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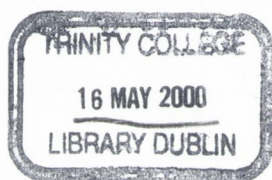
**Thinking About What Might Have Been:
Cognitive Processes in Counterfactual and Semifactual Thinking
about Controllable Events**

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2000



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Summary

In this thesis we present the results of ten experiments, involving approximately 2000 participants in total, designed to examine how people think about what might have been. We had two main aims. The first aim was to compare two different kinds of thinking about what might have been - counterfactual “if only” thinking about how things could have been different and semifactual “even if” thinking about how things could have turned out the same. The second aim was to examine how people think about controllable events (i.e., decisions). In our first series of experiments (Experiments 1-3) we examined people’s counterfactual “if only” thoughts about controllable events. These experiments showed that the psychological mutability of controllable events (decisions) can be mediated by the status of those events with respect to interpersonal social norms. Controllable events that deviate from social norms (because they are inappropriate or selfish) are more often the focus of people’s counterfactual thoughts than are controllable events that adhere to those social norms (as they are appropriate or selfless). The experiments demonstrated that the effects of interpersonal social normality are distinct from those of intrapersonal habitual normality. In addition the experiments showed that the effects of varying social normality can interact with those of temporal order (that the last event in a independent sequence is more mutable than earlier events) in determining the mutability of events. Selfish controllable events that occur in the last position in a scenario are more often the focus of people’s counterfactual thoughts than selfish controllable events that occur earlier.

In our second series of experiments (Experiments 4 & 5) we began our comparison of counterfactual and semifactual thinking. These experiments had the modest aim of establishing whether counterfactual thoughts are reliably evoked by “if only” sentence completion tasks and semifactual thoughts are reliably evoked by “even if” sentence completion tasks. The results of these experiments demonstrated that “if only” and “even if” thoughts focus on different imaginary alternatives to reality. People’s “if only” thoughts focus on imaginary alternatives that would undo an outcome (*counterfactual* alternatives), and their “even if” thoughts focus on imaginary alternatives that would not undo an outcome (*semifactual* alternatives).

Our third series of experiments (Experiments 6 & 7) compared the *consequences* of counterfactual and semifactual thinking. These experiments showed that counterfactual “if only” and semifactual “even if” thinking have different consequences for people’s causal judgments and their emotional reactions. Counterfactual thinking can increase how causal an antecedent event is seen as being in producing an outcome. Semifactual thinking instead has little effects on people’s causal judgments or else reduces the causality ascribed to an

antecedent events (depending on the salience of an available semifactual alternative). The experiments also showed that in situations in which counterfactual “if only” thinking increases emotions such as regret and feeling bad, semifactual “even if” thinking can reduce the same emotions. Counterfactual and semifactual thinking have different consequences.

In our final series of experiments (Experiments 8-10) we examined the factual events that people focus on in their counterfactual and semifactual thoughts. The experiments showed that people’s “if only” and their “even if” thoughts focus on controllable events more often than on uncontrollable events. However, people’s counterfactual and semifactual thoughts focus on different kinds of controllable events. Their “if only” thoughts focus on those with an explicit counterfactual alternative, whereas their semifactual “even if” thoughts focus on those with an explicit semifactual alternative, and on those with an explicit counterfactual alternative. The experiments also showed that people’s counterfactual “if only” thoughts focus on changing the later of two events in an independent sequence (the temporal order effect), their semifactual “even if” thoughts focus on changing both events. However, following the generation of both counterfactual and semifactual thoughts, people attribute more guilt and blame in producing an outcome to the second of two actors rather than to the first.

We suggest that the results of our experiments can be explained with reference to the mental models that underlie counterfactual and semifactual thinking. When people think counterfactually, we suggest that they keep in mind at least two explicit models - one representing the factual situation, in which an antecedent event and an outcome occurred, and one representing a counterfactual alternative situation, in which neither occurred. When they think semifactually, they instead keep in mind at least three explicit models - one representing the factual situation, one representing a counterfactual alternative situation, and a third explicit model representing a semifactual situation, in which the antecedent event did not occur, but the outcome did. We argue that the similarities and differences between these initial explicit models can account for the similarities and differences between counterfactual and semifactual thinking observed in our results.

Chapter 1 Introduction

Thinking about What Might Have Been

When people think back over the past, or about their current situation, they do not restrict themselves to thinking about events as they actually happened. People do not just think about what is or was, they also think about what might have been “if only” or “even if” something else had occurred. This kind of thinking falls under the general heading of *counterfactual* thinking, where counterfactual means, literally, contrary to the facts. In this thesis counterfactual thinking will be defined in a much more restricted sense, in which the term is used to refer to one specific kind of thinking about what might have been. In the more general sense of the word, a *counterfactual* statement is a conditional statement of the form “if p then q” in which the antecedent is known or expected to be false (Ginsberg, 1986). This definition encompasses both statements about the past or present, for example, “if I had studied harder, I would have passed the exam”, and also statements about the future, for example, “if I were to miss college tomorrow, I would fail the exam”, although these future statements are more often termed *prefactuals*, because they are counter only to an imagined experience (e.g., Gleicher et al., 1995). In this thesis we will restrict our discussion to how people think about what might have been (i.e., past or present outcomes), as opposed to how they think about what could be (i.e., future outcomes).

Thinking about what might have been generally involves changing or *mutating* something about past events. Typically the events are replaced by imaginary counterfactual *alternatives*, for example, in the statement mentioned above:

1. if I had studied harder, I would have passed the exam

replaces the factual situation:

2. I did not study hard enough and I failed the exam.

The “might-have-been” thoughts that people construct tend to be grounded in aspects of the factual situation, as the essence of this kind of thinking lies in the comparison between the imaginary alternatives that are constructed and the factual situation. Byrne (1997) suggested that the imaginary scenarios that people generate must be *recoverable* from the factual situation on which they are based. Because of this, when people think counterfactually, they only make minimal alterations to reality (Pollock, 1986), and these alterations tend to be made only to a restricted set of events, those that lie along what Kahneman and Tversky (1982) called the “joints of reality”. Some of the imaginary alternatives that people construct

may be more similar or *closer* to the factual situation than others (e.g., Kahneman & Varey, 1990; Lewis, 1973; Stalnaker, 1968), as they involve less or smaller alterations to reality.

Philosophers have drawn a distinction between two different kinds of thinking about what might have been (e.g., Barker, 1991; Goodman, 1973). The first is similar to that described in 1 above:

3. if only I had studied harder, I would have passed the exam

In statements such as this one, both the antecedent (studying harder) and the consequent (passing the exam) are false, given the factual situation described in 2 above. Goodman (1973) termed this kind of thinking “true counterfactual” thinking, and it is this we refer to in the remainder of this thesis when we talk about counterfactual thinking. Counterfactual thoughts often take the form of “if only” statements and act to undo an outcome by changing or mutating something about past events.

Here is an example of the second kind of thinking about what might have been, based on the same factual situation:

4. even if I had studied harder, I would have failed the exam

This is an example of what Goodman (1973) calls semifactual thinking. Semifactuals are similar to counterfactuals (and indeed are *counterfactual* in the general sense of the word) in that, given the factual situation on which they are based, their antecedents are false. They differ from counterfactuals in that their consequents remain true (i.e., I would have failed the exam, and, in fact, I did fail the exam). Semifactual thoughts often take the form of “even if” statements and act to show how a different set of antecedent events could have resulted in the same outcome as the factual situation.

In summary, counterfactual “if only” assertions depend on undoing an outcome in the context of a mutated antecedent event, whereas semifactual “even if” assertions depend on leaving an outcome unchanged in the context of a mutated antecedent event. Counterfactual and semifactual thinking are *logically* distinct, but are they *psychologically* distinct? Our main aim in this research was to compare people’s “if only” and “even if” thinking.

Why have researchers been so interested in people’s imaginary thinking? Thinking about what might have been appears to be a pervasive part of everyday cognition. There is increasing evidence to suggest that from children as young as two years old can think not only in terms of what actually happened, but also in terms of what almost happened (Harris, 1997). For example, when children were shown a toy car swerving to avoid a toy deer that lay in its path, in their descriptions of the events many of them suggested that the car had

“almost” run into the deer. By four years old children can also answer questions regarding how events were caused, and how they could have been prevented, with reference to imaginary alternative events (Harris, German & Mills, 1996). However, although these studies have demonstrated that people are able to think counterfactually across their lifespans, there is also evidence to suggest that people’s ability to reason logically and reach valid conclusions on the basis of such imaginary alternatives does not develop until they reach their teenage years (e.g., Markovits & Vachon, 1989; Wing & Scholnik, 1986).

The ability to think about what might have been has also been shown to be prevalent across a range of different cultures. Early experiments by Bloom (1981) suggested that Chinese speakers, whose language does not contain a subjunctive mood (e.g., “if I *had* done X, then Y *would have* happened), had more difficulty in expressing and comprehending counterfactual statements than did English speakers. However, later experiments that used materials in more idiomatic Chinese, showed that Chinese speakers were just as capable as English speakers of expressing and comprehending counterfactual assertions (e.g., Au, 1983, 1984; Liu, 1985). Since then, thinking about what might have been has been studied in a wide range of languages and cultures (e.g., Byrne, Segura, Culhane, Tasso & Berrocal, in press; Giroto, Legrenzi & Rizzo, 1991; Teigen, 1995). Roese and Olson (1995a) suggest that language and culture can affect the content of people’s “might-have-beens” and the situations in which they are applied, but that anyone with an adequate level of education can generate and reason about hypothetical situations (see also Markus & Kitayama, 1991).

Further evidence for the importance of thinking about what might have been comes from case studies of those people who, as the result of brain damage, do not seem to generate counterfactual thoughts at all. The brain mechanisms underlying thinking about what might have been are only beginning to be elucidated. However, in a review paper of research into the psychological functions of the dorsolateral prefrontal cortex, Knight and Grabowecky (1995) suggested that mental simulation, of the kind engaged in when people think about what might have been, is selectively impaired following damage to this region of the brain. In reporting a case study they noted that their patient (W.R.) displayed, “a complete absence of counterfactual expressions. In particular, W.R. expressed no counterfactual emotions. He seemed unable to feel grief or regret, nor was he bothered by their absence...” (p 1367). It may be that some of the wide range of social and judgmental difficulties experienced by such patients (e.g., Damasio, 1994; Shallice, 1988), are a result of their inability to imagine how things might have been otherwise.

In the rest of this chapter we review the psychological literature that exists on thinking about what might have been. The majority of this research has focused on examining people's counterfactual "if only" thoughts about how things might have turned out differently, rather than on their semifactual "even if" thoughts about how things might have turned out the same (for a notable exception, see Branscombe, Owen, Gartska & Coleman, 1996). In general, this review will therefore be concerned with the psychological literature on counterfactual "if only" thinking.

The review falls into several different sections, within each of which we will try to answer a particular question about the nature of counterfactual thinking. These questions are, in order:

1. When do people think about what might have been?
2. What do people think about in their counterfactual thoughts?
3. How do people mutate events?
4. What are the consequences of thinking about what might have been?
5. What theories have been put forward to explain this body of research?

We will attempt to provide answers to all of these questions, and then we will discuss the aims and objectives of the research reported in this thesis.

1. When do people generate "if only" thoughts? The antecedents of counterfactual thinking

Studies of people's reactions to traumatic life events show that people are often driven to mentally undo such events (e.g., Davis, Lehman, Wortman, Silver & Thompson, 1995; Davis, Lehman, Silver, Wortman & Ellard, 1996). Davis et al. (1995) interviewed people who had lost a child or partner in a motor vehicle accident between 4 to 7 years prior to their study. They found that 56% of those interviewed about the accident spontaneously reported mentally undoing the event at some stage in the past, and that 48% of those interviewed reported that they were still thinking "if only..." at the time of the study. This finding also generalises to people's responses to other traumatic events, for example, to parents who had lost a child to Sudden Infant Death Syndrome (SIDS; Davis et al., 1995).

What is it about such events that motivates people to generate counterfactual "if only" thoughts? In the traumatic events described above the outcomes were both very unexpected and very negative (Davis et al., 1995). Both of these factors may be important antecedents of counterfactual thinking. In order to study the antecedents of counterfactual thinking

experimentally, researchers have had to examine people's *spontaneous* thoughts (e.g., Markman, Gavanski, Sherman & McMullen, 1993). Asking people specifically to undo an outcome can tell researchers about what events people mutate and about how they mutate those events, but in order to discover what *motivates* counterfactual thinking, researchers must explore the counterfactuals that people naturally generate.

Disconfirmed Expectancies

Several researchers have suggested that disconfirmed expectancies play an important role in motivating counterfactual thinking (e.g., Kahneman & Miller, 1986; Roese & Olson, 1995a). Unexpected outcomes have also been shown to trigger more attributional thinking than expected outcomes (e.g., Hastie, 1984), and Roese and Olson (1995a) have suggested that increased causal and counterfactual thinking may occur following unexpected outcomes because, "expectancies that are disconfirmed signal to the organism that the environment was not understood, not 'mastered'. Thus enhanced processing following disconfirmed expectancies in order to regain mastery has obvious survival value." (p 18).

Following on from this, a number of different researchers have examined the effects of the expectedness of an outcome on people's spontaneous counterfactual thinking. Klauer and Migulla (1995) presented their participants with scenarios in which an outcome was either expected by the protagonist (i.e., similar to previous outcomes), or unexpected (i.e., different from previous outcomes). For example, one of their scenarios described a tennis player who either lost to an opponent that he had frequently lost to before (expected outcome), or lost to an opponent that he had frequently beaten before (unexpected outcome). They asked participants to imagine and write down the thoughts of the protagonist as he mentally reviewed the day. Surprisingly, Klauer and Migulla (1995) found no difference in the number of counterfactual thoughts produced by participants following expected and unexpected outcomes.

However, experiments conducted by Sanna and Turley (1996) did show that people produce more spontaneous counterfactual thoughts following unexpected outcomes than expected outcomes. They presented participants with a scenario that described a student who failed an exam when they had either always or never done poorly in exams before. They found that when the outcome was described as unexpected by the protagonist participants generated more spontaneous counterfactuals than if it was described as expected.

Why is there a discrepancy between the results of the experiment reported by Klauer and Migulla (1995) and those reported by Sanna and Turley (1996)? One possibility is that

the student participants taking part in the studies found the scenario used by Sanna and Turley (1996), which described an exam scenario with which they would be familiar, more involving than those used by Klauer and Migulla (1995), which concerned outcomes experienced by professional tennis players and famous violinists. This idea (that people will generate more spontaneous counterfactuals following unexpected outcomes provided that they find those outcomes involving) is further supported by a second experiment reported by Sanna and Turley (1996). In this experiment they examined spontaneous counterfactual thinking in participants who had actually just received their marks in a university exam. Sanna and Turley (1996) found that participants whose exam performance was unexpected (based on a measure of expected performance participants had completed several days before the exam in question) generated more counterfactual thoughts than participants who performed as they had expected to. In real-life settings people generate more counterfactual thoughts following unexpected outcomes. Disconfirmed expectancies can evoke counterfactual thinking.

Negative Outcomes

The real-life outcomes studied by Davis et al. (1995) were not just unexpected, they were also very negative. A large number of researchers have suggested that counterfactual “if only” thinking is more likely to follow negative outcomes than positive ones (e.g., Boninger, Gleicher & Strathman, 1994; Gavanski & Wells, 1989; Gleicher et al., 1990; Johnson, 1986; Kahneman & Miller, 1986; Landman, 1987). However, early studies by Roese and Olson (1993a, 1993b) did not support the idea that people generate more counterfactual thoughts following negative outcomes. For example, Roese and Olson (1993a) presented their participants with a scenario that concerned the exam performance of a girl called Andrea who either passed her exam with a very good mark (positive outcome) or failed her exam (negative outcome). They asked participants to “list any things that you can think of to change Andrea’s performance on her exam”. They found that participants listed just as many counterfactual thoughts following positive outcomes as following negative outcomes. However, these studies did not employ a measure of spontaneous counterfactual thinking, but instead directly asked participants how the outcome could be undone, and it may be that “asking people directly obscures naturally occurring propensities to react with greater or fewer spontaneous counterfactual thoughts.” (Roese & Olson, 1995a; p 20). What about the results of studies that have looked at spontaneous “if only” thinking following positive and negative outcomes?

Markman et al. (1993) recorded participants' spontaneous thoughts in response to a computer based card game (blackjack) in which the outcome was framed as either positive or negative. They found that the number of spontaneous counterfactuals produced by participants was not affected by whether the outcome was framed as a loss (negative) or as a gain (positive). However, there are two possible reasons why Markman et al. may not have shown a difference between the number of counterfactuals produced in each condition. Firstly, the actual outcome described in both the positive and negative outcome conditions was the same (a net gain of \$5), what differed was the way in which the outcome was described. Secondly, the outcome that each participant experienced (drawing with the dealer) was unusual and unexpected in the context of the game that they were playing (blackjack). It may be that "the uniform unexpectedness of both positive and negative outcomes might have so powerfully stimulated counterfactual generation that further variation as a function of outcome valence might have been unlikely." (Roese & Olson, 1995a; p 20).

Other studies that have independently manipulated both the valence and the expectedness of the outcome have shown that people do generate more spontaneous counterfactual thoughts following negative outcomes (e.g., Klauer & Migulla, 1995; Sanna & Turley, 1996). For example in Sanna and Turley's first experiment described earlier they varied whether the protagonist of the scenario was described as passing the exam (a positive outcome) or failing it (a negative outcome) and whether the outcome (passing or failing) was expected or unexpected. Their experiment showed that outcome valence has an independent effect on the number of counterfactual "if only" thoughts that people produce (see also Klauer & Migulla, 1995). People generate more spontaneous counterfactual thoughts following negative outcomes than following positive outcomes. Negative events can elicit counterfactual thinking. What other factors may lead people to be more likely to generate counterfactual thoughts?

Individual Differences

Particular people may be more likely to generate counterfactual "if only" thoughts than others. In a thought listing task in response to a wide range of scenarios, Kasimatis and Wells (1993; cited in Kasimatis & Wells, 1995) found, firstly, that people differ reliably in the number of counterfactuals that they produce (i.e., those that produce a lot of counterfactuals to one scenario will produce a lot to other scenarios, whereas those that produce few to one scenario will also produce few to other scenarios), and secondly, that this is consistent over time (i.e., that those who produced more counterfactuals to an earlier

set of scenarios, also produced more counterfactuals to a second set of scenarios presented several weeks later).

It has been suggested that a propensity to produce counterfactual thoughts may be related to a range of different personality characteristics. However, Kasimatis and her colleagues (e.g., Kasimatis & Sterling, 1994; Kasimatis & Wells, 1993; cited in Kasimatis & Wells, 1995) found only low correlations between the propensity to produce counterfactual thoughts and a range of personality measures including locus of control, need for cognition, optimism, self-esteem, and rumination. This led Kasimatis and Wells (1995) to conclude that “the observed propensity for some people to engage in counterfactual thinking in response to negative events is a unique individual difference characteristic.” (p 98). However, there may be other individual differences in counterfactual thinking that can be related to personality characteristics, for example, Roese and Olson (1993b) showed that people with high self-esteem differ from those with low self-esteem in the kind of counterfactual thoughts that they produce, but not in their propensity to produce counterfactual thoughts.

Closeness

A fourth variable that has been suggested to influence counterfactual generation is the perceived closeness of an outcome to an alternative outcome. A close counterfactual “does not invoke an alternative possible world, but states a fact about the history of this world - namely, that things were close to turning out differently than they did” (Kahneman & Varey, 1990, p 1101). Kahneman and Varey (1990) suggested that we judge an outcome as being “close” to occurring to the degree that the causal system involved in producing the factual outcome had a *propensity* to produce the alternative outcome. They defined a propensity as “what is learned about the probability of an outcome from observing events or hearing about them” (Kahneman & Varey, 1990, p 1104). People will judge that an alternative outcome *almost* occurred if event cues suggest, during the causal episode under consideration, that the alternative outcome had a high probability of occurring. It is important to note that, in Kahneman and Varey’s discussion of closeness, propensities are not the same things as dispositions. Dispositions refer to the probabilities of particular outcomes *before* the start of a causal episode, whereas propensities refer to those probabilities as judged from event cues *during* that causal episode. Imagine, for example, a race in which there are three runners. The first is in the lead, the second is known to have a strong finish, and the third has been progressively catching up with the leader. If the second and third runners lose by the same

amount (i.e., the second runner does not show the expected strong finish and the third does not quite catch up) it seems more appropriate to say that the third runner almost won the race, as her performance during the race suggested a strong propensity to catch up with the winner, than it is to say that the second runner almost won the race, as, although she had a strong prior disposition to catch up, she did not display any sign of this during the race.

Although it has been suggested that such close counterfactuals do motivate people to generate counterfactual “if only” thoughts (e.g., Roese & Olson, 1995a), it is difficult to separate closeness as defined in terms of propensities (Kahneman & Varey, 1990) from the expectedness of the outcome. If an alternative outcome has at some stage appeared to be highly probable (whether from events cues or dispositions), the factual outcome, when it occurs, must to some degree be unexpected.

Research has shown that spontaneous counterfactual “if only” thinking is evoked by a number of different situational factors, for example, if an outcome is negative or unexpected. Certain people have also been shown to be more prone to counterfactual thinking than others and the kind of counterfactuals that they generate may be affected by other personality characteristics that they possess. It is important to remember that counterfactual thinking may also occur outside of these situations as in many situations people are actually asked to generate counterfactuals or have counterfactuals suggested to them. Arguments from counterfactual premises form the basis of debate in many situations where actual experiments are not possible, like law, for example, when a lawyer suggests that “if the driver of the car had not been speeding then the accident would not have occurred” (e.g., Hart & Honore, 1959), and history and politics, for example, the claim that “if Chamberlain had not adopted a policy of appeasement, the Second World War would not have occurred.” (e.g., Ferguson, 1997; Tetlock & Belkin, 1996). People may also be actively encouraged to think counterfactually, for example, in the advertisements for pension schemes which suggest that “you would be better off by £10,000 today, if you had started putting £10 a week into our scheme 10 years ago.”, or discouraged from generating counterfactuals, for example, when those grieving are encouraged not to dwell on the past (e.g., Davis & Lehman, 1995). We know that people generate counterfactuals in their everyday lives. The next question that we need to answer is what people focus on in these “if only” thoughts, that is, what events do people think about?

2. What do people focus on in their “if only” thoughts? Constraints on counterfactual thinking

There are a potentially infinite number of imaginary alternatives that can be constructed to any factual situation. However, people are more likely to consider some of these alternatives than others. Philosophers have long been concerned with trying to understand why some imaginary alternatives seem closer to reality than others and why some counterfactual alternatives seem more natural than others (e.g., Hofstadter, 1979; Lewis, 1973). Take the example used by Hofstadter (1979; p. 641):

Driving down a country road you run into a swarm of bees. You don't just duly take note of it: the whole situation is immediately placed in perspective by a swarm of “replays” that crowd into your mind. Typically, you think, “Sure am lucky that my window wasn't open!” - or worse, the reverse: “Too bad my window wasn't closed!” “Lucky I wasn't on my bike!” “Too bad I didn't come along five seconds earlier.” Strange but possible replays: “If that had been a deer I could have been killed!” “I bet those bees would rather have had a collision with a rosebush.” Even stranger replays: “Too bad those bees weren't dollar bills!” “Lucky those bees weren't made of cement!” “Too bad it wasn't just one bee instead of a swarm,” “Lucky I wasn't the swarm instead of being me.” What slips naturally and what doesn't - and why?

What is it that differentiates the more natural counterfactuals here (e.g., “Sure am lucky that my window wasn't open”) from those that seem unnatural or even downright bizarre (e.g., “Lucky those bees weren't made of cement”)? It has been suggested that the more natural counterfactual thoughts are those that contain mutations that occur at the “joints of reality” (Kahneman & Tversky, 1982) or where reality is at its most “slippable” (Hofstadter, 1979). Byrne (1997) has suggested that these joints of reality may be guided by the core categories of mental life as identified by G. Miller and Johnson-Laird (1976), for example, space, time, causality and intentionality.

The study of why people focus on some kinds of factual events more often than on others has also been of interest to psychologists (e.g., Girotto et al., 1991; Kahneman & Tversky, 1982; Kahneman & Miller, 1986; Miller & Gunasegaram, 1990; Wells, Taylor & Turtle, 1987). Hofstadter (1979) suggested that the “observation of what kinds of things slip, versus what kinds don't, offers a good window on the unconscious mind.” (p 643) and Byrne (1997) has suggested that the counterfactual mutations that people make may be informative about the structure of the mental representations that people hold, not only of imaginary alternatives, but also of the factual situation itself. The study of what people come to change in their counterfactual “if only” thoughts has fallen under two main headings:

mutability effects and counterfactual constraints (e.g., Kahneman & Miller, 1986; Seelau, Seelau, Wells & Windschitl, 1995). However, in reality these are two sides of the same coin, concerning as they do what kinds of events people mutate (mutability effects) and what kinds of events people do not mutate (counterfactual constraints).

In their analysis of what people are more likely to imagine when they think of alternatives to the past, Seelau et al. (1995) defined a counterfactual constraint as “a mechanism that precludes entire sets of events from consideration for mutation, even though the alteration of these events would undo the outcome... . Counterfactual constraints serve the purpose of restricting all possible alternatives to a practical subset.” (p. 60). Seelau et al. group constraints on counterfactual thinking into three main categories: natural law constraints, availability constraints, and purpose constraints.

Natural law constraints depend upon people’s understanding of natural laws, although this is not necessarily in line with the laws put forward by formal science. It is unusual for people to consider mutating pervasive features of the natural world such as the presence of oxygen in the air (e.g., “if only the air had been 100% nitrogen, then the fire would have gone out.”), unless their presence in a situation is unusual or unexpected, for example, in a manufacturing process where oxygen is necessarily excluded.

The second category that Seelau et al. distinguish is that of *availability constraints*. These constraints, they argue, depend on the relative ease with which certain events in a scenario come to a person’s mind. They suggest that people’s tendency to mutate, for example, exceptional events as opposed to normal events (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982) or controllable events as opposed to uncontrollable events (e.g., Girotto et al., 1991) arises because these exceptional and controllable events come more readily to mind “whether as a function of salience, recency, familiarity, imaginability, or some related property.” (p 61). Seelau et al.’s conception of availability differs from that proposed by Kahneman and Miller (1986). In their *norm theory*, Kahneman and Miller suggested that events for which there is an easily imaginable or available alternative will be more mutable than events for which no such alternative is available. It is the availability of alternatives to an event, rather than the availability of the event itself, that determines whether an event will be the subject of people’s counterfactual thoughts.

The third category of constraints that Seelau et al. (1995) proposed were *purpose constraints*. They suggested that the intent with which a person engages in counterfactual thinking can constrain both the counterfactual thoughts that they generate and the thoughts that they publicly express. In attempting to console an accident victim, people may express

counterfactuals about how things could have been worse (e.g., if you hadn't been wearing your seat belt, your injuries could have been much worse; a *downward counterfactual*), rather than counterfactuals about how things could have been better (e.g., if you had been driving slower, the accident might never have happened; an *upward counterfactual*). If, however, a person's aim was to avoid accidents in future, they might instead focus on how things could have been better (i.e., on how the accident could have been avoided) rather than on how things could have been worse.

Seelau et al.'s categories are useful in that they provide one way in which we can think about counterfactual constraints. However, whether there are indeed such clear boundaries between these three types of constraints, and whether they are independent of one another, is another question. As we will discuss in a later section, Girotto et al. (1991) showed that people are more likely to change events that were under their control rather than events outside of their control. It is possible that the *natural law constraints* that Seelau et al. (1995) proposed arise out of the same mechanism that results in the controllability effect. People may not mutate the basic laws of science and nature because these laws, such as gravity and the ongoing passage of time, are totally outside of their control. Although their view of counterfactual constraints may be flawed, Seelau et al. do raise some interesting points. In highlighting the idea that the purpose with which people engage in counterfactual thinking may effect what they come to mutate, they have mentioned aspects of counterfactual thinking that are often ignored, particularly the distinction between the counterfactuals that people generate and those that they express in any given situation.

In the next sections we will discuss the range of different constraints or mutability effects that have been studied by psychologists interested in counterfactual thinking. We will review in turn the evidence for, the exceptionality effect (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982), the controllability effect (e.g., Girotto et al., 1991), the focus effect (e.g., Legrenzi, Girotto & Johnson-Laird, 1993), the action effect (e.g., Byrne & McEleney, 1997; Gilovich & Medvec, 1994; Landman, 1987), the temporal order effect (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990), and the causal order effect (e.g., Kahneman & Miller, 1986; Wells et al., 1987).

The Exceptionality Effect

Consider the following scenario as used by Kahneman and Tversky (1982):

Mr. Jones was 47 years old, the father of three and a successful banking executive. His wife

had been ill at home for several months.

On the day of the accident, Mr. Jones left the office at the regular time. He sometimes left early to take care of home chores at his wife's request, but this was not necessary on that day. Mr. Jones did not drive home by his regular route. The day was exceptionally clear and Mr. Jones told friends at the office that he would drive along the shore to enjoy the view.

The accident occurred at a major intersection. The light turned amber as Mr. Jones approached. Witnesses noticed that he braked hard to stop at the crossing although he could easily have gone through. His family recognised this as a common occurrence in Mr. Jones' driving. As he began to cross after the light changed, a light truck charged into the intersection at top speed, and rammed Mr. Jones' car from the left. Mr. Jones was killed instantly. As commonly happens in such situations, the Jones family and their friends often thought and often said "if only..." during the days that followed the accident. How did they continue this thought ?

Kahneman and Tversky (1982) gave this version of the scenario (the "route" version) to one group of their participants. For a second group of participants the italicised paragraph instead read as follows (the "time" version):

On the day of the accident, Mr. Jones left the office earlier than usual, to attend to some household chores at his wife's request. He drove home along his regular route. Mr Jones occasionally chose to drive along the shore to enjoy the view on exceptionally clear days, but that day was just average.

In the first version of this scenario the protagonist leaves the office at his usual time (normal), but takes an unusual route home (exceptional). In the second version, the time at which the protagonist leaves the office is exceptional, whereas the route he took was normal. Kahneman and Tversky found that participants' first responses focused on undoing whichever event was described as exceptional for the protagonist, for example, in the route version of the scenario participants were more likely to respond "if only Mr. Jones had taken his normal route home", whereas in the time version of the scenario they responded with "if only Mr. Jones had left work at his usual time". Kahneman and Tversky (1982) concluded, firstly, that people focus on exceptional rather than on normal events in their counterfactual "if only" thoughts, and, secondly, that people change these events to become more normal (a *downhill* change) as opposed to more exceptional (an *uphill* change), or to something as exceptional as the factual event (a *horizontal* change).

The interpretation of these results proposed by Kahneman and Tversky (1982) and Kahneman and Miller (1986) has been criticised. Gavanski and Wells (1989) suggested that the fundamental rule governing such mental simulations relates to the correspondence between outcomes and prior events. Specifically, they suggested that: "People will change

events in the direction of normality to undo exceptional outcomes, but change events in the direction of exceptionality to undo normal outcomes.” (p 314) - what they referred to as *norm correspondence*. They suggested that the conclusion drawn by Kahneman and his colleagues (Kahneman & Miller, 1986; Kahneman & Tversky, 1982), that the fundamental rule governing mental simulation is that people tend to change exceptional events to their normal values, applies to only one situation - that in which the outcome is exceptional.

In support of their argument, Gavanski and Wells (1989) carried out an experiment in which they presented their participants with scenarios ending in both exceptional and normal outcomes. The scenario they used was about a girl called Andrea preparing for an exam. She was described as either a good student or a poor student. They varied whether the events leading up to the outcome of the scenario were exceptional (e.g., “Andrea spent Thursday evening doing household chores - something she rarely did”) or normal (e.g., “Andrea was very nervous, as she always was before important exams”). They also varied whether the outcome was normal or exceptional for the protagonist (e.g., passing the exam was exceptional if Andrea was described as a poor student, but normal if she was described as a good student). The results of the experiment showed that when participants read about an exceptional outcome (Andrea passed or failed unusually), they focused on changing exceptional antecedent events to become more normal. However, when participants read about a normal outcome (Andrea passed or failed as usual), they focused on changing both exceptional and normal antecedent events to become more exceptional. Overall, Gavanski and Wells found that exceptional antecedent events were more mutable than normal antecedent events. The results confirmed their hypothesis that people would mutate antecedent events to become more normal in order to undo exceptional outcomes, and would mutate antecedent events to become more exceptional in order to undo normal outcomes. It does not, therefore, seem that, as Kahneman and Tversky (1982) had suggested, people have a general preference to change events in the direction of greater normality (a *downhill* change).

However, the experiments by Kahneman and Tversky (1982) and Gavanski and Wells (1989) both showed that people focus on exceptional antecedent events more often than on normal antecedent events in their counterfactual thoughts. Gavanski and Wells explain this by pointing out that exceptional events can be changed both to become more normal and to become more exceptional, and hence can be changed to undo both exceptional and normal outcomes. Normal events can be changed to become more exceptional, but not to become more normal, and so they are changed only to undo normal outcomes.

The Controllability Effect

A second constraint on counterfactual thinking that has been studied is what is known as the controllability effect. Girotto et al. (1991) showed that people are more likely to focus on controllable events rather than on uncontrollable events in their counterfactual “if only” thoughts. They presented their participants with a scenario about a man who was delayed on his way home from work by four events. Three of these events were outside of his control (e.g., a flock of sheep crossing the road), and one was within his control as it was the result of an intentional decision (going to a bar and drinking a beer). When the protagonist arrived home, he found that his wife had had a heart attack and that he was too late to save her life. Participants were then asked to generate “if only” thoughts on behalf of the protagonist. Girotto et al. found that their participants mentioned the controllable event more often as a first response and earlier overall than any of the other three events in the scenario (e.g., “if only I had not stopped at the bar, my wife would still be alive”). Girotto et al. additionally showed that people undo controllable events more often than uncontrollable events regardless of the position of the events in a causal chain (see Wells et al., 1987), and of whether the events were described as exceptional or normal for the protagonist of the scenario (e.g., Kahneman & Tversky, 1982). People undo controllable rather than uncontrollable events, regardless of whether the uncontrollable events were external to the protagonist (e.g., a flock of sheep crossing the road) or were actions of the protagonist that were constrained by the circumstances (e.g., having to stop the car due to an asthma attack).

Girotto et al.’s experiments appear to demonstrate a robust effect. However, in all three of their experiments the controllable event they used remained the same, namely a decision to enter a bar and drink a beer. In fact, it is possible that there was something else about this event, other than its controllability, that made it particularly mutable (see McCloy & Byrne, in press, and Chapter 2). In order to get around this problem, Markman, Gavanski, Sherman & McMullen (1995) designed an experiment in which they could vary which event was controllable and which event was uncontrollable. They presented their participants with a computer generated “wheel of fortune” game that featured two different wheels. Participants were split into two groups, one group were allowed to choose which wheel determined their prizes (the “wheel choice” condition) and the second group were assigned a wheel, but were allowed to choose the starting point of that wheel and how quickly it spun (the “spin choice” condition). The outcome of the game was the same for all participants. Markman et al. found that participants tended to focus on whichever aspect of the game had been under their control in their counterfactual thoughts - those in the “wheel

choice” condition mentioned their choice of wheel more often as a first response, and those in the “spin choice” condition mentioned the starting point of their wheel and how fast it spun. Even when the nature of the events is controlled for, people focus on controllable events more often than uncontrollable events in their counterfactual thoughts.

This result is further supported by accounts of real-life counterfactuals following negative life events. Davis et al. (1995) found that the people they interviewed overwhelmingly focused on their own controllable actions in their counterfactual “if only” thoughts as opposed to events outside of their control. For example, in their motor vehicle accident study, several of those interviewed had lost loved ones in accidents that had also involved an intoxicated driver. Although many of these participants mutated things that they themselves had done, none of them reported mentally undoing the presence of the intoxicated driver at the scene. Mandel and Lehman (1996) proposed that this effect occurs because, when people engage in counterfactual thinking, they are in effect looking for ways in which they personally could have prevented a particular negative outcome from occurring.

Focus Effects

Another constraint on the counterfactuals that people generate is what is called the *focus rule*, that is that events “are commonly altered by changing some property of the main object of concern or attention.” (Kahneman & Tversky, 1982, p. 206). To demonstrate this effect Kahneman and Tversky presented participants with the Mr. Jones scenario described earlier, to which they added the following information:

It was later ascertained that the truck was driven by a teenage boy, named Tom Searler. Tom’s father had just found him at home under the influence of drugs. This was a common occurrence, as Tom used drugs heavily. There had been a quarrel, during which Tom grabbed the keys that were lying on the living room table and drove off blindly. He was severely injured in the accident.

Participants either completed “if only” sentences on behalf of Mr. Jones’ relatives, or on behalf of Tom’s relatives. The majority of those who generated “if only” thoughts on behalf of Tom’s relatives undid the accident by removing Tom from the scene of the accident, whereas only a small proportion of those generating “if only” thoughts on behalf of Mr. Jones’ relatives mentioned Tom, with the majority mutating Mr. Jones’ actions, as in Kahneman and Tversky’s previous experiment. Kahneman and Tversky showed that, by changing people’s focus of mutation within a scenario, it is possible to change what they

mutate when they think counterfactually (see also Kahneman & Miller, 1986). This effect generalises to blame assignment. Macrae & Milne (1992) found that participants' judgments of blame based on a food poisoning scenario were influenced by whether they were asked to think about the scenario from the perspective of the restaurant owner or that of the person who developed food poisoning.

Legrenzi et al. (1993) extended the idea of focus to suggest that people will restrict their counterfactual "if only" thoughts to events that are explicit in their mental representations of a factual situation. This, they argued, is part of a general tendency that people have to focus on explicit information in a wide range of cognitive tasks, e.g., deductive reasoning and decision making. This idea forms an important part of one theory of counterfactual thinking - that based on the *mental models* theory (e.g., Byrne, 1997; Johnson-Laird & Byrne, 1991) - which we will describe later. One corollary of the focus effect is that, when people are asked to think counterfactually about a scenario, they should be more likely to focus on mutations to the events of the scenario, rather than adding in new events from outside the scenario that are not alternatives to any of the events that were explicitly mentioned. For example, Girotto et al. (1991) found that 70% of participants focused on events that had been explicitly mentioned in the scenario that they used. People rarely considered counterfactual alternatives, for example, an ambulance had drawn up outside of the protagonists' house just in time to save his wife, that were not alternatives to any of the events that had been mentioned in the scenario. However, this effect may not generalise to all situations. For example, when the outcome of a scenario is phrased as a failure, people's counterfactual mutations tend toward adding in new elements in order to undo the outcome, and towards upward counterfactuals about how things could have turned out better than they did (e.g., Roese & Olson, 1993a).

This research on focusing in counterfactual "if only" thinking suggests that the information that people are presented with, and the point of view that they adopt in thinking about that information, can affect the mutations they make in order to undo an outcome. This may explain why, in the motor vehicle accident study reported by Davis et al. (1995), people who had lost a loved one in a car accident focused on changing their own, or the deceased's behaviour, for which they had a lot of information, as opposed of that of the other driver involved.

The Action Effect

Consider the following scenario:

Mr. Paul owns shares in company A. During the past year, he considered switching to stock in company B, but he decided against it. He now finds out that he would have been better off by \$1,200 if he had switched to the stock of company B. Mr. George owned shares in company B. During the past year he switched to stock in company A. He now finds out that he would have been better off by \$1,200 if he had kept his stock in company B. Who feels greater regret?

Kahneman and Tversky (1982) found that 92% of participants given this scenario believed that the individual who acted (Mr. George) would feel more regret. This tendency, for emotional reactions to be amplified if an outcome results from an action rather than an inaction, is what is known as the *action effect* in counterfactual thinking. This effect occurs for both negative outcomes (where the relevant emotion is often regret) and positive outcomes (where the relevant emotion is often elation), although the effect is not as strong for positive outcomes and tends to occur only when the counterfactual alternative outcome (in this case, being better off by \$1,200) is made explicit (e.g., Byrne & McEleney, 1999; Gleicher et al., 1990; Landman, 1987). The action effect has also been shown to be independent of the order in which the action and inaction are presented in the scenario (e.g., Gleicher et al., 1990).

Gilovich and Medvec (1994) suggested that there is a temporal pattern in people's experience of regret. They presented participants with the following scenario:

Dave and Jim do not know each other, but both are enrolled at the same elite East Coast University. Both are only moderately satisfied with where they are and both are considering transferring to another prestigious school. Each agonizes over his decision, going back and forth between thinking he is going to stay and thinking he will leave. They ultimately make different decisions: Dave opts to stay where he is and Jim decides to transfer. Suppose their decisions turn out badly for both of them: Dave still doesn't like it where he is and wishes he had transferred, and Jim doesn't like his new environment and wishes he had stayed.

When participants were asked who they thought would regret his decision more on learning it was a mistake, the majority thought that the individual who acted (Jim) would feel more regret. However, when they were asked who would regret his decision more in the long run, the majority instead thought that the individual who did not act (Dave) would feel more regret. This also holds for people's real-life regrets. People regret their actions in the short term and their failures to act (inactions) in the long term (Gilovich and Medvec, 1994).

How robust are these effects? Byrne and McEleney (1997) presented their

participants with versions of the above scenario that resulted in a positive outcome for both of the protagonists. Their participants judged that the person who acted would feel better about his decision in the short term, a replication of the action effect for good outcomes. However, they also thought that the person who acted would feel better about his decision in the long run. There is no reversal from an action to an inaction effect over time for good outcomes.

Byrne and McEleney (1999) argued that there is an asymmetry between the amount of information that people have in the short and in the long term about the consequences of actions and inactions. They presented participants with scenarios in which the consequences, both in the short term and in the long term, were known for both actions and inactions. Byrne and McEleney found that, when the counterfactual consequences are specified for both the actor and the non-actor, people regret their actions more than their inactions in both the short and the long term.

What can we conclude about the action effect? Under a wide range of circumstances, people's emotional reactions to an outcome are amplified more if it is the result of an action than the result of an inaction. This occurs whether outcomes are looked at from a short or a long term perspective, and whether outcomes were positive or negative. Only when the outcome of a situation is negative and people do not have equal information about the consequences of both actions and inactions, is there a reversal to an inaction effect in the long term. However, this final situation may be similar to many of the real-life situations in which people generate counterfactuals, as the results from scenarios of this type mirror the pattern observed in studies of real-life regrets (e.g., Gilovich & Medvec, 1994; but see Savitsky, Medvec & Gilovich, 1997).

There is a rich and varied literature on the action effect in counterfactual thinking. This literature is often held up as showing that actions are more psychologically mutable than inactions. Researchers have often assumed that, as emotions such as guilt and regret are amplified more following actions than inactions (the *emotional amplification* effect; Kahneman & Miller, 1986), actions must be more mutable than inactions (e.g., Byrne & McEleney, 1997). However, when N'Gbala and Branscombe (1997) had participants generate "if only" thoughts following the Mr. Paul and Mr. George scenario (Kahneman & Tversky, 1982), they found no difference in the proportion of people who focused on changing the action, e.g., "if only George had not switched", and those who focused on changing the inaction, e.g., "if only Paul had decided to switch"¹. So, although researchers

¹ Byrne & McEleney (1999) report an action effect in the focus of people's "if only" responses in the short term, but not in the long term.

have demonstrated an interesting effect in people's emotional reactions, more work needs to be carried out in order to elucidate what the link is between these emotional reactions and the events that people come to mutate in their counterfactual "if only" thoughts.

The Temporal Order Effect

Another prediction that Kahneman and Miller (1986) made was that later events in an independent (i.e., non-causal) sequence would be more mutable than those that precede them in time. Miller and Gunasegaram (1990) tested this proposition by presenting their participants with the following scenario:

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

When asked which of two alternatives came to mind most readily, Jones tossing a tail or Cooper tossing a head, 89% of participants chose the option that mutated the toss of the person who acted second (Cooper). In addition the majority of participants indicated that they thought that Cooper would experience more guilt and would be blamed more by Jones. Miller and Gunasegaram argued that these results demonstrate that later events in a temporal sequence are more mutable than earlier events.

Miller and Gunasegaram also showed that this effect generalises beyond scenario studies. They gave participants an article to study that they would be tested on later. One group of participants were told that the test questions had already been set before they started studying (student second), and another group were told that the test questions would be set after they finished studying (student first). Of those participants who were told that they had failed the experimental task (selecting the same exam questions from a list as the "teacher"), those in the "student first" condition rated the questions selected by the teacher as less fair and reasonable than those in the "student second" condition. Miller and Gunasegaram suggested that this occurred because, in the "student first" condition it is the actions of the teacher that are mutable as they happen last (e.g., "if only the teacher had picked the same questions as me"), whereas in the "student second" condition, the participant's own actions are mutable as they happen last (e.g., "if only I had picked the same questions as the teacher").

This temporal order effect seems to be fairly robust. It occurs for good and bad outcomes and it occurs in scenarios that contain both explicit (e.g., heads and not heads) and implicit (e.g., heads and tails) negations (Byrne et al., in press). Why does the temporal order of events affect mutability? One suggestion is that later events are more mutable because they are more recent in memory. However, Byrne et al. found that the temporality effect still occurs when the second event to occur in time is the first event to be mentioned in the scenario (e.g., Cooper tosses a tail; before this Jones had tossed a head), showing that it is the order of events as they occur in the world, not their recency of mention, that is important. A second suggestion is that the temporal order effect arises due to the use of a phrase in the scenario that has a strongly stereotyped order (heads or tails). However, Miller and Gunasegaram (1990) have shown this effect both in more realistic settings and in scenarios with no such linguistic stereotypes (see also Byrne et al., in press; Experiment 4).

A third suggestion is that the temporal order effect arises because earlier events in a sequence are presupposed and act as a context against which later events are judged (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). Byrne et al. (in press) hypothesised that it would be possible to “shake loose” this presupposition by presenting an alternative to the earlier event that would result in a different outcome (c.f., Wells & Gavanski, 1989). The scenario they used was as follows (same-card version):

Imagine two individuals (Jones and Brady) who take part in a television game show, on which they are offered the following very attractive proposition. Each individual is given a shuffled deck of cards and each one picks a card from his own deck. If the two cards they pick are of the same colour (i.e., both from red suits or both from black suits) each individual wins £1,000. However, if the two cards are not the same colour, neither individual wins anything. Jones goes first and picks a black card from his deck. At this point, the game-show host has to stop the game because of a technical difficulty. After a few minutes, the technical problem is solved and the game can be restarted. Jones goes first again, and this time the card that he draws is a red card. Brady goes next and the card that he draws is a black card. Thus, the outcome is that neither individual wins anything.

In this version of the scenario, in which Jones’ card choice remains the same both before and after the technical hitch, participants show a temporality effect - they mutate Brady’s choice more often and judge that he will feel more guilt and will be blamed more for the outcome. In a second version of the scenario (the different-card version), Jones instead picks a black card before the technical hitch. This time the alternative presented would have resulted in a different outcome to what actually happened. In this version of the scenario, participants do not show a preference for mutating one or the other actor, or assigning more

guilt to one or the other.² Byrne et al. concluded that their results were consistent with the idea that the temporal order effect arises because earlier events in a scenario are presupposed. Also the results of this experiment also conclusively ruled out explanations of the temporal order effect in terms of the more recent event being “fresh” in working memory or more available in a backward search of events. If this were so the temporal order effect should occur in both the same and different card versions of the scenario. We can conclude that people tend to change later events in an independent sequence rather than earlier events.

The Causal Order Effect

It has been argued that, independently of any effects of temporal order, the counterfactual mutability of events may be affected by their position in a causal, dependent, sequence (e.g., Girotto et al., 1991; Kahneman & Miller, 1986; Wells, Taylor & Turtle, 1987). Kahneman and Miller (1986) presented their participants with a list of weights of weight-lifters paired with a list of the maximum weight each had managed to lift. These followed a general trend, except for the tenth weight-lifter, who, in one version was only three kilograms heavier than the ninth, but managed to lift thirty kilograms more, and in the other version was thirty kilograms heavier, but had only lifted three kilograms more. Regardless of the order of presentation of the lists, or of the version of the scenario they received, participants preferred to alter the weight lifted, rather than the weight of the lifter, to make the tenth entry of the lists less surprising. This led Kahneman and Miller (1986) to infer that causes (size, and presumably strength) are less mutable than effects (the weight lifted). However, Wells et al. (1987) pointed out that this situation is one in which there is a violation of the normal cause-effect relationship, for example, “she pulled the trigger and the gun did not go off”. Wells et al. (1987) hypothesised that, given a situation in which the normal cause-effect relationship held, for example, “she pulled the trigger and the gun went off”, causes (pulling the trigger) would be more mutable than subsequent effects (the gun going off). Furthermore, given a sequence of events that form a causal chain, the first cause in the chain should be relatively more mutable than later causes.

Wells et al. presented their participants with a scenario describing a man’s attempts to make it across town to a sale in a stereo shop. His progress was impeded by four minor misfortunes, with the result that when he arrived at the shop the last stereo had just been sold. The four impeding events could occur in any order in the scenario, but were described

in such a way that later events were seen to be caused by earlier ones. Wells et al. found that

² Participants’ blame ratings do follow the standard pattern for the temporal order effect, but it is weaker in this condition.

participants' focused on the first event in the causal chain in their first responses to the mutation question, regardless of what that event was. Participants showed no preference to mutate events in any other position in the scenario over any other position (see also Girotto et al., 1991). Wells et al. (1987) suggested that the causal order effect occurs because it is difficult to imagine an event not occurring if that which caused it to occur still happens. Hence later events in a causal chain are relatively less mutable as they are constrained by the occurrence of earlier events. The first event in a causal chain is relatively more mutable as it is subject to no such prior constraints, and hence has a greater freedom of occurrence or nonoccurrence than later events.

In real-life situations this effect may not be as straightforward as it appears. The main problem with applying an analysis based on position in a causal sequence to real events is that there are no set rules for determining the length of a particular causal chain. Indeed, Davis and Lehman (1995) suggested that, in real-life studies, the lengths of the causal chains that people consider can differ dramatically. For example, in parents who have lost a child to SIDS, some focus on the events of the fateful day in their counterfactuals, whereas others focus on a difficult pregnancy. Bearing this point in mind we can conclude that causal order does effect the counterfactual thoughts that people generate, but that this type of analysis may be difficult to apply in predicting counterfactual thinking in real-life situations.

In summary, people are more likely to focus on some kinds of events than on others in their counterfactual "if only" thoughts. People tend to focus on those events that were exceptional (e.g., Kahneman & Tversky, 1982), controllable (e.g., Girotto et al., 1991), and the focus of attention (e.g., Kahneman & Tversky, 1982). They focus on the first event in a causal, dependent, sequence (e.g., Wells et al., 1987), and the last event in a temporal, independent, sequence (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). In addition, they may be more likely to focus on actions than inactions (e.g., Byrne & McEleney, 1999; Gilovich & Medvec, 1994; Landman, 1987). Knowing the events that people are likely to change when they think back over the past is important, but in order to fully understand what happens when people generate counterfactual mutations, we also need to know how they change those events, that is, what imaginary alternatives to reality do people construct?

3. How do people mutate events?

When people think counterfactually they do not just restrict their thoughts to the factual events, they also think about different kinds of imaginary alternatives to those factual

events. In this section we will look at the different kinds of imaginary alternatives that people construct in their counterfactual “if only” thoughts and will try to answer the question, what kinds of mutations are there?

Kahneman and Tversky (1982) were the first to try to classify different kinds of mutations. As we saw earlier, they based their classification on whether mutations resulted in a counterfactual scenario that was more exceptional than the factual events - an *uphill* change - more normal - a *downhill* change - or equally as normal or exceptional - a *horizontal* change. They suggested that people tend to prefer to make downhill changes (i.e., to make events less exceptional) as opposed to uphill or horizontal changes (but see Gavanski & Wells, 1989). This classification of counterfactual mutations is deeply rooted in the semantic structure of the specific scenario involved, in that any mutation might have different effects on different situations, for example, “if only I had been wearing shoes...”, is a *downhill* mutation in the context of going for a long walk (where wearing shoes is normal), whereas it is an *uphill* mutation in the context of having a bath (where wearing shoes is exceptional).

An alternative classification of counterfactual mutations, proposed by Roese and Olson (1993a), is that between *additive*, *subtractive*, and *substitutive* counterfactuals. *Additive* counterfactuals are those that add in new elements in order to undo an outcome, for example, “if only I owned an umbrella, I would not be wet”. *Subtractive* counterfactuals are those that remove elements in order to undo an outcome, for example, “if I had forgotten my umbrella, I would be wet”. *Substitutive* counterfactuals consist of a subtraction followed by a subsequent addition, for example, “if only I had driven to work instead of cycling, I would not be wet”. Roese and Olson hypothesised that although counterfactual mutations with additive and subtractive structures would be generated as often as each other, the use of additive and subtractive counterfactuals would depend on the valence of the outcome. They found that, in order to undo negative, failure outcomes, people were more likely to generate additive counterfactuals, whereas, to undo positive, successful outcomes, people were more likely to generate subtractive counterfactuals. Roese and Olson argued that their findings were “consistent with the logic that people tend to see success as following from intentional acts that facilitate success (i.e., acts that should be done), whereas failures result from the absence of acts that should have been done.” (p. 316).

This kind of classification of counterfactuals is based purely on the logical structure of people’s mutations, and has the advantage of reflecting stable qualities of the mutations under consideration, as a counterfactual that is additive in one situation will also be additive

in other situations. However, it side-steps the issue of what counterfactuals actually mean to people, and we cannot hope to understand the consequences of thinking counterfactually without some consideration of the semantics of different kinds of counterfactuals. A third way of classifying counterfactuals is that proposed by Markman et al. (1993). They suggested that most outcomes allow the imagination of evaluatively better or worse possible alternatives. Counterfactual mutations can be classified into those that result in alternatives that improve on reality - *upward* counterfactuals - and those that result in alternatives that worsen reality - *downward* counterfactuals. *Upward* counterfactuals often take the form of “if only” statements, for example, a student who received a B on an exam might think, “if only I’d got an A...”, and *downward* counterfactuals often take the form of “at least” statements, for example, “at least I didn’t get a C...”. Markman et al. proposed that upward and downward counterfactuals have different functions. Imagining how things could have been better may make people feel worse about their current situation but it may also help them learn from experience and avoid negative outcomes in future. Imagining how things could have been worse may make people feel better about their current situation.

Markman et al. predicted that upward counterfactuals would occur more often following negative outcomes, where a better reality is easily imaginable, and repeatable outcomes, where there is a chance to improve in future. Downward counterfactuals should be more common following positive outcomes, where a worse reality is easily imaginable, and unrepeatable outcomes, where people must make the best of the outcome in hand. In a computer generated blackjack game, they found that participants generated more spontaneous upward counterfactuals following outcomes that were framed as negative and also if they were told that they would be playing the game again. Participants generated more spontaneous downward counterfactuals following outcomes that were framed as positive and if they were told that they would only get to play the game once. Upward counterfactuals do seem to occur in situations in which people must prepare for the future, whereas downward counterfactuals do seem to occur in situations in which people must make the best of their current situation.

Do upward counterfactuals actually help people prepare for the future, and do downward counterfactuals actually help people feel better about their current situation? Roese (1994; Experiments 1 & 2) found that, when his participants were asked to think about how things could have been worse following negative outcomes, they reported significantly more positive affect about those outcomes than participants who were asked to think about how things could have been better. Roese (1994; Experiment 3) also found that

participants who were asked to generate upward counterfactuals about their performance on an anagram task, did significantly better on a subsequent anagram task than those who were asked to generate downward counterfactuals. We will discuss the consequences of thinking about how things could have been better and of how things could have been worse when we come to discuss the consequences of counterfactual thinking in the next section.

There is one final distinction between different kinds of alternatives that we will consider. When people think about what might have been they do not just think of imaginary alternatives to reality that would result in a different outcome to that of the factual situation - *counterfactual* alternatives. People can also imagine alternatives to reality that result in the same outcome as the factual situation - *semifactual* alternatives. In the literature, this distinction has frequently been ignored, and a main goal of our research has been to examine the distinction between counterfactuals and semifactuals further. We will return to this point in the final section of this review when we discuss the limitations of previous research and the goals of the experiments reported herein.

4. What are the consequences of thinking about what might have been?

One of the main reasons for the upsurge of interest in the phenomena of this kind of thinking arose from the realisation that thinking about how things could have happened otherwise might have significant consequences for people's judgments and their emotional reactions (e.g., Kahneman & Miller, 1986). Legal philosophers, such as Hart and Honoré (1959), have long recognised the power of arguments based on what might have been within legal settings, and from drama, poetry and prose, there are no end of examples in which writers assert the affective power of such thoughts. For example, Flaubert's (1857) heroine, Emma Bovary, torments herself with thoughts of what might have been had she married another man. In the next sections we review the evidence for the judgmental and affective consequences of thinking about what might have been.

Judgmental Consequences

Counterfactual "if only" thinking affects causal judgments (e.g., Mandel & Lehman, 1996; N'Gbala & Branscombe, 1995; Spellman, 1997; Wells & Gavanski, 1989), the assessment of blame (e.g., Branscombe et al., 1996; Nario-Redmond & Branscombe, 1996), perceptions of criminal behaviour (e.g., Macrae, Milne & Griffiths, 1993), victim compensation (e.g., Macrae, 1992; Miller & McFarland, 1987), and judgments of suspiciousness (e.g., Miller, Turnbull & McFarland, 1989). We will review evidence for

each of these in turn.

Causal judgments

Philosophers have long been interested in the relationship between thinking about what might have been and causal judgments (e.g., Goodman, 1973; Hart & Honoré, 1959; Mackie, 1974). Counterfactual “if only” thinking has, for example, been linked to the application of Mill’s (1872) *method of difference*, which requires people to think about whether undoing certain events in the past will undo an outcome. Goodman (1973) has argued that counterfactual statements, such as the example we used earlier:

5. if only I had studied harder, I would have passed the exam

assert that there is a causal link between their antecedent (studying harder) and their consequent (passing exams).

Psychologists have also been interested in the consequences counterfactual “if only” thinking has for people’s causal judgments (e.g., Mandel & Lehman, 1996; N’Gbala & Branscombe, 1995; Spellman, 1997; Wells & Gavanski, 1989). Kahneman and Tversky (1982) suggested that people run simulations in their minds in making causal judgments about past events. They proposed that, “to test whether event A caused event B, we may undo A in our mind, and observe whether B still occurs in the simulation.” (p. 202). Note that Kahneman and Tversky (1982) did not imply that all counterfactual thinking has to do with causal judgments, for example, they suggested that mental simulation of this sort may also play a role in probability judgments. They also did not suggest that all causal judgments would rely on counterfactual “if only” thinking, only that some kinds of causal judgments, such as those in which people must assess whether a particular event was necessary for an outcome to occur (Spellman & Mandel, 1999).

Wells and Gavanski (1989) were the first to show that counterfactual thinking can affect people’s causal judgments. They presented their participants with a scenario concerning a taxi driver who refused a lift to a disabled couple. The couple then took their own car and were involved in a fatal accident when they encountered a bridge that had collapsed. In one version of the scenario, participants read that the taxi driver made it safely across the bridge before it collapsed. In a second version, participants instead read that the taxi driver also drove off the collapsed bridge and almost did not make it to safety. When participants read that had the taxi driver taken the couple it would have undone the outcome, they rated his refusal as more causal of the couple’s deaths, than if they read that the taxi driver taking the couple would have resulted in the same outcome (see Williams, Lees-Haley & Price, 1996, for a replication of this finding). People rate decisions as more causal when

the alternative to that decision would result in a different outcome to the factual situation (where counterfactual thoughts should be more available), than when the alternative would result in the same outcome as the factual situation (where, we will suggest, semifactual thoughts may be more available: see Chapter 4).

In addition to manipulating the nature of the alternatives presented in this scenario, Wells and Gavanski (1989) also varied the order in which participants received two tasks. Following the scenario, one group made causal ratings first, and then completed a counterfactual mutation task, coming up with ways in which the outcome could have been avoided. A second group completed the counterfactual mutation task first, followed then by the causal rating task. Wells and Gavanski found that, when participants imagined how things could have been different before they made causal ratings, they rated the taxi driver's refusal as more causal of the outcome, than if they rated his refusal before generating counterfactuals. The results of this experiment showed that the availability of an alternative that would undo an outcome and the actual generation of counterfactual "if only" thoughts can act to increase how causal an antecedent event is seen as being.

However, the results of other studies suggest differently (e.g., Mandel & Lehman, 1996; N'Gbala and Branscombe, 1995). For example, when Mandel and Lehman (1996) presented participants with a version of the Mr. Jones scenario (Kahneman & Tversky, 1982; see page 13) in which Mr. Jones decides to drive home by an unusual route. While going through a junction at a green light, his car is hit by another car, driven by a drunk teenager, which has gone through the red light in the opposite direction. Mr. Jones is seriously injured. One group of participants were asked to generate "if only" thoughts on behalf of Mr. Jones. A second group were asked about what might have prevented the accident and a third group were asked about how the accident had been caused. Mandel and Lehman (1996; Experiment 1) found that participants generated "if only" thoughts and preventability judgments that centred on Mr. Jones' actions, in particular, his decision to drive home by an unusual route. However, participants' causal judgments instead centred on the actions of the drunken teenager. Mandel and Lehman showed, firstly, that the most mutated event in the scenario is not necessarily the most causal. Secondly, they showed that counterfactual mutations and preventability ascriptions tend to focus on the same events.

In another experiment, Mandel and Lehman (1996; Experiment 3) constructed a scenario which, in common with those used by Wells and Gavanski (1989), contained antecedent events with alternatives that either would or would not undo the outcome of the scenario. After reading the scenario all of the participants carried out a counterfactual

mutation task, following which they rated three of the events in the scenario (the main protagonist's decision to fly, his wife's decision not to plead with him not to, and an engine malfunction in the aeroplane) for how causal they had been in producing the outcome (the death of the protagonist). Mandel and Lehman (1996: Experiment 3) found that varying whether the alternatives to the two decisions in the scenario would or would not undo the outcome did not effect how causal those decisions were seen as being. Mandel and Lehman therefore, failed to replicate the first part of Wells and Gavanski's (1989) study (but see Williams et al., 1996). Secondly, they found that participants who had mutated an event in their counterfactual thoughts did not rate that event as more causal than those who did not. Thirdly, although participants in their study rated the engine malfunction as most causal overall, they mutated it significantly less often than the two decisions described in the scenario.

Taking the results of these two experiments together, Mandel and Lehman (1996) concluded that counterfactual "if only" thinking may be more important in establishing how an outcome could have been prevented and hence how negative outcomes could be prevented in future, which may also explain why people's counterfactual "if only" thoughts are more likely to focus on events that are within their control rather than those that are not (c.f. Girotto et al., 1991). People's causal judgments may be based more on covariation information. In the scenarios used by Mandel and Lehman (1996) the events that were assigned the most causality (the drunk driver and the engine malfunction) are events that , in general, tend to covary with the outcomes in question (car accidents and plane crashes). Mandel and Lehman therefore suggest that people's causal thoughts will focus on events that are useful for predicting future outcomes.

Where do the results of these studies leave the question of the consequences of counterfactual thinking for causal judgments? Mandel and Lehman (1996) provided convincing evidence that counterfactuals may more often focus on antecedent events that would prevent an outcome rather than those that caused an outcome. These two kinds of events may, of course, coincide in many situations, for example, if a driver were to accidentally hit a child with their car whilst changing the station on the radio, their actions (not paying attention) both covary with the outcome (car accidents) and could be undone to prevent the outcome (e.g., "if only I had been paying more attention to the road, I would not have hit that child"). Given Mandel and Lehman's failure to replicate the finding that the availability of an alternative to an antecedent event that would undo an outcome increases the causality assigned to that event (Wells & Gavanski, 1989; Williams et al., 1996), the

question remains as to why that effect might have been observed in the particular circumstances described in previous experiments.

Spellman (1997) put forward a theory of causal judgments that she applied to this question. She argued that causality is assigned on the basis of changes to the probability of an outcome. In working out how causal a particular event was in a single case, such as in many of the scenarios used in the literature on counterfactual thinking, Spellman (1997) argued that people look at the probability of an outcome (for example, a car crash) occurring after a particular event has occurred and compare it to the probability of the outcome occurring before the event took place. If the event changes the probability of the outcome, it is seen as causal, whereas if it does not change the probability, it is not seen as causal. The event which changes the probability of the outcome the most is the one that will be assigned the most causality in producing the outcome. Spellman (1997) applied this analysis (called *crediting causality*) to the first scenario used by Wells and Gavanski (1989). In this scenario, a boss takes one of his employees out to dinner. He orders for both of them, but unfortunately his choice of meal contains a wine sauce to which his employee is allergic and she subsequently dies. In one version of the scenario, the boss originally considered ordering a dish that did not contain a wine sauce. In the other version, the meal that the boss originally considered also contained a wine sauce. Wells and Gavanski found that their participants rated his decision as more causal when the alternative that he considered would undo the outcome (it did not contain a wine sauce) than when it would not (it also contained a wine sauce). Spellman (1997; p 345) explained this result in terms of changes in probability thus:

In the two-wine condition, before the boss made his final ordering decision, the probability of the woman dying is high. (Not guaranteed - the woman could still ask about the dish or refuse to eat the dish etc. - but high given the alternatives that the subject is likely to consider.) After the decision, the probability has not changed much if at all. In the one-wine condition, before the boss made his final ordering decision, the probability of the woman dying is much lower. (It is high if he chooses the wine dish, but effectively zero if he does not.) When he decides on the dish with wine, her probability of dying increases. Thus the boss's decision in the one-wine condition is more causal than in the two-wine condition because the availability of alternatives (mutability) leads to a lower pre-event estimation of the probability of the outcome.³

If the effect of available alternatives can be explained by way of changes in probability, where does that leave the rest of the conclusions drawn by Wells and Gavanski

³ Note that a *probability* is not the same as a *propensity* (Kahneman & Varey, 1990 - see page 8).

(1989)? We suggest that their results may still have a lot to say about how people make causal judgments, even if it is within a restricted range of circumstances. In the scenarios and causal rating tasks they used Wells and Gavanski (1989) effectively presented their participants with a single event and asked them to judge whether or not that event was causal in producing the outcome. With the exception of Williams et al. (1996), who replicated Wells and Gavanski's findings, none of the other studies on counterfactual thinking and causal judgments have examined this particular situation, and have instead provided several causal candidates or have asked people to name "the cause" of an outcome. What these other studies (e.g., Mandel and Lehman, 1996) have done is to ask people to assign causality between events. We argue that people can think of an event as being *causal* of an outcome, in the sense that it may have contributed to it, without thinking that that event was *the cause* of that outcome, and also that, as Wells and Gavanski (1989) have shown, when a single event is provided to be judged in isolation, if that event is mutable, it may be seen as more causal. One result that Wells and Gavanski reported that has not, as yet, been directly tested by any of the other studies described here, is that generating counterfactual "if only" thoughts before making causal ratings to a single event increases causal ratings compared to when causal ratings are made prior to any mutations. Mandel and Lehman (1996) did find that mutating an event does not make that event seem more causal, when compared to situations in which that event is not mutated. However, they were looking at causality in comparison to other events, and at situations in which other mutations took place before the causal ratings were made. Can this result (Wells and Gavanski, 1989) be replicated? We will return to this point when we deal with causal judgments in Chapter 4.

Spellman and Mandel (1999) argued that counterfactual thinking may still act as a cue to causality, even if causal judgments are made on the basis of probabilities, in that, if one can imagine many alternatives to an outcome, that outcome may seem highly improbable and any antecedent event that changes the probability of that outcome may be seen as more causal. If one cannot imagine any alternatives to the occurrence of an outcome, that outcome may instead seem inevitable (Mandel & Lehman, 1996), and antecedent events may do little to change its probability of occurrence and may not be seen as at all causal. We can conclude that counterfactual thinking may influence some causal judgments, although it is by no means involved in every causal judgment, nor is counterfactual thinking necessary for causal thinking (e.g., Kahneman & Tversky, 1982). We believe that there is much that remains to be done in elucidating the kinds of causal judgments that may be influenced by counterfactual thinking.

Blame Assignment

Thinking about what might have been has also been shown to be important for how people assign blame (e.g., Branscombe et al., 1996; Nario-Redmond & Branscombe, 1996), and this is one area in which researchers have directly studied the consequences of both counterfactual and semifactual thinking. For example, Branscombe et al. (1996) presented their participants with the following description of an accident:

Driver A (Samantha) was said to be driving west, with sun glare making it difficult for her to see. Eyewitnesses reported that her traffic light was either green or yellow when she entered the intersection and that she may have been driving too fast for the weather conditions, although the police estimated her speed as 35 mph which was the posted speed limit. Driver B (Jacqueline) was said to be travelling south, at approximately 25 to 30 mph which, also according to eyewitnesses, was too fast for the weather conditions. Driver B said that she did not apply her brakes because of the ice on the downhill slope. Witnesses did confirm that the vehicle did “fishtail” as it travelled over the ice. Both drivers were said to be mentally preoccupied - Samantha with news that her grandmother had been hospitalised and Jacqueline with news that her daughter was ill at the day care centre.

Following the scenario one group of participants was directed to focus on the actions of Driver A and the other group was directed to focus on the actions of Driver B. In each group approximately half of the participants were then asked to write down how the accident could have been avoided “if only” the driver in question (A or B) had behaved differently. The remaining participants were asked to write down how the accident might still have occurred “even if” the driver in question (A or B) had behaved differently. Regardless of which of the protagonists participants focused on, participants blamed the protagonist more for the outcome and reduced blame to the other protagonist if they generated “if only” thoughts about how that persons’ behaviour could have changed the outcome, than if they generated “even if” thoughts about how changes to their behaviour would have resulted in the same outcome. People assign more blame to a person when changes to their actions would undo an outcome than when changes would not undo an outcome.

Branscombe et al. (1996) also found that the focus of participants thoughts of what might have been interacted with the kind of mutation that they carried out in affecting how they assigned blame. When participants generated “if only” thoughts that focused on one of the protagonists, it increased blame to that protagonist and reduced blame to the other protagonist. However, when participants generated “even if” thoughts about one of the protagonists, it did not affect the blame assigned to the other protagonist. Branscombe et al. argued that both the kind of “might have been” that people consider and the focus of

attention are critical for blame assignment. They pointed out that this may have grave effects in, for example, rape cases, where the actions of the victim and her state of mind tend to be the focus of the proceedings. Nario-Redmond and Branscombe (1996) also showed that, in rape case scenarios, when people consider how the outcome could have been worse for the victim, for example if the assailant had inflicted additional injuries, the perceived seriousness of the rape and the culpability of the assailant decrease.

Both counterfactual “if only” and semifactual “even if” thinking appear to effect how people assign blame. That counterfactual and semifactual thinking appear to have different effects in this one kind of judgment task suggests that they may have different effects on the other kinds of judgments described here and also on people’s emotions. We examine other consequences of semifactual thinking in the series of experiments reported Chapter 4.

Perceptions of Criminal Behaviour and Victim Compensation

The availability of counterfactual alternatives has been shown to affect not just perceptions of rape, but also perceptions of other kinds of criminal behaviour (e.g., Macrae et al., 1993), and has been shown to influence the process of victim compensation (e.g., Macrae, 1992; Miller & McFarland, 1987).

Macrae et al. (1993) presented their participants with a scenario describing a man who was mugged on his way home from a bar. In one version of the scenario, he walked home by his usual route and in another version he took a new route home. Macrae et al. found that participants who read that the protagonist took an unusual route home recommended a harsher punishment for the perpetrator, considered the case to be more serious and reported more sympathy towards the victim, than those who read that he was mugged while taking his normal route home. Macrae et al. concluded that when counterfactual alternatives to the outcome of a crime are more readily available (because their antecedents are exceptional, e.g., Kahneman and Miller, 1986), that crime will be perceived as more serious than if alternatives are not so readily available. This was supported by another study, again reported by Macrae et al. (1993) in which they varied the mutability of the outcome by using closeness rather than exceptionality. Participants in this experiment read about a burglary that occurred either six weeks or one day before a family returned from a long holiday. Those participants who read that the burglary was temporally close to the family’s return recommended harsher punishment, considered the crime to be more serious and felt more sympathy toward the victims, than those who read that the burglary took place several weeks before the family’s return. The easier it is to undo the outcome of a crime, the

more serious that crime will appear to be (see also Turley, Sanna & Reiter, 1995).

Both the closeness of an alternative outcome and the exceptionality of the events leading up to that outcome have also been shown to influence people's judgments of appropriate levels of victim compensation. Macrae (1992) presented one group of his participants with the following scenario:

Jane has walked to work each day for the past 2 years. She is very much a creature of habit - always taking the same route to work. One day, however, she decided that she wanted a change of scenery and took a different route to the office. On the way she passed some building works. As she walked along the pavement, a piece of scaffolding fell from the construction and struck her on the back. Jane sustained minor injuries and as a consequence of the incident was detained in hospital for 4 days.

A second version of the scenario only differed in that Jane was instead described as taking her usual route home. Macrae (1992) found that his participants recommended more compensation for the victim and described the scaffolding company as more negligent and as deserving a higher fine when the route that Jane took home was described as exceptional, than when it was described as normal (see also Miller & McFarland, 1986).

Miller and McFarland (1986) presented participants with scenarios in which they varied the closeness of an alternative outcome. In one scenario a survivor of a plane crash was described as dying of exposure either seventy-five miles or a quarter of a mile from safety. Participants in this experiment recommended significantly more compensation for the family of the victim when his fate was easily avoided (he was only a quarter of a mile from being found) than when it was not. Counterfactual thinking can influence perceptions, both of criminal behaviour and the fate of victims of crime and negligence. As counterfactual arguments are frequently used in legal situations (e.g., Hart and Honoré, 1959), it is very important to understand the consequences that counterfactual thinking may have in such situations.

Suspiciousness

The availability of counterfactual alternatives can also affect people's judgments of the suspiciousness of an outcome. Miller et al. (1989) presented participants with the following task:

Imagine that you have a young child who loves chocolate chip cookies. Imagine further that you buy your cookies in packages that include oatmeal as well as chocolate chip

cookies. Your child's practice is to go to the cookie jar and select the chocolate chip cookies, leaving the oatmeal ones to go stale. One day you think of a strategy to cope with the situation. You tell your child to close his eyes before he reaches into the jar, taking whichever cookie he grabs. He agrees to this and heads to the kitchen and the cookie jar. The jar contains 1 chocolate chip cookie and 19 oatmeal cookies. Shortly, he comes back, exclaiming that he did just what you said and he selected a chocolate chip cookie.

A second group the scenario instead read that the jar contained 10 chocolate chip cookies and 190 oatmeal cookies. Participants were then asked to rate how suspicious they would be that the child peeked into the jar before selecting a cookie. Miller et al. (1989) found that participants who read that there was only one chocolate chip cookie in the jar expressed greater suspicion about the child's honesty than those who read that there were ten chocolate chip cookies in the jar (although the objective probability of selecting a cookie, 5%, is the same). Miller et al. concluded that it is not the probability of an outcome occurring by chance that determines people's suspiciousness judgments, but the number of ways in which they can imagine the outcome having occurred. In the first version of the story only one imaginary scenario can be constructed that results in the outcome (the selection of a prized chocolate chip cookie), however, in the second version, there are ten possible scenarios in which this could occur, one for each chocolate chip cookie in the jar.

In summary, counterfactual "if only" thinking has been shown to have a number of consequences for the judgments that people make. The ease with which people can imagine an outcome being undone effects their judgments of causality, blame and suspiciousness. It also effects how people perceive criminal behaviour and how they decide on levels of victim compensation. In the next section we consider whether counterfactual thinking can also influence people's emotions.

Affective Consequences of Counterfactual Thinking

Counterfactual thinking has been suggested to influence people's emotions by two different mechanisms, by contrasts between the factual outcome and an imagined alternative outcome, and by causal inferences based on the counterfactual scenario generated (e.g., Roese & Olson, 1995a). We will review the evidence for each of these mechanisms in turn, and attempt to elucidate the role they play in different emotions, for example, satisfaction, regret, guilt, and shame (e.g., Medvec, Madey & Gilovich, 1995; Niedenthal, Tagney & Gavanski, 1994).

Kahneman and Miller (1986) proposed a hypothesis of *emotional amplification* in

which they stated that, “the affective response to an event is enhanced if its causes are abnormal.” (p 145). In more general terms this suggestion implies that the more easily a person can imagine an outcome turning out differently, the more their emotional reactions to that outcome will be amplified. For example, Kahneman and Tversky (1982) presented their participants with the following scenario:

Mr. Crane and Mr. Tees were scheduled to leave the airport on different flights, at the same time. They travelled from town in the same limousine, were caught in a traffic jam, and arrived at the airport 30 minutes after the scheduled departure time of their flights. Mr. Crane is told that his flight left on time. Mr. Tees is told that his flight was delayed, and just left five minutes ago. Who is more upset?

Although the objective situation of both of the protagonists is the same (both men miss their flights), and their expectations about the outcome are the same (both expected to miss their flights by 30 minutes), 96% of respondents stated that Mr. Tees would be more upset. Kahneman and Tversky (1982) suggested that this occurs because it would be easier for Mr. Tees to imagine how he could have arrived five minutes earlier than it is for Mr. Crane to imagine how he could have avoided a 30 minute delay.

This experiment illustrates one of the two mechanisms by which counterfactual thinking can influence people’s emotional reactions, namely, by means of contrasts between the factual outcome and a counterfactual alternative. Although emotional reactions in general may be increased where there is an easily available counterfactual alternative, the particular emotion, or certainly whether that emotion is positive or negative, is affected by the specific counterfactual alternative considered. In the experiments conducted by Roese (1994; Experiments 1 & 2) described earlier, he showed that following negative outcomes, when people were asked to imagine how things could have been worse they reported significantly less negative affect than those who were asked to imagine how things could have been better (see also Medvec et al., 1995).

Nowhere is this contrast effect more evident than in its effects on people’s perceptions of luck. Teigen (1995) showed that, although unlucky situations tend to be unpleasant, as would be expected, lucky situations, “are not necessarily positive for the target person” (p 297). Most of the everyday examples of luck that he collected tended to focus on negative events that could have been worse. This is supportive of the idea that downward counterfactuals are important for coping and affect regulation. For example, a soldier who had stepped on a landmine and had initially been described by the newspapers

as unlucky, described himself as lucky only to have lost a leg (Teigen, 1988). Johnson (1986) showed the converse of this effect. Participants in his study rated a man, Chris, who recovered from food poisoning as being luckier and happier than a woman, Debbie, who narrowly missed out on winning a trip around the world. In objective terms, Debbie's situation was by far the better of the two (she did not suffer a life threatening illness). However, the most available alternative for Chris was worse (i.e., death), whereas for Debbie it was better (i.e., winning). Johnson's (1986) study indicated that it is not just the events that people experience that determine their reactions to situations, but also what they perceive as almost happening. People judge the events of their lives in comparison to the available counterfactual alternatives that are evoked.

Roese and Olson (1995a) suggested that comparison processes may not only come into play directly, as when people consider an alternative outcome that is better or worse than the factual situation, but that they may also be induced indirectly due to the presence of mutable antecedent events. As we mentioned when we discussed the *action effect*, people seem to regret negative outcomes more and to feel more elation following positive outcomes when those outcomes result from actions as opposed to inactions (e.g., Byrne & McEleney, 1999; Gilovich & Medvec, 1994; Gleicher et al., 1990; Landman, 1987). This amplification of emotional reactions due to mutable antecedent events does not just apply to the action / inaction distinction. For example, in the following scenario:

Mr. Jones almost never takes hitch-hikers in his car. Yesterday, he gave a man a ride and was robbed. Mr. Smith frequently takes hitch-hikers in his car. Yesterday, he gave a man a ride and was robbed. Who do you think would experience greater regret over the episode?

the majority of people consider that Mr. Jones, whose actions were exceptional, would feel more regret than Mr. Smith, whose actions were normal (Kahneman & Miller, 1986; see also Miller & Turnbull, 1990). The presence of mutable antecedent events can act indirectly to increase people's emotional reactions by making counterfactual alternatives to the factual situation relatively more available (e.g., Roese & Olson, 1995a).

The second mechanism by which counterfactual "if only" thinking can influence people's emotional reactions is one based on causal inferences. Roese and Olson (1995a) argued that some emotions depend not only on a contrast between real and imagined outcomes, but also on causal inferences based on the counterfactual scenarios that people generate. People may, for example, regret antecedent events to the extent that they believe those events to have caused negative outcomes. Wells and Gavanski (1989) showed that

people assign higher causal potency to events for which there is an available alternative that would undo an outcome than to those for which an available alternative would result in the same outcome as the factual situation. Boninger et al. (1994) showed that the same manipulation can effect how much regret and self-blame people report. They presented participants with a scenario that asked them to imagine that they were a runner preparing for an Olympic 400 metre race. Participants then read (different outcome condition):

On the day before the 400 metre race, in a freak accident during training, you sprain your left ankle. Although there is no break or fracture, when you try to run, the pain is excruciating. Your trainer tells you about many advances in pain killing medications and assures you that you will still be able to participate. He recommends that you choose between two drugs, both legal according to Olympic guidelines. One is a well-known pain killer that has been proved effective but also has some serious side effects including temporary nausea and drowsiness. The other pain killer is a newer and less well-known drug. Although the research suggests that the newer drug might be a more effective pain killer, it's side effects are not yet known because it has not been widely used. After considerable thought, you elect to go with the more well-known drug. On the day of the race, although there is no pain in your ankle, you already begin to feel the nausea and find yourself fighting off fatigue. You finish in fourth place, only 1 tenth of a second from a Bronze medal, 4 tenths from a silver, and 5 tenths from a gold medal. After the event, you learn that some athletes in other events who were suffering from similar injuries used the other, newer drug. They felt no pain and experienced no side effects.

In this version of the scenario, the alternative, taking the newer drug, would have resulted in a different outcome. In a second version (same outcome condition), participants instead read that the newer drug had the same side effects as the more well-known drug and hence that the alternative would have resulted in the same outcome. Boninger et al. (1994) found that participants in the different outcome condition indicated that they would regret their choice of drug more and would blame themselves more for the outcome than those in the same outcome condition. It may be that, when an alternative to the athlete's decision is provided that would undo the outcome, that decision appears more causal of the negative outcome and therefore people feel worse about it than when an alternative is provided that would not undo the outcome, following which the causal role of the decision in producing the outcome can be discounted.

Further evidence that people's emotional reactions may be influenced by causal inferences based on counterfactual scenarios comes from research carried out by Niedenthal et al. (1994). They found that the particular emotion that people report depends on the kind

of antecedent event that people focus on in their counterfactual thoughts. In one experiment Niedenthal et al. (1994; Experiment 1) asked their participants either to describe an event that caused them to feel guilt or that caused them to feel shame. Participants were then asked to generate counterfactual “if only” thoughts. Niedenthal et al. (1994) found that, in undoing the outcome of guilt stories, participants focused on changing some aspect of their behaviour, i.e., “if only I had done something differently...”. but in undoing the outcome of shame stories, participants focused on changing something about their own personal characteristics, i.e., “if only I was a different kind of person...”. In a subsequent set of experiments, Niedenthal et al. (1994; Experiments 2a & 2b) presented their participants with a scenario that had been shown to elicit equal amounts of guilt and shame. The scenario read as follows:

Your good friend, who rarely dates, invites you to attend a party with him/her and his/her date, Chris. It's your friend's first date with Chris. You go along and discover that Chris is not only very attractive, but is also flirting with you. You flirt back. Although you are not seriously interested in him/her, at the end of the night you give Chris your phone number. The next day your good friend raves to you about how much he/she liked Chris.

One group of participants were asked to generate “if only” thoughts that focused on their behaviour, and a second group were asked to generate “if only” thoughts that focused on the type of person that they were. Niedenthal et al. (1994) found that those participants who were directed to mutate their behaviour reported feeling more guilt than shame about the flirting scenario described above, whereas those who were directed to mutate aspects of the self reported feeling more shame than guilt. It appears that people feel guilt about an outcome when it seems that their actions were causally related to that outcome. They feel shame instead when the outcome is instead causally linked to an aspect of their personality. These experiments supported the argument that the particular causal inferences invited by counterfactual “if only” thoughts can affect, not just whether people's emotions in a situation are amplified, but also the specific emotions that they experience. The results also provide a good illustration of the reciprocal relationship between affect and counterfactual thought, as in these experiments the particular emotion felt both affected and was affected by the type of counterfactual produced in a situation (Niedenthal et al., 1994). This reciprocal relationship is also evident in studies of more general negative affect. Negative outcomes elicit upward counterfactuals about how things could have been better, and upward counterfactuals in turn tend to result in more negative affect (e.g., Markman et al., 1993; Roese, 1994).

Counterfactual “if only” thinking can affect people’s emotional reactions in a wide range of different ways. We have described two mechanisms by which this may occur - through *contrasts* between factual and counterfactual outcomes, and through *causal inferences* based on the counterfactual scenarios generated. The relationship between counterfactual thinking and emotions is a reciprocal one as, not only do people’s counterfactual thoughts affect their emotional responses, but their emotional responses affect the counterfactual thoughts that they produce. Counterfactual thinking plays a key role in emotions such as regret, guilt and shame. Both the availability of counterfactuals and the kind of counterfactual considered are important. In Chapter 4 we shall return to the affective consequences of counterfactual “if only” thinking when we compare them to those of semifactual “even if” thinking.

In the previous sections we have reviewed the existing literature on thinking about what might have been. We have covered research on the antecedents of, the constraints on, the alternatives considered, and the consequences of counterfactual “if only” thinking about how things might have turned out differently. Wherever possible, we have also included the existing research on another kind of thinking about what might have been, semifactual “even if” thinking about how things might have turned out the same. In the final sections of this review we will describe the main theories that have been put forward to account for these results, before moving on to outline the goals of the research that we have undertaken.

5. Theories of Counterfactual Thinking

Two main theories have been put forward to attempt to explain the mechanisms underlying counterfactual thinking - *norm theory* (Kahneman & Miller, 1986), and the *mental models theory* (as it applies to counterfactuals; e.g., Byrne, 1997; Johnson-Laird & Byrne, 1991). We will briefly summarise these two theories and examine the degree to which they can account for the evidence provided in previous sections.

Norm Theory

Norm theory was proposed by Kahneman and Miller (1986) in a paper that has possibly been the most influential in all psychological research on counterfactual thinking. It was designed to account for people’s post-hoc judgments of the surprisingness of an outcome and, like many previous social judgment theories, norm theory centres on the comparison between the outcome experienced and some cognitive anchor. For example, in Helson’s (1964) *adaption level* theory, people were suggested to base their assessments of a

situation on comparisons between their current state and the state to which they had become accustomed. Within norm theory, people's reactions, whether cognitive or affective, are suggested to be at least partially determined by the magnitude of the difference between the experienced outcome and a normal outcome. Where norm theory differed from previous social judgment theories was that Kahneman and Miller (1986) suggested that people compare outcomes, not just with precomputed schemas and frames of reference, but also with norms that are computed after the event, rather than before. They suggested that people interpret their experiences in the light of alternatives that can either be remembered or constructed after the fact.

Kahneman and Miller proposed that each outcome evokes a range of alternative outcomes. If these alternatives are similar to the outcome experienced, the factual outcome is termed normal, for example, when a person gets a C grade on an exam and can remember many previous occasions on which they also got a C grade. Outcomes that are abnormal or exceptional are those that evoke alternatives that are different from the factual outcome (and hence counterfactual in nature), for example, when a person gets a C grade and can remember or construct occasions on which they instead received an A grade. The ease with which antecedent events can be mentally altered to create a counterfactual scenario is what Kahneman and Miller referred to as mutability and it is suggested by norm theory that the extent to which an outcome is normal or exceptional (or unsurprising or surprising) depends on the mutability of the events occurring before that outcome and hence the ease of construction of a counterfactual scenario.

As we mentioned earlier, some kinds of events are easier to mutate than others. Kahneman and Miller suggested that the basic rule governing counterfactual mutations was that exceptional antecedent events were returned to their normal or default values. Their theory is consistent with Kahneman and Tversky's (1982) finding that people are more likely to mutate exceptional antecedent events than routine antecedents and that they are likely to change those exceptional events to become more normal or routine. Kahneman and Miller (1986) went on to predict the other kinds of events that might turn out to be relatively more mutable, in that mutating those events recapitulated expectancies. In all, there has been a great deal of support for the mutability effects that they originally predicted: the temporal order effect (e.g., Miller & Gunasegaram, 1990), the action effect (e.g., Landman, 1987), focus effects (e.g., Legrenzi et al., 1993), closeness (e.g., Kahneman & Varey, 1990), and the controllability effect (e.g., Girotto et al., 1991). In addition, Kahneman and Miller (1986) proposed the principle of *emotional amplification*, in which they suggested that

people's emotional reactions to an outcome will be amplified to the extent that it is easy to imagine that outcome not having occurred, which has also received a reasonable degree of support (e.g., Boninger et al., 1994; Gleicher et al., 1990; Landman, 1987).

However, norm theory and its predictions have been criticised on a number of counts, many of which have been discussed earlier in this review. In addition to the mutability effects mentioned above, Kahneman and Miller (1986) also predicted that effects would be more mutable than causes. Wells et al. (1987) suggested that this is only the case when the events presented are in violation of normal cause-effect relationships. They showed instead that in regular cause and effect chains, causes are more mutable than effects and that the first event in a causal chain is more mutable than subsequent events. Kahneman and Miller's (1986) prediction therefore only applies in a limited set of circumstances.

A second, and more serious, challenge to norm theory came from the work of Gavanski and Wells (1989). They challenged the idea that the fundamental rule governing the generation of counterfactuals is that people change exceptional events to become more normal (Kahneman & Miller, 1986; Kahneman & Tversky, 1982). Their experiments showed that, although people do change exceptional antecedent events more often than normal ones in their counterfactual "if only" thoughts, they do not always change them in the direction of greater normality. To undo exceptional outcomes people tend to change exceptional antecedent events to become more normal. However, to undo normal outcomes people tend to change both normal and exceptional events to become more exceptional. However, although Gavanski and Wells' (1989) findings did support some of the predictions of norm theory (they showed that exceptional events are more mutable than normal events), their findings did present problems for the suggested *mechanisms* involved in generating counterfactuals based on norm theory. In particular, their findings suggested that at least one other mechanism may be involved, based on a correspondence between outcomes and the kind of changes made to antecedent events.

Norm theory has been hugely influential in the literature on counterfactual thinking. Kahneman and Miller's (1986) original paper has not only spawned most of the research upon which the psychological study of counterfactual thinking has been based, but also has resulted in a large number of predictions, many of which have been supported by later research. Research suggests that, although further work is needed on the mechanisms underlying the effects reported in the literature (Gavanski & Wells, 1989), much can be predicted and explained from the basic idea that people are more likely to mutate exceptional antecedent events than normal or routine antecedent events in the counterfactual thoughts.

However, although norm theory has been able to account for a large number of the mutability effects observed in counterfactual thinking, there have been some criticisms of its generality (e.g., Roese & Olson, 1993a). It is possible that there are a large number of events in the world that cannot be classified as either exceptional or normal. Even if all events could be classified in this way, norm theory does not predict which of a set of events, having the same degree of normality, would be the subject of people's counterfactual mutations. Roese and Olson (1993a) suggested that the categorisation of mutations, into uphill, downhill and horizontal changes, used by Kahneman and Miller (1986; see also Kahneman & Tversky, 1982) is neither the most parsimonious nor clear cut way of describing the mutations that people make.

Finally, although Kahneman and Miller's (1986) norm theory suggests a possible mechanism from which the observed *mutability effects* in counterfactual thinking may arise, by itself the comparison between norms and exceptions is not adequate to explain the *consequences* of counterfactual thinking. For example, although the principle of *emotional amplification* can account for the situations in which people may experience stronger emotions about an outcome, it does not predict which emotion will be experienced (e.g., guilt or shame - Niedenthal et al., 1994). In addition, this principle cannot account for the differing emotional consequences of considering upward and downward counterfactuals (e.g., Markman et al., 1993). People's emotional reactions in these situations are based, not on comparisons between norms and exceptions, but on comparisons between better and worse states of affairs.

In conclusion, although norm theory has been very influential and has inspired much of the research that is now considered basic to the understanding of how people think about what might have been, there are some serious questions about the mechanisms it suggests and about its generality in explaining the totality of findings concerning counterfactual "if only" thinking.

Mental Models Theory

A second theory, proposed by Byrne and her colleagues (e.g., Byrne, 1997; Byrne, Culhane & Tasso, 1995; Byrne & McEleney, 1997; 1999; Byrne et al., in press), is the *mental models theory* of counterfactual generation. The mental models theory was originally designed to account for people's performance on a wide range of reasoning tasks (e.g., Johnson-Laird, 1983; Johnson-Laird & Byrne, 1991) as an alternative to the mental logic or rule-based theories of reasoning that were prevalent at the time (e.g., Braine & O'Brien,

1991; Rips, 1993). These rule-based theories suggested that each connective, such as “if” or “or”, has an associated formal rule of inference and that deduction proceeds by the steps of firstly recovering the underlying logical form of the premises presented, and then applying these formal rules to try to derive a conclusion from the premises. If reasoners cannot derive a conclusion from the rules they possess, then they will respond that the inference is invalid. For example, when given the premises:

- 6. If it is hot, then I wear a T-shirt.
It is hot.

people find it easy to derive the valid conclusion:

- 7. Therefore I wear a T-Shirt.

Rule theorists argue that this is because the mind is equipped with a mental rule corresponding to the *modus ponens* inference:

- 8. If p then q
p
Therefore q

Other inferences such as *modus tollens* (from “not-q” to “not-p”) are more difficult because people do not have a mental rule that corresponds to them and hence they must combine several different rules in order to arrive at a logically valid conclusion.

The mental models theory instead denies that people’s minds contain any such formal inference rules (e.g., Johnson-Laird, 1983; Johnson-Laird & Byrne, 1991). The theory instead suggests that people reason from their understanding of a situation, in that they construct mental models, which are representations that are close to the structure of the world rather than to the language used to describe the world (Johnson-Laird, 1983). In making a deduction, people firstly construct models based on their understanding of the situation, they then formulate a conclusion on the basis of those models. Finally, people evaluate the conclusion they have drawn by searching for alternative models in which that conclusion does not hold.

For example, the conditional described above:

- 9. If it is hot, then I wear a T-shirt.

is consistent with a number of different possible models of the situation, as shown below (with separate models on separate lines)⁴ :

10.
- | | |
|---------|-------------|
| hot | T-shirt |
| not hot | not T-shirt |
| not hot | T-shirt |

However, the mental models theory argues that people rarely construct all of the possible models of a situation due to the constraints of working memory (e.g., Johnson-Laird & Byrne, 1991). Instead, people may represent some models explicitly in their initial representation of the situation and other models implicitly, for example:

11.
- | | |
|-----|---------|
| hot | T-shirt |
| ... | |

where there is one explicit model that corresponds to the information provided in the conditional premise and a second model (the implicit model) represented by the three dots, that indicates that there may be other possible models (e.g., Johnson-Laird, Byrne & Schaeken, 1992). When people are presented with a premise, as in the example used above:

12.
- | |
|------------|
| It is hot. |
|------------|

they construct a model of it:

13.
- | |
|-----|
| hot |
|-----|

They combine it with the models they have constructed in order to form a conclusion. As, in this example, the additional information provided in the second premise corresponds to something in the explicit model in 11 above, people easily form the conclusion that “Therefore I wear a T-shirt”. The case is different for the modus tollens inference, where the second premise instead reads:

14.
- | |
|-------------------------|
| I do not wear a T-shirt |
|-------------------------|

they construct a model of the premise:

15.
- | |
|-------------|
| not T-shirt |
|-------------|

⁴ “not” is a propositional-like tag to indicate negation (e.g., Johnson-Laird & Byrne, 1991)

In this case, the information from the second premise does not correspond to anything contained in the explicit model. In order to reach the valid conclusion (“Therefore it is not hot”) people must consider more possibilities and therefore need to flesh out the implicit model to be more explicit. In the fully explicit set of models shown in 10 above, there is a model that contains information corresponding to that provided in the second premise:

16. not hot not T-shirt

If reasoners flesh out their models to contain this possibility, they should be able to draw a valid conclusion. The mental models theory suggests that inferences such as *modus tollens* are difficult because they require people to flesh out their models and to keep more than one situation in mind. People make errors in reasoning often because they rely only on their initial models of situations when drawing conclusions (e.g., Johnson-Laird & Byrne, 1991). The idea that people rely on models such as these in their deductive reasoning has been both tested experimentally, and modelled computationally (Johnson-Laird & Byrne, 1991). Mental models theory has, to date, been shown to more effectively account for the data on the difficulty of various kinds of inferences and on the errors that people make, than any of the rule based theories (e.g., Evans, Newstead & Byrne, 1993).

Recent evidence supports the novel predictions of the mental models theory (e.g., Girotto, Mazzocco & Tasso, 1997) and it has been extended to a number of new domains, for example, probabilistic reasoning (Johnson-Laird, 1994), probabilistic thinking (Johnson-Laird, Legrenzi, Girotto, Legrenzi & Caverni, 1999) and prediction (Rodrigo, de Vega & Casteñeda, 1992). With its emphasis on the consideration of alternative possibilities, mental models theory therefore seems ideally placed to try to account for the phenomena of counterfactual thinking.

Byrne (1996) suggested two key principles about counterfactual generation. The first is that the generation of counterfactual scenarios is *goal driven* in that people seek to change events that will effectively undo an outcome⁵. Secondly, there is a *recoverability* constraint on the generation of counterfactual scenarios, and therefore people make only minimal mutations to the factual situation in their counterfactual thoughts so that the factual situation will later be recoverable from the counterfactual scenario generated (c.f., Lewis, 1973; Pollock, 1986; Stalnaker, 1968). Given these two principles, Byrne (1996) argued that the counterfactual thoughts that people generate arise out of the models that they have constructed to represent the factual situation.

⁵ Note that this may not be the case for *semifactual* scenarios, where the outcome need not be undone.

As the mental models theory suggests, when people understand a factual situation, they construct an initial set of models that represents as little information as possible explicitly due to the constraints of working memory. When they come to generate counterfactual scenarios, again due to working memory limitations, they do not construct all possible counterfactual models. In people’s initial counterfactual models they may focus on mutating only what is explicit in their models of the factual situation (Byrne & McEleney, 1997), in line with the recoverability constraint, and people may do so in such a way as to effectively undo the outcome of the scenario, thus achieving the goal of counterfactual thinking.

The description of models theory as it applies to counterfactual thinking given above is somewhat abstract. It becomes a bit clearer when we consider an example to which it has been applied. Byrne and McEleney (1997), for example, applied the mental models theory to the action effect in counterfactual thinking . In a college choice scenario like that used by Gilovich and Medvec (1994; see page 18) they showed that most people respond that Paul, the individual who acted (by switching universities), would regret his decision more than John, the individual who did not act (and stayed at the same university).

Byrne and McEleney (1997) suggested that the action effect occurs because people represent actions explicitly in their models and inactions implicitly. They suggested that both the starting point for the two individuals described in the scenario (being at their original university) and the outcome (being unhappy) may be represented in people’s initial models of the factual situation. They suggested that the action of switching universities may be represented explicitly, whereas remaining at the same university may be represented implicitly. So the initial models of John and Paul’s factual situations may be of the following sort:

15.	<i>John</i>	factual:	in college A	unhappy
	<i>Paul</i>	factual:	in college A	unhappy
			switch to B	unhappy

Multiple models are difficult to keep in mind due to working memory constraints (e.g. Johnson-Laird & Byrne, 1991), so people do not construct all of the possible counterfactual models. Instead, they construct initial counterfactual models based on what they can mutate most easily in their factual models. It has been shown that people find it easier to subtract events in their counterfactual thoughts than to add them (Kahneman & Miller, 1986; Roese, 1994), perhaps because this results in them having to keep less models in mind. In

generating counterfactuals people may be more likely to subtract an event from their representation of Paul's situation (i.e., undoing his decision to switch universities, "if Paul had stayed at his old university he might have been happy"), rather than to add an event to John's situation (i.e., imagining that he had decided to switch universities). As people can more readily imagine how things could have turned out better for Paul than for John, they judge that Paul would feel more regret about his current situation. Byrne and McEleney (1999) were able to extend this analysis to account for some related phenomena, for example, that there is a reversal to an inaction effect in the long term for negative outcome, but not for positive outcomes.

The mental models theory of counterfactual thinking has not only been used to account for the action effect (Byrne & McEleney, 1997; 1999), but also for the temporal order effect (Byrne, Culhane & Tasso, 1995; Byrne et al., in press) and for a new spatial effect that was predicted by the theory (that descriptions of spatial arrays that are consistent with only one model - *determinate* - would be subject to more complex mutations than those that are consistent with more than one model - *indeterminate* ; Byrne, 1997). However, the mental models theory, at least in this domain, is a relatively new theory and it still requires much work. It has been applied to only a few of the observed phenomena of counterfactual "if only" thinking. In addition, many of its predictions remain untested, and those that have been tested, such as the spatial effect mentioned above, have yet to be replicated by other researchers. There are, however, a number of appealing aspects to the theory, foremost amongst which must be that it aligns the study of counterfactual thinking with the study of other aspects of higher-level cognition (see also Legrenzi et al., 1993). By looking at the commonalities between counterfactual thinking and other kinds of cognition, such as reasoning, decision-making, and problem-solving, it may be possible in time to understand more fully the relationships between different kinds of thinking.

Aims of the Present Research

The research that we report stemmed from two observations concerning the literature that we have reviewed in this chapter. The first was that many experiments into counterfactual thinking have focused on, or uncovered something about, how people think about *controllable events* . The second was that the literature on thinking about what might have been has overwhelmingly been concerned with *counterfactual "if only" thinking* , and has relatively ignored *semifactual "even if" thinking* . In this section we will further discuss these two observations and how they led into the program of research that we carried out.

Giroto et al. (1991) defined a controllable event as, “an event the occurrence of which depends on an actor’s decision” (p. 115). Under this definition we can see that the study of controllable events within the literature on thinking about what might have been extends far beyond investigations into the controllability effect (e.g., Giroto et al., 1991; Markman et al., 1993), as other studies within the literature have focused on, or uncovered something about, how people think about decisions (e.g., Boninger et al., 1994; Davis et al., 1995; Gilovich & Medvec, 1994; Gleicher et al., 1990; Landman, 1987; N’Gbala & Branscombe, 1995; Mandel & Lehman, 1996; Wells & Gavanski, 1989).

Many of the experiments on the consequences of counterfactual thinking have examined how people think about and react to the outcomes of their decisions. For example, Boninger et al. (1994) examined how the availability of different kinds of alternatives to a decision (i.e., those that would or would not undo an outcome) affected people’s emotional reactions to that decision (see also Mandel & Lehman, 1996; N’Gbala & Branscombe, 1995; Wells & Gavanski, 1989). In addition, research into real-life counterfactual thinking has also highlighted the importance of thinking about decisions. Davis and Lehman (1995) suggested that people see their actions (or inactions) as the consequences of decisions, and hence that it is not their actions that are mutable, but rather the decisions that led to those actions (c.f., Wells et al., 1987). Following traumatic life events, people’s counterfactual thoughts often focus on decisions that were, in hindsight, inadequately thought through. Davis and Lehman suggested that this may explain why people often focus on mundane, everyday events in their real-life counterfactual thoughts, in contrast to the experimental findings (e.g., Kahneman & Tversky, 1982). People do not consider many alternatives in deciding to do what is normal, but when they decide to do something unusual or exceptional they may think that decision through more carefully.

Why are decisions so important? It may be because, in making a decision people are, by definition, considering alternatives. These alternatives may then be readily available when they later come to think about what might have been, as the “road not taken” has already been specified. We believed that, given the importance of people’s past decisions in counterfactual thinking, there was still much to learn about how people think about decisions on two main counts. Firstly, we were interested to discover more about why some decisions are more often the focus of people’s counterfactual “if only” thoughts than others. A number of factors have been considered that may affect the mutability of decisions, for example, whether those decisions were fully thought through (Davis & Lehman, 1995), and whether

they resulted in action or inaction (e.g., Landman, 1987). We were interested to see whether other factors might also be important, an issue that we addressed in the experiments reported in Chapter 2 (Experiments 1-3).

Secondly, we were interested to examine how the alternatives considered in making a decision could affect people's subsequent thoughts about what might have been. As we have mentioned, in studies such as those reported by Wells and Gavanski (1989) and Boninger et al. (1994), there has already been some interest in exploring the effects of considering alternatives to such controllable events. As we mentioned earlier there are different kinds of alternatives that people can consider, for example, upward and downward counterfactual alternatives about how things could have been better or worse (e.g., Markman et al., 1993), or counterfactual or semifactual alternatives about how the outcome could have turned out differently or the same (e.g., Branscombe et al., 1996). We were interested in exploring further how considering different alternatives in making decisions affects thinking about what might have been. In particular, we were interested in the effects of generating counterfactual and semifactual alternatives, as this ties in with the main focus of this thesis, as discussed below. This issue is taken up in Chapters 3, 4 and 5 (Experiments 4-10).

Counterfactuals and Semifactuals

The majority of research on thinking about what might have been has centred on people's counterfactual thoughts about how things could have been different "if only" something else had happened. We consider this to be in some ways a limitation of past research. As our second main goal we therefore took the comparison of counterfactual thinking to another kind of thinking about what might have been, semifactual thinking about how things could have turned out the same "even if" something else had happened. To date, there has only been one study, by Branscombe et al. (1996), that has directly compared counterfactual "if only" and semifactual "even if" thinking. This study showed that they have different consequences for the assignment of blame. Thinking counterfactually about a person's behaviour may increase the blame assigned to that person, whereas thinking semifactually the same behaviour may reduce the blame a person is assigned. We suggest that counterfactual "if only" and semifactual "even if" thinking may differ in other ways.

This idea receives further support from experiments that, we argue, have indirectly examined counterfactual and semifactual thinking, such as those by Wells and Gavanski (1989) and Boninger et al. (1994) that we discussed above. These are the experiments that compared the effects of considering alternatives that would or would not have resulted in a

different outcome. Again, these studies have shown differences in people's judgments and their emotional reactions following the presentation of such counterfactual or semifactual alternatives. However, without the inclusion of baseline conditions, for example, those in which no alternative is presented, it is difficult to establish to what extent these differences result from each kind of thinking. In our experiments, reported in Chapters 3, 4 and 5 (Experiments 4-10), we examined some of the established phenomena of counterfactual "if only" thinking. However, in our experiments we considered both counterfactual and semifactual thinking to see where the similarities and differences lie between these two kinds of thinking about what might have been.

Thinking about what might have been has been demonstrated to be important for a wide range of judgments and emotions, and to play an important role in people's everyday cognition. We would therefore argue that it is both an interesting and worthwhile field of study, and hence our overall goal in this thesis was to find out more about how people think about what might have been.

Chapter 2 Controllable Events

In the experiments reported in this chapter we examined the mutability of controllable events. In particular, we were concerned with the suggestion that some controllable events are more psychologically mutable than others (e.g., McCloy & Byrne, in press). The three experiments we report attempted to uncover some possible factors that may play a role in determining the mutability of controllable events.

Giroto, Legrenzi and Rizzo (1991) were the first to demonstrate that people tend to mentally undo events that are controllable (i.e., that result from an intentional decision), rather than events that are uncontrollable (see also Mandel & Lehman, 1996; Markman et al., 1995). They found that this controllability effect occurs regardless of whether the uncontrollable events are described as external to the protagonist (e.g., a fallen tree blocking the road) or are actions of the protagonist that are constrained by the circumstances (e.g., having to stop the car due to an asthma attack; see page 15).

Uncontrollable events also differ in their mutability. Giroto et al. (1991, Experiment 3) found differences in the frequency with which uncontrollable events were undone: People mentally undid Mr. Bianchi's return for a spare pair of glasses more often than his stop for an asthma attack. Do controllable events also differ in their mutability? The only controllable action that Giroto et al. pitted against uncontrollable events was the decision made by their protagonist (Mr Bianchi) to drink a beer in a bar. Are all controllable events equally mutable?

A recent experiment has shown that this is not the case (McCloy & Byrne, in press: Experiment 1). In this experiment, carried out as an undergraduate final year project, it was shown that some kinds of controllable events are more mutable than others. Consider Mr. Bianchi's tendency to think that he could have saved his wife if only he had not called into the bar for a drink. Suppose he had been delayed instead because he had decided to call in to his aging parents to check they were well - an equally controllable event. Would there be an equally strong tendency to think that he could have saved his wife if only he had not called in to check on his parents? These two sorts of controllable events may differ on many dimensions, but one suggestion is that the events differ in their appropriateness. The experiment tested the idea that controllable events that were considered inappropriate, such as drinking and driving (c.f. the protagonist of the scenario used by Giroto et al., 1991), would be more mutable than appropriate controllable events, such as visiting one's parents.

A scenario was designed that included three controllable events that differed in their appropriateness, one was appropriate, one was neutral and one was inappropriate, and one

uncontrollable event.¹ The scenario used read as follows:

Mr. Ryan worked in an office several miles from where he and his wife lived. Usually he went straight home from work, however, on the day in question he was delayed for a number of reasons. On leaving the office Mr. Ryan first decided to call and visit his parents who lived nearby. He then stopped and bought a newspaper. After this he hit rush hour and was delayed in a traffic jam. Following this he pulled into a drive-through restaurant for a burger. When he finally arrived home, Mr. Ryan found his wife on the floor. She had had a heart attack and was dying. He tried to help her but his efforts came too late. As commonly happens in such tragic situations, Mr. Ryan often thought and often said “if only...” in the days that followed. How did he complete this thought?

The experiment showed that participants’ “if only” completions focused significantly more often on the inappropriate controllable event, having a burger, than on the appropriate controllable event, visiting parents, or the neutral controllable event, buying a newspaper. The appropriate and neutral controllable events were undone only as often as the uncontrollable event, the traffic jam. So, when faced with the scenario, participants were more likely to say “if only I had not stopped for that burger my wife would still be alive”, than they were to focus on the other actions in the scenario. Why might inappropriate actions be more psychologically mutable than appropriate actions?

The aim of this chapter is to examine the mutability of controllable events. One suggestion is that inappropriate controllable events are more mutable than appropriate controllable events because inappropriate events are exceptional and appropriate events are normal. The tendency to mutate events that are exceptional rather than those that are routine or normal is well established in the literature on counterfactual thinking (e.g., Gavanski & Wells, 1989; Kahneman & Miller, 1986; Kahneman & Tversky, 1982). However, when Giroto et al. (1991; Experiment 2) varied whether the controllable event in their scenario was exceptional for the protagonist (i.e., if it deviated from what he habitually did) or routine, they found that it did not effect the event’s mutability. Controllable events are more mutable than uncontrollable events regardless of whether they deviate from or adhere to a person’s habitual modes of behaviour. So it seems unlikely that inappropriate controllable events are more mutable than appropriate controllable events because they are exceptional with respect to such habitual norms of behaviour.

However, previous studies that have demonstrated that exceptional events are more mutable than routine events have focused on only one kind of normality (e.g., Gavanski &

¹ The appropriateness of the events used was established in a pretest. See McCloy and Byrne (in press) for further details.

Wells, 1989; Girotto et al., 1991; Kahneman & Tversky, 1982). All of these studies have defined exceptional events as deviations from habit and normal events as adherence to habit. We will refer to this kind of normality as *intrapersonal* normality. This is however not the only kind of normality that could fit in with Kahneman and Miller's (1986) norm theory, which has been the starting point for much of the previous research. It may be that controllable events vary not only in how normal they are with respect to personal habits, but also with how normal they are with respect to prevailing social norms (McCloy & Byrne, in press). We suggest that this kind of normality is distinct from intrapersonal normality and we will refer to it instead as *interpersonal* normality.

This suggestion is consistent with Seelau et al.'s (1995) ideas about *natural law* constraints, and their suggestion that, "people's knowledge of the constant effects of the basic laws of science and nature such as gravity...constrains the counterfactuals they generate." (p. 60). We consider that, not only does people's understanding of natural laws constrain the counterfactual alternatives that they consider, but also their implicit understanding of social laws and norms for behaviour. People will therefore be more likely to change or mutate events that deviate from the social norms that they hold than those which reflect them. The mutability of controllable events may be influenced by a wide range of social constraints, for example, perceived necessity, selfishness, legality and appropriateness, which have as common the fact that they are different forms of adherence to or deviation from interpersonal social norms for behaviour, i.e., unnecessary, selfish, illegal and inappropriate acts deviate from social norms and necessary, unselfish, legal and appropriate acts do not. We argue that people focus on inappropriate events in their counterfactual "if only" thoughts because they are exceptional with respect to interpersonal norms. Appropriate controllable events are relatively immutable because they are normal with respect to interpersonal norms.

The three experiments reported in this chapter had the primary aim of examining whether the effects of *interpersonal* normality are distinct from those of *intrapersonal* normality in determining counterfactual mutability. These experiments also aimed to examine whether the effects of interpersonal normality (McCloy & Byrne, in press) would generalise from situations with outcomes that were negative and exceptional (as in Girotto et al., 1991; McCloy & Byrne, in press, Experiment 1) to those that had positive outcomes and those that had normal outcomes. Thirdly, we aimed to examine whether the effects of interpersonal normality would generalise, from events that deviated from the norm in terms of their *appropriateness* (McCloy & Byrne, in press), to those that deviated along another

dimension, that of *selfishness*. Fourthly, we aimed to see if the effects of interpersonal normality can interact with other constraints on the counterfactual alternatives people generate. In general, the research literature on counterfactual thinking has been concerned with teasing out the different factors that can effect counterfactual mutability and not with how these factors may interact. The third experiment examined whether the effects of interpersonal normality would interact with those of temporal order (e.g., Miller & Gunasegaram, 1990)².

Experiment 1

In this experiment we based our scenarios on those constructed by Gavanski and Wells (1989) to demonstrate the *norm correspondence* effect (see pages 13-14). In these scenarios, Gavanski and Wells (1989) found that when the outcome was described as exceptional (e.g., a good student failing an exam), their participants focused on exceptional antecedent events in their counterfactual thoughts. However, when the outcome was described as normal (e.g., a poor student failing), participants focused instead on normal antecedent events. Gavanski and Wells (1989) suggested that this effect occurs because people assume that exceptional outcomes are caused by exceptional antecedent events, and that normal outcomes are caused by normal antecedent events. So when they want to undo an exceptional outcome they focus on antecedent events that were likewise exceptional and when they want to undo a normal outcome they focus on antecedent events that were normal.

Gavanski and Wells (1989) showed that the norm correspondence effect held for antecedent events which were exceptional or normal with respect to *intrapersonal* norms (i.e., whether they were habitual or not), and for outcomes that were again exceptional or normal with respect to *intrapersonal* norms (i.e., whether they were the same as or different to a person's previous performance). We decided to use the norm correspondence effect to test whether the effects of varying *interpersonal* normality are distinct from those of *intrapersonal* normality. We suggest that antecedent events which are normal or exceptional with respect to *interpersonal* norms (i.e., appropriate or inappropriate) will not show a correspondence when paired with outcomes that are normal or exceptional, not with respect to *interpersonal* norms, but with respect to *intrapersonal* norms (i.e., the same as or different to previous performance). Therefore we predict that, in a scenario like the one used by Gavanski and Wells (1989), inappropriate controllable events will more often be the

² This experiment was carried out at the University of Malaga, Spain, in collaboration with Susana Segura and Pablo Fernandez Berrocal.

focus on people's counterfactual thoughts than appropriate controllable events for both exceptional and normal outcomes. If interpersonal and intrapersonal normality were one and the same thing, we would instead expect that people would focus on inappropriate events to undo exceptional outcomes (McCloy & Byrne, in press), and that they would instead focus on appropriate events to undo normal outcomes.

Gavanski and Wells (1989) are not the only researchers to show a correspondence between the outcome of a scenario and the antecedent events that people mutate. Bouts, Spears and Van der Pligt (1992) showed, using a similar scenario methodology, that people are more likely to focus on negative antecedent events to undo evaluatively negative outcomes (i.e., failure) and positive antecedent events to undo positive outcomes (i.e., success). In this experiment we were also interested in testing an alternative hypothesis, that the effects of varying appropriateness on the mutability of controllable events arise instead because of a *valence* correspondence effect (Bouts et al., 1992; see also Klauer, Jacobson & Migulla, 1995). In previous experiments (Giroto et al., 1991; McCloy & Byrne, in press) the outcomes of the scenarios used were negative. It is possible that inappropriate events (such as drinking and driving) are seen as negative and that neutral and appropriate events (such as visiting parents) are seen as positive. If that were the case, participants in earlier experiments might have been focusing on the inappropriate events rather than the appropriate event because they, like the outcome of the scenario, were negative. In order to rule out this potential explanation of the results we decided to use, not only scenarios with negative, failure outcomes, but also scenarios with positive, success outcomes. If participants in earlier experiments were focusing on inappropriate events because of a valence correspondence effect, we would expect that, when faced with a positive outcome, they would focus on appropriate events instead. However, if this valence correspondence explanation does not hold we would predict that inappropriate events will be undone more often than appropriate events for both negative (failure) and positive (success) outcomes.

In summary, in this experiment we examined whether inappropriate controllable events are more mutable than appropriate controllable events, not only for outcomes that are intrapersonally exceptional and those that are negative (McCloy & Byrne, in press), but also for outcomes that are intrapersonally normal and those that are positive. We suggest that, if this is the case, it is consistent with an explanation of this effect (that inappropriate events are more psychologically mutable than appropriate events) based on the *interpersonal* normality of such events, and rules out explanations based on *intrapersonal norm* correspondence (Gavanski & Wells, 1989), and on *valence* correspondence (e.g., Bouts et al., 1992).

Method

Materials and Design

We constructed a scenario based on those used by Gavanski and Wells (1989) and Roese and Olson (1993a) that described four events other than routine preparation that preceded the exam performance of a student, Karen. Two of the events were inappropriate: one facilitated her exam performance (cheating in the exam) and one inhibited it (drinking the night before); two of the events were appropriate: again, one facilitated her exam performance (looking up extra references) and one inhibited it (giving blood before the exam). The scenario we used read as follows (*exceptional failure* - see appendix 1a):

Karen is a third year student at university. She is a good student in most respects, coming near top in her class in her last two years. Karen has an important exam coming up the next afternoon. She decides to go and look up some extra reference materials in the library which is something she rarely does. She then completes her studying and goes home. On arriving home, despite not being much of a drinker, Karen decides to see if a few glasses of wine will help her settle. They have the desired effect and she is soon soundly asleep.

The next morning she hears a call for blood donors on the radio. Although she has never given blood before, she decides to do so and calls in at the local blood donation centre on her way to college. She then goes on to her exam. The exam itself is about as difficult as she had expected. Her book bag is at her feet and, although it is not something she would usually do, she glances at her notes to find the answer for one of the questions. She then completes the rest of the paper.

When the results of the exam are announced several weeks later Karen discovers that she has unusually failed.

We constructed four versions of the scenario that differed only in their outcomes in terms of whether or not the protagonist passed the exam (i.e., success or failure) and how exceptional or normal this was for her: exceptional failure, normal failure, exceptional success, normal success. The normal or exceptional status of success or failure by the protagonist was established by describing the protagonist as either “a good student in most respects, coming near top in her class in her last two years” (making success normal and failure exceptional) or “a poor student in most respects, coming near bottom in her class in her last two years” (making success exceptional and failure normal). Following the scenario, participants were asked to list any things that they could think of that could have been different to change Karen’s performance on the exam. There were four independent variables: two were between-participants variables - the valence of the outcome (i.e., success or failure) and the intrapersonal exceptionality of the outcome (i.e., exceptional or normal) -

and two were within-participants - the appropriateness or inappropriateness of the target event and the facilitatory or inhibitory nature of the target event. The dependent variable was the frequency with which participants mentioned each of the four target events as their first response to the mutation question³.

Participants and Procedure

The participants were 199 undergraduates from the University of Dublin, Trinity College and Dublin City University (112 women, 77 men) who took part in the experiment voluntarily. They had an average age of 20 years (range 17-44). Participants were randomly assigned to one of the four outcome conditions (exceptional failure, $n = 51$; normal failure, $n = 47$; exceptional success, $n = 52$; normal success, $n = 49$). Participants were presented with a two page booklet consisting of a cover page with instructions and space for recording age and gender and a second page with one of the four versions of the scenario and space for recording answers. On completion of the experiment participants were given an explanatory paragraph for debriefing purposes. Participants were instructed to write down their answers as they occurred to them and not to change their answers once they had written them.

Results and Discussion

Manipulation Check

We employed a post-test manipulation check to establish whether the events used in the scenario differed significantly in their appropriateness. 148 undergraduates from University of Dublin, Trinity College took part in the post test voluntarily (the results from 20 participants were subsequently disregarded because they failed to follow the instructions). Each participant received two questionnaires, one concerning the actions that inhibited success (donating blood, having a few drinks) and another concerning the actions that facilitated success (looking up extra references, cheating in the exam).

For the inhibitory actions, the two actions mentioned in the scenario were presented along with three other actions that could inhibit performance on an exam (watching television, spring cleaning, helping a friend). Participants were asked to imagine that they were sitting an exam tomorrow and were asked to rank the five actions in the order in which they believed them to be acceptable reasons for not doing well, from 1 for the most acceptable to 5 for the least acceptable.

³ Like many previous studies we use participants' first responses as our mutation measure throughout this thesis (e.g., Kahneman & Miller, 1986). We argue that a person's first response reflects the alternative state of affairs that comes most readily to their mind.

For the facilitatory actions, the two actions used in the scenario were again presented along with three other actions. This time the actions were ones which would potentially facilitate performance on an exam (getting a good night's sleep, complimenting the lecturer, cramming the night before). Participants were again asked to imagine that they were sitting an exam tomorrow and were asked to rank the five actions in the order in which they believed them to be acceptable means of improving their performance, from 1 for most acceptable to 5 for least acceptable.

We compared the mean ranks that participants gave to the two scenario actions in each questionnaire using a Wilcoxon signed ranks test. As expected, participants considered that our inappropriate inhibitory action (having a few drinks, mean rank 3.51) was significantly less acceptable than our appropriate inhibitory action (giving blood, mean rank 2.15; Wilcoxon, $z = 6.46$, $p < 0.0001$). Participants considered that our inappropriate facilitatory action (cheating in the exam, mean rank 4.52) was significantly less acceptable than our appropriate facilitatory action (looking at extra references, mean rank 2.08; Wilcoxon, $z = 9.29$, $p < 0.0001$).

First counterfactual alternatives

For the exceptional failure scenario, participants' first responses focused most often on the *inappropriate inhibitory* action (having a few drinks, 37%; see Table 2.1). They mentioned this significantly more often than the appropriate inhibitory action (giving blood, 16%; binomial, $n = 27$, $z = 2.12$, $p < 0.02$) and the inappropriate facilitatory action (cheating in the exam, 2%; binomial, $n = 20$, $z = 4.02$, $p < 0.00003$). Somewhat unexpectedly, they mentioned the *inappropriate inhibitory* action only as often as the *appropriate facilitatory* action (looking up extra references, 31%; binomial, $n = 35$, $z = 0.51$, $p < 0.31$). The *appropriate facilitatory* action was mentioned significantly more often in participants' first responses than both the appropriate inhibitory action (31% versus 16%; binomial, $n = 24$, $z = 1.63$, $p < 0.05$) and the inappropriate facilitatory action (31% versus 2%; binomial, $n = 17$, $z = 3.64$, $p < 0.0002$). As in previous experiments (McCloy & Byrne, in press; Experiment 1), the most frequently mutated event is an inappropriate one, the results of this experiment fail to replicate those of earlier results in one important respect. In this experiment the most often mutated inappropriate event is mutated only as often as one of the appropriate events in the scenario (the appropriate facilitatory action). We will return to this unexpected result shortly.

Table 2.1: Percentage of participants' first responses mentioning each of the target events in Experiment 1

	<i>Exceptional</i>		<i>Normal</i>		<i>Total</i>
	Failure	Success	Failure	Success	
n	51	52	47	49	199
<i>Inhibitory</i>					
Inappropriate (having drinks)	37	25	15	29	27
Appropriate (giving blood)	16	8	15	6	11
<i>Facilitatory</i>					
Inappropriate (cheating)	2	13	0	22	10
Appropriate (extra references)	31	27	28	29	29
Total	86	73	57	86	76

Exactly the same pattern was observed in the exceptional success scenario, as Table 2.1 shows. Participants' first responses focused equally as often on the *inappropriate inhibitory* action (25%) and the *appropriate facilitatory* action (27%; binomial, $n = 27$, $z = 0.19$, $p < 0.42$). They mentioned the inappropriate inhibitory action more often than the appropriate inhibitory action (25% versus 8%; binomial, $n = 17$, $z = 2.18$, $p < 0.01$) and the inappropriate facilitatory action (25% versus 13%), although for the inappropriate facilitatory action this difference is not significant (binomial, $n = 20$, $z = 1.34$, $p < 0.09$). Participants mention the appropriate facilitatory action (27%) more often than the appropriate inhibitory action (8%; binomial, $n = 18$, $z = 2.36$, $p < 0.01$) and the inappropriate facilitatory action (13%; binomial, $n = 21$, $z = 1.53$, $p < 0.06$). Following exceptional outcomes (whether positive or negative), our participants therefore focused equally often on *inappropriate inhibitory* and *appropriate facilitatory* actions in their first responses to the mutation question.

For the normal failure scenario participants' first responses focused mainly on the *appropriate facilitatory* action (looking up extra references, 28%; see Table 2.1). They mentioned it significantly more often than the inappropriate facilitatory action (0%; binomial, $n = 13$, $z = 3.61$, $p < 0.0002$), but not significantly more often than the *inappropriate inhibitory* action and the *appropriate inhibitory* action (both 15%; binomial, $n = 20$, $z = 1.34$, $p < 0.09$). They mention both the *inappropriate* and *appropriate inhibitory* actions significantly more often than the inappropriate facilitatory action (15% versus 0%; binomial, $n = 7$, $z = 2.65$, $p < 0.004$). Interestingly, although the majority of our participants' responses (76%) focused on one of the four target events in the scenario, in the normal

failure scenario almost half of the first responses (43%) did not mention one of the target events and instead consisted of advice or suggestions as to how to avoid failure in future (e.g., if she had studied harder during the year then she would have passed), replicating earlier findings with such material (e.g., Roese & Olson, 1993a).

Finally, for the normal success scenario, participants' first responses focused equally on the *inappropriate inhibitory* action (29%), the *inappropriate facilitatory* action (22%) and the *appropriate facilitatory* action (29%; see Table 2.1). They mentioned the inappropriate inhibitory action more often than the appropriate inhibitory action (29% versus 6%; binomial, $n = 17$, $z = 2.67$, $p < 0.004$) and equally as often as the inappropriate facilitatory action (29% versus 22%; binomial, $n = 25$, $z = 0.6$, $p < 0.27$) and the appropriate facilitatory action (29% in both cases). They mentioned the inappropriate facilitatory action more often than the appropriate inhibitory action (22% versus 6%; binomial, $n = 14$, $z = 2.14$, $p < 0.02$) and equally as often as the appropriate facilitatory action (22% versus 29%; binomial, $n = 25$, $z = 0.6$, $p < 0.27$) and they mentioned the appropriate facilitatory action significantly more often than the appropriate inhibitory action (29% versus 6%; binomial, $n = 17$, $z = 2.67$, $p < 0.004$). For the normal outcome scenarios, participants' first responses focused equally as often on three out of the four target events in the scenario. For the normal failure scenario, two of these events were inhibitory events, whereas for the normal success scenario, two were facilitatory events. These results may reflect a tendency to focus on inhibitory events in order to undo failure, and on events that facilitate success in order to undo success (c.f., Roese & Olson, 1993a).

Norm and Valence Correspondence

The results show that participants' mutations of appropriate and inappropriate events do not follow patterns predicted on the basis of either an *intrapersonal norm* correspondence approach or a *valence* correspondence approach. People do not focus on inappropriate (exceptional) actions rather than on appropriate (normal) actions following exceptional outcomes (39% versus 42%; binomial, $n = 82$, $z = 0.22$, $p < 0.5$); nor do they focus on appropriate (normal) actions more than inappropriate (exceptional) actions following normal outcomes (33% versus 39%; binomial, $n = 69$, $z = 0.6$, $p < 0.4$). This rules out the possibility that the pattern of results is determined by *intrapersonal norm* correspondence.

The results also rule out the idea that the pattern is determined by *valence correspondence* : Participants do not focus on inappropriate (negative) actions rather than appropriate (positive) actions following negative (failure) outcomes - in fact the reverse is the

case (27% versus 45%; binomial, $n = 71$, $z = 2.01$, $p < 0.05$); nor do they focus on appropriate (positive) actions more often than on inappropriate (negative) actions following positive (successful) outcomes - again this pattern is opposite to the predictions of the valence approach, although the difference is not significant (35% versus 45%; binomial, $n = 80$, $z = 1.12$, $p < 0.2$). Overall in this study participants focus equally as often on appropriate events as on inappropriate events (40 % versus 36%; binomial, $n = 150$, $z = 0.65$, $p < 0.3$).

Overall the results of this experiment show that participants focus equally on the inappropriate inhibitory action (having a few drinks, 27% overall) and on the appropriate facilitatory action (looking up extra references, 29% overall; binomial, $n = 110$, $z = 0.38$, $p < 0.35$). Their focus on the inappropriate inhibitory action is as we expected, but their equal focus on the appropriate facilitatory action is surprising. One possible explanation for this unexpected result is that, since the appropriateness of events was only established after the fact, our manipulations were not effective in influencing participants' interpretations of the events of the scenario. Support for this potential explanation comes from the pattern of focus of participants' counterfactuals with respect to inhibitory and facilitatory events in this experiment. In order to undo successful outcomes it has been shown that people focus on events that facilitated that success in their counterfactual thoughts. To undo a failure they instead focus on events that inhibited success in their counterfactual thoughts (e.g., Roese & Olson, 1993a). However, in our experiment this pattern does not hold. For success outcomes, participants focus equally as often on inhibitory actions (34%) as on facilitatory actions (30%; binomial, $n = 64$, $z = 0.5$, $p < 0.31$) and for failure outcomes they focus as often on inhibitory actions (42%) as on facilitatory actions (47%; binomial, $n = 87$, $z = 0.54$, $p < 0.29$). From inspection of participants' first responses it does seem that participants may have reached interpretations of the events of the scenario other than those intended. For example, in response to the *appropriate facilitatory* action (checking extra references), at least 21% of participants provided responses indicating that they believed that it would inhibit exam success e.g., "Extra reference material in the library could have confused Karen more - should have just studied what she had". Although we based our scenario on that by Gavanski and Wells (1989), it may be that, as this was a situation with which our participants, as students, were familiar, they were bringing in their own experiences which altered their perceptions of the events in the scenario. Accordingly, we carried out a second experiment using different materials designed to overcome this potential difficulty. Another concern was that we could not control for the position of the events in the

scenario in this experiment. The nature of the scenario we used required the events to take a particular sequence in time e.g., studying for an exam will always precede cheating in the exam itself. As previous researchers have shown (e.g., Miller & Gunasegaram, 1990; Wells et al., 1987) the position in a dependent (causal) or independent (temporal) sequence that an event takes can effect how mutable that event is. Accordingly, in the second experiment, we used materials whose events could occur in any order.

Experiment 2

The aim of the second experiment⁴ was, once again, to examine how the appropriateness of controllable events affects their mutability. The second experiment differed from the first in a number of ways. Firstly, we used a scenario with a more neutral and less familiar content to avoid interference from participants' own experiences. To this end we used a scenario concerning the attempts of a man, Alan, to get to a sale on time (c.f., Wells et al., 1987). Secondly, the scenario used this time was such that the order of the events could be varied to control for any effects of position within the scenario on participants' counterfactual mutations (Miller & Gunasegaram, 1990; Wells et al., 1987). Thirdly, instead of testing for differences in appropriateness between the target events after the experiment in a manipulation check, this time we employed a pretest measure of appropriateness in order to select four target events for inclusion in the scenario.

Once again, our primary dependent measure was the frequency with which participants mentioned the target events in their first responses to the counterfactual mutation question. Our hypotheses were the same as for the previous experiment, i.e., that inappropriate events (exceptional with regard to interpersonal norms) will be undone more often than appropriate events (normal with regard to interpersonal norms). Once again, we do not expect participants' mutations to show a norm correspondence effect when the normality of the outcome of the scenario is defined with respect to intrapersonal norms (i.e., habit) instead of interpersonal norms, i.e., inappropriate events will be more mutable than appropriate events for both exceptional and normal outcomes. Additionally, we do not expect participants' mutations to show a valence correspondence effect, i.e., inappropriate events will be more mutable than appropriate events for both negative (failure) and positive (success) outcomes.

In this experiment we looked at two other features of interest in counterfactual

⁴ The results of this experiment are reported in part in McCloy and Byrne (in press).

thinking about controllable events: the direction of people's counterfactual thoughts and the structure of those counterfactual thoughts. When people think about what might have been they construct counterfactuals in different *directions*: they sometimes think of how things could have been better (an *upward* counterfactual) and they sometimes think of how things could have been worse (a *downward* counterfactual, see e.g., Markman et al., 1993). These two kinds of counterfactual thoughts may have different functions: Upward counterfactuals help people to prepare for the future and they are more common after failure, and when the outcome is controllable. Downward counterfactuals help people to feel better about their current situation and they are more common after success, and for uncontrollable outcomes (Markman et al., 1993; Roese, 1994; Roese & Olson, 1995b). In this experiment we examined the direction of counterfactuals as well as their frequency.

Roese and Olson (1993a) found that the *structure* of participants' mutations was affected by whether the outcomes were successes or failures and whether the antecedents were inhibitory or facilitatory events (see also Dunning & Parpal, 1989). They found that participants changed a *successful* outcome by constructing *subtractive* counterfactuals (e.g., "Andrea might have failed if she had not looked for the extra reference material"), whereas they changed a *failure* outcome by constructing *additive* counterfactuals (e.g., "Andrea might have succeeded if she had mentally studied while doing her chores"). Participants changed *inhibitory* events by constructing *subtractive* counterfactuals (e.g., "if only she had not been nervous, her concentration would have been better") and they changed *facilitatory* events by constructing *additive* counterfactuals (e.g., "if only she had tested herself with the old examination, she would have known whether she needed to study more"). In this experiment we also examined the structure of mutations: whether they were additive, subtractive or substitutive (a subtraction followed by a subsequent addition).

To summarise, in this experiment our first aim was to replicate the finding that inappropriate controllable events are more mutable than appropriate controllable events (McCloy & Byrne, in press), and to attempt to generalise this finding to scenarios with positive and (intrapersonally) normal outcomes. Secondly, we aimed to test alternative explanations of the role of appropriateness in the controllability effect, based on the correspondence between the antecedents and outcome in terms of their exceptionality or normality, and the correspondence in terms of their valence and to try to demonstrate that appropriateness based on interpersonal norms is distinct from normality based on

intrapersonal norms such as habit. To this end, we constructed scenarios with appropriate and inappropriate antecedents, which had either normal or exceptional outcomes, and either good or bad outcomes. Our third main aim was to examine the relationship between the structure (additive, subtractive, substitutive) and direction (upward, downward) of counterfactual thoughts and the nature of the events in the scenario.

Method

Materials Pretest

We used a pretest to establish two appropriate and two inappropriate controllable events to include in the scenario. Of these, one of each inhibited success, and the other facilitated success. For the inhibitory actions participants were presented with six actions which could have stopped someone from being on time: going for a drink, buying a newspaper, posting a letter, buying cigarettes, picking up a book from the library, stopping for fast food. Their task was to rank the six actions in the order in which they believed that they were acceptable excuses for being late. For the facilitatory actions they were presented with six actions, each of which could be a way of making up lost time: taking a shortcut, going through a stop sign, overtaking a slow driver, ignoring a red light, taking a ring road, driving above the speed limit. Their task was to rank the six actions in the order in which they believed them to be acceptable ways to make up time. The participants received the two ranking tasks in random order. The 28 undergraduate students (21 women and 7 men) from the University of Dublin, Trinity College, who took part in this pretest voluntarily were aged 21 years on average.

For each action a low mean rank indicated that participants found the action to be appropriate (the ranks can range from 1 to 6) and a high mean rank indicated they found it to be inappropriate. We included in the scenario the inhibitory action, stopping to post a letter, ranked as the most appropriate (mean rank 1.9) and inhibitory action, stopping to buy cigarettes, ranked as the (second) most inappropriate (mean rank 4.1), and the difference in rankings for these two events was reliable (Wilcoxon, $z = 4.093$, $p < 0.0001$)⁵. We included the facilitatory action, taking a shortcut, ranked as most appropriate (mean rank 1.4) and the facilitatory action, driving through a red light, ranked as least appropriate (mean rank 5.6) and the difference in rankings for the two

⁵ We did not use the most inappropriate inhibitory action, stopping for a drink (mean rank 5.9), because drinking and driving may be a particularly salient inappropriate event, being the subject of various health and safety promotion campaigns.

events was reliable (Wilcoxon, $z = 4.713$, $p < 0.0001$; see appendix 2 for the mean ratings of all of the events used in the pretest) .

Materials and Design

We constructed a scenario based on Wells et al. (1987) that described four events that occurred when an individual, Alan, was on his way to a sale in a stereo shop (a scenario we chose because of the ease with which the order of the four antecedents can be varied). Two of the events were inappropriate: one facilitated him successfully getting there on time (running a red light) and one inhibited it (stopping at a tobacconists to buy cigarettes); two were appropriate: one facilitated him getting there (taking a shortcut) and one inhibited him (stopping to post a letter). The events were chosen to be ones that could be readily carried out in any temporal sequence, and we varied their positions in the scenario at random.

We constructed four versions of the scenario that differed only in their outcomes in terms of whether or not the protagonist made it to the sale on time (i.e., success or failure), and how exceptional or normal this was for him: exceptional failure, normal failure, exceptional success, or normal success. The normal or exceptional status of success or failure for the protagonist was established by describing his past attempts at getting to the sale on time as either always successful or as always failures. An example of one of the scenarios (the exceptional failure scenario - see appendix 1b) is as follows:

Alan likes music a lot. There is one stereo shop in particular that he frequents. This shop has a good sale on a limited amount of stock once a year. It is very popular and the best deals usually go within the first half hour. Alan tries to make it to the sale on time every year. So far he has always succeeded.

It is the morning of the sale and there are a number of things that Alan wants to do. He gets into his car and leaves home in good time to make it to the sale. Alan starts his morning by taking a shortcut through some side streets. He then goes to the post office to post a letter. Next, Alan stops at a tobacconists to buy some cigarettes. Coming up to the stereo shop, Alan drives through a red light. Alan arrives at the shop half an hour after the sale starts only to find that the last stereo had just been sold.

Alan is really annoyed, he thinks "Things would have been different if..."

Participants were asked to provide four likely completions of Alan's thoughts. In addition, participants were asked to record next to each of the answers that they had given whether this answer described how things could have been worse or whether it described how things could have been better.

The experiment had two between-participant variables and two within-participant variables. One between-participant variable was the valence of the outcome (i.e. success or failure), and the other was the exceptionality of the outcome (i.e. exceptional or normal). One within-participant variable was the appropriateness or inappropriateness of the target antecedent event, and the other was the facilitatory or inhibitory nature of the target event. The dependent variables were the frequency with which participants mentioned each of the four target events in their first sentence completion, whether the direction of the counterfactual alternatives was upwards to a better alternative or downwards to a worse alternative, and whether the structure of the counterfactual alternatives was additive, subtractive or substitutive.

Participants and Procedure

The participants were 149 students from the University of Dublin, Trinity College (117 women and 32 men) who took part in the experiment voluntarily. Their average age was 20 years (range 17-49). They were randomly assigned to one of the four outcome conditions (exceptional failure $n = 40$; normal failure $n = 37$; exceptional success $n = 36$; normal success $n = 36$). Participants were presented with a page with instructions and space for recording age and gender at the top, followed by one of the versions of the scenario with space for recording four answers. This was followed by the question about whether each answer given had described how things could be better or worse. They were instructed to write down answers as they occurred to them and not to change their answers once they had written them.

Results and Discussion

First counterfactual alternatives

For the *exceptional failure* scenario participants changed the *inappropriate inhibitory* action most often overall (38%: see Table 2.2). For example, they suggested he would have got there on time if he hadn't stopped at the tobacconists. They changed it more often than the appropriate inhibitory action, posting a letter (13%; binomial, $n = 20$, $z = 2.24$, $p < 0.02$), the inappropriate facilitatory action, running a red light (0%; binomial, $n = 15$, $z = 3.87$, $p < 0.0001$) and the appropriate facilitatory action, taking a shortcut (0%; binomial, $n = 15$, $z = 3.87$, $p < 0.0001$). Neither of the facilitatory actions whether inappropriate (the red light) or appropriate (the shortcut) were ever changed (0% each). The appropriate inhibitory action (posting a letter) was changed more often than either of

the facilitatory actions (13% versus 0% in each case; binomial, $n = 5$, $z = 2.24$, $p < 0.02$). These results replicate the finding that people focus on undoing inappropriate controllable events in order to undo negative, exceptional outcomes (McCloy & Byrne, in press). They differ from those of Experiment 1, where it was shown that people also undo acceptable facilitatory events. The results also replicate the finding (Roese & Olson, 1993a) that, in order to undo failure, people focus on undoing actions that inhibited success. In this condition, neither of the facilitatory events were ever undone. The fact that we were able to replicate both of the findings discussed above suggests that changing the scenarios used in this experiment to be more neutral was effective.

Table 2.2:
Percentage of participants' first responses mentioning each of the target events in Experiment 2

	<i>Exceptional</i>		<i>Normal</i>		<i>Total</i>
	Failure	Success	Failure	Success	
n	40	37	36	36	149
<i>Inhibitory</i>					
Inappropriate (cigarettes)	38	14	43	6	26
Appropriate (posting letter)	13	3	16	3	9
<i>Facilitatory</i>					
Inappropriate (red light)	0	47	3	47	23
Appropriate (shortcut)	0	8	0	8	4
Total	51	62	72	64	

Exactly the same pattern is observed for the *normal failure* scenario (see Table 2.2): participants mutations focused on the *inappropriate inhibitory* action (the cigarettes) most often overall (43%). They changed the inappropriate inhibitory action more often than the appropriate inhibitory action, the letter (16%; binomial, $n = 22$, $z = 2.13$, $p < 0.02$), the inappropriate facilitatory action, the red light (3%; binomial, $n = 17$, $z = 3.64$, $p < 0.0002$), and the appropriate facilitatory action, the shortcut (0%; binomial, $n = 16$, $z = 4$, $p < 0.00003$). Once again, neither of the facilitatory actions, whether inappropriate (the red light) or appropriate were changed often (3% and 0% respectively). The appropriate inhibitory action, the letter, was changed more often than the inappropriate facilitatory action, the red light (16% versus 3%; binomial, $n = 7$, $z = 1.89$, $p < 0.03$), and the appropriate facilitatory action, the shortcut (16% versus 0%;

binomial, $n = 6$, $z = 2.45$, $p < 0.008$). Again, participants in this condition focused on inappropriate events more often than on appropriate events. This extends the previous findings, which were confined only to exceptional outcomes, to scenarios with normal outcomes. The results differ from those of Experiment 1 in the same way as those from the normal failure condition. Once again, following a failure outcome, participants focused on inhibitory events more often than on facilitatory events, which are again undone very rarely.

Participants mutated the *inappropriate facilitatory* action for the two success outcome conditions more often than any other event. For the *exceptional success* scenario participants mutations focused mainly on the *inappropriate facilitatory* action (47%; see Table 2.2). For example, they suggested that he would not have got there on time if he didn't go through the red light. They changed the inappropriate facilitatory action, the red light, more often than the appropriate facilitatory action, the shortcut (8%; binomial, $n = 20$, $z = 3.13$, $p < 0.001$), the inappropriate inhibitory action, the cigarettes (14%; binomial, $n = 22$, $z = 2.56$, $p < 0.006$), and the appropriate inhibitory action, the letter (3%; binomial, $n = 18$, $z = 3.77$, $p < 0.0001$). They changed the appropriate facilitatory action, the shortcut, as often as the appropriate inhibitor, the letter (8% versus 3%; binomial, $n = 4$, $z = 1$, $p < 0.16$), and the inappropriate inhibitory action, the cigarettes (8% versus 14%; binomial, $n = 8$, $z = 0.71$, $p < 0.24$). They showed a small tendency to undo the inappropriate inhibitory action, the cigarettes, more often than the appropriate inhibitory action, the letter, although the difference is statistically marginal (14% versus 3%; binomial, $n = 6$, $z = 1.63$, $p < 0.06$). Participants in this condition once again focus on inappropriate controllable events more often than on appropriate controllable events. This extends previous findings to scenarios with positive, successful outcomes. The focus of participants' responses is once again different from that in Experiment 1, as their responses focus on only one of the target events in this experiment. Note that, in this *success* condition, the focus of participants' responses changes from *inhibitory* events (as it was following *failure* outcomes) to *facilitatory* events. This is similar to the results of Experiment 1, and strongly replicates Roese and Olson's (1993a) finding that, in order to undo successful outcomes, people focus on undoing events that facilitated success.

Exactly the same pattern is found for the *normal success* scenario: Participants mutations again focused on the *inappropriate facilitatory* action, the red light (47%; see Table 2.2). They changed the inappropriate facilitatory action more often than the

appropriate facilitatory action, the shortcut (8%; binomial, $n = 22$, $z = 3.13$, $p < 0.001$), the inappropriate inhibitory action, the cigarettes (6%; binomial, $n = 19$, $z = 3.44$, $p < 0.0003$), and the appropriate inhibitory action, the letter (3%; binomial, $n = 18$, $z = 3.77$, $p < 0.0001$). They changed the appropriate facilitatory action, the shortcut, as often as the inappropriate inhibitory action, the cigarettes (8% versus 6%; binomial, $n = 5$, $z = 0.45$, $p < 0.33$), and the appropriate inhibitory action, the letter (8% versus 3%; binomial, $n = 4$, $z = 1$, $p < 0.16$). They changed the inappropriate inhibitory action, the cigarettes, as often as the appropriate inhibitory action, the letter (6% versus 3%; binomial, $n = 3$, $z = 0.58$, $p < 0.29$). In this final condition, participants' responses again focused on inappropriate controllable events more often than on appropriate controllable events, extending previous findings to scenarios whose endings are both normal and positive. Again, these results differ from those of Experiment 1, in that participants in this experiment focused primarily on changing just one of the target events. As in the other success condition, participants' responses focus on facilitatory events more often than on inhibitory events, again replicating the findings of Roese and Olson (1993a).

The results show that for failure outcomes participants focus on the inappropriate inhibitory action in their mutations, suggesting that things would have been different (i.e., he would have got there on time) if he hadn't stopped at the tobacconists to buy cigarettes. For success outcomes they focus instead on the inappropriate facilitatory action suggesting that things would have been different (i.e., he wouldn't have got there on time) if he hadn't gone through the red light. Participants focus on inappropriate controllable antecedents more than the appropriate controllable ones, for all outcomes (49% versus 13%; binomial, $n = 84$, $z = 3.27$, $p < 0.0006$). These results replicate previous findings (McCloy & Byrne, in press) in showing that inappropriate controllable events are more psychologically mutable than appropriate controllable events. In addition, they extend these findings to scenarios with normal outcomes, and to those with positive outcomes. The results also replicate previous findings (Roese & Olson, 1993a) in showing that in order to undo failure, people undo antecedent events that inhibited success, whereas, in order to undo success, people undo antecedent events that facilitated success.

Norm and Valence Correspondence

Overall the results of this experiment show that the mutability effect demonstrated

by McCloy and Byrne (in press), that controllable events which are inappropriate are more mutable than controllable events that are appropriate, is distinct from the *intrapersonal exceptionality* effect studied by other researchers (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982). If they were one and the same thing, participants would have focused on *inappropriate* events when the outcome of the scenario was described as exceptional with respect to a person's habitual modes of behaviour and *appropriate* events when the outcome was described as being normal, i.e., that their mutations would follow *norm correspondence* (Gavanski & Wells, 1989). However, this experiment showed that participants change inappropriate events more often than appropriate events for exceptional outcomes (49% versus 12%; binomial, $n = 46$, $z = 4.6$, $p < 0.00003$), and that they also change inappropriate events more than appropriate events for normal outcomes (49% versus 14%; binomial, $n = 46$, $z = 4.33$, $p < 0.00003$).

The results rule out the idea that inappropriate actions are more mutable because of a *valence correspondence* effect: this explanation predicts that participants should change inappropriate actions when the outcome is bad (failure), and appropriate actions when the outcome is good (success). The experiment shows that participants undo inappropriate actions more often than appropriate actions for bad (failure) outcomes (42% versus 14%; binomial, $n = 43$, $z = 3.71$, $p < 0.0001$), but they also undo inappropriate actions more often than appropriate actions even for good (success) outcomes (57% versus 11%; binomial, $n = 49$, $z = 5.15$, $p < 0.00003$).

Finally, the results rule out the idea that inappropriate actions are more mutable because of an interaction between normality and valence: this explanation predicts that people should undo inappropriate actions for outcomes which are both bad and exceptional, and they should undo appropriate actions for outcomes which are both good and normal. The experiment shows that people undo inappropriate actions more than appropriate actions for bad exceptional events (38% versus 13%; binomial, $n = 20$, $z = 2.24$, $p < 0.02$), but they also change inappropriate actions more than appropriate actions even for good normal events (53% versus 11%; binomial, $n = 23$, $z = 3.13$, $p < 0.001$).

The results of Experiment 2 fall into a clearer pattern than those of Experiment 1, suggesting that we may have been correct in suspecting that an extraneous variable, such as differences in participants' interpretations of events, or the fixed order of the events in the scenario, was affecting participants' responses in the first experiment. However, like

the results of Experiment 1, these results rule out any explanation of the effects of appropriateness based on either *norm* or *valence* correspondence, or on a combination of the two. For all outcomes, inappropriate controllable events are more mutable than appropriate controllable events. This is consistent with an explanation of the effects of appropriateness in terms of *interpersonal* normality, which we will return to in the discussion.

Counterfactual direction

The majority of participants (88%) completed the task of coding their responses as either better (upward) or worse (downward) than reality. As Table 2.3 shows, participants tended to imagine how things could have been better (41% upwards counterfactuals) rather than how things could have been worse (23% downwards) for the target events in their first sentence completions (binomial, $n = 84$, $z = 3.27$, $p < 0.0006$). This tendency is observed both for inappropriate actions (31% versus 19%; binomial, $n = 66$, $z = 2.50$, $p < 0.007$), and for appropriate actions (10% versus 4%; binomial, $n = 18$, $z = 2.22$, $p < 0.02$). The result is consistent with previous findings on the direction of counterfactuals for controllable events (e.g., Markman et al, 1993; Roeser & Olson, 1995b). The results show that there is no difference in the direction of participants' mutations to inappropriate and appropriate actions. Regardless of which of these two kinds of events participants undo, they do so in a way that suggests how things could have turned out better than they did.

Table 2.3: The percentage of upward and downward counterfactuals in participants' first responses for each of the four target events in Experiment 2 (Key: Upward counterfactuals first, downward counterfactuals second in parentheses)

n	<i>Exceptional</i>		<i>Normal</i>		<i>Total</i>
	Failure <i>37</i>	Success <i>31</i>	Failure <i>31</i>	Success <i>32</i>	
<i>Inhibitory</i>					
Inappropriate (cigarettes)	41 (0)	16 (0)	48 (0)	6 (0)	28 (0)
Appropriate (posting letter)	14 (0)	0 (0)	19 (0)	3 (0)	9 (0)
<i>Facilitatory</i>					
Inappropriate (red light)	0 (0)	6 (42)	0 (0)	6 (38)	3 (19)
Appropriate (shortcut)	0 (0)	0 (10)	0 (0)	3 (6)	1 (4)
Total	54 (0)	23 (52)	68 (0)	19 (44)	41 (23)

For failure outcomes, participants imagined how things could have been better (60% upward) significantly more often than they imagined how things could have been worse (0% downward; binomial, $n = 41$, $z = 6.40$, $p < 0.00001$; see Table 2.3). For example, they imagined how Alan might have arrived on time for the sale had he not stopped to buy cigarettes. For success outcomes participants instead imagined how things could have been worse (48% downward) significantly more often than they imagined how things could have been better (21% upward; binomial, $n = 43$, $z = 3.10$, $p < 0.001$). For example, they imagined how Alan might *not* have made it to the sale on time, had he not run the red light. This result is again consistent with previous findings on the direction of counterfactuals for controllable events (Roese & Olson, 1995b). The results also show that participants imagined how things could have been better for inhibitory actions (37% upward) rather than imagining how things could have been worse (0% downward; binomial, $n = 49$, $z = 7.00$, $p < 0.00001$). For facilitatory actions they instead imagined how things could have been worse (23% downward) rather than how things could have been better (10% upward; binomial, $n = 35$, $z = 4.56$, $p < 0.00003$). As people focus on inhibitory actions following failure, and on facilitatory actions following success, these results mirror those of the effects of outcome valence on counterfactual direction. Undoing failure results in an imagined better alternative world (where failure changes to success), whereas undoing success results in an imagined worse alternative world (where success changes to failure).

Counterfactual structure

Overall 64% of the first counterfactual alternatives that focused on one of the four target events were either subtractive, additive, or substitutive. As Table 2.4 shows, participants tended to remove *inappropriate* events (54% subtractive counterfactuals), e.g., he might have made it on time if he hadn't stopped to buy cigarettes. They produced more subtractive counterfactuals than additive or substitutive ones (10%), and the difference is reliable (binomial, $n = 73$, $z = 6.07$, $p < 0.00001$). They produced more subtractive counterfactuals for both the inappropriate inhibitory action (26% subtractive versus 1% additive/substitutive) and the inappropriate facilitatory action (17% subtractive versus 8% additive/substitutive).

Participants also tended to remove *appropriate* events (11% subtractive), e.g., he would have made it on time if he hadn't stopped to post the letter. They produced more subtractive counterfactuals than additive or substitutive ones (1%) and the

difference is reliable (binomial, $n = 16$, $z = 3.5$, $p < 0.0002$). They produced more subtractive counterfactuals both for the appropriate inhibitory action (9% subtractive versus 1% additive/substitutive) and the appropriate facilitatory action (2% subtractive versus 0% additive/substitutive). Just as for counterfactual *direction*, there are no differences in the *structure* of participants' responses to inappropriate and appropriate actions. The results also show that people make subtractive mutations for both inhibitory and facilitatory events. This contrasts with Roese and Olson's (1993a) finding that people make subtractive mutations to events that inhibit success and additive mutations to events that facilitate success. In this experiment, we have replicated the primary effect concerning inhibitory and facilitatory actions reported in their study (that inhibitory actions are undone to undo failure, and facilitatory actions are undone to undo success), and so our result may suggest problems in generalising from Roese and Olson's (1993a) results. As we mentioned above, Roese and Olson (1995b) showed that people generate upward counterfactuals more often than downward counterfactuals in response to controllable events. Perhaps people also generate subtractive counterfactuals more often than additive counterfactuals in response to controllable events. All of the actions described in our scenario were controllable, but this was not the case in the scenario used by Roese and Olson (1993a).

Table 2.4: The percentage of subtractive, additive and substitutive counterfactuals in participants' first responses for each of the four target events in Experiment 2 (Key: Subtractive counterfactuals first, additive and substitutive counterfactuals combined in parentheses)

n	<i>Exceptional</i>		<i>Normal</i>		<i>Total</i>
	Failure 39	Success 33	Failure 33	Success 33	
<i>Inhibitory</i>					
Inappropriate (cigarettes)	36 (3)	12 (3)	48 (0)	6 (0)	26 (1)
Appropriate (posting letter)	13 (0)	3 (0)	15 (3)	3 (0)	9 (1)
<i>Facilitatory</i>					
Inappropriate (red light)	0 (0)	36 (15)	3 (0)	33 (18)	17 (8)
Appropriate (shortcut)	0 (0)	9 (0)	0 (0)	9 (0)	2 (0)
Total	49 (3)	61 (18)	67 (3)	52 (18)	54 (10)

Considering all of our participants' first responses, not just those that focused on the four target events, 93% could be coded as either subtractive, additive or substitutive. When

the outcome of the scenario is described as normal for the protagonist, participants generate significantly more subtractive counterfactuals (59%) than additive or substitutive counterfactuals (32%; binomial, $n = 66$, $z = 2.46$, $p < 0.007$). However, when the outcome of the scenario is described as exceptional for the protagonist, participants do not generate significantly more subtractive counterfactuals (55%) than additive or substitutive counterfactuals (39%; binomial, $n = 72$, $z = 1.41$, $p < 0.08$). For success outcomes participants generated significantly more subtractive counterfactuals (58%) than additive or substitutive counterfactuals (33%; binomial, $n = 66$, $z = 2.22$, $p < 0.01$). This is also the case for failure outcomes. Participants generated significantly more subtractive counterfactuals (56%) following failure outcomes than additive or substitutive counterfactuals (40%; binomial, $n = 72$, $z = 1.65$, $p < 0.05$). These results contrast with those of Roese and Olson (1993a) who found that people make subtractive mutations following successful outcomes and additive counterfactuals following failure outcomes. Again, we suggest that this result may have arisen due to the controllable nature of the events used in our scenario.

The results of Experiment 2 replicate those of McCloy and Byrne (in press) in showing that inappropriate controllable events are more often the focus of people's counterfactual thoughts than are appropriate controllable events. The results of Experiment 2 also extend these findings to scenarios with positive and normal outcomes. The results also show that people focus on changing inhibitory actions to undo failure, and facilitatory actions to undo success (c.f., Roese & Olson, 1993a). Experiment 2 also showed that there are no differences in either the *structure* or *direction* of people's mutations to appropriate and inappropriate controllable events. In common with controllable events in general, people generate more upward counterfactuals about how things could have been better than downward counterfactuals about how things could have been worse to these two kinds of events (Roese & Olson, 1995b). They also generate more subtractive than additive or substitutive counterfactuals for both appropriate and inappropriate events.

Taken together the results of Experiments 1 and 2 are consistent with the explanation put forward as to why inappropriate events are mutated more often than appropriate events: Inappropriate events are more mutable than appropriate events because they are exceptional with respect to *interpersonal* social norms, whereas appropriate events are normal with respect to *interpersonal* social norms. We consider this effect to be part of the wider tendency to mutate exceptional events rather than normal events that was discussed by Kahneman and Miller (1986). The experiments support this idea in two different ways.

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Firstly, they show that the effects of *interpersonal* social normality on counterfactual thinking are distinct from those of *intrapersonal* habitual normality: events that are normal or exceptional with respect to interpersonal norms (i.e., appropriate or inappropriate) do not show a *norm* correspondence effect (Gavanski & Wells, 1989) with outcomes that are normal or exceptional with respect to habitual intrapersonal norms. Inappropriate events are undone more often than appropriate events for both exceptional and normal outcomes. Secondly, the experiments rule out an alternative explanation for the effect based on *valence* correspondence: inappropriate events are undone more often than appropriate events for both negative (failure) outcomes and positive (success) outcomes. We believe that the differences between the results of Experiments 1 and 2 are a result of our failure to control both for the order of presentation of events and for participants' background knowledge in the materials used in Experiment 1.

One of the main points to come out of these experiments is the idea that the unitary concept of normality put forward by Kahneman and Miller (1986) does not fully account for the patterns of experimental results. We suggest that, to really explain what is going on in these experiments, there must be at least two different kinds of normality: *intrapersonal* habitual normality and *interpersonal* social normality. We also suggest that, just as a person's behaviour may deviate from intrapersonal normality in a range of different ways, for example, deviations from everyday routine or deviations from previous performance, there may be different ways in which a person's behaviour may deviate from interpersonal normality. In these two experiments we have examined only the effects of varying appropriateness on mutability, but other factors that cause behaviour to deviate from social norms, for example, the perceived necessity or legality of actions, could also effect the frequency with which an event is subject to counterfactual mutation.

In our third experiment we compared the mutability of events that were exceptional or normal with respect to interpersonal social norms for a different reason: actions done purely for yourself (e.g., reading a magazine) as opposed to actions done for yourself and others (e.g., household chores), and looked at how the effects of deviating from interpersonal norms interact with the effects of another factor, the position of an event in a temporal sequence, in determining the counterfactual mutability of an event.

Experiment 3

The results of the previous two experiments had shown that controllable events that are inappropriate are more psychologically mutable than those that are appropriate. We

argued that this reflects a general tendency to undo events that are exceptional with respect to interpersonal, social norms for behaviour, rather than those which are normal. How general is this effect? As we suggested above events could deviate from interpersonal norms along a number of different dimensions (e.g., perceived necessity, legality, selfishness). In order to examine the generality of the effects of interpersonal normality, we would therefore need to examine whether the mutability of events could be influenced by varying another one of the factors suggested above. In Experiment 3⁶, therefore, our primary aim was to establish whether varying the *selfishness* of the events in a scenario could effect their mutability. We predicted that controllable events which were *selfish* (i.e., done purely for the self) would be more mutable than controllable events which were *selfless* (i.e., done for more than just the self), because selfish events are exceptional with respect to interpersonal norms and selfless events are normal.

Our other aim in Experiment 3 was to explore the interactions between different mutability effects in counterfactual “if only” thinking. The literature on counterfactual thinking is full of examples of factors that can effect event mutability. People are, for example, more likely to focus on controllable events rather than uncontrollable events (e.g., Giroto et al., 1991; Markman et al., 1995), exceptional events rather than routine events (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982), early events in a causal (dependent) sequence (Wells et al., 1987) and later events in a temporal (independent) sequence (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). In demonstrating the effects of each of these factors, researchers have quite rightly been concerned with controlling for all of the other potential factors that can influence mutability. However, this leaves an interesting question unanswered: How do these factors interact in determining the mutability of an event?

One reason for looking at the interaction of mutability effects is that there are disparities between the experimental evidence on mutability effects and real-life data on counterfactual thinking. When researchers have looked for evidence for mutability effects in people’s real-life counterfactual “if only” thoughts, they have had mixed results (e.g., Davis & Lehman, 1995). We would suggest that this may occur, not because of problems with the existing laboratory research, but because of researchers current lack of understanding of how the myriad different factors that contribute to real-life counterfactual mutability interact. A few studies have considered interactions between some of the mutability factors mentioned above (e.g., controllability and exceptionality - Giroto et al., 1991). In Experiment 3, we

⁶ This experiment was designed and conducted in collaboration with Susana Segura and Pablo Fernandez Berrocal while on a three month research visit to the psychology faculty at the University of Malaga, Spain.

examined how the effects of *interpersonal normality* might interact with those of *temporal order* (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). The temporal order effect relates to people's tendency to focus on the last of a set of events presented in an independent temporal sequence in their counterfactual "if only" thoughts. As it has been relatively ignored in work on interactions in counterfactual thinking (but see Gleicher et al., 1990), and as there have been recent experimental studies on this effect (e.g., Byrne et al., in press), in Experiment 3 we turned our attention to the effects of temporal order on people's counterfactual "if only" thoughts. The existing evidence on the temporal order effect showed that neutral events that occur in the last position in an independent, temporally-ordered sequence are more mutable than neutral events that occurred earlier in that sequence. We predicted that this finding would also apply to events that were not so neutral. In particular, we predicted that events which were exceptional with respect to interpersonal norms (because they are selfish) would be more mutable if they occurred in the last position in an independent sequence than if they occurred earlier in that sequence. The temporal order effect will affect both neutral and exceptional events.

Experiment 3 was therefore designed, firstly, to examine whether the selfishness of events would affect their counterfactual mutability, and secondly, if selfishness did have an effect, to examine whether the effects of selfishness would interact with those of position in a temporal sequence. We predicted that selfish controllable events would more often be the subject of people's counterfactual "if only" thoughts than those which are selfless. Secondly, we predicted that this would interact with the temporal order effect, in that, selfish events that occur in the last position in a temporal sequence will be more mutable than those that occur earlier.

Method

Materials and Design

We constructed a scenario that described a morning in the life of a woman named Maria. During the morning Maria carried out nine tasks. Of these, eight were everyday household tasks (dusting, putting on the washing machine, cleaning the fridge, making sandwiches, sweeping the floor, ironing, making the beds, washing the dishes) while one was an event carried out purely for Maria herself (reading a magazine). These made up our sample of eight selfless events and one selfish event. Previous studies of the temporal order effect have mostly focused on sequences of two or four events in their scenarios (e.g., Byrne et al., in press), although the effect has been observed in sequences of up to ten

events (Sherman & McConnell, 1996). We would argue that, in real life, people often deal with chains of events that are much longer than just two events, and so we chose to include nine separate events in our scenario.

For one group the selfish event (reading a magazine) appeared in the first position in the scenario (the start condition). For a second group it appeared in the fifth position in the scenario (the middle condition) and for a third group it appeared in the ninth position in the scenario (the end condition). The position of the eight selfless events in the scenario was varied to control for event effects, so that each event appeared equally as often in each of the remaining eight positions in the scenario. The scenario was in Spanish, the native language of our participants, and translated read as follows (middle condition; see appendix 1c):

Maria is a housewife. One morning, before going out, she put on the washing machine. Then she swept the floor. Later she ironed the clothes. Then she did the dusting. Following that she read a magazine. Then she made the beds. After that she did the dishes. Later she cleaned the fridge. Then she made some sandwiches. When she left, she had an accident in the car. *Maria thinks that she could have avoided the accident if she had not carried out some of the previous tasks, for example, if...*

The nine target events were presented in a temporal (independent) sequence in that later events did not depend for their occurrence on earlier events in the scenario. The independent variables were the nature of the events in the scenario, whether the events were selfless or selfish (a within-participants variable) and the position of the selfish event in the scenario, at the start, in the middle or at the end (a between-participants variable). The dependent variables were the nature of the event (selfless or selfish) and the serial position of the event that participants mentioned first in their responses to the mutation question (in italics above).

Participants and Procedure

Our participants were 117 undergraduates from the University of Malaga, Spain who took part in the experiment voluntarily⁷. The materials were presented in the participants' native Spanish (see appendix 1c for a sample of the Spanish materials). Participants received a two page booklet consisting of a cover page with instructions and a second page with one of the three versions of the scenario and space for recording answers. They were assigned at random to one of the three experimental conditions (start, $n = 35$; middle, $n = 42$; end, $n = 40$). Participants were asked to read the scenario carefully. They were told that there were no right or wrong answers, to write their answers down as they occurred to them and not to

⁷ Age and gender data was not collected in this experiment.

change their answers once they had written them. Following completion of the experiment participants were verbally debriefed.

Results

First responses - Focus

Participants first responses to the mutation question were coded for focus (i.e., which of the nine target events they mentioned) and for serial position (i.e., the position in the scenario held by that event). First responses that did not concern one of the nine target events were coded as “other” and could not be scored for serial position.

Overall participants first responses focused significantly more often on the *selfish* event (reading a magazine; 30%) than on any of the selfless events (see Table 2.5). They undid it more often than than cleaning the fridge (9%; binomial, $n = 46$, $z = 3.54$, $p = 0.0002$), making the beds (4%; binomial, $n = 40$, $z = 4.74$, $P < 0.00003$), ironing, sweeping the floor and making sandwiches (3% each; binomial, $n = 39$, $z = 4.96$, $p < 0.00001$), dusting (3%; binomial, $n = 38$, $z = 5.19$, $p < 0.00001$), doing the dishes and putting on the washing machine (2% each; binomial, $n = 37$, $z = 5.43$, $p < 0.00001$).

Table 2.5: Percentage of participants’ first responses mentioning each of the target events in the scenario in Experiment 3

<i>Event</i>	<i>n</i>	<i>Position</i>			<i>Total</i>
		<i>Start</i>	<i>Middle</i>	<i>End</i>	
		<i>35</i>	<i>42</i>	<i>40</i>	<i>117</i>
<i>Read magazine</i>		31	19	40	30
<i>Clean fridge</i>		11	14	3	9
<i>Make beds</i>		3	7	3	4
<i>Sweeping floor</i>		0	5	5	3
<i>Make sandwiches</i>		3	5	3	3
<i>Do ironing</i>		0	7	3	3
<i>Do dusting</i>		3	0	5	3
<i>Wash dishes</i>		3	0	3	2
<i>Washing machine</i>		3	2	0	2
Total		57	60	63	60

This pattern holds in the condition where the *selfish* event occurred at the *start* of the scenario (the first position). Participants’ first responses undo the selfish event, reading a magazine (31%) significantly more often than any of the selfless events in the scenario (see Table 2.5): cleaning the fridge (11%; binomial, $n = 15$, $z = 1.81$, $p < 0.05$), making the beds, doing the dishes, putting on the washing machine, dusting and making sandwiches (1% each; binomial, $n = 12$, $z = 2.89$, $p < 0.001$), ironing and sweeping the floor (0% each;

binomial, $n = 11$, $z = 3.32$, $p < 0.0005$).

It also holds in the condition where the *selfish* event occurred at the *end* of the scenario (the ninth position). Participants' first responses focused more often on reading a magazine (40%) than on any of the other events (see Table 2.5): dusting and sweeping the floor (5% each; binomial, $n = 18$, $z = 3.30$, $p < 0.0005$), cleaning the fridge, making the beds, doing the dishes, ironing and making sandwiches (3% each; binomial, $n = 17$, $z = 3.64$, $p < 0.0002$) and putting on the washing machine (0%; binomial, $n = 16$, $z = 4.00$, $p < 0.00003$).

However the pattern is not the same for the condition where the *selfish* event is mentioned in the *middle* of the scenario (the fifth position). Although reading a magazine is once again the most common first response (19%) it is not mentioned significantly more often than cleaning the fridge (14%; binomial, $n = 14$, $z = 0.53$, $p < 0.3$), making the beds or ironing (7% each; binomial, $n = 11$, $z = 1.51$, $p < 0.07$; see Table 2.5). The selfish event is mentioned significantly more often than sweeping the floor and making sandwiches (5% each; binomial, $n = 10$, $z = 1.90$, $p < 0.03$), putting on the washing machine (2%; binomial, $n = 9$, $z = 2.33$, $p < 0.01$), doing the dishes and dusting (0% each; binomial, $n = 8$, $z = 2.83$, $p < 0.003$).

As predicted, the selfish controllable event is more mutable than events which are selfless. We suggest that these results provide a replication of the effects of *interpersonal* normality shown in the previous experiments, and that they extend this effect to events that deviate from prevailing interpersonal norms along another dimension, that of selfishness. The effects of selfishness are strongest in the end condition (40%) where the selfish event appears in the last position in the scenario. They are also strong in the start condition (31%) where the selfish event comes first in the scenario. They are considerably weaker in the middle condition (19%) where it appears in the fifth position in the scenario. This suggests that the effects of selfishness and position in a temporal sequence interact in determining counterfactual mutability. To examine this effect further we analysed the serial position of participants' first mentioned target events.

First responses - Serial Position

When participants' first responses were scored for what position the event mentioned had in the scenario, it was found that they mentioned events in the last position in the scenario (ninth event, 19%) most often (see Table 2.6) Participants mentioned events in the ninth position more often than those in all of the other positions in the scenario (2nd & 6th

positions, 3% each; 3rd position, 1%; 4th & 7th positions, 2% each; 5th position, 9%; 8th position, 7%) although, for events in the first position (14%), this is not significant (see appendix 3 for binomials). They mentioned events that come first in the scenario (14%) more often than those in all of the other positions in the scenario, except for those in the fifth (9%) and the ninth (19%) positions. As predicted, events that occur in the last position in a temporal sequence are more mutable than earlier events (c.f., Byrne et al., in press; Miller & Gunasegaram, 1990). This extends previous findings to a longer scenario with a different content. However, in this scenario events that occur in the first position in the scenario are also highly mutable (Sherman & McConnell, 1996).

Table 2.6: Percentage of participants' first responses mentioning events in each position in the scenario in Experiment 3

Position	n	Condition			Total
		Start 35	Middle 42	End 40	
1st		31	5	8	14
2nd		0	5	5	3
3rd		0	2	0	1
4th		0	2	3	2
5th		9	19	0	9
6th		0	5	5	3
7th		3	2	0	2
8th		11	7	3	7
9th		3	12	40	19
Total		57	60	63	60

The results of the experiment once again support the idea that events which deviate from interpersonal social norms are more mutable than events which adhere to those norms. The experiment showed that this is a robust effect, occurring as it does, not only for events that vary in *appropriateness* as in Experiments 1 and 2, but also for events that vary in their degree of *selfishness* (whether they are done for self alone or self and others). The robustness of the effect is also demonstrated by the fact that it occurs in very different scenarios and across different languages and cultures.

The results of the experiment also demonstrated that, as predicted, the mutability of selfish events varies with their position in the scenario. Selfish events which occur last in an independent temporally ordered sequence are more mutable than those which occur first, and selfish events which occur first are in turn more mutable than those which occur in the middle of the sequence. It appears that the effects of selfishness and those of temporal order can and do interact.

Our results replicated the finding that the last event in a temporal sequence is more

mutable than earlier events (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). However, they seem to indicate that the *first* event in a temporal sequence is also highly mutable. Why might this be the case? One suggestion is that this may be the result of two different tendencies - the tendency to undo the last event in a temporal sequence (e.g., Miller & Gunasegaram, 1990), and the tendency to undo the first event in a causal sequence (e.g., Wells et al., 1987). It is possible that some of our participants may have inferred that the events in the scenario formed a dependent causal sequence, rather than an independent temporal sequence, and that this may have resulted in them focusing on the first event in the sequence, rather than on the last. A second possibility is that the results may reflect the relative availability of the events in memory (in terms of primacy and recency effects)⁸. However, Byrne and her colleagues (Byrne et al., in press) have ruled out an explanation of the temporal order effect in terms of recency effects, and hence we suggest that memory effects may not be enough to account for all of our results. However, we did not test for either of these possibilities in our experiment, and hence the question remains open. One concern about this experiment is that the scenario used seems rather unrealistic, as perhaps a person would rarely attempt so many household tasks in one morning. A second concern is that the mutation task used was very specific, directing participants to mutate only the tasks listed in the scenario. However, despite these potential problems, the results did replicate previous findings, with respect to the effects of both the *interpersonal normality* (McCloy & Byrne, in press; experiment 1), and the *temporal order* (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990) of events.

The results of the experiment show that the selfishness of events can effect their counterfactual mutability, and that this effect can interact with that of temporal order in determining which events will most often be the subject of participants' "if only" thoughts. We will discuss the implications of these results along with those of Experiments 1 and 2 in the final section in this chapter.

General discussion

Controllable events are more mutable than uncontrollable events as Girotto et al. (1991) have shown. However, McCloy and Byrne (in press; Experiment 1) demonstrated that all controllable events are not equally mutable. Their experiment showed that people focus on inappropriate events more often than on appropriate controllable events in their counterfactual "if only" thoughts. People undo appropriate and neutral controllable events

⁸ We thank Shane O'Mara for this suggestion.

only as often as they undo uncontrollable events. Our primary aim in the experiments reported in this chapter was to explore this effect further.

In Experiment 1 we ruled out two alternative explanations as to why inappropriate events are more psychologically mutable than appropriate events. The results showed that the increased mutability of inappropriate events does not result from *norm correspondence* between the event and the outcome of the scenario (Gavanski & Wells, 1989). People's responses do not follow a pattern of undoing inappropriate events more often than appropriate events following *exceptional* outcomes, and appropriate events more often than inappropriate events following *normal* outcomes. The results also showed that the increased mutability of inappropriate events does not arise from a *valence correspondence* between the event and the outcome (e.g., Bouts et al., 1992). People's responses do not follow a pattern of undoing inappropriate events more often than appropriate events following *negative* outcomes, and appropriate events more than inappropriate events following *positive* outcomes. However, our concerns about the results of Experiment 1 led us to carry out a second experiment, using different materials, to see if we could replicate the findings of previous experiments (McCloy & Byrne, in press; Roese & Olson, 1993a) and the results of Experiment 1.

The results of Experiment 2 were clearer than those of Experiment 1. Overall they replicated McCloy and Byrne's (in press) finding that inappropriate controllable events are more often the subject of people's counterfactual "if only" thoughts than appropriate controllable events. The results of Experiment 2 extended this finding from scenarios with negative and exceptional outcomes, to those with positive and normal outcomes, and hence, also ruled out both of the alternative explanations mentioned above. The results also showed that people undo *inappropriate inhibitory* events in order to undo failure outcomes, and *inappropriate facilitatory* events in order to undo success outcomes, replicating Roese and Olson's (1993a) earlier finding. In Experiment 2 we also examined the direction and structure of people's counterfactual mutations to inappropriate and appropriate controllable events, and we found no differences between them. People construct more upward counterfactuals, about how things could have been better, than downward counterfactuals, about how things could have been worse, in responses to both inappropriate and appropriate events. This replicated previous findings on the direction of counterfactuals constructed in response to controllable events (e.g., Markman et al., 1993). People also construct more subtractive than additive or substitutive counterfactuals in response to both inappropriate and appropriate events. People's counterfactual "if only" thoughts therefore tend to *undo* both of

these kinds of events in order to undo an outcome.

We argue that the results of Experiments 1 and 2 are consistent with an explanation of the effects of appropriateness based on the *interpersonal* normality of events. We suggest that inappropriate events are mutated more often than appropriate events because they represent exceptions to prevailing interpersonal, social norms. Kahneman and Tversky (1982) suggested that one of the main rules governing mental simulation was that people are more likely to change exceptional events to become more normal than they are to change normal events to become more exceptional. They proposed that, “the psychological distance from an exception to the norm that it violates is smaller than the distance from the norm to the same exception” (p 205). The concepts of norms and exceptions discussed by Kahneman and Tversky (1982) and later by Kahneman and Miller (1986) are however somewhat vague. In testing their ideas previous researchers interested in the *exceptionality* effect have worked from a much more restricted definition of what is normal and what is exceptional (e.g., Gavanski & Wells, 1989; Giroto et al., 1991; Kahneman & Tversky, 1982). They defined exceptional and normal events with respect to deviations from or adherence to a person’s habitual modes of behaviour - what we have termed *intrapersonal* normality.

Our results cannot be explained by a view of exceptionality taken from this definition - inappropriate events are not exceptional and appropriate events are not normal because they deviate from or adhere to a person’s habits. Instead we suggested that there may be several kinds of normality, each following the same rule, i.e., that exceptional events are more likely to be the focus of participants’ counterfactual “if only” thoughts than normal events. To this end we postulated the existence of a second kind of normality, interpersonal normality, that involves whether or not events abide by prevailing social norms, and that is distinct from the intrapersonal, habitual normality that has already been extensively studied. The results of Experiments 1 and 2 are consistent with this idea in that they showed that appropriate and inappropriate events are not subject to a norm correspondence effect (Gavanski & Wells, 1989) when the normality of the outcome is defined in terms of intrapersonal norms (i.e., habit).

For the assumption of two distinct kinds of normality to be a useful one we need to be able to use it, not just to *explain* previous findings, but also to *predict* the findings of future experiments. Therefore, in order to support our supposition of the existence of interpersonal, social normality, we needed to generate and test predictions based on this concept. Events can deviate from *intrapersonal* norms in a range of different ways, for example, by differing from everyday routine or from previous performance. These different

kinds of events have been shown to be subject to the same kind of exceptionality effect (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982), supporting the existence of *intrapersonal* normality and an *intrapersonal exceptionality* effect. We suggested that events can also deviate from *interpersonal* norms along a number of dimensions other than appropriateness, such as necessity, legality and selfishness. For example, selfish events are exceptional with respect to interpersonal social norms, and selfless events are normal. If there is an *interpersonal exceptionality* effect, we would therefore expect selfish events to be more often the focus of people's counterfactual "if only" thoughts than selfless events. We tested this idea in Experiment 3.

The results of Experiment 3 showed, as predicted, that people focus on selfish events (i.e., actions done purely for the self) more often than on selfless events (i.e., actions done for more than just the self) in their counterfactual "if only" thoughts. As this finding was predicted purely on the basis of the existence of an interpersonal exceptionality effect, it provides further support for our suggestion that there exist at least two distinct kinds of normality.

In Experiment 3 we also examined how different mutability effects interact in determining the counterfactual mutability of events. The results showed that the effect of selfishness interacted with those of temporal order (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990) in determining the mutability of the events in the scenario. The results replicated previous findings by showing that the last event in a temporal sequence is more mutable than earlier events, and extended them to a longer scenario (9 events rather than 2 or 4 events). The results also showed that, although selfish events are more mutable than selfless events, selfish events that occur at the end of a temporal sequence are more mutable than those that occur earlier. We suggest that many of the discrepancies between laboratory and real-life research into counterfactual "if only" thinking (e.g., Davis & Lehman, 1995) arise because researchers do not yet understand how the different mutability factors discovered in laboratory research (e.g., Kahneman & Miller, 1986) interact in their effects on mutability in real-life situations.

The main argument of this chapter is that controllable events (i.e., events resulting from decisions) can vary in how often they are the focus of our counterfactual "if only" thoughts. One factor that can act to determine how mutable a controllable event is whether or not that event deviates from prevailing interpersonal norms. Controllable events that are exceptional with respect to interpersonal social norms for behaviour are more often the focus of our counterfactual thoughts than those which are normal. We have discussed two ways in

which controllable events may deviate from interpersonal norms: appropriateness and selfishness, and there may well be others, for example, the legality of an action or the perceived necessity of carrying it out. Our results may however be open to other interpretations. For example, some actions may in fact be more controllable than others, in that the easier it is for a person to imagine avoiding or postponing carrying out an action, the more controllable the action appears⁹. We have not tested this possibility with respect to the actions we employed in our scenarios, and so this question remains open. It is also important to remember that the degree to which a particular event is exceptional with regard to interpersonal norms is highly dependent on the situation under consideration, and on the perspective of the person making the judgment. As Kahneman and Miller (1986) suggested, norms are often constructed after the fact, and it is possible that the interpersonal normality of an event may depend on, for example, the outcome of the situation in which it occurs¹⁰.

We have argued that the exceptionality effect discussed by Kahneman and Miller (1986) in their norm theory is a useful idea in trying to understand the processes underlying counterfactual thinking. In practical terms, however, a unitary conception of what it is to be normal or exceptional is not sufficient to account for the data. We have proposed two different kinds of normality to try to account for the existing findings - intrapersonal and interpersonal. Miller et al. (1990) discuss what they call the “counterfactual fallacy”, that we tend to assume that what need not have been (because we can imagine it otherwise) ought not to have been. The results of the three experiments reported in this chapter indicate that people may also exhibit the converse of the counterfactual fallacy: they think that what ought not have been, because it goes against prevailing social norms, need not have been.

In the next chapter we will continue to look at controllable events. In this chapter we were concerned with the *nature* of the decisions that people make (i.e., whether they are exceptional or normal with respect to social norms). In the Chapter 3 we will go on to examine the effects that the *alternatives* that people consider when they make decisions have on people’s thoughts about what might have been. In addition, we will begin to address the second main aim of this thesis - the comparison of *counterfactual* and *semifactual* thinking.

⁹ We thank Vittorio Girotto for this suggestion.

¹⁰ We again thank Vittorio Girotto for this suggestion.

Chapter 3 Counterfactuals and Semifactuals

The experiments reported in this chapter had the aim of establishing whether counterfactual thoughts, about how things might have been different, are reliably evoked in response to “if only” generation tasks, and whether semifactual thoughts, about how things might have turned out the same, are reliably evoked in response to “even if” generation tasks. The study of thinking about what might have been has implications for a wide range of social and cognitive processes. But as we pointed out in Chapter 1 most research has focused on only one side of the story - *counterfactual* thinking about how things could have been *different*. Counterfactual statements contain both an antecedent and a consequent that are factually false. The following description of an unpleasant factual situation:

1. I forgot my umbrella and I am wet.

could evoke a counterfactual statement such as:

2. If only I had not forgotten my umbrella, I would not be wet.

Counterfactual assertions are often characterised by the phrase “if only” and they depend on undoing an outcome in the context of a mutated antecedent event.

Counterfactual “if only” thinking is, however, only one possible way of thinking about what might have been. Philosophers have long distinguished between counterfactual “if only” thinking about how things could have been different and semifactual “even if” thinking about how things could have turned out the same (e.g., Goodman, 1973; Pollock, 1976). A semifactual based on the factual situation described in 1 above could be:

3. Even if I had not forgotten my umbrella I would be wet.

This sentence is counterfactual in the sense that it is contrary to the facts of reality, but only its antecedent is false (I did not remember my umbrella). Its consequent is true (I am wet). Semifactual assertions are often characterised by the phrase “even if” and they depend on leaving an outcome unchanged in the context of a mutated antecedent event. However, although counterfactual thinking about how things could have been different has received considerable attention in the research literature, there has been a paucity of research into the equally important and related semifactual thinking about how things could have turned out the same.

As was described in Chapter 1, the study of counterfactual thinking has focused on three main issues. One issue concerns the *antecedents* of counterfactual thinking, that is, the situations in which it is most likely to occur. Studies indicate that counterfactual thinking about how things could have been different is more common following negative outcomes

and disconfirmed expectancies (e.g., Klauer & Migulla, 1995; Roese & Olson, 1997; Sanna & Turley, 1996). A second issue has been *how* people think counterfactually, that is, what determines the factual events people change or mutate, and which imaginary alternatives to a factual event people construct. Studies on *counterfactual mutability* have shown that certain aspects of factual situations are more mutable than others (e.g., Girotto et al., 1991; Kahneman & Miller, 1986; Miller & Gunasegaram, 1990; Wells et al., 1987). A third issue concerns the *consequences* of counterfactual thinking. Thinking about how things could have been different has been demonstrated to have a range of consequences, both for our judgments and for our emotions. Counterfactual “if only” thinking influences judgments of causality, responsibility and blame (e.g., Macrae, 1992; Miller & Turnbull, 1990; N’Gbala & Branscombe, 1995; Wells & Gavanski, 1989). It also influences the experience of certain emotions, such as regret, elation, guilt and shame (e.g., Byrne & McEleney, 1997; 1999; Gilovich & Medvec, 1994; Landman, 1987; Niedenthal et al., 1994).

What little research there has been on semifactual thinking suggests that counterfactual and semifactual thinking may differ in a number of fundamental ways. Firstly, thinking about how things could have turned out the same may have different antecedents from thinking about how things could have been different. In one experiment participants were presented with a scenario in which an individual died from an allergic reaction to an ingredient in a meal unwittingly ordered for her by her colleague (Wells & Gavanski, 1989). In one scenario the colleague considered an alternative meal which contained different non-fatal ingredients, and people judged the colleagues choice of meal to be very causally related to the outcome. This may have occurred because, in this situation, it was easy to generate counterfactual “if only” thoughts by focusing on the alternative non-fatal meal. In the other scenario, the colleague considered an alternative meal which also contained the fatal ingredient, and people judged the colleagues choice of meal to be less causally related to the outcome. This may instead have occurred because, in this situation, it was easy to generate semifactual “even if” thoughts by focusing on the alternative equally-fatal meal. The results suggest that the nature of alternatives that people consider may influence whether they generate counterfactual or semifactual thoughts: if they consider an alternative that would have resulted in a different outcome, they may generate counterfactual “if only” thoughts; if they consider an alternative that would have resulted in the same outcome, they may generate semifactual “even if” thoughts.

Counterfactuals and semifactuals also differ in their consequences, for example, in their effects on judgments of blame (see page 32). As we mentioned in Chapter 1,

Branscombe et al. (1996) showed that when people generated counterfactual “if only” thoughts about a person’s behaviour before making blame ratings they attributed that person more blame in producing the outcome compared to when they instead generated semifactual “even if” thoughts.

In this chapter and the two that follow we will describe three series of experiments designed to compare counterfactual “if only” thinking with semifactual “even if” thinking. The first series, reported in this chapter, was concerned with comparing the imaginary alternatives considered in counterfactual thinking with those considered in semifactual thinking. The second series, reported in Chapter 4, compared the consequences of counterfactual and semifactual thinking, in particular, for causal judgments and for a range of different emotions. The third series, reported in Chapter 5, compared the factual events focused on in counterfactual thinking with those focused on in semifactual thinking with the main aim of understanding the nature of the mental representations underlying both kinds of thinking.

The two experiments reported in this chapter had the aim of establishing that counterfactual thoughts are expressed by “if only” assertions and semifactual thoughts are expressed by “even if” assertions. It seems clear from previous research that counterfactual thoughts can be expressed using phrases such as “if only” or by using conditionals in the subjunctive mood, e.g., “if I had remembered my umbrella I would not have got wet”. The situation is less clear cut for semifactual thoughts, and it is a matter of some philosophical debate whether semifactuality can best be captured by a phrase such as “even if”, e.g., “even if I had remembered my umbrella I would be wet” (e.g., Bennett, 1982; Goodman, 1973) or by a phrase such as “if...still”, e.g., “if I had remembered my umbrella I still would be wet” (e.g., Barker, 1991).

Our primary aim in these experiments was to examine whether “if only” sentence completion tasks can actually reliably evoke counterfactual thoughts, i.e., thoughts that undo an outcome by mutating an antecedent event, and whether “even if” sentence completion tasks actually reliably evoke semifactual thoughts, i.e., thoughts that leave the outcome unchanged despite mutating an antecedent event¹. We believed that previous research has ignored a fundamental question about the mechanisms underlying any differences between the two kinds of thinking by not establishing that people focus on different imaginary

¹ Remember that the logical structure of a counterfactual presupposes the falsity of its antecedent and its consequent (Fillenbaum, 1974; Byrne & Tasso, 1999), and the logical structure of a semifactual presupposes the falsity of its antecedent and the truth of its consequent. Hence counterfactual thoughts should mentally *undo* an outcome, and semifactual thoughts should *not undo* an outcome.

alternatives in their counterfactual thoughts from in their semifactual thoughts. Even in the experiments reported by Branscombe et al.'s (1996), people were explicitly asked to consider how things could have been different when generating "if only" statements and how things could have turned out the same when generating "even if" statements. The experiments did not establish whether these alternatives are those that people naturally focus on in their "if only" and "even if" thoughts. Our aim in these experiments was therefore to provide a foundation for interpreting the results of later experiments.

Experiment 4

In this experiment our main aim was to examine the different sorts of alternative antecedents to a factual outcome that people consider in their "if only" and "even if" thoughts. We were interested to see whether the alternatives that people consider in these two kinds of thoughts were respectively counterfactual and semifactual in nature. Our second aim was to examine the effects on thinking about what might have been of considering a range of different alternatives to a decision. The effects of considering different counterfactual alternatives to a decision are known only for situations in which just one alternative is considered (e.g., Wells & Gavanski, 1989). But in daily decision-making, people often consider more than one alternative, and in this experiment we examined the effects of considering at least two explicitly provided counterfactual alternatives.

In the experiment we provided people with a counterfactual alternative that would lead to a different outcome and a semifactual alternative that would lead to the same outcome. We suggest that people use "if only" in situations where they presuppose the falsity of the antecedent and consequent, and they use "even if" in situations where they presuppose the falsity of the antecedent and the truth of the consequent. Hence the focus of "if only" counterfactuals will be on an alternative antecedent that would undo the outcome and the focus of "even if" semifactuals will be on an alternative antecedent that would not undo the outcome.

Our second aim was to examine the effects of counterfactual alternatives which would both lead to the same outcome or which would both lead to a different outcome. When either alternative would undo the outcome, "if only" counterfactuals may focus equally on either, whereas "even if" semifactuals may focus on something other than the provided alternatives. Conversely, where neither alternative would undo the outcome, "if only" counterfactuals may focus on something other than the provided alternatives,

whereas “even if” semifactuals may focus equally on either.

Following on from the theme of *controllable events* adopted in the previous chapter we were also interested to see whether generating “if only” and “even if” statements about antecedent events can effect how controllable and how inevitable an outcome is seen as being. If people can imagine how, if a different decision had been made, an outcome could have turned out differently (i.e., if they generate counterfactual thoughts), we suggest that they will think that the outcome was more controllable and less inevitable than if they can imagine how the same outcome could have resulted (i.e., if they generate semifactual thoughts). In addition, we believe that the nature of the alternatives considered at the time of making the decision will affect how controllable and inevitable the outcome is seen as being. We suggest that, if all of the alternatives considered when the decision was being made would have resulted in different outcomes, an outcome may seem more controllable and less inevitable, than if all of the alternatives considered would have resulted in the same outcome.

In summary, we predicted that people’s “if only” thoughts will focus on alternative antecedents that would have undone an outcome, and that their “even if” thoughts will focus on alternative antecedents that would not have undone an outcome. People’s “if only” thoughts will be counterfactual in structure, and their “even if” thoughts will be semifactual in structure. Secondly, we predicted that changes in the nature of the alternatives presented in the scenario - whether all, some or none of them would result in a different outcome - will differentially affect the focus of people’s “if only” and “even if” thoughts. Thirdly, we predicted that both the mutations that people generate - “if only” or “even if” - and the nature of alternatives in the scenario, will affect people’s judgments of the controllability and inevitability of an outcome.

Method

Participants and Procedure

The participants were 282 undergraduates from the University of Dublin, Trinity College (197 women and 84 men, and one whose gender was not recorded) who took part in the experiment voluntarily. Their average age was 20 years, with a range from 17 to 52 years. The participants were tested in large groups and they were instructed to read the scenarios carefully and to provide answers to the questions that followed as the answers occurred to them. They were also instructed not to change their answers once they had written them.

Materials and Design

We constructed scenarios based on an ice-cream parlour sundae menu and a restaurant dinner menu. Each participant received two scenarios, one based on each content. They were asked to provide “if only” thoughts for one content and “even if” thoughts for the other. The order in which participants received the two scenarios was determined at random. Hence the first independent variable was the mutation task: “if only” or “even if”. Both scenarios contained a menu with three possible choices. The menu was followed by an ordering decision by the protagonist which led to a negative outcome. An example of the ice-cream parlour scenario is as follows (the restaurant scenario is provided in appendix 1d):

Philip goes into an ice-cream parlour. He looks at the menu for ice-cream sundaes:-

Sundaes

Banana Split

Ice-cream (Strawberry and Vanilla), Banana, Cream and Butterscotch Sauce

Knickerbocker Glory

Ice-cream (Strawberry, Chocolate and Vanilla), Fruit, Jelly and Cream

Chocolate Sundae

Ice-cream (Chocolate and Vanilla), Chocolate Flake, Cream and Chocolate Sauce

He’s not sure which to choose, but eventually decides on the Knickerbocker Glory. While he is eating it he starts to come out in a rash. When he asks he finds out that the chocolate ice-cream used contains an ingredient to which he is allergic. He looks at the menu and his choice of sundae. Philip thinks about whether or not things could have been different. He says “even if...”. How does he complete this sentence?²

The second independent variable was the nature of the alternatives presented in the scenario. There were four versions of the scenario. In each one, the option chosen was the knickerbocker glory and the outcome was that Philip ate something to which he was allergic. The four scenarios differed in whether the two rejected alternatives, the banana split and the chocolate sundae, would have led to the same or a different outcome. In the version above (the first alternative undoes scenario), the first alternative, the banana split, would have led to a different outcome, whereas the second alternative, the chocolate sundae, would not, because the outcome is attributed to the chocolate ice-cream, which is not an ingredient of the first alternative but is of the second. In a second version of the scenario (the second alternative undoes scenario), the outcome was attributed to the

² Participants were provided with spaces for up to 4 responses to this question.

strawberry ice-cream and so the first alternative would not undo the outcome, whereas the second alternative would undo it. In a third version of the scenario (the neither alternative undoes scenario), the outcome was attributed to the vanilla ice-cream which is present in all three sundaes and so neither alternative would have resulted in a different outcome. Finally, in the fourth version of the scenario (the both alternatives undo scenario), the outcome was attributed to the jelly and so both of the alternatives would have undone the outcome as the jelly is only present in the knickerbocker glory. Within each of the “if only” and “even if” conditions, participants were randomly assigned to one of the four conditions (first alternative undoes, second alternative undoes, neither undo, or both undo).

Following the mutation task for each scenario participants were presented with two rating tasks. They were asked to rate, on nine point scales (1-9), firstly how inevitable the outcome of the situation was and, secondly, how much control the protagonist had over the outcome of the situation (see appendix 1d). A score of 1 indicated that the participants thought that the outcome was not at all inevitable or controllable, and a score of 9 indicated that they thought the outcome was totally inevitable or controllable.

The dependent variables were the content of participants’ first responses to each mutation question (if only, even if), and their scores, from 1 to 9, on each of the two rating tasks (inevitability, controllability).

Results and Discussion

We categorised the focus of participants mutations into four categories: mutations which focused on the first counterfactual alternative, e.g., “if only I had chosen the banana split” (33%), the second counterfactual alternative, e.g., “if only I had chosen the chocolate sundae” (17%), the factual choice, including mentions of the reaction to it, e.g., “if only the knickerbocker glory had not contained jelly” (28%), or unspecified alternatives, e.g., “if only I had chosen something else” (11%). The remaining 11% of first responses fell into a miscellaneous category (see Table 3.1) ³.

Multiple alternatives with different outcomes

First alternative undoes

The results show that “if only” completions focused on alternatives that would

³ We conducted separate analyses on (a) the first scenario received and (b) both scenarios. There were no differences between the results of these analyses and so we report the results for both scenarios regardless of the order in which they were received.

undo the outcome whereas "even if" completions focused on alternatives that would not undo the outcome, as Table 3.1 shows. For the scenario in which the first alternative would undo the outcome, participants constructed "if only" counterfactuals that focused on the first alternative (51%) whereas they constructed "even if" semifactuals that focused on the second alternative (53%), and the focus of their counterfactuals and semifactuals was reliably different (chi-square = 47, df = 3, $p < 0.01$). Their "if only" counterfactuals focused on the first alternative (51%) more often than either the second (1%, binomial $z = 5.53$, $n = 35$, $p < 0.001$), the factual choice (27%, binomial, $z = 2.22$, $n = 52$, $p < 0.05$), or an unspecified alternative (10%, binomial, $z = 4.22$, $n = 41$, $p < 0.001$), as Table 7 shows. In contrast, their "even if" semifactuals focused on the second alternative (53%) more often than either the first (16%, binomial, $z = 3.75$, $n = 48$, $p < 0.001$), the factual choice (20%, binomial, $z = 3.22$, $n = 51$, $p < 0.001$), or an unspecified alternative (6%, binomial, $z = 5.15$, $n = 41$, $p < 0.001$).

Table 3.1: Percentages of participants who focused on each event in their sentence completions in each condition in Experiment 4

Condition	First Response			
	First alternative	Second alternative	Factual choice	Unspecified alternatives
<i>First undoes</i>				
if only ($n = 67$)	51	1	27	10
even if ($n = 70$)	16	53	20	6
<i>Second undoes</i>				
if only ($n = 71$)	8	58	18	4
even if ($n = 72$)	63	10	18	6
<i>Neither undoes</i>				
if only ($n = 71$)	6	3	56	3
even if ($n = 69$)	45	3	16	30
<i>Both undo</i>				
if only ($n = 71$)	42	7	34	8
even if ($n = 66$)	32	2	38	20

Second alternative undoes

Likewise, for the scenario in which the second alternative would undo the outcome, participants constructed "if only" counterfactuals that focused on the second alternative (58%) whereas they constructed "even if" semifactuals that focused on the first alternative (63%), and the focus of their counterfactuals and semifactuals was again reliably different (chi-square = 54, df = 3, $p < 0.01$; see Table 3.1). Their "if only" counterfactuals focused on the second alternative (58%) more often than on either the first

alternative (8%, binomial, $z = 5.11$, $n = 47$, $p < 0.001$), the factual choice (18%, binomial, $z = 3.83$, $n = 54$, $p < 0.001$), or an unspecified alternative (4%, binomial, $z = 5.73$, $n = 44$, $p < 0.001$). In contrast, their "even if" semifactuals focused on the first alternative (63%) more often than on either the second alternative (10%, binomial, $z = 5.27$, $n = 52$, $p < 0.001$), the factual choice (18%, binomial, $z = 4.2$, $n = 58$, $p < 0.001$) or an unspecified alternative (6%, binomial, $z = 5.86$, $n = 49$, $p < 0.001$).

The pattern is clear also when we collapse these two "one alternative undoes" conditions together. Participants focus on the alternative that would undo the outcome rather than on the alternative that would not undo the outcome, regardless of whether it appears first or second, in their "if only" statements (54% versus 5%, binomial, $z = 7.51$, $n = 82$, $p < 0.001$). In contrast, their "even if" statements focus on the alternative that would not undo the outcome rather than the one that would (58% versus 9%, binomial, $z = 6.40$, $n = 100$, $p < 0.001$). Overall, in the one alternative undoes conditions, the focus of participants "if only" counterfactuals and their "even if" semifactuals is reliably different (chi-square = 97.52, $df = 3$, $p < 0.01$).

These results show, firstly, that the focus of people's "if only" and their "even if" thoughts are different in both "one undoes" conditions. "If only" thoughts focus on different imaginary alternatives to reality than "even if" thoughts. More importantly, the results show that, as we had predicted, people's "if only" completions focus on an alternative that which would undo the outcome, and their "even if" thoughts focus on an alternative that would not undo the outcome. This suggests that counterfactual thoughts, in which an outcome is undone in the context of a mutated antecedent event, can readily be expressed by the phrase "if only". Semifactual thoughts, in which an outcome remains unchanged in the context of a mutated antecedent event, can readily be expressed by the phrase "even if".

Multiple alternatives with similar outcomes

Neither alternative leads to a different outcome

When neither of the alternatives would have led to a different outcome, the focus of participants' counterfactuals and semifactuals was reliably different (chi-square = 52, $df = 3$, $p < 0.01$; see Table 3.1). People constructed "if only" counterfactuals that focused on aspects of the factual choice (56%), more often than the first alternative (6%, binomial, $z = 5.43$, $n = 44$, $p < 0.001$), the second alternative (3%), or an unspecified alternative (3%, binomial, $z = 5.86$, $n = 42$, $p < 0.001$ in each case). The result suggests that when neither

alternative would lead to a different outcome, people construct counterfactuals by simply deleting the factual antecedent (e.g., "if only I hadn't chosen the knickerbocker glory") rather than by substituting, that is, deleting and replacing, the factual antecedent with a counterfactual one. Given the logical structure of counterfactuals, this makes sense, as the alternatives presented in the scenario would not result in "if only" statements that successfully undid the outcome of the scenario.

When neither of the alternatives would have led to a different outcome people's "even if" semifactuals could focus on either one equally, but the results show that they focused mainly on the first alternative (45%; see Table 3.1). They focused as often on an unspecified alternative (30%, binomial, $z = 1.39$, $n = 52$, $p < 0.09$). Their responses focused more on each of these two factors than on the second alternative (binomial, $z = 5.05$, $n = 33$, $p < 0.001$, and binomial, $z = 3.96$, $n = 23$, $p < 0.001$ respectively) or the factual choice (binomial, $z = 3.09$, $n = 42$, $p < 0.001$, and binomial, $z = 1.77$, $n = 32$, $p < 0.05$ respectively). This focus on the first alternative may reflect an effect of the order of presentation and we return to it in the next experiment.

Again, the results from the "neither" condition show that people's "if only" thoughts focus on different imaginary alternatives to reality than their "even if" thoughts. The results show that, when there are no counterfactual alternatives available in the scenario, people's "if only" thoughts instead focus on generating counterfactuals that change something about the factual situation. The results show that, in this condition, where both of the alternatives presented are semifactual in nature (i.e., they would result in the *same* outcome as the factual situation), people's "even if" thoughts focus on the alternatives presented in the scenario. We have suggested that people focus on the first presented alternative more often than on the second presented alternative in their "even if" thoughts due to the order in which these alternatives were mentioned in the scenario.

Both alternatives lead to a different outcome

There were no reliable differences between the focus of participants' counterfactuals and semifactuals when both alternatives would undo the outcome (chi-square = 7, $df = 3$, $p < 0.09$; see Table 3.1). People's "if only" counterfactuals could focus on either one of the alternatives equally since they each undo the outcome, but the results show that they focused mainly on the first alternative (42%). They focused as often on aspects of the factual choice (34%), and there is no reliable difference between these responses (binomial, $z = 0.82$, $n = 54$, $p < 0.21$). They focused more on each of these

factors than on the second alternative (binomial, $z = 4.23$, $n = 35$, $p < 0.001$, and binomial, $z = 3.53$, $n = 29$, $p < .001$ respectively), or an unspecified alternative (binomial, $z = 4$, $n = 36$, $p < 0.001$, and binomial, $z = 3.29$, $n = 30$, $p < 0.001$ respectively). Once again, the fixed order of the two alternatives may have led people to focus on the first rather than on either one equally, and we return to this order effect in the next experiment.

People's "even if" semifactuals focused largely on aspects of the factual situation (38%), and unexpectedly, they also focused on the first alternative (32%) and there is no reliable difference between them (binomial, $z = 0.59$, $n = 46$, $p < 0.28$). They focus more on each of these factors than on the second alternative (binomial, $z = 4.71$, $n = 26$, $p < 0.001$ and binomial $z = 4.26$, $n = 22$, $p < 0.001$, respectively), or an unspecified alternative (binomial, $z = 1.95$, $n = 38$, $p < 0.05$, and binomial, $z = 1.37$, $n = 34$, $p < 0.09$, respectively).

In this condition, we found that there was no difference in the imaginary alternatives that people focus on in their "if only" and "even if" thoughts. People focus equally as often on the first alternative presented in the scenario and on changing aspects of the factual situation in both their "if only" and "even if" thoughts. This result was unexpected, and once again, we suggest that participants' responding in this condition may have been affected by the order of mention of events in the scenario. In this condition, where both of the alternatives presented were counterfactual in nature (i.e., they would result in a *different* outcome to the factual situation), we expected people's "if only" thoughts to focus on the two presented alternatives equally or to suggest that the outcome could have been avoided if the protagonist had chosen "something else" (i.e., an unspecified alternative). In contrast, we expected people's "even if" thoughts to focus on the factual situation and not on the alternatives presented. The order of presentation of the alternatives in the scenario may have resulted in an increased number of participants mentioning the first presented alternative in their responses to the mutation questions. We will return to this in the next experiment.

Rating tasks

We carried out a two (mutation task: if only, even if) by three (nature of alternatives: neither undoes, one undoes, both undo) multivariate analysis of variance on the two rating measures, inevitability and controllability. The MANOVA showed a significant main effect for the nature of alternatives (Wilk's lambda = 0.94, $F(2, 538) = 9.13$, $p < 0.0001$), but not for mutation task (Wilk's lambda = 0.99, $F(1, 538) = 2.53$, p

< 0.08), or for an interaction between them (Wilk's $\lambda = 0.99$, $F(2, 538) = 1.45$, $p < 0.22$). The univariate tests are described below.

Inevitability

The nature of the alternatives presented in the scenario significantly affected participants' ratings of how inevitable the outcome of the scenario was ($F(2, 538) = 14.72$, $p < 0.0001$). Participants ratings of inevitability significantly decreased from the "neither alternative undoes" condition (mean rating 5.76), to the "one alternative undoes" conditions (mean 4.85), to the "both alternatives undo" condition (mean 4.10) as shown by post-hoc Student-Neuman-Keuls tests ($p < 0.05$) on each comparison. This result indicates that participants thought that the outcome (e.g., Philip eating something to which he was allergic) was least inevitable when both alternatives would have resulted in a different outcome, and most inevitable when neither alternative would have resulted in a different outcome, as we predicted, with situations in which one of the alternatives would undo the outcome and the other would not falling somewhere in between.

The mutation task that participants carried out (if only, even if) did not significantly affect how inevitable they thought the outcome was ($F(1, 538) = 0.00$, $p < 0.99$). Participants rated the outcome as just as inevitable when they generated "if only" thoughts before making inevitability ratings (mean rating 4.89) as when they generated "even if" thoughts (mean 4.90). There was no significant interaction between the effects of the two independent variables ($F(2, 538) = 0.18$, $p < 0.83$). This runs contrary to the suggestion made by Branscombe et al. (1996) who suggested that generating counterfactual "if only" thoughts about an outcome would make it seem less inevitable than generating semifactual "even if" thoughts.

Controllability

The nature of the alternatives presented in the scenario also significantly affected how much control participants thought that the protagonist had over the outcome ($F(2, 538) = 8.03$, $p < 0.03$). Surprisingly, participants thought that the outcome was significantly more controllable when neither alternative would have undone the outcome (mean rating 5.37), than when one alternative would have undone the outcome (mean 4.66), and when both alternatives would have undone the outcome (mean 4.57). Post-hoc Student-Neuman-Keuls tests ($p < 0.05$) show that there are significant differences between the neither undoes and the one undoes conditions and between the neither undoes and both

undo conditions, but not between the both undo and one undoes conditions.

The mutation task that participants carried out also significantly affected the amount of control that participants perceived the protagonist to have had ($F(1, 538) = 5.06, p < 0.03$). Participants thought that the protagonist had significantly more control over the outcome of the situation when they generated “if only” thoughts before making controllability ratings (mean rating 5.04) than when they generated “even if” thoughts (mean 4.60), in line with our predictions. Once again, there was no significant interaction between the effects of the two independent variables ($F(2, 538) = 2.70, p < 0.07$).

The results from the rating tasks show that the mutation task that participants carry out affects how controllable they believe the outcome of the scenario to be. When people generate counterfactual “if only” thoughts about antecedent events they believe that the outcome is more controllable than when they generate semifactual “even if” thoughts. This supports the suggestion made by Davis and Lehman (1995) that, in dealing with traumatic life events, when an individual generates counterfactual thoughts he or she is:

“implying that the event was not random and indiscriminate in its occurrence and is thus preserving the fundamental assumption that significant events in one’s life are, at minimum, potentially controllable, if only in retrospect.”(p371).

The need for perceived control over events has been well documented (e.g., Janoff-Bulman, 1992) and it seems that counterfactual thinking may play an important role in gaining this control. That the mutation task that participants carry out does not affect their inevitability ratings suggests that controllability and inevitability are not just two sides of the same coin. It appears that when an event is seen as more controllable it does not necessarily mean that it is also less inevitable.

The results also show that the nature of the alternatives considered at the time of making a decision can effect both how inevitable and how controllable subsequent outcomes are seen as being. This may suggest that changing the nature of the alternatives presented in a scenario affects people’s counterfactual and semifactual thinking more strongly than changing the mutations that people are asked to generate. When all of the alternatives considered would have resulted in the same outcome as the factual situation, people believe that the outcome was more inevitable than when one alternative would have resulted in a different outcome and when all of the alternatives considered would have resulted in a different outcome. Indeed, the perceived inevitability of the outcome seems to depend directly on the proportion of the alternatives considered that would have resulted in

a different outcome. Surprisingly, this pattern is the same with regard to how controllable participants believed the outcome to be. Participants believed the outcome to be *more* controllable when neither alternative would have undone the outcome than when one alternative or both alternatives would have undone the outcome, in direct contrast to our predictions.

Overall, the results of the experiment show that people focus on different alternatives when they generate “if only” and “even if” statements (see also Branscombe et al., 1996; Goodman, 1973). When people generate “if only” thoughts they focus on a counterfactual alternative antecedent that would have undone the outcome. We can conclude that “if only” statements characterise counterfactual thoughts, because they focus on imaginary alternatives that would have resulted in a different outcome, and the falsity of the antecedent and the falsity of the consequent is presupposed. When they generate “even if” thoughts they focus on a semifactual alternative antecedent that would not have undone the outcome. We can conclude that “even if” statements characterise semifactual thoughts, because they focus on imaginary alternatives that would have resulted in the same outcome, and the falsity of the antecedent and the truth of the consequent is presupposed (e.g., Bennett, 1982).

The experiment shows not only that “if only” and “even if” focus on different alternative antecedents, but also that the alternatives that people focus on correspond to counterfactual alternatives for “if only” and semifactual alternatives for “even if” (e.g., Barker, 1991; Bennett, 1982). The results show that the focus of “if only” and “even if” statements is affected by the nature of the alternative antecedents available. This difference in focus may underlie the finding that people’s causal judgments about a decision and the counterfactual mutability of the decision are influenced by whether a rejected alternative would or would not have undone the outcome (Wells and Gavanski, 1989). Likewise, “if only” and “even if” thoughts can have different effects on judgments of blame (Branscombe et al., 1996) which may arise because people focus on different sorts of alternatives.

Although the results of the experiment do, for the most part, support our hypotheses, they also suggest that there may have been an additional effect of the order of presentation of the alternatives within the scenario: participants seem to focus more often on the first presented alternative than on the second presented alternative. We suggest that controlling for the order of alternatives may lead to stronger results. Therefore, we conducted a second experiment using the same materials, but randomising the order of

presentation of alternatives, with the aim of replicating our main findings.

Experiment 5

In this experiment we tested the same hypotheses as in the previous one. Therefore, we hypothesised that when participants were presented with an alternative that would lead to a different outcome and an alternative that would lead to the same outcome, their counterfactual “if only” sentence completions would focus on the alternative that would undo the outcome and their semifactual “even if” sentence completions would focus on the alternative that would not undo the outcome. In addition, we hypothesised that when presented with a scenario in which both alternatives would lead to a different outcome, people’s “if only” counterfactuals may focus equally on either alternative or on an unspecified alternative, whereas their “even if” semifactuals may focus on something other than the presented alternatives. Conversely, when neither alternative would undo the outcome, people’s “if only” counterfactuals may focus on something other than on the presented alternatives, whereas their “even if” semifactuals may focus equally on either alternative or on an unspecified alternative.

The only differences in this experiment were that we varied the order of presentation of the alternatives within the scenario to control for the effects of the order of alternatives that we believed had occurred in the previous experiment. Also, as we were primarily concerned with whether we could replicate the main findings from the mutation results in the previous experiment once order of mention had been controlled for, we did not include the two rating tasks (controllability, inevitability) in this experiment. The results we report then are solely concerned with the content of participants’ first responses to the “if only” counterfactual and “even if” semifactual mutation questions.

Method

Participants and Procedure

The participants were 117 undergraduates from the University of Dublin, Trinity College (79 women, 38 men) who took part in the experiment voluntarily. Their average age was 21 years, with a range from 17 to 55 years. The participants were again tested in large groups and were instructed to read the scenarios carefully and to provide answers to the questions that followed as the answers occurred to them. They were also instructed not to change their answers once they had written them.

Materials and Design

The materials used in the experiment were identical to those from the previous experiment, except that this time we varied the order of presentation of the alternatives on each of the two menus to control for any potential order effects (see appendix 1e). Each menu item appeared equally as often in each of the three positions in the scenario. Again, each participant received two scenarios, one based on each content (ice-cream parlour, restaurant) and were asked to provide “if only” thoughts for one content and “even if” thoughts for the other. The order in which participants received the two scenarios was determined at random. Within each of the “if only” and “even if” conditions participants were randomly assigned to one of the four “nature of alternatives” conditions (original first alternative undoes, original second alternative undoes, neither alternative undoes, both alternatives undo).

The independent variables were the mutation task carried out by participants (“if only”; “even if”) and the nature of the alternatives that they read about (one undoes - 2 versions - neither undoes, both undo). The dependent variable was the content of participants’ first responses to each of the two mutation tasks.

Results and Discussion

Scoring

We again categorised the focus of participants’ first responses into four main categories. For comparison with the previous experiment these were: mutations which focused on the alternative that had originally been presented as the first alternative in the scenario in Experiment 4 (banana split; roast chicken), those that focused on the alternative that had been presented as the second alternative in the scenario (chocolate sundae; steak and mushroom pie), those that focused on the factual choice, including mentions of the reaction to it, and those that focused on unspecified alternatives (i.e., “something else”).

First responses

This time the most common first response to the mutation questions was to focus on some aspect of the factual situation (35%; see Table 3.2). Participants in this experiment, as expected, did not show an overall preference for mutating either of the two alternatives presented in the scenarios. They focused as often on the alternatives that had been first in the original scenarios (19%) as on those that had been second (20%). 16% of participants’ first responses in this experiment focused on an unspecified alternative and 11% fell into a

miscellaneous category.

Table 3.2: Percentages of participants who focused on each event in their sentence completions in each condition in Experiment 5

Condition	First Response			
	Original first alternative	Original second alternative	Factual choice	Unspecified alternatives
<i>Original first undoes</i>				
if only (n = 19)	53	16	21	0
even if (n = 22)	18	68	5	9
<i>Original second undoes</i>				
if only (n = 21)	0	62	19	0
even if (n = 17)	35	12	35	12
<i>Neither undoes</i>				
if only (n = 42)	5	2	64	2
even if (n = 37)	14	5	24	51
<i>Both undo</i>				
if only (n = 35)	23	17	37	11
even if (n = 41)	24	10	41	22

Multiple alternatives with different outcomes

Original first alternative undoes

The results again show that participants’ “if only” completions focused on alternatives that would undo the outcome whereas their “even if” completions focused on alternatives that would not undo the outcome, as Table 3.2 shows. For the scenarios in which the alternative that was mentioned first in the previous experiment would result in a different outcome, participants constructed “if only” counterfactuals that focused on the original first alternative (53%, e.g., “if only I had chosen the banana split.”) whereas they constructed “even if” semifactuals that focused on the original second alternative (68%, e.g., “even if I had chosen the chocolate sundae.”). Overall the focus of their counterfactuals and semifactuals was reliably different (chi-square = 15.63, df = 3, p < 0.01). Their “if only” counterfactuals focused on the “first” alternative (53%) more often than on either the “second” alternative (16%; binomial, n = 13, z = 1.94, p < 0.03), the factual situation (21%; binomial, n = 14, z = 1.60, p < 0.05) or an unspecified alternative (0%; binomial, n = 10, z = 3.16, p < 0.0008). In contrast, their “even if” semifactuals focused on the “second

alternative (68%) more often than on either the “first” alternative (18%; binomial, $n = 189$, $z = 2.52$, $p < 0.006$), the factual situation (5%; binomial, $n = 16$, $z = 3.5$, $p < 0.0002$) or an unspecified alternative (9%; binomial, $n = 17$, $z = 3.15$, $p < 0.0008$).

Original second alternative undoes

Likewise, for the scenarios in which the alternatives that were mentioned second in the previous experiment (chocolate sundae, steak and mushroom pie) would have resulted in a different outcome, participants constructed “if only” counterfactuals which focused on the alternative that was originally second (62%) whereas they constructed “even if” semifactuals that focused on the alternative that was originally first (35%; see Table 3.2). The focus of participants counterfactuals and semifactuals was reliably different (chi-square = 15.1, $df = 3$, $p < 0.01$). Their “if only” counterfactuals focus on the “second” alternative (62%) more often than on either the “first” alternative (0%; binomial, $n = 13$, $z = 3.61$, $p < 0.0002$), the factual situation (19%; binomial, $n = 17$, $z = 2.18$, $p < 0.01$) or an unspecified alternative (0%; binomial, $n = 13$, $z = 3.61$, $p < 0.0002$). In contrast, their “even if” semifactuals focused on the “first” alternative (35%) more often than on the “second” alternative or an unspecified alternative (both 12%), although this difference does not reach significance (binomial, $n = 8$, $z = 1.40$, $p < 0.08$), and equally as often as on the factual situation (also 35%).

The pattern is again particularly clear when we collapse the two “one alternative undoes” conditions together. Participants focus on the alternative that would undo the outcome rather than the alternative that would not undo the outcome, regardless of what that event is, in their “if only” completions (58% versus 8%; binomial, $n = 26$, $z = 3.92$, $p < 0.00005$). In contrast, their “even if” completions focus on the alternative that would not have undone the outcome rather than on the alternative that would have undone the outcome (54% versus 15%; binomial, $n = 27$, $z = 2.89$, $p < 0.002$). Overall, in the “one alternative undoes” conditions the focus of participants “if only” counterfactuals and their “even if” semifactuals is reliably different (chi-square = 26.2, $df = 3$, $p < 0.01$).

These results replicate the key finding of the previous experiment, that “if only” completions focus on an alternative that would undo an outcome and “even if” completions focus on an alternative that would not undo an outcome. This demonstrates that the original result still holds when the order of events in the scenario is controlled for and again lends support to the idea that counterfactual thoughts can be expressed readily by the phrase “if only” and semifactual thoughts by the phrase “even if”.

Multiple alternatives with similar outcomes

Neither alternative undoes the outcome

When neither of the alternatives presented in the scenario would have resulted in a different outcome, the focus of participants' counterfactuals and semifactuals is again reliably different (chi-square = 24.65, $df = 3$, $p < 0.01$; see Table 3.2). People's "if only" counterfactuals focused on aspects of the factual situation (64%) more often than on either the "first" alternative (5%; binomial, $n = 29$, $z = 4.64$, $p < 0.00003$), the "second" alternative or an unspecified alternative (both 2%; binomial, $n = 28$, $z = 4.9$, $p < 0.00003$). This result again shows that when neither alternative would lead to a different outcome people construct counterfactuals by simply deleting the factual antecedent rather than by substituting it, that is, deleting it and replacing the factual antecedent with a counterfactual alternative.

When neither of the alternatives would have led to a different outcome, people's "even if" semifactuals focused most often on an unspecified alternative (51%) in contrast to the previous experiment. They focus on an unspecified alternative (e.g., "even if I'd chosen something else this would have happened") more often than on either the "first" alternative (14%; binomial, $n = 24$, $z = 2.86$, $p < 0.002$), the "second" alternative (5%; binomial, $n = 21$, $z = 3.71$, $p < 0.0001$) or the factual situation (24%; binomial, $n = 28$, $z = 1.89$, $p < 0.03$). Participants in this experiment do not focus on one of the alternatives in the scenario significantly more often than the other (14% versus 5%; binomial, $n = 7$, $z = 1.13$, $p < 0.13$) once the order of presentation of alternatives is controlled for, unlike the previous experiment.

Both alternatives lead to a different outcome

As in the previous experiment, when both of the alternatives presented in the scenario would undo the outcome, there was no significant difference between the focus of participants' "if only" counterfactuals and their "even if" semifactuals (chi-square = 2.91, $df = 3$, $p < 0.1$; see Table 3.2). However the pattern of mutations made by participants in this experiment is different to that in the previous experiment.

People's "if only" counterfactuals focus most often on the factual situation (37%) and they do so significantly more often than on the "second" alternative (17%; binomial, $n = 19$, $z = 1.61$, $p < 0.05$) and an unspecified alternative (11%; binomial, $n = 17$, $z = 2.18$, $p < 0.01$), but not more often than the "first" alternative (23%; binomial, $n = 21$, $z = 1.09$, $p < 0.14$). However, unlike the previous experiment, once the order of presentation of

alternatives is randomised, participants do not focus on the “first” alternative (23%) significantly more often than on the “second” alternative (17%; binomial, $n = 14$, $z = 0.53$, $p < 0.30$).

The pattern for the focus of participants’ “even if” semifactuals is the same. Again, they focus on the factual situation most often (41%), significantly more so than on the “second” alternative (10%; binomial, $n = 21$, $z = 2.84$, $p < 0.002$) and an unspecified alternative (22%; binomial, $n = 26$, $z = 1.57$, $p < 0.06$) although this difference is marginal. They do not focus on the factual situation significantly more often than on the “first” alternative (41% versus 24%; binomial, $n = 27$, $z = 1.35$, $p < 0.09$). The “first” alternative is mentioned more often than the “second” alternative (24% versus 10%; binomial, $n = 14$, $z = 1.60$, $p < 0.05$), but not more often than an unspecified alternative (24% versus 22%; binomial, $n = 19$, $z = 0.23$, $p < 0.41$).

In this experiment, the proportion of participants mentioning the “first” alternative in each scenario is reduced compared to the previous experiment. This suggests that we were correct in assuming that the order of presentation of events was affecting participants’ responding in the “both” condition. However, as in the previous experiment, a high proportion of participants focus on changing something about the factual situation in both their “if only” and “even if” responses. It may be that, when all of the available alternatives would lead to different outcomes from the factual situation, the factual events themselves become more salient. Wells and Gavanski (1989) showed that people change decisions more often in their counterfactual thoughts when the alternative to them would undo an outcome than when it would not. Perhaps this affects not only counterfactual “if only” thinking, but also semifactual “even if” thinking.

The results of this experiment replicate those of the previous experiment. People focus on different imaginary alternatives when they generate “if only” statements from when they generate “even if” statements. When people generate “if only” statements they focus on an imaginary alternative that would have undone the outcome and when they generate “even if” statements they focus on an imaginary alternative that would not have undone the outcome. Again, we can conclude that “if only” and “even if” statements do provide a good characterisation of counterfactuals and semifactuals respectively (e.g., Barker, 1991; Bennett, 1982).

The results show that when the order of presentation of alternatives is controlled for, participants do not focus on one of the alternatives in the scenario more often than on the other in the “both” and “neither” conditions. Ruling out the order effect leads to different

patterns of responding from the previous experiment in the remaining two conditions in the experiment, where neither of the alternatives presented would undo the outcome and where both of the alternatives presented would undo the outcome. When neither alternative would undo the outcome participants' "if only" sentence completions focus on changing aspects of the factual situation, e.g., "if only I hadn't ordered an ice-cream I would not be ill", whereas their "even if" sentence completions focus on an unspecified alternative, e.g., "even if I had ordered something else I would be ill", as we had predicted. When both alternatives would lead to a different outcome participants, surprisingly, focus on changing aspects of the factual situation in both their "if only" and their "even if" sentence completions. It is possible that this manipulation, in which all of the alternatives presented would result in *different* outcomes to that of the factual situation, may act to increase the salience of the factual events and the factual outcome above that of the either of the presented alternatives. The factual events in this condition are the only ones that would lead to the negative outcome.

Once again this experiment shows that "if only" and "even if" thoughts focus on different imaginary alternatives to reality. Secondly, it shows that the alternatives focused on by people in their "if only" and "even if" thoughts correspond to the structure of counterfactuals and semifactuals respectively. Thirdly, the experiment shows that the nature of the alternatives considered in making a decision can affect the focus of people's counterfactual and semifactual thoughts.

General Discussion

The two experiments reported in this chapter showed that people focus on different imaginary alternatives to reality when they generate "if only" thoughts than when they generate "even if" thoughts. People's "if only" thoughts focus on imaginary alternatives that would have resulted in a different outcome and characterise counterfactual thoughts, in that both the falsity of the antecedent and that of the consequent is presupposed (e.g., Bennett, 1982). People's "even if" thoughts focus on imaginary alternatives that would have resulted in the same outcome and characterise semifactuals, in that the falsity of the antecedent and the truth of the consequent are presupposed. Finally, the experiments show that the focus of people's counterfactual and semifactual thoughts can be affected differently by the nature of the alternatives that were considered in making a decision. People's "if only" and "even if" thoughts focus on different imaginary alternatives depending on whether all, some, or none of the alternatives considered in making a decision would have resulted in a different outcome to that of the factual situation.

These experiments establish that “if only” sentence completion tasks reliably evoke counterfactuals and “even if” sentence completion tasks reliably evoke semifactuals. It is essential to establish the validity of “if only” and “even if” sentence completion tasks in this way before using them to further compare counterfactual and semifactual thinking. The results also suggest mechanisms by which differences between counterfactual and semifactual thinking may come about. Branscombe et al. (1996) found that generating “if only” and “even if” thoughts can have different effects on judgments of blame. This effect may arise because people are focusing on different imaginary alternatives in their “if only” thoughts from those that they focus on in their “even if” thoughts. Because of the alternatives they focus on, people’s “if only” thoughts suggest that, by changing their actions, a person could have changed an outcome, whereas their “even if” thoughts suggest that, by changing their actions, a person still could not have changed the outcome. It may be that people are blamed for outcomes to the extent that their actions are seen as being able to change or influence those outcomes, and hence people are blamed more following the generation of “if only” thoughts than following the generation of “even if” thoughts. We suggest that, because “if only” and “even if” thinking focus on different alternatives to reality (*counterfactual* and *semifactual* alternatives respectively), they will have different consequences, not only for how people assign blame, but also for people’s causal judgments and emotional reactions. We will return to this suggestion in the next chapter.

Just as counterfactuals can be expressed both by the phrase “if only” and by conditionals in the subjunctive mood (e.g., “if I had remembered my umbrella, I would not have been wet”), so semifactuals may also be expressed by more than one construction. In these experiments we have shown that the phrase “even if” effectively captures semifactuality. That is not to say that other constructions, for example, “if...still” (Barker, 1991), would not be as effective. For our purposes, we require a semifactual equivalent to the counterfactual “if only” sentence completion task, and “even if” completions seem to be an appropriate and reliable task to use. We turn now to consider the *consequences* of counterfactual “if only” and semifactual “even if” thinking.

Chapter 4 Consequences of Counterfactual and Semifactual Thinking

In the previous chapter we reported the results of two experiments which demonstrated that “if only” and “even if” thoughts focus on different imaginary alternatives to reality. The results suggest that people’s “if only” thoughts are counterfactual in structure, in that they focus on imaginary alternatives to antecedent events that would have resulted in a different outcome. People’s “even if” thoughts, in contrast, have a semifactual structure, in that they focus on imaginary alternatives to antecedent events that would have resulted in the same outcome as the factual situation. The experiments also showed that the focus of people’s “if only” and “even if” thoughts can be affected by the nature of the alternative antecedents considered in making a decision.

In the two experiments reported in this chapter we examined whether the differences in the focus of counterfactual and semifactual thinking result in them having different judgmental and affective consequences. We had two main aims. Our first aim was to examine whether counterfactual “if only” and semifactual “even if” thinking have different consequences for people’s causal judgments. Our second aim was to examine whether semifactual “even if” thinking has different effects on negative emotions such as regret, self-blame and feeling bad from those of counterfactual “if only” thinking. Counterfactual “if only” thinking has been shown to have a wide range of consequences. Thinking about how things could have been different “if only” something else had happened has been shown to influence both people’s judgments of causality, responsibility and blame (e.g., Macrae, 1992; Miller & Turnbull, 1990; N’Gbala & Branscombe, 1995; Wells & Gavanski, 1989), and the experience of several different emotions, such as regret, elation, shame and guilt (e.g., Gleicher et al., 1990; Landman, 1987; Niedenthal et al., 1994).

The experiments reported by Branscombe et al. (1996) also demonstrated that semifactual “even if” thinking may have different consequences from counterfactual “if only” thinking. The results of their experiments suggested that “if only” and “even if” thoughts have different effects on judgments of blame; thinking counterfactually about a person’s behaviour increases the amount of blame they are assigned in producing an outcome, whereas thinking semifactually about that same behaviour decreases the amount of blame that they are assigned.

The experiments in this chapter focused on two areas in which we believed the consequences of counterfactual “if only” and semifactual “even if” thinking might differ. The

first experiment (Experiment 6) examined whether counterfactual and semifactual thinking have different effects on causal judgments. The second experiment (Experiment 7) examined whether counterfactual and semifactual thinking differ in their consequences for a range of emotions. Our hypotheses concerning the effects of counterfactual “if only” thinking and semifactual “even if” thinking on causal judgments and emotions are discussed in detail below.

Counterfactuals, Semifactuals and Causal Judgments

Counterfactual “if only” thinking, about how an outcome could have been different if an antecedent event had not occurred, increases judgments about how causally important the antecedent event is for bringing about the consequent outcome. How might semifactual “even if” thinking affect causal judgments?

The relationship between thinking about what might have been and causal judgments has been explored by both philosophers (e.g., Goodman, 1973; Hart & Honoré, 1959; Mackie, 1974) and by psychologists (e.g., Mandel & Lehman, 1996; N’Gbala & Branscombe, 1995; Spellman, 1997; Wells & Gavanski, 1989). Philosophers have suggested, not only that both counterfactual and semifactual thinking are important for making causal judgments, but also that they will have different consequences for the causal judgments that people make. Counterfactual thinking has been hypothesised to play a key role in establishing causation by Mill’s (1872) “method of difference”, that is, the requirement to think about whether undoing certain events in the past would undo an outcome, which may be especially important in situations where experiments are not possible, for example, in historical enquiry (e.g., Mackie, 1974; Tetlock & Belkin, 1996). Likewise, semifactual thinking is important for the complementary “method of agreement”, that is, the requirement to think about whether alternative events could have led to the same outcome. For example, Sherman and McConnell (1995, p.210) suggest that,

“it is important for perceivers to consider not only how mutations could have changed the outcome, but also how alternative antecedent events could have led to the same outcome. Only then will perceivers be able to judge correctly the inevitability or the avoidability of an event and to grasp the causal structure of the situation.”

(see also Mandel & Lehman, 1996). Goodman (1973) has argued more directly what the effects of counterfactual and semifactual thinking on causal judgments might be. He suggested that counterfactual “if only” statements assert that there is a causal link between

their antecedent and their consequent. The example used in the previous chapter:

1. If only I had not forgotten my umbrella, I would not be wet

appears to imply that there is a causal link between whether or not one has remembered one's umbrella and whether or not one is wet. Semifactual "even if" statements, Goodman (1973) instead suggested, deny that there is a causal link between their antecedent and their consequent. The example from the previous chapter:

2. Even if I had not forgotten my umbrella, I would be wet.

appears to deny that there is a link between remembering one's umbrella and not being wet.

As in previous research on thinking about what might have been, the psychological literature has mostly focused on the role of counterfactual "if only" thinking in causal judgments (e.g., Mandel & Lehman, 1996; N'Guala & Branscombe, 1995; Spellman, 1997; Wells & Gavanski, 1989). For example, Wells and Gavanski (1989) asked their participants to evaluate the causal role of a particular antecedent event, a meal ordered for an individual by her colleague, in producing an outcome, the individual's death due to an allergic reaction to her meal. The participants who were encouraged to generate counterfactual "if only" thoughts before making causal judgments considered it's causal importance to be greater than those who made causal judgments before generating counterfactual thoughts.

However, some of the results of previous experiments are suggestive of what the effects of generating semifactual "even if" thoughts may be, even though they do not test it directly. In the experiment described above, Wells and Gavanski (1989) also showed that participants' judgments of the causal importance of the colleagues' choice of meal were greater when an explicit alternative was provided that would undo the outcome (an alternative meal that did not contain a fatal ingredient), than when the alternative provided would not undo the outcome (the alternative meal also contained the fatal ingredient). The results of the experiments reported in the previous chapter (Experiments 4 & 5) suggest that participants may have generated counterfactuals in the situation where the alternative would undo the outcome (e.g., "if only Mr. Carlson had chosen the other meal, Karen would still be alive"), and semifactuals in the situation where the alternative would not undo the outcome (e.g., "even if he had chosen the other meal, she would still have died"). Our first aim in this chapter is to examine whether semifactual thoughts, about how an outcome could

have been the same if an antecedent had not occurred, decrease judgments about how causally important an antecedent is in bringing about a subsequent outcome (as opposed to counterfactual thoughts which increase the perceived causal importance of antecedent events).

Our second aim is to examine possible explanations of the processes that underlie the relation between alternatives that would undo an outcome and judgments of causality. Two main explanations have been put forward to explain why people judge the causal importance of an antecedent event to be greater when an alternative is presented that would undo the outcome than when an alternative is presented that would not undo the outcome. The first explanation centres on the relative availability of counterfactual thoughts in the two situations, as was described above, with counterfactual “if only” thoughts being relatively more available in the first situation and semifactual “even if” thoughts being relatively more available in the second. Counterfactual “if only” statements may assert that a causal link exists between their antecedent and their consequent, whereas semifactual “even if” statements may instead deny a link between their antecedent and their consequent (Goodman, 1973). When people generate a counterfactual, the explicit models that they represent may correspond to those of a strong causal relation between an antecedent event and an outcome. The mental models theory suggests that, when people generate counterfactual “if only” thoughts they explicitly represent at least two situations, the factual situation in which both the antecedent event (p) and the outcome (q) occurred:

3. factual: p q

and a counterfactual situation in which neither occurred:

4. counterfactual: not-p not-q

(e.g., Byrne, 1997). people may represent these two explicit models:

5. factual: p q
 counterfactual: not-p not-q
 ...

and they may also keep in mind other possible models of the situation, that have not yet been fleshed out to be fully explicit (represented by the three dots). However, if they keep in mind just the two explicit models in their representations, those models are equivalent to those for

strong causation (Johnson-Laird & Byrne, 1991) in which the occurrence or non-occurrence of the antecedent event and the outcome covary perfectly. As people explicitly represent a causal relation when they generate counterfactual thoughts, their judgments of the strength of a causal relation may increase following counterfactual thinking.

What about semifactuals? The initial explicit representations that people construct in generating semifactual “even if” thoughts may correspond to a denial of a causal link between an antecedent event and an outcome (e.g., Goodman, 1973). When people generate semifactual “even if” thoughts they may again explicitly represent at least two situations, the factual situation in which both the antecedent event and the outcome occurred, and a semifactual situation in which the outcome occurred but the antecedent event did not:

6.	factual:	p	q
	semifactual:	not-p	q

In these two explicit models¹ the occurrence of the antecedent event and of the outcome does not covary, and the models are therefore equivalent to the denial of a causal link. If this is the case, then following the generation of semifactual thoughts, people’s judgments of the strength of a causal relation may decrease.

There is however another possibility. It may be that when people generate semifactual “even if” thoughts, the initial explicit models that they generate correspond, not to the denial of a causal link, but to the weakening of a causal link (Johnson-Laird & Byrne, 1991). People may keep in mind at least three explicit models:

7.	factual:	p	q
	counterfactual:	not-p	not-q
	semifactual:	not-p	q

One model corresponds to the factual situation, one to a counterfactual alternative and one to a semifactual alternative. Within these models there is some covariation between the occurrence of the antecedent event and the outcome, although it is not as strong as in the models of counterfactuals described in 5 above (e.g., Byrne, 1997). If people represent semifactuals as weakening a causal link, semifactual thinking may have little effect on people’s judgments of causality.

¹ Again, people may also keep in mind other possible models of the situation that are not explicitly represented.

The second main explanation put forward to explain the effects of alternatives that would or would not undo an outcome on judgments of causality is one based on how much the antecedent event changes the probability of occurrence of the outcome. The provision of an alternative that would undo an outcome may change the perceived probability of the outcome (Spellman, 1997) which may in turn increase its perceived causality. In the fatal meal scenario described earlier, the person's consideration of a meal with a fatal ingredient in the context of an alternative meal with no fatal ingredient establishes that the person's choice of meal has initially a 50% probability of resulting in the fatal outcome. After he makes his decision the probability of the outcome changes to 100%. In contrast, the person's consideration of a meal with a fatal ingredient in the context of an alternative meal which also has the fatal ingredient establishes that the person's choice of meal originally has a 100% probability of resulting in the fatal outcome. After he makes his decision the probability stays the same at 100%. The person's choice of meal changes the probability of occurrence of the outcome more in the situation where there is an alternative that would result in a different outcome (50% change), than where there is an alternative that would result in the same outcome (0% change), and so it is considered more causally important in that situation (Spellman, 1997). This account predicts that an event should be ascribed more causality in producing an outcome the more alternatives there are to it that would have resulted in a different outcome.

In the first experiment in this chapter we assessed the effects of generating "if only" and "even if" thoughts, and of varying the nature of the available alternatives, on people's causal judgments. Our primary aim in the experiment was to examine whether generating semifactual "even if" thoughts about an event decreases causal judgments compared to generating counterfactual "if only" thoughts. A secondary aim was to examine the predictions of the probability account of causality in scenarios similar to those used in the experiments in the previous chapter, where both, one or neither of the alternatives presented would result in a different outcome.

Counterfactuals, Semifactuals and Emotions

The second issue that we were interested in was the effects that counterfactual and semifactual thinking have on people's emotional reactions. Thinking counterfactually about how an outcome could have been different amplifies emotional reactions to that outcome (e.g., Kahneman & Miller, 1986). This occurs both for negative emotions, such as regret, guilt and shame (e.g., Landman, 1987; Niedenthal et al., 1994), and for positive emotions,

such as elation (provided the counterfactual is made salient; Gleicher et al., 1990). There has been no direct work as yet carried out on the emotional consequences of thinking semifactually about how things could have turned out the same “even if” something else had occurred. What effects might semifactual thinking have on people’s emotional reactions?

There are three possible ways in which semifactual “even if” thoughts could affect people’s emotional reactions. The first is that thinking “even if”, like thinking “if only”, may act to amplify people’s emotional reactions. This would be the case if considering any alternative to a factual situation, regardless of its effect on the outcome, served to increase emotional reactions. This first suggestion does not really seem to be a plausible one, especially in the light of, both the studies that show that emotional reactions may depend on the outcome of the counterfactual scenario generated (e.g., Markman et al., 1995), and those that show that emotional reactions are affected by the particular alternative that is considered (e.g., Niedenthal et al. 1994).

The second possibility is that semifactual “even if” thoughts may have no effect on people’s emotional reactions. Much of the evidence on the emotional consequences of counterfactual thinking suggests that counterfactuals have their effects on emotions by way of a contrast mechanism (e.g., Dunning & Parpal, 1995; Roese, 1994). People compare the outcome of the factual situation to the outcome of the counterfactual scenario that they have generated. Kahneman and Miller (1986) suggested that people’s emotional reactions to an outcome are amplified to the degree that the outcome of the most available counterfactual scenario is different to that of the factual situation. A number of different researchers (e.g., Markman et al., 1995; Roese, 1994) have shown a more specific contrast effect. Their experiments showed that people tend to feel worse to the extent that the counterfactual outcome that they generate is better than reality (i.e., an upward counterfactual), and to feel better when the counterfactual outcome they generate is worse than reality (i.e., a downward counterfactual). If counterfactual “if only” thinking has its effects on emotional reactions by way of a contrast between the factual outcome and the outcome generated, then semifactual “even if” thinking should not affect emotional reactions. The key feature of semifactual scenarios is that they result in the same outcome as the factual situation. Therefore, as there is no alternative outcome to compare the factual outcome to, people’s emotional reactions should not be amplified by semifactual thinking.

A third possibility is that semifactual “even if” thinking may have its own distinct effects on people’s emotional reactions, and, in particular, that it may act to decrease emotional reactions in situations where counterfactual “if only” thinking increases emotional

reactions. Roese and Olson (1995a) argued that some emotions, for example regret, depend not only on a contrast between real and imagined outcomes, but also on causal inferences based on counterfactual scenarios. These *counterfactual emotions* may also be differentiated on the basis of the kinds of antecedent events that are mutated. For example, Niedenthal et al. (1994) showed that when people make counterfactual mutations that focus on aspects of themselves (e.g., “if only I was more intelligent, I would have passed the exam.”), they report feeling shame, whereas if their counterfactual mutations focus on aspects of their behaviour (e.g., “if only I had worked harder, I would have passed the exam.”), they report feeling guilt. Counterfactual “if only” and semifactual “even if” thoughts may suggest different causal inferences (Goodman, 1973). People may regret events to the extent that they believe those events to have caused negative outcomes. Counterfactual “if only” thoughts may lead to increased regret for an antecedent event because they assert that there is a causal link between that antecedent event and the outcome. Semifactual “even if” thoughts may instead deny or weaken a causal link between an antecedent event and an outcome, and hence reduce regret for that event.

In the second experiment in this chapter we compared people’s emotional reactions following “if only” and “even if” thoughts to emotional reactions in a baseline condition where people did not generate mutations. We also compared the effects on emotional reactions of presenting either an alternative that undid an outcome, or one that left the outcome unchanged, to situations where no alternative outcome was presented.

Experiment 6

In this experiment we were interested in examining the consequences for causal judgments of generating counterfactual “if only” and semifactual “even if” thoughts. Within this general aim we had several specific aims. Counterfactual “if only” thinking about how an outcome could have been different if a particular antecedent event had not occurred increases people’s judgments of the causal importance of the antecedent event. Our primary aim in this experiment was to examine whether semifactual “even if” thoughts, in contrast, decrease judgments of the causal importance of antecedent events. We developed two competing hypotheses based on how people may mentally represent semifactuals. If people represent semifactuals by an explicit denial of a causal link between an antecedent and the outcome (c.f. Goodman, 1973), then we would expect that generating semifactual “even if” thoughts about an antecedent event would decrease people’s judgments of its causal importance in producing an outcome. If, however, people

represent semifactuals as weakening a causal link between an antecedent event and an outcome rather than as denying a causal link then generating semifactual “even if” thoughts may have little effect on judgments on causality (e.g., Johnson-Laird & Byrne, 1991).

We tested these hypotheses by extending the design of the previous experiments (Experiments 4 and 5) to include a causal rating task either directly following the scenario (the rate first conditions), or after the mutation task (the mutate first conditions). We expected that people’s causal ratings would be higher if they generated counterfactual “if only” mutations before making causal ratings than if they made causal ratings before generating counterfactuals. With semifactual “even if” mutations we expected one of two things to happen. If people represent semifactuals as an explicit denial of a causal link between antecedent and outcome, then people’s causal ratings would be lower if they generated semifactual “even if” mutations before they made causal ratings, than when they made causal ratings before they generated semifactuals. Alternatively, if semifactuals only deny the necessity of a particular causal candidate but not its sufficiency in producing an outcome, there may be little difference between the causal ratings of those who make causal ratings before generating semifactuals and those who make them after generating semifactuals.

By using a similar design to Experiments 4 and 5 we were also able to examine the explanations that have been put forward as to why people judge the causal importance of an antecedent event to be greater when an alternative is presented that would undo the outcome than when an alternative is presented that would not undo the outcome. In particular, it allowed us to examine predictions made from the idea that probability mediates causal judgments (Spellman, 1997). This view suggests that the more a decision changes the probability of an outcome, the more causal importance the decision will be judged to have had in producing that outcome. If we apply Spellman’s analysis to the scenarios used in Experiments 4 and 5 we can see that, in the scenarios in which both of the alternatives would have led to a different outcome, the protagonist originally has a 33% probability of choosing a meal that will lead to a negative outcome, as only one of the three dishes on the menu contains the problem ingredient. In the scenario where one alternative would undo the outcome and the other would not, the initial probability of choosing a problem meal goes up to 67%, as two of the three meals contain the problem ingredient. Finally, in the condition where neither alternative would have resulted in a different outcome, the original probability of occurrence of the outcome was 100%, as all three dishes on the menu contained the problem ingredient. In all three scenarios, the probability

of the outcome *after* the decision has been made is 100%, so the greatest change in probability is in the both alternatives undo condition (67%), followed by the one alternative undoes condition (33%), and finally the neither alternative undoes condition (0%) where there is no change in probability at all. If this view is correct, we would therefore expect participants' causal ratings to be the highest in the condition where both alternatives would lead to a different outcome, and lowest in the condition where neither alternative would lead to a different outcome, with the condition where one alternative would lead to a different outcome and the other would not falling somewhere in between.

Our main aim in this experiment was to establish whether semifactual "even if" thinking decreases judgments of causality. Our secondary aim was to test the predictions of the probability approach in explaining causal judgments.

Method

Participants and Procedure

The participants were 498 undergraduates from the University of Malaga, Spain (402 women and 96 men) who took part in the experiment voluntarily. Their average age was 22 years. The experiment was presented in a two page booklet consisting of a cover page with instructions and a second page with the scenario, the mutation task (if only or even if) and the causal rating task. The instructions asked participants to read the scenario carefully and to answer the questions that followed. They were asked to answer the questions in the order in which they were presented, to write down answers as they occurred to them and not to change their answers once they had written them. On completion of the experiment participants were verbally debriefed.

Materials and design

We examined three independent variables manipulated in a between-participants design. The first variable was the nature of the available alternatives (both alternatives undo the outcome, one alternative undoes the outcome and the other does not, neither alternative undoes the outcome). We used a slightly modified version of the ice-cream parlour scenario used in the previous two experiments, which we translated into Spanish, the native language of our participants. There were again four versions of the scenario. For each of the four versions of the scenario we ensured that the three choices on the menu occurred in all possible orders, which were presented at random to participants, to control for the suspected order effects in the results of Experiment 4. Once again there were two

versions in which one alternative would undo the outcome and the other alternative would not undo the outcome (and we refer to them as the chocolate version and the strawberry version because their order as first alternative or second was varied), one version in which both alternatives would undo the outcome (the caramel version), and one version in which neither alternative would undo the outcome (the vanilla version). In all versions of the scenario Philip chose the house sundae and came out in a rash (see appendix 1f).

The second variable was the type of mutation task (counterfactual or semifactual). The mutation task was similar to the one used in the previous experiments: Participants were asked to provide four likely completions of either an “if...” or an “even if...” sentence stem on behalf of the protagonist.² Half of the participants were given the counterfactual mutation task and the other half were given the semifactual mutation task. The third variable was the order in which participants performed two tasks (mutation task first and causal task second, or vice versa). We gave half of the participants the mutation task first and the causal task second, and the other half received the tasks in the opposite order. The causal task was adapted from Wells and Gavanski (1989), and participants were asked: How much do you think that Philip's decision was the cause of what happened (that Philip ate something to which he was allergic)? and they provided their answer on a nine-point rating scale, where 0 equals *not at all causal*, and 8 equals *the most important cause* (see appendix 1f). The two dependent variables were the content of participants first responses to the mutation task and their causal ratings.

Results and discussion

First, we report the results for the mutation task, and then we report the results for the causal task which addresses the two aims of the experiment: whether semifactuals lead to a decrease in causal ratings compared to counterfactuals which lead to an increase in causal ratings, and whether causal judgments follow the predictions of the explanation based on the idea that probability mediates causality.

Mutation task

Participants first responses were coded into four categories, as in the previous experiments: mutations that focused on the chocolate sundae (12%), the strawberry sundae (11%), the factual choice or the reaction to it (49%) and unspecified alternatives (18%).

² In Spanish “if only...” (*si solo*) is not a natural construction, so “if...” (*si*) was used instead. This construction has been successfully used by a number of different researchers who have studied counterfactual thinking using Spanish speaking participants (e.g., Byrne et al., in press).

The remaining 10% of first responses fell into a miscellaneous category. The results of this experiment replicate the primary patterns of the previous experiments. Two differences are notable: as in Experiment 5, the order effects in the results of Experiment 4 were successfully eliminated, and secondly, in every condition the most common first response focused on the factual choice, as Table 4.1 shows.

Table 4.1: Percentages of participants who focused on each event in their sentence completions in each condition in Experiment 6

Condition	First response			
	Chocolate sundae	Strawberry sundae	Factual choice	Unspecified alternatives
<i>Chocolate sundae undoes</i>				
if only (n = 48)	30	6	48	10
even if (n = 48)	13	21	29	27
<i>Strawberry sundae undoes</i>				
if only (n = 48)	4	40	42	2
even if (n = 47)	21	6	53	9
<i>Neither undoes</i>				
if only (n = 77)	4	5	62	14
even if (n = 78)	6	6	41	42
<i>Both undo</i>				
if only (n = 75)	21	12	49	8
even if (n = 77)	4	4	58	22

Multiple alternatives with different outcomes

Strawberry sundae undoes For the scenario in which the strawberry sundae would undo the outcome and the chocolate sundae would not, participants constructed "if only" counterfactuals that focused on the alternative that undid the outcome (40%) and "even if" semifactuals that focused on the alternative that did not undo the outcome (21%) and the focus of their counterfactuals and semifactuals was reliably different (chi-squared = 13.44, df = 3, p < 0.01; see Table 4.1). Their "if only" counterfactuals focused on the alternative that undoes the outcome (40%) more often than on the one that does not (4%, binomial, n = 21, z = 3.71, p < 0.001) or an unspecified alternative (2%, binomial, n = 20, z = 4.02, p < 0.001), and as often on the factual choice (42%, binomial, n = 39, z = 0.16, p < 0.44). The factual choice was mentioned more often than the alternative that does not undo the outcome (42% versus 4%, binomial, n = 22, z = 3.84, p < 0.001) or an unspecified alternative (42% versus 2%, binomial, n = 21, z = 4.15, p < 0.001), which were mentioned as often as each other (4% versus 2%, binomial, n = 3, z = 0.58, p < 0.28).

In contrast, participants' "even if" semifactuals focused on the alternative that

would not undo the outcome (21%) more often than on the one that would undo it (6%, binomial, $n = 13$, $z = 1.94$, $p < 0.05$). They mentioned it more often than an unspecified alternative (21% versus 9%, binomial, $n = 14$, $z = 1.60$, $p < 0.06$), although not as often as the factual choice (53%, binomial, $n = 35$, $z = 2.54$, $p < 0.01$). The factual choice was focused on more than the alternative which would undo the outcome (6%, binomial, $n = 28$, $z = 4.16$, $p < 0.001$) or an unspecified alternative (9%, binomial, $n = 29$, $z = 3.90$, $p < 0.001$). They focused on an unspecified alternative as often as on the alternative that would undo the outcome (9% versus 6%, binomial, $n = 7$, $z = 0.38$, $p < 0.35$).

Chocolate sundae undoes A similar pattern holds for the scenario in which the chocolate sundae would undo the outcome and the strawberry sundae would not. Participants again generated "if only" counterfactuals that focused on the alternative that would undo the outcome (30%) and "even if" semifactuals that focused on the alternative that would not undo the outcome (21%), and the focus of their counterfactuals and their semifactuals was again reliably different (chi-square = 19.33, $df = 3$, $p < 0.01$; see Table 4.1). Participants' "if only" counterfactuals focused on the alternative that would undo the outcome (30%) rather than on the one that would not (6%, binomial, $n = 17$, $z = 2.67$, $p < 0.01$) or an unspecified alternative (10%, binomial, $n = 19$, $z = 2.06$, $p < 0.05$). They focused on the factual choice marginally more often than on the alternative that would undo the outcome (48% versus 30%, binomial, $n = 37$, $z = 1.48$, $p < 0.07$), and more often than on the alternative that would not undo the outcome (48% versus 6%, binomial, $n = 26$, $z = 3.92$, $p < 0.001$) or an unspecified alternative (48% versus 10%, binomial, $n = 28$, $z = 3.40$, $p < 0.001$) which were mentioned as often as each other (6% versus 10%, binomial, $n = 8$, $z = 0.71$, $p < 0.25$).

In contrast their "even if" semifactuals focused on the alternative that would not undo the outcome (21%) somewhat more often than on the one that would undo it (13%) although the difference is not reliable (binomial, $n = 16$, $z = 1.00$, $p < 0.16$). The alternative that would not undo the outcome was mentioned as often as the factual choice (21% versus 29%, binomial, $n = 24$, $z = 0.82$, $p < 0.21$) or an unspecified alternative (21% versus 27%, binomial, $n = 23$, $z = 0.63$, $p < 0.26$). The factual choice was mentioned more often than the alternative that would undo the outcome (29% versus 13%, binomial, $n = 20$, $z = 1.79$, $p < 0.05$) as was an unspecified alternative (27% versus 13%, binomial, $n = 19$, $z = 1.61$, $p < 0.06$). The factual choice and an unspecified alternative were mentioned as often as each other (29% versus 27%, binomial, $n = 27$, $z = 0.19$, $p < 0.85$).

0.42).

When we collapse the results across the two conditions in which one alternative would undo the outcome, the reversal in the focus of participants' responses for "if only" counterfactuals and "even if" semifactuals is clearly evident. Participants' counterfactuals focused on the alternative that would undo the outcome rather than the one that would not undo the outcome (34% versus 5%, binomial, $n = 30$, $z = 4.54$, $p < 0.001$). Their semifactuals focused on the alternative that would not undo the outcome rather than the one that would undo the outcome (21% versus 9%, binomial, $n = 29$, $z = 2.04$, $p < 0.05$). Overall, the focus of participants' "if only" counterfactuals and their "even if" semifactuals was reliably different (chi-square = 30.44, $df = 3$, $p < 0.01$).

The results of this experiment replicate those of Experiments 4 and 5. People's "if only" thoughts focus on alternatives that *would undo* an outcome more often than on those that *would not undo* an outcome. The results also replicate the finding that people's "even if" thoughts focus on alternatives that *would not undo* an outcome more often than on those that *would undo* an outcome. Where these results differ from those of the previous experiments is that, in this experiment, a substantial proportion of participants focused on making changes to the factual situation in both their "if only" and "even if" responses. Perhaps there may have been something in the translation of the scenario used in this experiment that made the factual choice particularly salient to our participants.

Multiple alternatives with the same outcome

Neither alternative undoes When neither of the alternatives would have led to a different outcome, the focus of participants' counterfactuals and semifactuals was reliably different (chi-square = 15.69, $df = 3$, $p < 0.01$; see Table 4.1). Participants' "if only" counterfactuals focused primarily on the factual choice (62%), more often than on an unspecified alternative (14%, binomial, $n = 59$, $z = 4.82$, $p < 0.001$), and more than on either of the two alternatives, the chocolate sundae (4%, binomial, $n = 51$, $z = 6.30$, $p < 0.001$) or the strawberry sundae (5%, binomial, $n = 52$, $z = 6.10$, $p < 0.001$). They focused on an unspecified alternative more often than on either the chocolate sundae (14% versus 4%, binomial, $n = 14$, $z = 2.14$, $p < 0.05$) or the strawberry sundae (14% versus 5%, binomial, $n = 15$, $z = 1.81$, $p < 0.05$) which were mentioned as often as each other (4% versus 5%, binomial, $n = 7$, $z = 0.38$, $p < 0.35$).

Participants' "even if" semifactuals focused equally on the factual choice (41%) and an unspecified alternative (42%, binomial, $n = 65$, $z = 0.12$, $p < 0.45$). The factual

choice (41%) was mentioned more often than either of the two alternatives, the chocolate or the strawberry sundae (both 6%, binomial, $n = 37$, $z = 4.44$, $p < 0.001$), as was the unspecified alternative (42% versus 6%, binomial, $n = 38$, $z = 4.54$, $p < 0.001$). The chocolate sundae and the strawberry sundae were mentioned as often as each other (both 6%). The results of the experiment show that, when the order of presentation of alternatives is randomised (as in Experiment 5), participants show no preference for mutating one of the alternatives in the scenario more often than the other. As in Experiment 5, people's "if only" counterfactuals focus on the factual choice and their "even if" semifactuals focus on an unspecified alternative. However, in this experiment, people's "even if" responses focus on the factual choice as often as on an unspecified alternative. This again suggests that, in the scenario used in this experiment, the factual choice was particularly salient to our participants.

Both alternatives undo When both of the alternatives would have led to a different outcome the focus of participants' counterfactuals and semifactuals was reliably different (chi-square = 17.94, $df = 3$, $p < 0.01$; see Table 4.1) in contrast to the results of the previous experiments. Participants' "if only" counterfactuals focused most often on aspects of the factual choice (49%). They mentioned it more often than either of the two alternatives, the chocolate sundae (21%, binomial, $n = 53$, $z = 2.88$, $p < 0.01$), or the strawberry sundae (12%, binomial, $n = 46$, $z = 4.13$, $p < 0.001$), and an unspecified alternative (8%, binomial, $n = 43$, $z = 4.73$, $p < 0.001$). The chocolate sundae and the strawberry sundae were mentioned equally often (21% versus 12%, binomial, $n = 25$, $z = 1.40$, $p < 0.08$). The chocolate sundae was mentioned reliably more often than an unspecified alternative (21% versus 8%, binomial, $n = 22$, $z = 2.13$, $p < 0.05$), and the strawberry sundae was mentioned as often as an unspecified alternative (12% versus 8%, binomial, $n = 15$, $z = 0.77$, $p < 0.22$). Once again, the results show that the order effect observed in the first experiment is eliminated when order is controlled.

Participants' "even if" semifactuals focused primarily on the factual choice (58%) more often than on an unspecified alternative (22%, binomial, $n = 62$, $z = 3.56$, $p < 0.001$), or on the chocolate or strawberry sundaes (both 4%, binomial, $n = 48$, $z = 6.06$, $p < 0.001$). They focused on an unspecified alternative more often than either the chocolate sundae or the strawberry sundae (22% versus 4%, binomial, $n = 20$, $z = 3.13$, $p < 0.001$), which were mentioned as often as each other (both 4%). As in Experiment 5, when both alternatives would undo the outcome, both people's counterfactual "if only"

and their semifactual “even if” thoughts focus on the factual choice presented in the scenario more often than on the available alternatives.

The mutation results replicate the findings from the previous two experiments that the focus of counterfactual “if only” thoughts is on an alternative that would undo the outcome and the focus of semifactual “even if” thoughts is on an alternative that would not undo the outcome. In common with Experiment 5 the results show that the order effects that were evident in the results of Experiment 4 are eliminated when this factor is controlled, and it provides a replication of the results of both of the previous experiments with a between-participants design and a different population. Participants’ mutations focused largely on the factual choice, more often so than in the previous two experiments, which may perhaps reflect some cultural difference between our Irish and Spanish participants.

Causal ratings

The mean causal rating given to the ordering decision overall was 3.8 on a nine point scale from “0” (not at all causal) to “8” (the most important cause) which suggests that the ordering decision was seen as moderately causal of the outcome, as Table 4.2 shows. We carried out a 2 (counterfactual mutation task versus semifactual mutation task) by 2 (mutation task first versus causal rating task second versus the opposite order) by 3 (both alternatives would undo the outcome, one alternative undoes the outcome and the other does not, neither alternative undoes the outcome) between-participants analysis of variance on the participants’ causal ratings³.

The analysis of variance showed no main effect of mutation task ($F(1, 482) = 0.37, p < 0.54$): participants rated the ice-cream decision as moderately causal equally in the counterfactual conditions (mean 3.73) and the semifactual conditions (mean 3.88). It showed a main effect of task order ($F(1, 482) = 6.91, p < 0.01$): participants rated the ice-cream decision as more causal when they carried out the mutation task before the causal rating task (mean 4.13) than when they did the tasks in the opposite order (mean 3.48) as shown by post-hoc tests (Bonferroni, $p < 0.01$). It showed no main effect for the nature of available alternatives ($F(2, 482) = 2.66, p < 0.07$): participants rated the ice-cream decision as moderately causal equally when both alternatives would have undone the outcome (mean 3.92), when one alternative would undo the outcome and the other would

³ The two groups (chocolate sundae undoes; strawberry sundae undoes) were collapsed to form one group (one alternative undoes) for the causal rating analyses because the predictions for these two groups for the causal ratings are the same.

not (mean 4.05), and when neither alternative would undo the outcome (mean 3.41). None of the variables interacted with each other: mutation task and task order ($F(1, 482) = 2.15$, $p < 0.14$); mutation task and available alternatives ($F(2, 482) = 0.86$, $p < 0.42$); task order and available alternatives ($F(2, 482) = 0.97$, $p < 0.38$). There was a marginally reliable interaction of the three variables, mutation task, task order and available alternatives ($F(2, 482) = 2.66$, $p < 0.07$), and we carried out planned comparisons on this interaction (see Winer, 1971, for the legitimacy of such comparisons).

Table 4.2: The mean causal ratings (with standard deviations in parentheses) in each condition in Experiment 6

Mutation Task	Condition			Overall mean
	Both undo	One undoes	Neither undo	
<i>If only (mean 3.73)</i>				
Causal rating first (n = 125)	3.61 (2.74)	3.06 (2.68)	3.08 (3.08)	3.23
Mutation first (n = 122)	4.54 (2.77)	4.55 (2.44)	3.58 (2.81)	4.25
<i>Even if (mean 3.88)</i>				
Causal rating first (n = 119)	4.11 (3.26)	4.27 (2.82)	2.74 (2.55)	3.73
Mutation first (n = 128)	3.46 (2.62)	4.33 (2.56)	4.20 (2.75)	4.02
<i>Overall mean</i>	3.92	4.05	3.41	

Participants rated the ice-cream decision as more causal when they generated “if only” counterfactuals before they made their causal ratings (“if only” mutate first, mean 4.25), compared to when they made causal ratings first (“if only” rate first, mean 3.23; Bonferroni test, $p < 0.05$; see also Wells & Gavanski, 1989). However, participants did not rate the ice-cream decision as more or less causal when they generated “even if” semifactuals about the ice-cream decision before they made their causal ratings (“even if” mutate first, mean 4.02), compared to when they made causal ratings first (“even if” rate first, mean 3.73; Bonferroni test, $p < 0.96$). The planned comparisons also show that there is no difference in the causal ratings provided by participants in the two baseline conditions where the causal rating takes place before any mutation task (“if only” rate first, mean 3.23; “even if” rate first, mean 3.73; Bonferroni test, $p < 0.73$). The results show that thinking counterfactually about a decision makes it seem more causal, but thinking semifactually about a decision does not effect how causal it seems. This result may indicate that semifactuals are not represented by an explicit denial of a causal link (c.f., Goodman,

1973), but by a weakening of the causal link between the antecedent and the consequent.

To examine this result further, we conducted an analysis in which we compared the causal ratings of participants in the “if only” and “even if” mutate first conditions to those of participants in the baseline rate first conditions. To do this we combined the data from the “if only” and “even if” rate first conditions together to form one baseline condition (hereafter referred to as “rate first”). When we carried out an analysis of variance based on these three groups (“if only”, “even if”, “rate first”) we found that overall, the group that participants belonged to still significantly affected their causal ratings. Post-hoc Scheffe tests showed that participants rated Philip’s choice as significantly more causal when they generated “if only” thoughts before they made causal ratings (mean 4.24) than if they made causal ratings first (mean 3.46; Scheffe test, $p < 0.05$). However, there was no significant difference between those participants who generated “even if” thoughts first (mean 4.02) and those who made causal ratings first (Scheffe test, $p > 0.2$). Finally, there was no significant difference between those in the “if only” and “even if” mutate first conditions (mean 4.24 versus mean 4.02; Scheffe test, $p > 0.5$). So, compared to the baseline “rate first” condition, people rate decisions as more causal following the generation of “if only” thoughts, but neither more nor less causal following the generation of “even if” thoughts. This again suggests that “even if” thoughts are represented as a weakening rather than a denial of a causal link.

We carried out a further test to examine whether the predictions of the probability explanation were corroborated. If probability mediates causality, greater causality should be ascribed to decisions taken in the situation where both alternatives would undo the outcome compared to the situation in which one alternative would undo the outcome, and, in turn, decisions should be ascribed more causality in this situation than in the situation where neither alternative would undo the outcome (see Spellman, 1997). In the analysis of variance reported earlier, there was no main effect for the nature of available alternatives, and the causal ratings did not differ reliably when both alternatives would undo the outcome (mean 3.92), one alternative would undo the outcome (mean 4.05), or neither alternative would undo the outcome (mean 3.41). Even if the predictions are constrained to just the situation in which a counterfactual “if only” mutation task is carried out, the lack of a mutation task by alternatives interaction suggests that the predictions are not corroborated. To be certain we carried out a trend test on the counterfactual “if only” mutations alone to examine whether there was a trend for the decision to be judged to be more causal in the condition in which both of the alternatives would have undone the

outcome (mean 4.07) compared to the situation where one of the alternatives would have undone the outcome (mean 3.80), and for the decision to be judged to be more causal in this condition than in the condition where neither alternative would undo the outcome (mean 3.12). No reliable trend was found (Jonckheere test, $J^* = 0.97$, $p < 0.17$). The results indicate that the degree to which a decision changes the probability of an outcome does not affect how causal the decision is perceived to be.

The results replicate the findings from Experiments 4 and 5: people complete "if only" sentences by constructing counterfactual scenarios based on an alternative antecedent that would undo the outcome; they complete "even if" sentences by constructing semifactual scenarios based on an alternative antecedent that would not undo the outcome. In addition, the results of this experiment show that generating counterfactual "if only" thoughts about how an outcome could have been different makes the antecedent events seem more causally related to the outcome, whereas generating semifactual "even if" thoughts about how an outcome could have been the same does not affect how causally related the antecedent events are perceived to be to the outcome. This suggests that semifactuals may not be represented explicitly as the denial of a causal relation. If they were, we would expect that following the generation of "even if" thoughts people's causal ratings would *decrease* compared to the baseline conditions. This is not the case. Instead, semifactuals may be represented as a weakened causal relation (e.g., Johnson-Laird & Byrne, 1991). We return to a mental models based account of the causal structure of counterfactuals and semifactuals both at the end of this chapter and in Chapter 6, where we discuss the possible mental representations underlying counterfactual and semifactual thinking. Finally, the results are not consistent with the view that causal judgments are mediated by probability judgments (Spellman, 1997).

In this experiment we have demonstrated that counterfactual and semifactual thinking have different judgmental consequences. These data support previous research by Branscombe et al. (1996) and extends it from judgments of blame to judgments of causality. In the next experiment in this chapter we set out to see whether counterfactual and semifactual thinking would have different consequences in a different sphere, that is, whether they would have different emotional consequences.

Experiment 7

Counterfactual “if only” thoughts, about how an outcome could have turned out differently have been shown to have a wide range of emotional consequences. It has been suggested that the easier it is for a person to imagine how an outcome might not have occurred, the greater is their emotional reaction to that outcome (the *emotional amplification* hypothesis; Kahneman & Miller, 1986). However, the relationship between counterfactual thinking and emotions is not that simple. The counterfactual outcome with which the factual outcome is compared also effects people’s emotional reactions: thinking of counterfactual outcomes that are worse than the factual outcome makes people feel better about their current situation, whereas thinking about counterfactual outcomes that are better than the factual outcome makes people feel worse (e.g., Markman et al., 1995; Roese, 1994). In this experiment⁴ we were primarily concerned with examining the effects that semifactual “even if” thinking would have on people’s emotional reactions.

We took as our starting point an experiment by Boninger et al. (1994; see page 38). They found that, when presented with a scenario concerning an Olympic athlete who narrowly missed winning a medal, participants who heard about an alternative that would have resulted in a different outcome to the factual situation judged that the runner would experience more regret and self-blame and would feel worse compared to participants who heard about an alternative that would have resulted in the same outcome as the factual situation. From this result, Boninger et al. concluded that thinking counterfactually about how things could have been different increases general negative affect and emotions such as regret and self-blame.

However, the results of our Experiments 4 and 5 suggested an alternative interpretation of these results. The first situation, in which the alternative newer drug would have undone the outcome, is one in which counterfactual “if only” thinking would dominate, whereas the second situation, where the alternative newer drug would have resulted in the same outcome, is one in which semifactual “even if” thinking would be more common. Can a situation in which semifactual thoughts are generated act as a baseline for judging the emotional effects of counterfactual thinking, as Boninger et al. (1994) have assumed? Or, is it possible that semifactual “even if” thoughts may have their own distinct emotional consequences, making us feel better or worse in different situations from counterfactual thinking? This question has not been addressed in previous research, which has not included any baseline condition against which to independently judge the effects of counterfactual and

⁴ The results of this experiment are reported in part in McCloy & Byrne (1999).

semifactual thinking, for example, a third condition in which no information concerning alternative outcomes was presented. Without such a baseline we cannot be sure whether counterfactual thinking increases emotional reactions, whether semifactual thinking reduces emotional reactions, or whether *both* kinds of thinking can effect people's emotional reactions.

Why might semifactual "even if" thinking reduce people's feelings of emotions such as regret and self-blame? In the introduction to this chapter we described two different mechanisms by which counterfactual "if only" thinking has been postulated to affect emotional reactions: contrast and causal inference. However, it seems unlikely that semifactual thinking would affect emotional reactions by way of a contrast mechanism. Contrast mechanisms within thinking about what might have been rely on the availability of an alternative outcome with which to compare the factual outcome (e.g., Markman et al., 1995). As semifactual scenarios by definition result in the same outcome as the factual situation, there is no alternative outcome that people can compare with the factual outcome. Therefore we suggested that, if semifactual thinking were to affect emotional reactions, it would be by the second of these two mechanisms - by causal inferences based on the semifactual scenario generated. The results of Experiment 6 demonstrated that people may represent semifactual "even if" thoughts as the weakening of a causal link between an antecedent event and an outcome. It may be that people, for example, regret their actions to the extent that they see those actions as having caused negative outcomes. Counterfactual "if only" thoughts may lead to increased regret for an antecedent event because they assert that the event was causally related to the outcome (e.g., Roese & Olson, 1995). Semifactual "even if" thoughts in contrast may, by reducing the causal power of an antecedent event in producing an outcome, reduce regret for that event.

We therefore hypothesised that, compared to situations in which no information about an alternative outcome is presented, people will report more regret, self-blame and negative affect if they read about an alternative that would have resulted in a different outcome, whereas they will report less regret, self-blame and negative affect if they read about an alternative that would have resulted in the same outcome.

In the Boninger et al. (1994) experiment it was also assumed that considering an alternative that would have resulted in a different outcome was functionally equivalent to actually generating counterfactual "if only" thoughts. Although we believed that this assumption was a reasonable one, in this experiment we also varied, not only the alternative outcome that our participants read about (different, same, no alternative), but also the

mutation task that participants carried out. We compared participants emotional reactions following the generation of counterfactual “if only” thoughts and semifactual “even if” thoughts to a baseline condition in which participants did not make any explicit mutations. We hypothesised that, compared to situations in which no explicit mutations are made, people will report more regret, self-blame and negative affect following the generation of counterfactual “if only” statements, whereas they will report less regret, self-blame and negative affect following the generation of semifactual “even if” statements.

Finally in this experiment we also included a causal rating task. In the previous experiment (Experiment 6) we showed that counterfactual and semifactual thinking have different effects on causal judgments. In this experiment we were interested in testing whether this difference results in them having different emotional consequences (as mentioned above). As a result we were interested in examining if the differences in causal judgments demonstrated in Experiment 6 would generalise to an experiment that used a very different scenario and a different experimental design.

Our main aim in this experiment was to compare the emotional consequences of counterfactual and semifactual thinking, which we attempted to do in two different ways, by varying the nature of the alternative outcome that participants read about and by varying the mutation task that they carried out. In addition to this we wished to attempt to replicate the results of Experiment 6 with respect to the differences in causal judgments following counterfactual and semifactual thinking.

Method

Participants and Procedure

The participants were 367 undergraduates (264 women, 101 men, two participants did not record their gender) from the University of Dublin, Trinity College. They had an average age of 19 years (range 17-46 years). The experiment was presented in a three page booklet consisting of a cover page with instructions and space for recording age and gender, a second page with one of the versions of the scenario, and a third page with a mutation task (“if only”, “even if”, or no mutation task), the three emotion rating tasks (regret, feeling bad, self-blame) and the causal rating task. Participants were instructed to read the scenario carefully and to answer the questions that followed. They were asked to answer the questions in the order in which they were presented and not to change their answers once they had written them. On completion of the experiment participants were verbally debriefed.

Materials and Design

We gave all of the participants the following scenario, based on that used by Boninger et al. (1994):

You are a runner and since the age of eight you have competed in the sprint races in local track and field events. Up through school you had won every race in which you had competed. It was at the age of 13 that you began to dream about the Olympics. At the age of 18, before starting college, you decide to give the Olympics one, all out shot. You make the Irish Olympic team for the 400 metre race.

On the day before the 400 metre race, in a freak accident during training, you sprain your left ankle. Although there is no break or fracture, when you try to run, the pain is excruciating. Your trainer tells you about many advances in pain killing medications and assures you that you will still be able to participate. He recommends that you choose between two drugs, both legal according to Olympic guidelines. One is a well-known pain killer that has been proved effective but also has some serious side effects including temporary nausea and drowsiness. The other pain killer is a newer and less well-known drug. Although the research suggests that the newer drug might be a more effective pain killer, its side effects are not yet known because it has not been widely used.

After considerable thought, you elect to go with the more well-known drug. On the day of the race, although there is no pain in your ankle, you already begin to feel the nausea and find yourself fighting off fatigue. You finish in fourth place, only 1 tenth of a second from a Bronze medal, 4 tenths from a silver, and 5 tenths from a gold medal.

We manipulated two independent variables in the experiment: the nature of the mutation task that followed the scenario and the nature of the alternative outcome described in the scenario. We manipulated the nature of the mutation task by ensuring that one of three mutation tasks followed the scenario: a counterfactual mutation task in which participants were asked to imagine that in the days and weeks following the race they thought “if only...” and they were asked how they completed this thought; a semifactual mutation task, in which participants were instead asked to imagine that they thought “even if” and were asked how they completed this thought; or no mutation task, for which participants proceeded directly from reading the story to carrying out the emotion and cause rating tasks (see appendix 1).

We manipulated the nature of the alternative outcome that participants read about by ensuring that the scenario had three different endings. For the “different outcome” condition the final paragraph read:

After the event, you learn that some athletes in other events who were suffering from similar injuries used the other, newer drug. They felt no pain and experienced no side effects.

For the “same outcome” condition, the paragraph instead read that the other athletes had felt no pain but experienced the same side effects (see appendix 1g). For the “no alternative” condition this paragraph was omitted, so participants received no information concerning other athletes’ experiences with the newer drug. These two independent variables, each with three levels, resulted in nine different scenario/mutation task combinations. We assigned participants at random to one of the nine groups, and each group had approximately 40 participants.

The main dependent variables were participants’ causal ratings of the decision to take the older drug, and their ratings of emotional reactions to the outcome of the scenario. Participants rated on a nine point scale (where 1 indicated that they did not feel the emotion at all and 9 indicated that they felt it a great deal; see appendix 1g), firstly, how much they regretted taking the well-known drug; secondly, how bad they felt about what happened; thirdly, how much they blamed themselves for the outcome of the race; and finally, how much they thought that taking the well-known drug had caused them not to win an Olympic medal. All participants received the rating tasks in the order described above.

In addition, we analysed participants’ first responses to the counterfactual “if only” and semifactual “even if” mutation tasks, primarily as a manipulation check. In this experiment we were not so much concerned with the content of participants’ first responses as with their nature and only wanted to be sure that our participants had generated counterfactual “if only” thoughts that undid the outcome of the scenario and semifactual “even if” thoughts that left the outcome of the scenario unchanged.

Results and Discussion

Mutation tasks

We analysed the nature of the mutations that participants made, and the content of these mutations, primarily as a manipulation check. We were keen to make sure that participants in this experiment were generating “if only” statements that would undo the outcome of the scenario and “even if” statements that would leave the outcome of the scenario unchanged, in order to be able to compare our results to those of Experiment 6.

Nature of mutations

An independent second rater, blind to the experimental hypotheses, coded participants’ first responses for whether they did or did not undo the outcome of the scenario. In all 91% of first responses to the “if only” and “even if” mutation tasks could be

coded in this way.

The results showed that, as expected, participants’ “if only” counterfactuals undid the outcome of the scenario (90%) significantly more often than they did not undo the outcome of the scenario (3%; binomial, $n = 116$, $z = 10.03$, $p < 0.00001$). In contrast, participants’ “even if” semifactuals left the outcome of the scenario unchanged (78%) significantly more often than they undid the outcome of the scenario (9%; binomial, $n = 107$, $z = 8.22$, $p < 0.00001$). Participants appear to be generating counterfactual thoughts in response to the “if only” mutation task and semifactual thoughts in response to the “even if” mutation task. This pattern holds across all six conditions that featured a mutation task (see Table 4.3)⁵.

Table 4.3: Percentage of participants’ first responses in each condition that did or did not undo the outcome of the scenario in Experiment 7

Mutation task	Effect on outcome		Total
	Undoes	Does not	
<i>if only</i>			
different outcome (<i>n</i> = 42)	98	0	98
same outcome (<i>n</i> = 43)	91	9	100
no outcome (<i>n</i> = 37)	86	0	86
Total (<i>n</i> = 122)	90	3	93
<i>even if</i>			
different outcome (<i>n</i> = 42)	12	79	91
same outcome (<i>n</i> = 43)	5	91	96
no outcome (<i>n</i> = 37)	19	65	84
Total (<i>n</i> = 122)	9	78	87

For the scenario in which participants read about a different alternative outcome (i.e., that the other drug had no side effects), participants’ “if only” counterfactuals undid the outcome of the scenario (98%) significantly more often than they left it unchanged (0%; binomial, $n = 41$, $z = 6.40$, $p < 0.00001$), whereas their “even if” semifactuals left the outcome unchanged (79%) more often than they undid the outcome (12%; binomial, n

⁵ Within participants first responses, 7% of participants’ “if only” thoughts and 13% of participants’ “even if” thoughts could not be classified as to whether or not they would undo the outcome of the scenario. For example, “if only the others had taken the older drug...we would have been on a level footing” or “even if I took it would I win?”.

= 38, $z = 4.54$, $p < 0.00001$). In the condition where participants read about an alternative outcome that was the same as the outcome of the scenario (i.e., that the other drug had the same side effects), participants' "if only" counterfactuals again undid the outcome of the scenario (91%) more often than they left it unchanged (9%; binomial, $n = 43$, $z = 5.33$, $p < 0.00001$), whereas their "even if" semifactuals left the outcome unchanged (91%) rather than undoing the outcome (5%; binomial, $n = 41$, $z = 5.78$, $p < 0.00001$). Finally, in the condition where no information was provided concerning an alternative outcome, participants' "if only" counterfactuals undid the outcome of the scenario (86%) more often than they left it unchanged (0%; binomial, $n = 32$, $z = 5.66$, $p < 0.00001$) and their "even if" semifactuals left the outcome unchanged (65%) more often than they undid the outcome (19%; binomial, $n = 28$, $z = 3.78$, $p < 0.00005$).

Content of mutations

Participants' first responses could be scored into two main categories depending on their content: those that focused on the drug e.g., "if only I had taken the other drug I would have won a medal" (54%), and those that focused on some aspect of the accident, e.g., "if only I hadn't hurt my ankle I would have won a medal" (38%). The remaining 9% fell into a miscellaneous category (see Table 4.4).

Table 4.4: Percentage of participants' first responses in each condition falling into two main categories in Experiment 7

	Event		
Mutation task	Drug	Accident	Total
<i>if only</i>			
different outcome (<i>n</i> = 42)	55	40	95
same outcome (<i>n</i> = 43)	9	79	88
no outcome (<i>n</i> = 37)	24	68	92
Total (<i>n</i> = 122)	30	62	92
 <i>even if</i>			
different outcome (<i>n</i> = 42)	83	5	88
same outcome (<i>n</i> = 43)	84	12	96
no outcome (<i>n</i> = 37)	65	24	89
Total (<i>n</i> = 122)	78	13	91

Participants' "if only" counterfactuals focused significantly more often on the accident (62%) than on the choice of drug (30%; binomial, $n = 112$, $z = 3.78$, $p < 0.00005$; see Table 4.4). This holds for the conditions where participants read that the other drug would have resulted in the same outcome (79% versus 9%; binomial, $n = 38$, $z = 4.87$, $p < 0.00001$) and in the condition where participants did not receive any information about the other drug (68% versus 24%; binomial, $n = 34$, $z = 2.74$, $p < 0.005$). However, when the other drug would have resulted in a different outcome, participants' "if only" counterfactuals focus equally as often on the decision to take the well-known drug, e.g., "if only I had taken the other drug I would have won a medal" (55%), as on the accident (40%; binomial, $n = 40$, $z = 0.95$, $p < 0.17$).

In contrast, participants' "even if" semifactuals focus significantly more often on the choice of drug (78%) than on the accident (13%; binomial, $n = 111$, $z = 7.69$, $p < 0.00001$; see Table 4.4) and this holds in all three "even if" conditions: when the other drug would have the same side effects as the well-known drug (e.g., "even if I'd taken the other drug I would not have won a medal"; 84% versus 12%; binomial, $n = 41$, $z = 4.84$, $p < 0.00001$), when the other drug would have had no side effects (e.g., "even if I'd taken the other drug I might still not have been good enough to win a medal"; 83% versus 5%; binomial, $n = 37$, $z = 5.43$, $p < 0.00001$), and when participants received no information about the effects of the other drug (65% versus 24%; binomial, $n = 33$, $z = 2.61$, $p < 0.005$). Overall, the focus of participants' "if only" and "even if" thoughts is reliably different (chi-square = 65.76, $df = 2$, $p < 0.01$).

The mutation task results once again replicate the findings of the experiments reported in Chapter 3. People's "if only" thoughts are counterfactual in nature, in that they undo the outcome of the scenario by changing or mutating something about past events. In contrast, people's "even if" thoughts are semifactual in nature, in that they leave the outcome of the scenario unchanged despite mutating past events. This result generalises the findings of the previous experiments (Experiments 4, 5 and 6) both to a different kind of scenario, one that is less constrained and to a different experimental design. We can therefore conclude that any differences in the emotional effects of generating "if only" and "even if" thoughts can be attributed to there being different consequences of counterfactual and semifactual thinking respectively.

Rating tasks

We carried out a three (mutation task: "if only", "even if", no mutation task) by three

(alternative outcome: different, same, none) multivariate analysis of variance on the four dependent rating measures: regret, feeling bad, self-blame and causal ascription. The MANOVA showed a main effect of each of the independent variables. There was a main effect of both the mutation task carried out by participants - Wilks' lambda = 0.95, $F(2, 356) = 2.07$, $p < 0.05$ - and of the alternative outcome that participants read - Wilks' lambda = 0.77, $F(2, 356) = 12.13$, $p < 0.0001$. There was however no interaction between the two independent variables - Wilks' lambda = 0.93, $F(2, 356) = 1.51$, $p < 0.87$. We report the results from the univariate analyses of variance below.

“If only” and “even if” thoughts have different effects

The kind of mutation task (“if only”, “even if”, no mutation task) that participants carried out affected their ratings of emotions and causes, as shown by the main effect for mutation task. Univariate ANOVAs show that the sort of mutation task only affects participants’ ratings on two of the rating scales - feeling bad and causality. It significantly affected how bad participants reported feeling: participants’ ratings of feeling bad decreased following the generation of “even if” thoughts (mean 6.68) compared to the generation of “if only” thoughts (mean 7.29) , or no thoughts (mean 7.30), as shown by post-hoc Student-Neuman-Keuls tests ($p < 0.05$), and there is no difference between participants’ ratings following “if only” thoughts and those following no thoughts (see Table 4.5)

The mutation task that participants carried out also significantly affected their ratings of causality ($F(2, 356) = 4.77$, $p < 0.01$): participants’ ratings of the causal role of the decision to take the more well-known drug also decreased following the generation of “even if” thoughts (mean 4.82) compared to no thoughts (mean 5.67), as shown by post-hoc Student-Neuman-Keuls tests ($p < 0.05$), although not reliably compared to “if only” thoughts (mean 5.23; $p > 0.05$), and there was no significant difference between the “if only” and no mutation task conditions ($p > 0.05$).

Table 4.5: The effects of different mutation tasks (collapsed over different alternative outcomes) on ratings of emotions and causes in Experiment 7

	Regret	Feeling Bad	Self Blame	Cause
<i>If only task</i>	5.36	7.29	5.35	5.23
<i>Even if task</i>	5.29	6.68	4.85	4.82
<i>No mutation task</i>	5.88	7.30	5.25	5.67

There was no effect of mutation task on how much participants blamed themselves

for the outcome ($F(2, 356) = 1.55, p < 0.21$) although the results do fall into a similar pattern: participants blamed themselves as much when they generated “if only” thoughts (mean 5.35) as when they generated “even if” thoughts (mean 4.85) or no thoughts (mean 5.25). There was also no effect of mutation task on how much participants reported regretting taking the well-known drug ($F(2, 356) = 2.50, p < 0.08$): participants regretted their decision just as much following “if only” thoughts (mean 5.36), as following “even if” thoughts (mean 5.29), or no thoughts (mean 5.88).

How do the causality results of this experiment compare to those of the previous experiment? The no mutation task condition is equivalent to the two rate first conditions reported in Experiment 6, as in these conditions people made causal ratings without first generating mutations. The “if only” and “even if” conditions in this experiment are therefore equivalent to the “if only - mutate first” and “even if - mutate first” conditions in the previous experiment. As in Experiment 6, we found that the mutation task that participants carry out significantly affects their causal ratings. However, in this experiment the pattern is somewhat different. Again, we see no significant differences between those who generate “if only” thoughts before making causal ratings and those who generate “even if” thoughts. However, when we compare the causal ratings of those who generate “if only” thoughts and those who generate “even if” thoughts to the baseline “no thoughts” condition, we find that generating “even if” thoughts *decreases* causal ratings, whereas generating “if only” thoughts has no significant effect. This differs from the previous experiment, in which we found that generating “if only” thoughts *increased* causal ratings and that generating “even if” thoughts had no effect. We will return to this discrepancy later.

Different alternative outcomes have different effects

The nature of the alternative outcome that participants read about also affected their ratings of emotions and causes, as shown by the main effect for alternative outcome in the MANOVA we carried out on participants’ rating scores (see Table 4.6). Univariate ANOVAs show that the sort of alternative outcome also affected participants’ ratings on just two of the scales - regret and causality. It significantly affected how much participants reported regretting their decision to take the well-known drug ($F(2, 356) = 43.21, p < 0.001$): participants’ ratings of regret decreased when they read that the other drug would have had the same side effects (mean 4.08) compared to those who received no information concerning the effects of the other drug (mean 5.73), which in turn was significantly less than for those who read that the other drug would have had no side effects (mean 6.78), as

shown by post-hoc Student-Neuman-Keuls tests ($p < 0.05$).

Table 4.6: The effects of different alternative outcomes (collapsed over different mutation tasks) on ratings of emotions and causes in Experiment 7

	Regret	Feeling Bad	Self Blame	Cause
<i>Different alternative</i>	6.78	7.06	5.25	6.23
<i>Same alternative</i>	4.08	7.07	4.99	4.26
<i>No alternative</i>	5.73	7.16	5.24	5.25

The nature of the alternative outcome that participants read about also significantly affected their ratings of causality ($F(2, 356) = 27.91, p < 0.001$): participants' ratings of the causal role of the decision to take the well-known drug also decreased in the same outcome condition (mean 4.26) compared to the no alternative condition (mean 5.25), which in turn was less than in the different alternative condition (mean 6.23), as shown by post-hoc Student-Neuman-Keuls tests ($p < 0.05$).

There was no effect of the nature of the alternative outcome on how bad participants reported feeling about the outcome of the scenario ($F(2, 356) = 0.13, p < 0.88$): participants felt just as bad if they read that the other drug would have had the same side effects (mean 7.07), as they did when they read that it would have had no side effects (mean 7.06), or if they received no information about the effects of the other drug (mean 7.16). There was also no effect of the nature of the alternative outcome on how much participants blamed themselves for the outcome of the scenario ($F(2, 356) = 0.46, p < 0.63$): participants blamed themselves just as much in the same outcome condition (mean 4.99) as in the different outcome condition (mean 5.25), and in the no outcome condition (mean 5.24).

As we mentioned above, the results of Experiment 7 show a different pattern in participants' causal judgments than those of Experiment 6. How can we explain this discrepancy? One possibility is that asking people to generate "if only" and "even if" thoughts is not a strong manipulation of their counterfactual and semifactual thinking. Just because people report counterfactuals in response to "if only" mutation questions and semifactuals in response to "even if" mutation questions, we cannot be sure that this is all they are thinking. Perhaps people consider both counterfactuals and semifactuals and base their causal judgments on those they think most plausible? A second possibility is that the baseline we employed in this experiment, that of reporting no mutations before making causal ratings, was not an effective one. It has been shown that people spontaneously

generate counterfactual thoughts in response to negative outcomes (e.g., Sanna & Turley, 1996). Therefore, as the outcomes of this scenario was particularly negative, we cannot be sure whether participants were thinking counterfactually even when they were not directly asked to do so, as in the baseline conditions. Little is known about the circumstances under which semifactual thinking spontaneously occurs, and we may likewise be unable to rule out spontaneous semifactual thinking in our baseline conditions.

A third, and perhaps more promising, possible explanation as to why we found an effect of “even if” thoughts in this experiment but not in the previous experiment hinges on the mental models that may underlie semifactual thinking. As we have suggested in the introduction, semifactual thoughts may initially be represented by three explicit models, one corresponding to the factual situation, one to a counterfactual situation and one corresponding to a semifactual situation. Taken together these models suggest the weakening of a causal link, and hence, we suggested, they may result in semifactual “even if” thinking having little effect on people’s causal judgments. This is what we found in Experiment 6. However, in Experiment 7 the results were different. We believe that this may have occurred because different situations may results in some models being more salient than others (for example, if information is provided in a different order; Girotto et al., 1997). We suggest that, in Experiment 7, the semifactual model constructed in generating “even if” thoughts:

8. semifactual: new drug no medal

was made salient by the situation described in the scenario as not only the side effects of the drug , but also the presence of a sprained ankle, or any number of other events could be factors which result in a similar outcome. Winning an Olympic medal is a rare event, and hence semifactual alternatives, being more numerous, may be relatively more available in this situation. Because they focus on the semifactual model, the representations that participants constructed in generating “even if” thoughts may initially contain only two explicit models - those that suggest a denial of a causal link between antecedent and outcome:

9. factual: old drug no medal
 semifactual: new drug no medal

...

and hence participants’ causal ratings are reduced following “even if” thinking. We will return to this possibility in Chapter 6.

The results of this experiment provide the first demonstration that generating

semifactual “*even if*” thoughts can *reduce* people’s emotional reactions, at least their ratings of feeling bad. The reduction is particularly clear when the effects of semifactual thinking are compared to an appropriate neutral baseline of no thoughts about what might have been, rather than when semifactual “even if” thoughts are only compared to counterfactual “if only” thoughts, as in the few previous studies on semifactual thinking (Experiments 4, 5 and 6; Branscombe et al., 1996). Our experiment also shows that, compared to a baseline of generating no thoughts about what might have been, generating counterfactual “if only” thoughts does not result in an increase in people’s emotional reactions⁶. As predicted, these results mirror participant’s causal judgments in each of these conditions. Generating semifactual “*even if*” thoughts *reduces* people’s judgments of the causal importance of an antecedent event compared to not generating mutations. Generating counterfactual “if only” thoughts does not increase causal judgments compared to not generating mutations. This, we believe, suggests that in this case the effects of generating counterfactuals and semifactuals on people’s emotional reactions are being mediated by people’s causal inferences based on the counterfactual and semifactual scenarios they generate.

This suggestion is further supported by the results from the different alternative outcome conditions. The results of the experiment provide the first clear demonstration that the availability of an alternative antecedent which would have resulted in the *same* outcome can *reduce* people’s emotional reactions, at least their ratings of regret, compared to a baseline in which no information is provided concerning an alternative outcome. The experiment replicates the findings of previous studies that the availability of an alternative antecedent event which would have resulted in a *different* outcome *increases* people’s emotional reactions compared to when no alternative outcome information is presented. Our results therefore replicate the finding by Boninger et al. (1994) that people’s emotional reactions to an outcome are different when they read about an alternative outcome that is different from that of the factual situation from when they read about an alternative outcome that is the same as the factual situation. They extend these results by showing that both counterfactual and semifactual thinking can affect people’s emotional reactions. Again, these results mirror participant’s judgments of causality. People’s judgments of the causal importance of an antecedent event *decrease* when the available alternative antecedent would have resulted in the *same* outcome, compared to when no alternative outcome information is given. People’s judgments of causality *increase* when the available alternative antecedent would have resulted in a *different* outcome, compared to when no alternative outcome

⁶ Note that Boninger et al. (1994) did not include a mutation task in their experiment.

information is given.

The experiment shows that counterfactual and semifactual thinking have different emotional consequences and that the impact of semifactual thinking on our emotions may be just as important as the impact of counterfactual thinking. Thinking counterfactually about how things could have turned out differently can increase emotional reactions, whereas thinking semifactually about how things could have turned out the same can reduce the same emotional reactions. Of course, the Olympic scenario that we have examined has a negative outcome, the athlete does not win a medal, and it is well-known that counterfactual thinking is evoked more often following a bad outcome than following a good outcome (e.g., Sanna & Turley, 1996). Participants in our experiment may have spontaneously thought counterfactually even in situations where they were not asked to (i.e., the “no thoughts” conditions). Whether semifactual thinking exhibits the same tendencies as counterfactual thinking, such as prevalence after bad outcomes as opposed to good outcomes, remains an open research question.

Something that we did not predict in our results is the divergence between the effects of being presented with an alternative antecedent and those of actually explicitly generating counterfactual or semifactual mutations. The first has its main emotional effects on regret, while the second has its main effects on feeling bad. The explanation for this, we believe, lies in the events that each manipulation makes salient and the specific questions that we asked. The alternative outcome manipulation focused on providing an alternative to just one event, the choice of drug, whereas the mutation task manipulation was more open-ended. People’s mutations focused, not only on the choice of drug, but also on the accident and on other events. The manipulation of alternative outcomes was therefore more likely to affect emotional reactions to that one particular event (taking the drug), whereas the mutation task manipulation could affect reactions to any number of events in the scenario and therefore might be more likely to have an effect on more general measures of affect. The regret question we asked our participants required them to assess how much regret they would feel for the choice of drug that they made, whereas the feeling bad question was much more general and focused instead on the outcome of the scenario. We suggest that this is why people’s regret ratings were affected by the available alternative antecedent that they were given, and why their ratings of feeling bad were instead affected by the mutation task that they carried out. A second unusual result in this experiment is that neither of our manipulations affected participants’ ratings of self-blame. This is particularly surprising in that, using a similar scenario and questions and a comparable number of participants, we

failed to replicate the results of Boninger et al. (1994) with respect to varying alternative outcomes, and suggests their conclusion that regret and self-blame go together as *counterfactual emotions* may not be warranted.

Our experiment shows that both counterfactual and semifactual thinking can have consequences for our emotional reactions. The experiment supports the idea that the emotional effects of thinking about what might have been are not solely due to a perceived contrast between the factual outcome and an imagined outcome. If this were the case then we would expect that semifactual thinking, in which the outcome imagined is the same as that of the factual situation, would not have distinct emotional consequences. Our results support those of Experiment 6 in suggesting that the causal structure of counterfactuals and semifactuals are represented differently, and they suggest that the causal inferences people make based on the counterfactual and semifactual scenarios that they generate can affect their emotional reactions.

General Discussion

Counterfactual “if only” thinking and semifactual “even if” thinking have different judgmental and affective consequences. The results of Experiment 6 show that counterfactual and semifactual thinking have different consequences for causal judgments. Thinking counterfactually about an event was shown to increase judgments of the causal importance of that event, whereas thinking semifactually did not affect participants’ causal judgments. The results also replicate those of Experiments 4 and 5 in showing that “if only” thoughts are counterfactual in nature, in that they focus on alternatives that would have resulted in a different outcome to the factual situation, and that “even if” thoughts are semifactual in nature, in that they focus on alternatives that would have resulted in the same outcome. The experiment extends this finding both to a slightly different scenario and to a different language and culture. Finally, the results of Experiment 6 do not support the predictions of a probability based explanation of causal judgments (Spellman, 1997). Our participants’ responses do not follow a pattern of rating a protagonists’ decision as more causal the more that decision changed the probability of the occurrence of the outcome.

The results of Experiment 7 show that counterfactual and semifactual thinking have different consequences for people’s emotional reactions. Thinking counterfactually about how things could have turned out differently following a negative outcome increases emotional reactions such as regret and feeling bad. Thinking semifactually about how things could have turned out the same decreases emotional reactions such as regret and feeling bad.

Participants' emotion ratings mirror their causal ratings suggesting that, in this case, the different emotional consequences of counterfactual and semifactual thinking are the result of causal inferences based on the counterfactual and semifactual scenarios generated.

What have we discovered so far by comparing counterfactual and semifactual thinking? In the experiments reported in Chapter 3 we showed that counterfactual and semifactual thinking focus on different imaginary alternatives to reality. Counterfactual "if only" thoughts focus on alternatives that would lead to a different outcome than the factual situation, and semifactual "even if" thoughts focus on alternatives that would lead to the same outcome as the factual situation. The experiments we report in this chapter show that counterfactual and semifactual thinking have different consequences, something, we believe, that arises out of the different alternatives to reality that people construct in counterfactual and semifactual thinking about what might have been.

We suggest that the nature of mental representations of factual events that people construct may affect their construction of alternatives and their subsequent ratings of causality and emotional impact (e.g., Byrne, 1997). When people are asked to think "if only", they must undo the outcome and examine how the undone outcome could have come about. To do this they must keep in mind at least two different situations, one in which both the antecedent and the consequent occurred - *the factual situation* - and another in which neither occurred - *the counterfactual situation*. As a result, within people's initial explicit models, the occurrence or non-occurrence of the antecedent covaries perfectly with that of the consequent, and hence people's ratings of causality are increased compared to baseline (e.g., Mandel & Lehman, 1996). When people are asked to think "even if" they must keep the outcome the same and examine whether the same outcome could have been brought about by different antecedent events. Again, they must keep in mind at least two situations, one in which both the antecedent and the consequent occurred - *the factual situation* - and one in which the antecedent did not occur but the consequent did - *the semifactual situation*. If these two models are the only ones that people keep in mind (as we suggested was indicated by the results of Experiment 7), their initial explicit models suggest that there is no causal link between the antecedent and the consequent, as the occurrence of these two events does not covary across the available models. Hence people's causal ratings are decreased compared to baseline. However, the results of Experiment 6 suggest that people may represent a third situation, one in which neither the antecedent nor the consequent occurred, that is equivalent to a counterfactual situation. If people construct all three of these explicit models in generating "even if" thoughts, their initial explicit models instead suggest a weak

causal link between the antecedent and the consequent. Hence people's causal ratings are not affected by their "even if" thoughts. We suggest that different situations and manipulations may lead people to focus more or less on the semifactual model and that this may explain the differences observed between Experiments 6 and 7. For example, the explicit provision of a semifactual alternative in the same outcome condition of Experiment 7 is one factor which may have made the semifactual model particularly salient. The results of Experiment 7 show that the degree to which people think that the antecedent event may have caused the outcome following the generation of counterfactual or semifactual thoughts then affects their subsequent emotional reactions to that event. We address the question of the mental representations underlying counterfactual and semifactual thinking further in our final series of experiments which we report in the next chapter and we shall return to considering the structure of representations in Chapter 6.

Much of the interest in the consequences of counterfactual thinking has arisen out of a desire to understand the functions that this kind of thinking may serve (e.g., Roese, 1994). For example, downward counterfactuals, in which people imagine an outcome that is worse than their factual situation, have been hypothesised to serve an affect regulating function in that they make people feel better about their current situation, especially following negative, uncontrollable outcomes. Upward counterfactuals, in which people imagine outcomes that are better than their factual situation, instead serve a preparative function as, by imagining how things could have been better, people can construct plans which may lead to success in the future (e.g., Roese, 1994). Our experiments show that counterfactual and semifactual thinking have different consequences (see also Branscombe et al., 1996). What functions might semifactual thinking serve?

From our results we can suggest two possible functions that may be served by semifactual thinking. The first function relates to how people assess the causes of events. Counterfactual thinking has been shown to be important for how people work out whether or not a particular causal candidate was a necessary cause of an outcome (e.g., Mandel & Lehman, 1996; N'Gbala & Branscombe, 1995; Wells & Gavanski, 1989), and semifactual thinking appears to play a complementary role. Counterfactual thoughts assert and semifactual thoughts weaken or deny the fact that a causal candidate was necessary in producing an outcome and hence both may have important functions when people try to understand the causal structure of past events.

The second function relates to the affective consequences of semifactual thinking. Our results show that, following negative outcomes, semifactual "even if" thoughts can

serve to make people feel better and to regret their actions less. Semifactual thoughts may be employed to balance out the emotional effects of the compelling counterfactual thoughts that frequently follow negative outcomes (e.g., Davis et al., 1993). To the extent that people can think “even if”, they can deny that their actions caused negative outcomes and from this may be able to feel better about themselves. This may be particularly important following uncontrollable outcomes (where downward counterfactuals are also more common - Roese & Olson, 1995b). However, this study has only provided a preliminary glance at the emotional effects of semifactual “even if” thinking. Compared to the large body of research on counterfactual thinking and emotions (e.g., Boninger et al., 1994, Gleicher et al., 1990; Landman, 1987; Markman et al., 1993; Niedenthal et al., 1994) there is much that remains to be done, and many emotions that have not yet been considered. We will return to the implications of these findings in the final chapter.

There are questions about the consequences of semifactual as opposed to counterfactual thinking that remain open. In the experiments we report in this chapter, in common with the majority of previous research on thinking about what might have been, we have focused on examining the consequences of considering counterfactuals and semifactuals following *negative* outcomes. Counterfactual thinking has been shown to amplify emotional reactions following both negative and positive outcomes: available counterfactual alternatives make people feel worse following negative outcomes and better following positive outcomes (e.g., Gleicher et al., 1990). We have shown that semifactual thinking, in contrast, may make people feel better following negative outcomes. The question remains whether it will make people feel worse following positive outcomes. Future research may tell us more about both the consequences and the functions of semifactual thinking about how things could have turned out the same.

In Chapters 3 and 4 we examined the imaginary *alternatives* that people’s counterfactual “if only” and semifactual “even if” thoughts focus on, and the *consequences* that this has for their judgments and their emotions. We now move on to consider the *factual events* that people think about in their “if only” and “even if” thoughts, with the aims of discovering more about the mental representations underlying counterfactual and semifactual thinking (e.g., Byrne, 1997), and answering the question: What kinds of events do people focus on in their “even if” thoughts?

Chapter 5 Factual Focus of Counterfactual and Semifactual Thoughts

In Chapter 2 (Experiments 1-3) we examined the factual events that people focus on in their counterfactual “if only” thoughts. In this chapter we return to this issue, while retaining the main theme of the previous two chapters (Chapters 3 & 4), that is, the comparison of counterfactual “if only” and semifactual “even if” thinking. In the last two chapters we dealt with the *imaginary alternatives* to reality that people focus on in their “if only” and “even if” thought, and with the *consequences* that this has for their judgments and their emotions. The main aim of the three experiments reported in this chapter is to examine the kinds of *factual events* that people focus on in their counterfactual “if only” and semifactual “even if” thoughts.

Mutability Effects in Counterfactual Thinking

When people think about what might have been they tend to focus on some kinds of factual events more often than on others. In the existing literature on counterfactual thinking, there are a substantial number of papers devoted to establishing the kinds of events that people are more likely to change when they generate “if only” thoughts (e.g., Girotto et al., 1991; Kahneman & Miller, 1986; McCloy & Byrne, in press; Miller & Gunasegaram, 1990; Wells et al., 1987). In the experiments reported in this chapter, our primary aim was to establish the kinds of factual events that people focus on in their semifactual “even if” thoughts. Do people focus on the same kinds of events when they think “even if” as they do when they think “if only”?

Why have researchers been so concerned with the factual focus of counterfactual thoughts? One reason is that the factual events that people focus on in their counterfactual thoughts may provide information about the structure of the mental representations that people construct, not only of counterfactual alternatives, but also of the factual situation itself (e.g., Byrne, 1997). The factual events that people focus on when they think about what might have been have been suggested to highlight the “joints of reality” (Kahneman & Tversky, 1982) or the places where reality is at its most “slippable” (Hofstadter, 1979). A second reason for the interest in the factual focus of counterfactual thoughts is that the factual events that people mutate can effect their subsequent judgments. For example, Branscombe et al. (1996) found that, when the focus of people’s “if only” thoughts was on the actions of a rape victim, they blame her more and blame the assailant less, than when their “if only”

thoughts focus instead on the actions of the assailant.

Semifactual Thinking and Mutability

What kinds of events will people focus on when they generate semifactual alternatives? We have shown that counterfactual “if only” and semifactual “even if” thinking focus on different imaginary alternatives to reality and that they have different judgmental and affective consequences. Do people focus on different kinds of factual events in their semifactual “even if” thoughts from those that they focus on in their counterfactual “if only” thoughts?

One possible hypothesis is that counterfactual “if only” and semifactual “even if” thinking will focus on *different* kinds of factual events. In their discussion of the norm correspondence effect (the finding that people undo exceptional outcomes by undoing exceptional antecedent events and normal outcomes by undoing normal antecedent events; see Chapter 2), Gavanski and Wells (1989) suggested that, people may, for example, focus on exceptional antecedent events when they want to undo exceptional outcomes because they believe that exceptional antecedent events cause exceptional outcomes and will therefore effectively undo those outcomes. People’s counterfactual thoughts, they suggest, focus on events that they believe caused and therefore that will effectively undo an outcome. What about semifactual thinking? In semifactual “even if” thinking the goal is not to undo an outcome, but instead to leave the outcome unchanged despite changing past events. People should therefore be less likely to focus on changing events which they believe would effectively undo an outcome in the semifactual “even if” thoughts and should instead focus on different factual events, in particular on those events that did not play a causal role in producing the outcome. In any one factual situation counterfactual “if only” and semifactual “even if” thoughts should be unlikely to focus on mutating the same factual events.

An alternative idea is that counterfactual “if only” and semifactual “even if” thinking may focus on the *same* kinds of factual events. This suggestion arises out of the theory of *mental models* (e.g., Johnson-Laird and Byrne, 1991). This theory was first developed to account for people’s performance on a wide range of reasoning tasks (e.g., Girotto et al., 1997; Johnson-Laird & Byrne, 1991; Johnson-Laird et al., 1992), but has recently been extended to the field of counterfactual thinking (e.g., Byrne, 1997; Byrne & McEleney, 1997; 1999; Byrne et al., in press; Legrenzi et al., 1993). The theory suggests that when people come to understand a factual situation they construct a mental model or representation of that situation. Due to the constraints of working memory, as little information as possible

about the situation is represented explicitly in these models, with the remainder of the information being represented implicitly and only fleshed out if necessary. Therefore, only some of the events of a factual situation are represented explicitly in people's models of that situation. When people construct alternatives to a factual situation they focus on the events of the situation that they have represented explicitly. They then construct alternatives to these events, rather than to those that they have represented implicitly (e.g., Byrne & McEleney, 1997; Legrenzi et al., 1993).

It has been suggested that the mutability effects, or "biases", observed in counterfactual "if only" thinking arise out of the mental models that people construct. In particular, they arise because some kinds of events are more likely to be explicitly represented than others, for example, the action effect in counterfactual thinking may arise because actions tend to be represented explicitly and inactions tend to be represented implicitly (e.g., Byrne & McEleney, 1997; see Chapter 1). Both counterfactual and semifactual thinking involve the construction of alternatives to factual events. If the construction of alternatives in both cases proceeds in the same way, we would expect that both people's counterfactual "if only" and their semifactual "even if" thoughts should focus on events that they have explicitly represented in their mental models of the factual situation. If, for example, the controllability effect arises because people represent controllable events explicitly and uncontrollable events implicitly, both counterfactual and semifactual thoughts should focus on controllable events more often than on uncontrollable events. It is important to note that, even if counterfactual and semifactual thinking focus on the *same* kinds of factual events, it is still possible that they result in *different* affective and judgmental consequences. Although people's "if only" and "even if" thoughts may focus on making mutations to the same factual events, the alternatives that they generate to those events will be different (see Experiment 4 & 5), and we suggest that it is this difference that results in the distinct consequences of counterfactual and semifactual thinking.

Controllability and Temporal Order

In order to examine the factual events that people focus on in their semifactual "even if" thoughts, we returned to the two mutability effects that we considered in Chapter 2 - the *controllability* effect and the *temporal order* effect. One of our main aims in this thesis has been to understand more about how people think about controllable events, and so it seemed logical to return to them in our final series of experiments. In addition, given the competing hypotheses discussed above, we were interested in studying a mutability effect for which

there is an established account in mental models theory, as we believed that it would be helpful in interpreting our results. There is to date no well established account of the controllability effect in the mental models theory, and so we additionally decided to consider the temporal order effect, which was one of the first to be examined from this perspective (Byrne et al., 1995; Byrne et al., in press).

To recap on these effects, the *controllability* effect is the finding that people focus on controllable events more often than on uncontrollable events in their “if only” thoughts (e.g., Girotto et al., 1991; Markman et al., 1995). The *temporal order* effect is the finding that, in an independent, temporally-related series of events, people are more likely to change the last event in the sequence rather than earlier events. People are also more likely to attribute more guilt and blame to a person whose actions occurred last in an independent sequence of events, rather than to a person who acted earlier (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990).

In the first two experiments in this chapter (Experiments 8 & 9) we examined the controllability effect. Our main aim was to discover whether controllable events were also more likely to be the focus of people’s semifactual “even if” thoughts than uncontrollable events. In the third and final experiment (Experiment 10), we built on the findings of the previous two experiments by turning our attention to the temporal order effect. Our aim in this experiment was to examine whether the pattern of participants’ counterfactual and semifactual mutations could be predicted on the basis of the hypothesised mental representations underlying the temporal order effect.

Experiment 8

Counterfactual “if only” thoughts focus on controllable events rather than on uncontrollable events. Our main aim in this experiment was to establish whether people’s semifactual “even if” thoughts also tend to focus on controllable events. In many of the previous experiments reported in this thesis, we presented participants with scenarios that primarily concerned a decision made by the protagonist. In response to these scenarios, participants who completed counterfactual “if only” statements focused on alternatives to the decision that would have resulted in a different outcome to the factual situation and those who completed semifactual “even if” statements focused on alternatives to the decision that would have resulted in the same outcome as the factual situation. This, we believe, suggests that both counterfactual and semifactual thinking may be subject to a controllability effect (i.e., that both will focus on decisions rather than on uncontrollable

events). However, the previous scenarios were not designed specifically to include both controllable and uncontrollable events. As a more direct test of the controllability effect, in this experiment, we asked participants to generate either "if only" or "even if" thoughts in response to a scenario that contained events that were under the control of the protagonist (i.e., decisions), and events that were outside of the protagonist's control.

Research on counterfactual thinking has also shown that "if only" thoughts focus more often on factual events for which there is an explicitly available alternative that would result in a different outcome (e.g., Wells & Gavanski, 1989). Given a scenario in which there is a range of different decisions, people's "if only" thoughts tend to focus on those decisions for which a protagonist rejected an alternative that would have undone the outcome (i.e., a counterfactual alternative). This is consistent with the results of our previous experiments (Experiments 4, 5 & 6) in which we showed that counterfactual "if only" thoughts focus more often on imaginary alternatives that would undo an outcome. We suggest that, as semifactual "even if" thoughts focus on alternatives that would not undo an outcome, when faced with a range of different decisions people's "even if" thoughts will focus on decisions in which a protagonist rejected an alternative that would have resulted in the same outcome as the factual situation (i.e., for which there is an available semifactual alternative)¹.

Our aims in this experiment were, firstly, to examine whether semifactual thinking, like counterfactual thinking, focuses on controllable events (i.e., decisions) rather than on uncontrollable events. Secondly, we wanted to examine whether, given several controllable events, people's counterfactual "if only" thoughts would focus on those for which there is an alternative that would undo an outcome and people's semifactual "even if" thoughts would focus on those for which there is an alternative that would leave the outcome unchanged.

Method

Participants and Procedure

The participants were 51 secondary level students (31 women, 20 men) in their sixth year at Down High School, Downpatrick, Northern Ireland who took part in the experiment voluntarily. Their average age was 17 years, with a range from 16 to 18 years.

¹ In Experiments 4, 5 & 6 we looked at people's counterfactual and semifactual thoughts in response to one decision, as we were interested in the *alternatives* that people's thoughts would focus on. In this experiment we instead examined people's counterfactual and semifactual thoughts in a scenario that contained more than one decision, as we were interested in establishing the kinds of *decisions* that their thoughts would focus on.

The participants were instructed to read the scenario carefully and to provide answers to the questions that followed as the answers occurred to them. They were also instructed not to change their answers once they had written them. On completion of the experiment participants were verbally debriefed.

Materials and Design

We constructed a scenario in which a series of events lead to a negative outcome. Two of the factual events were controllable decisions made by the protagonist. For one of the decisions, the unchosen alternative would have resulted in a different outcome to that of the factual situation, and for the other decision, the unchosen alternative would have resulted in the same outcome as the factual situation. The scenario used was as follows (see appendix 1):

One day Mr. Ryan was getting ready to go to work. He firstly considered taking the bus, but finally decided to take his car. Mr. Ryan initially thought about driving to work by the coast road, but in the end he decided to go by the main road. As he was driving to work the brakes on his car failed and he was involved in an accident. While he was recovering in hospital, Mr. Ryan thought about whether or not things could have been different. He thought "if only...". How did he complete this thought ?

The first decision, to travel by car, is provided with an unchosen alternative, taking the bus, which would have undone the outcome (Mr. Ryan's brakes would not have failed and he would not have crashed his car). The second decision, to take the main road, is provided with an unchosen alternative, taking the coast road, which would not have undone the outcome (Mr. Ryan's brakes would still have failed and he would still have crashed his car). The third main event in the scenario was an uncontrollable event - the brakes on the car failing.

All participants received the same scenario, and the first independent variable was thus a within participants one based on the nature of the decisions in the scenario (available alternative undoes the outcome, available alternative does not undo the outcome). The second independent variable was a between-participants one based on the nature of the mutation task that participants carried out. One group carried out an "if only" counterfactual generation task and the second group carried out an "even if" semifactual generation task. The dependent variable was the content of participants' first responses to the mutation question they received. Specifically we were interested in whether they focused on the decision with the alternative that would undo the outcome (travel by car),

the decision with the alternative that would not undo the outcome (take main road), or the uncontrollable event (brakes failing).

Results and Discussion

Table 5.1 shows the percentage of participants receiving each of the two mutation questions (if only, even if) whose first responses focused on either the first decision made by Mr. Ryan, for which the rejected alternative would have undone the outcome, the second decision, for which the alternative he rejected would not have undone the outcome, or the uncontrollable event.

Table 5.1: Percentages of participants who focused on each of the target events in their sentence completions in each condition in Experiment 8.

Mutation task	Target Events			Total
	<i>Undoes outcome</i>	<i>Does not undo outcome</i>	<i>Uncontrollable Brakes failing</i>	
if only (n = 19)	89	11	0	100
even if (n = 32)	59	34	0	93
Total (n = 51)	71	25	0	96

Participants' first sentence completions focused on the controllable events (96%), the decisions made by Mr. Ryan, more often than on the primary uncontrollable event, Mr. Ryan's brakes failing (0%; binomial, n = 49, z = 7, p < 0.0001) and on all of the other events mentioned in participants' mutations (4%; binomial, n = 51, z = 6.58, p < 0.0001). Participants focused on the controllable events as often for the semifactual "even if" mutation task (93%) as for the counterfactual "if only" mutation task (100%), and there was no reliable difference between them (chi square = 2.09, df = 1, p < 0.1). Participants focused on the controllable events more often than on other events in their responses to both the "if only" mutation task (100% versus 0%; binomial, n = 19, z = 4.36, p < 0.0001), and to the "even if" mutation task (93% versus 7%; binomial, n = 32, z = 4.95, p < 0.0001). The result replicates previous findings that people undo controllable events more than uncontrollable events when they think counterfactually (e.g., Girotto et. al, 1991; Markman et al., 1995; McCloy & Byrne, in press). Moreover, it shows a similar controllability effect for semifactual thinking.

Participants' first sentence completions for the counterfactual "if only" task were different from their first sentence completions for the semifactual "even if" task (chi-square = 3.98, $df = 1$, $p < 0.05$). When participants generated an "if only" counterfactual thought, they focused on the decision for which an available alternative would undo the outcome (89%), e.g. "if only I had decided to take the bus, I would not have had the accident", rather than on the decision for which the available alternative would not undo the outcome (11%, binomial, $z = 3.44$, $n = 19$, $p < 0.01$). When participants generated an "even if" semifactual thought, there was no significant difference between the number of participants who focused on the decision for which the available alternative would not undo the outcome (34%), e.g. "even if I had taken the coast road, I would still have had an accident", and the number who focused on the decision for which the available alternative would undo the outcome (59%, binomial, $z = 1.46$, $n = 30$, $p < 0.08$). Surprisingly, there were a large number of participants in this condition who focused on the decision for which the available alternative would undo the outcome. When we compared the two conditions we found that our participants focussed significantly more often on the decision whose alternative would undo the outcome in their "if only" thoughts than in their "even if" thoughts (binomial, $n = 36$, $z = 1.76$, $p < 0.04$).² In contrast, we found that participants focused significantly more often on the decision whose alternative would not undo the outcome in their "even if" thoughts than in their "if only" thoughts (binomial, $n = 13$, $z = 1.76$, $p < 0.04$).

Although semifactual thoughts are more likely than counterfactual thoughts to focus on decisions for which an explicit alternative would not undo an outcome as we predicted, decisions for which there is an alternative that would undo an outcome are mutated in both kinds of thinking. When the focus of participants' mutations is examined across both mutation task conditions, it can be seen that participants in this experiment focus significantly more often on the decision for which the available alternative would undo the outcome (71%) than on the decision for which the available alternative would not undo the outcome (25%; binomial, $n = 49$, $z = 3.29$, $p < 0.0005$).

The results of this experiment show that counterfactual and semifactual thinking are subject to a controllability effect. As predicted, both counterfactual "if only" and semifactual "even if" thinking focus on controllable events (i.e., Mr. Ryan's decisions) more often than on uncontrollable events (e.g., the brakes on Mr. Ryan's car failing).

In our scenario we included two different kinds of decisions, one in which a

² This is the binomial test for independent proportions - see Walker (1985) for the rationale for using this test in these circumstances.

rejected alternative would undo the outcome (taking the bus instead of the car), and one in which a rejected alternative would result in the same outcome as the factual situation (taking the coast road instead of the main road). We found, in common with Wells and Gavanski (1989), that people focus on decisions for which there is an explicit alternative that undoes an outcome in their counterfactual "if only" thoughts. People's semifactual "even if" thoughts instead focus on both kinds of decisions. Given the results of the experiments reported in Chapters 3 and 4, this second result is rather surprising. As semifactual "even if" thoughts focus on imaginary alternatives to reality that would result in the same outcome as the factual situation rather than on those that would undo an outcome, we had expected people to preferentially focus on decisions for which there were such alternatives. The results of this experiment appear to show that this is not the case, people's semifactual thoughts focus on both kinds of decisions, and we now consider several possible reasons for this.

Overall in this experiment, the decision for which there is an available alternative that would undo the outcome was more often the focus of participants' mutations than the decision for which the explicit alternative would not undo the outcome. One possibility is that such decisions, for which an available alternative would undo an outcome, are inherently more psychologically mutable. Perhaps the availability of an alternative that would undo an outcome can make a decision particularly salient. A second possibility is that there is something in the nature of the events used in the scenario that makes the first decision (the choice of vehicle) open to both counterfactual and semifactual mutations and the second decision (the choice of route) open only to semifactual mutations. It may be possible to imagine not only how the choice of vehicle might undo the outcome (e.g., "if only he had taken the bus that day, he would not have been in the car and would have avoided the accident"), but also how it might not undo the outcome (e.g., "even if he had not taken the car that day, he may have taken it some other day and the brakes would still have failed"). In contrast, given the situation in which the brakes of the car failed, it may be more difficult to imagine how taking an alternative route would have undone the outcome. Indeed, the content of participants' mutations supports this interpretation. Although the majority of participants' responses in the "even if" condition (59%) focused on undoing the decision to take the car, 69% of all responses in this condition left the outcome unchanged (e.g., "even if I had taken the bus the brakes would have failed sometime"). In contrast, only 16% of participants' responses in the "if only" condition left the outcome unchanged. In order to rule out this possibility, that the pattern of results

observed was a result of the nature of the decisions used in the scenario, we carried out a second experiment (Experiment 9). In this experiment the scenario used was designed so that we could vary which decision within the scenario was presented with an alternative that would undo the outcome, and which decision was presented with an alternative that would not undo the outcome. In this way we could control for any effects that may have resulted from the content of each of the individual decisions.

Experiment 9

In Experiment 9 we once again focused on counterfactuals, semifactuals and the controllability effect. Our main aim was to carry out an experiment using a scenario that was similar in structure to that used in Experiment 8, but in which we could control for the content of the two decisions. We aimed to do this by varying the nature of the explicit alternative available to each decision, that is, we varied whether the alternative rejected in each decision would or would not have undone the outcome of the scenario. We predicted that, if this factor was controlled, people's "if only" thoughts would focus on decisions with an explicit alternative that *would undo* an outcome, as in Experiment 8. In addition, we predicted that people's "even if" thoughts would focus on decisions for which an explicit alternative *would not undo* an outcome. This prediction contrasts with the findings of the previous experiment, in which we found that people's "even if" thoughts focused on both kinds of decisions - both decisions whose alternatives would undo an outcome, and those whose alternatives would not. In this experiment, we predicted that, overall, decisions with an explicit alternative that would undo an outcome would be equally as mutable as those for which an explicit alternative would not undo an outcome. Our second aim was to attempt to replicate the key finding of the previous experiment - that both counterfactual "if only" and semifactual "even if" thoughts focus on controllable events (decisions) more often than on other events.

In summary, our two main aims in Experiment 9 were, firstly, to examine whether, once we controlled for the content of individual decisions, people's counterfactual "if only" thoughts would focus on decisions for which there is an explicit alternative that would undo an outcome, and their semifactual "even if" thoughts would focus on decisions for which there is an explicit alternative that would not undo an outcome. Secondly, we wanted to replicate the key finding of Experiment 8 that both counterfactual and semifactual thinking are subject to a controllability effect.

Method

Participants and Procedure

The participants were 109 undergraduates (88 women, 21 men) from University College Dublin, who took part in the experiment voluntarily. They had an average age of 20 years with a range from 17 to 49 years. The experimental materials were presented in a three page booklet consisting of a cover page with instructions and space for recording age and gender, a second page with one of the versions of the scenario and the mutation and rating tasks, and a third page containing a short debriefing paragraph. Participants were instructed to read the scenario carefully, to answer the questions in the order in which they were presented and not to change their answers once they had written them.

Materials

All participants received the following scenario based on that used by Wells et al. (1987; see also Experiment 2):

David likes music a lot. There is one stereo shop in particular that he frequents. This shop has a good sale on a limited amount of stock once a year. It is very popular and the best deals usually go within the first half hour.

It is the morning of the sale and David gets into his car and leaves home in good time to make it to the shop in time for the sale. There are two possible roads that he can take to get there, Church Road or Maple Road. David decides to take Maple Road. However, today the traffic on Maple Road is heavy and this slows him up. David drives on into town and goes to park his car. There are two car parks equally near the stereo shop in which he can park, East and West. David decides to park in the West car park. When he gets there the car park is very full and it takes him some minutes to find a parking space.

David arrives at the shop half an hour after the sale starts to find that the last stereo has just been sold. As he is about to leave he spots his neighbour Jim and goes over to talk to him. David explains the problems that he had getting to the shop. He finds out that, although Jim left at the same time as he did, Jim took Church Road and parked in the East car park.

One group (the road undoes condition) then read:

Jim tells him that the traffic on Church Road was light, but that the East car park was also very full.

In this scenario the available alternative to David's choice of road would have undone the outcome, whereas the available alternative to his choice of car park would not have undone the outcome. A second group (the car park undoes condition) instead read:

Jim tells him that the traffic on Church Road was also heavy, but that the East car park had plenty of spaces.

This time the available alternative to David's choice of road would not have undone the outcome, whereas the available alternative to his choice of car park would have undone the outcome. In this experiment, in contrast to Experiment 10, we were able to vary the status (undoes outcome, does not undo outcome) of the alternatives to the two target decisions, ruling out any effects of the content of the decisions themselves.

Following the scenario, approximately half of the participants in each condition (road undoes; car park undoes) received a counterfactual "if only" mutation task. The remaining participants received a semifactual "even if" mutation task.

Design

The independent variables were the version of the scenario received by participants (road undoes, car park undoes) and the mutation task that they carried out (if only, even if). The dependent variable was the content of participants' first responses to the mutation task that they received.

Results

Mutation task

A significant majority of participants' first sentence completions again focused on the two main controllable events in the scenario, David's decisions (74%), rather than on any of the other events in the scenario (26%; binomial, $n = 109$, $z = 5.08$, $p < 0.0001$). There was no significant difference in this regard in the pattern of responding in the counterfactual "if only" and the semifactual "even if" mutation task conditions (chi-square = 1.73, $df = 1$, $p < 0.01$). Participants focused on the controllable events more often than on other events in their responses to both the "if only" mutation task (79% versus 21%; binomial, $n = 55$, $z = 2.83$, $p < 0.003$), and to the "even if" mutation task (69% versus 31%; binomial, $n = 54$, $z = 4.35$, $p < 0.0001$). This result replicates the finding of the previous experiment in showing that people focus on controllable events (decisions) more often than on other events when they think counterfactually and semifactually.

For each of the individual scenarios (road undoes, car park undoes) the focus of participants' counterfactual "if only" and semifactual "even if" thoughts is different. In the scenario in which the alternative to the road that David chose would undo the outcome, overall the focus of participants' "if only" and "even if" thoughts was significantly different

(chi-square = 4.49, df = 1, $p < 0.05$; see Table 5.2). However the general pattern is the same in both groups, participants' counterfactual "if only" mutations focused significantly more often on David's decision to take Maple Road (63%) than on his decision to park in the West car park (0%; binomial, $n = 17$, $z = 4.12$, $p < 0.0001$). Participants' semifactual "even if" responses also focused on David's decision to take Maple Road (70%) more often than on his decision to park in the West car park (17%; binomial, $n = 20$, $z = 2.68$, $p < 0.005$). Participants mention David's choice of road more often in the "even if" condition (70%) than in the "if only" condition (63%; binomial, $n = 33$, $z = 1.40$, $p < 0.08$). Participants also mention David's choice of car park more often in the "even if" condition (17%) than in the "if only" condition (0%; binomial, $n = 4$, $z = 1.40$, $p < 0.08$)³. The significant chi-square reported above may therefore result from the fact that each of the two decisions is mentioned more often in the "even if" condition than in the "if only" condition, although these differences are only marginal.

Table 5.2: Percentage of participants in each condition mentioning the target decisions in Experiment 9

Scenario	Decision		Total
	Road	Carpark	
<i>Road undoes</i>			
if only (<i>n</i> = 27)	63	0	63
even if (<i>n</i> = 23)	70	17	87
<i>Carpark undoes</i>			
if only (<i>n</i> = 28)	14	61	75
even if (<i>n</i> = 31)	45	29	74

In the scenario in which the alternative to the car park that David parked in would undo the outcome, the focus of participants' "if only" and "even if" thoughts was once again different (chi-square = 9.43, df = 1, $p < 0.01$). Participants' counterfactual "if only" mutations focused significantly more often on David's decision to park in the West car park (61%) than on his decision to take Maple Road (14%; binomial, $n = 21$, $z = 2.84$, $p < 0.005$). Participants' "even if" mutations, in contrast, focused somewhat more often on David's decision to take Maple Road (45%) than on his decision to park in the West car park (29%) although this difference is not statistically significant (binomial, $n = 23$, $z = 1.04$, $p < 0.15$). Participants in the "if only" condition mention David's choice of car park significantly more often (61%) than those in the "even if" condition (29%; binomial, $n = 26$, $z = 2.95$, p

³ For the rationale for using a binomial test for this kind of comparison see Walker (1985).

< 0.005). In contrast, participants in the “even if” condition mentioned David’s choice of road significantly more often (45%) than those in the “if only” condition (14%; binomial, $n = 18$, $z = 2.95$, $p < 0.005$).

When we collapse the results across both scenarios we can see that overall, as in the previous experiment, participants’ “if only” and “even if” mutations focused on different kinds of events (chi-square = 9.05, $df = 1$, $p < 0.01$; see table 5.3).

Table 5.3: Percentage of participants in each mutation task condition mentioning the decisions for which an alternative would or would not undo the outcome collapsed across scenario in Experiment 9

<i>Mutation task</i>	Alternative		<i>Total</i>
	<i>Undoes outcome</i>	<i>Does not undo outcome</i>	
if only ($n = 55$)	62	7	69
even if ($n = 54$)	46	33	79
Total ($n = 109$)	54	20	74

Participants’ counterfactual “if only” mutations focused significantly more often on decisions for which the alternative available would undo the outcome (62%) than on decisions for which the available alternative would not undo the outcome (7%; binomial, $n = 38$, $z = 4.87$, $p < 0.0001$). In contrast, participants’ semifactual “even if” mutations focused as often on decisions for which there was an explicit alternative that would not undo the outcome (33%) as on decisions for which there was an explicit alternative that would undo the outcome (46%; binomial, $n = 43$, $z = 1.07$, $p < 0.14$). However, participants in the “if only” condition mentioned decisions with an alternative that would undo the outcome (62%) significantly more often than those in the “even if” condition (46%; binomial, $n = 59$, $z = 2.86$, $p < 0.005$). In contrast, participants in the “even if” condition mention decisions with an alternative that would not undo an outcome (33%) significantly more often than those in the “if only” condition (7%; binomial, $n = 22$, $z = 2.86$, $p < 0.005$). Overall, when the focus of participants’ mutations is examined across both mutation task conditions, it can again be seen that participants focus significantly more often on decisions for which there is an explicit alternative that would undo the outcome (54%) than on decisions for which there is an explicit alternative that would not undo the outcome (20%; binomial, $n = 81$, $z = 4.11$, $p < 0.0001$). Overall, the results of Experiment 9 replicate the main findings of Experiment 8.

The results of this experiment show that, once again, both counterfactual “if only”

and semifactual “even if” thinking focus more often on controllable events. This replicates the results of Experiment 8 and generalises them to a different set of materials and a different population of participants. The results also replicate those of Experiment 8 in showing that, although there are some differences between the two scenarios, when we control for the content of individual decisions, counterfactual “if only” thoughts focus on decisions for which an alternative undoes the outcome, whereas semifactual “even if” thoughts focus both on decisions for which an alternative undoes the outcome and on those for which an alternative does not undo the outcome. Although semifactual thoughts are more likely to focus on decisions for which an explicitly available alternative will not undo the outcome than are counterfactual thoughts as we predicted, decisions for which there is an alternative that would undo the outcome are mutated in both kinds of thinking and are more mutable overall. This, we believe, supports the suggestion that decisions with an explicit alternative that undoes an outcome are particularly psychologically mutable (e.g., Wells & Gavanski, 1989). The differences observed in participants’ responding to the two scenarios suggests that we were correct to assume that the content of individual decisions may make them more open to mutation. In particular, the results suggest that David’s choice of road was more mutable than his choice of car park.

Why might decisions with an explicit counterfactual alternative be more psychologically mutable than those with an explicit semifactual alternative? The answer may lie in the models that people construct when they think counterfactually and semifactually. The results of Experiments 6 and 7 suggest that when people generate semifactual “even if” thoughts the initial models that they construct may contain at least three explicit models:

1.	factual:	p	q
	counterfactual:	not-p	not-q
	semifactual:	not-p	q

How could models such as these result in the pattern of semifactual “even if” mutations observed in Experiments 8 and 9? In the basic situation described in the two scenarios we used in these experiments, in which there is a decision with an explicit alternative that would undo the outcome (A), a decision with an explicit alternative that would not undo the outcome (B) and an outcome, the models that people construct when they generate “even if” thoughts may be:

2.	factual:	A	B	C
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counterfactual:	not-A		not-C
semifactual:		not-B	C
		...	

The mental models theory suggests that complex multiple models such as these are difficult to keep in mind due to the constraints of working memory (Johnson-Laird & Byrne, 1991). It is possible that, particularly under conditions of high cognitive load, people may therefore not flesh out all of these models to be fully explicit. Instead, we suggest that people may only flesh out their models to contain one of the two imaginary alternative situations - the *counterfactual* situation:

3.	factual:	A	B	C
	counterfactual:	not-A		not-C
			...	

or the semifactual situation:

4.	factual:	A	B	C
	semifactual:		not-B	C
			...	

We suggest that participants’ responses to the mutation questions may reflect the fact that when people generate “even if” thoughts, they may fall back on either of these alternatives,as both are present in their initial explicit models of the situation. People’s “even if” mutations therefore focus on both the decision for which there is an explicit alternative that would undo an outcome (a *counterfactual* alternative) and the decision for which there is an explicit alternative that would not undo the outcome (a *semifactual* alternative).

The initial representations underlying counterfactual “if only” thinking are different. When people generate counterfactual “if only” thoughts, they may initially represent only two models explicitly - one representing the factual situation and another representing a counterfactual alternative situation. The models they construct of the scenarios are therefore:

5.	factual:	A	B	C
	counterfactual:	not-A		not-C

Consequently, people's "if only" thoughts focus primarily on the decision for which there is an alternative that would undo the outcome. Based on the models that people construct when they generate semifactual "even if" thoughts, and those that they construct when they generate counterfactual "if only" thoughts, we can make a suggestion as to why decisions for which there is an explicit counterfactual alternative are more psychologically mutable than those for which there is an explicit semifactual alternative. We suggest that this difference arises because a model representing a counterfactual alternative is present in the initial explicit models that people construct to represent counterfactual "if only" thoughts, *and* in the initial explicit models that they construct to represent semifactual "even if" thoughts, whereas an explicit model representing a semifactual alternative is only present in people's initial representations of semifactual "even if" thoughts. When people think about what might have been, counterfactual alternatives are therefore more readily available than semifactual alternatives. We return to these models in Chapter 6.

When we compare the results of Experiments 8 and 9 a number of distinct conclusions emerge. Firstly, the experiments show that when people think about what might have been they tend to focus on controllable events, whether the mutations they make are counterfactual or semifactual in nature. This result is consistent with those of our previous experiments and also with an explanation of the controllability effect in terms of the mental models theory (e.g., Byrne, 1997), a point we will return to in the general discussion. Secondly, both experiments showed that counterfactual and semifactual thoughts differ in the kinds of decisions that they focus on. Counterfactual "if only" thoughts focus on decisions in which a rejected alternative would undo an outcome (a *counterfactual* alternative). Semifactual "even if" thoughts focus both on decisions like these and also on decisions for which a rejected alternative would not undo an outcome and would instead result in the same outcome as the factual situation (a *semifactual* alternative). Overall, in scenarios like those used in these two experiments, decisions for which an explicitly available alternative would result in a different outcome to the factual situation are more mutable than those that result in the same outcome as the factual situation. We suggest that these results can be accounted for on the basis of the mental models that people construct in generating counterfactual and semifactual thoughts. We will return to this point in Chapter 6. We now move on to consider the temporal order effect.

Experiment 10

In the previous experiments (Experiments 8 & 9) we were able to *explain* the various differences that we have observed between counterfactual and semifactual thinking on the basis of the models that people may construct in generating “if only” and “even if” thoughts. Can we *predict* any further differences on the basis of the different logical structure of counterfactual and semifactuals? In an attempt to do so we turned to a mutability effect that has already been the subject of much research from the perspective of mental models theory - the *temporal order* effect (e.g., Byrne et al., 1995; Byrne et al., in press; see page 20).

Byrne et al. (in press) replicated the temporal order effect in a modified version of the scenario used by Miller and Gunasegaram (1990). Their scenario read as follows:

Imagine two individuals (John and Michael) who are offered the following very attractive proposition. Each individual is given a shuffled deck of cards, and each one picks a card from their own deck. If the two card they pick are of the same colour (i.e., both from black suits or both from red suits) each individual wins £1000. However, if the two cards are not the same colour, neither individual wins anything. John goes first and picks a black card from his deck. Michael goes next and picks a red card from his deck. Thus the outcome is that neither individual wins anything.

In this scenario, people tend to focus on changing the actions of the second actor (Michael) rather than on those of the first actor (John) in order to undo the outcome (e.g., “if only Michael had picked a black card, they would have won £1000”). In addition, when asked which actor would feel more guilt and which actor would blame the other more, people respond that the second actor will feel more guilt and will be blamed by the first actor for the outcome.

In the game of chance described above, the full set of alternative models that people may construct are:

6.	factual:	black	red	lose
	counterfactual (1):	black	black	win
	counterfactual(2):	red	red	win
	semifactual:	red	black	lose

When people generate counterfactual “if only” thoughts they focus on the first counterfactual model described above:

alternative model that people must construct in generating semifactual thoughts:

11. semifactual: red black lose

is difficult for two main reasons. Firstly, it involves changing the actions of the first actor which, as they are presupposed in the models of the factual situation, is hard to do (Byrne et al., in press). Secondly, the semifactual model involves changing the choices of both actors. The mental models theory suggests that where possible people make minimal mutations to factual events when they think about what might have been (e.g., Byrne, 1997). Therefore, the more changes a mutation involves, the harder that mutation is to generate and to keep in mind. Given these two factors, we therefore suggest that the semifactual model is much more difficult to generate than either the first counterfactual model, which only involves changing the actions of the second actor, or the second counterfactual model, which although changing the actions of the first actor, does not change the actions of both.

In responding “neither” to the guilt and blame questions, people would have to keep this difficult semifactual model in mind. However, when they come to answer the guilt and blame questions, people’s responses are no longer constrained by the need to be consistent with the logic of a semifactual. We suggest that guilt and blame questions do not carry the same overtones of semifactuality as do “even if” mutations. People may therefore base their models instead on the most simple mutation that they can make. In this scenario, the easiest model to generate is the first counterfactual model, that changes only the actions of the second actor (e.g., Byrne et al., in press):

12. counterfactual: black black win

Hence we suggest that, following the generation of semifactual “even if” thoughts and counterfactual “if only” thoughts people may attribute more guilt and blame to the second of the two actors.

We based our experiment on one carried out by Byrne et al. (in press), using a scenario similar to that described above. Our predictions were, firstly, that people’s counterfactual “if only” thoughts would focus on changing the actions of the second of two actors described in a scenario in accordance with previous research, whereas their semifactual “even if” thoughts would change the actions of both actors because of the logical structure of the task. Secondly, we proposed two conflicting hypotheses about the pattern of responses that participants would make in response to the guilt and blame questions. The

first was that people who generated semifactual “even if” thoughts would not attribute more guilt and blame to either actor in the scenario, and that they would therefore respond that neither would feel more guilt or would be blamed more than the other. The second was that people who generated counterfactual “if only” thoughts and those who generated semifactual “even if” thoughts would attribute more guilt and blame to the second of two actors.

Method

Participants and Procedure

The participants were 58 undergraduates from University College Dublin (43 women, 15 men). They had an average age of 20 years, with a range from 17 to 33 years. Participants were tested as one large group. They were presented with a three page booklet containing a cover page with instructions and space for recording age and gender, a second page consisting of a scenario and questions, and a third page with a debriefing paragraph. They were instructed to read the instructions carefully, to write down their answers as they occurred to them and not to change their answers once they had written them.

Materials and Design

The scenario that we used was based on the scenario used by Byrne et al (1999, Experiment 4). The protagonists of our scenario were also described as taking part in a card choice game⁴. The protagonists had to pick a card from identical decks of cards containing 50% green cards and 50% blue cards. We decided to use a less familiar blue and green pack, as Byrne et al.’s (1999) results indicated that there is a weak stereotype for the order “red or black” over “black or red” in a standard pack of cards⁵. The scenario used read as follows:

Imagine two brothers Alan and Sean who take part in a television game show on which they are offered the following very attractive proposition. Each brother is given a shuffled deck of cards. Half of these cards are green and the other half are blue. If the two cards they pick are of the same colour (i.e. both green or both blue) they both win £1000. However, if the two cards are not the same colour neither brother wins anything. Alan goes first and picks a green card from his deck. Sean goes next and picks a blue card from his deck. Thus the outcome is that neither individual wins anything.

Directly after the scenario one group of participants were asked to complete the following counterfactual mutation task:

⁴ This scenario is analogous to the coin toss scenario used by Miller and Gunasegaram (1990) that we described in the general introduction to this chapter.

⁵ This stereotype is not as strong as that for “heads or tails” over “tails or heads” (Byrne et al., in press).

Alan and Sean would have won if only one of them had picked a different card, for instance, if...

A second group instead completed a semifactual mutation task:

Alan and Sean would still have lost even if one of them had picked a different card, for instance, if...

Following the mutation task all participants were presented with two questions. The first question asked which of the two protagonists they would predict would feel more guilt about the outcome. The second question asked which of the two protagonists they would predict would blame the other more (see appendix 1j). These questions were presented as forced choice tasks consisting of three options, with participants indicating their response by marking a box next to the name of either the first actor (Alan), the second actor (Sean), or neither actor.

The independent variable in this study was the mutation task that participants carried out (if only, even if). The dependent variables were the focus of participants' first responses to the mutation question and their choice of actor (first, second, neither) in response to the guilt and blame questions.

Results

Mutation task

We scored participants' first responses to each of the mutation tasks for whether they undid the actions of the first actor (Alan), those of the second actor (Sean), or the actions of both actors (Alan and Sean). 93% of participants' first responses could be categorised into one of these three categories (100% "if only"; 88% "even if"). The remaining responses were ones in which it was impossible to ascertain which of the actors was being referred to, for example, "if either had taken the same as the other". Overall, there was a significant difference between the patterns of responding in the "if only" and "even if" conditions (chi-square = 20.1, $df = 2$, $p < 0.001$; see Table 5.4).

Table 5.4: Percentage of participants in each condition focusing on each of the protagonists of the scenario in Experiment 10

	<i>First actor</i>	<i>Protagonist Second actor</i>	<i>Both actors</i>	<i>Total</i>
<i>Mutation task</i>				
<i>if only</i> (<i>n</i> = 26)	27	69	4	100
<i>even if</i> (<i>n</i> = 32)	22	16	50	88

In the “if only” condition the most common response was to change the actions of the second actor (69%; e.g., “if Sean had chosen a green card they would have won”). Participants in the “if only” condition mentioned the second actor significantly more often than the first actor (27%; binomial, *n* = 25, *z* = 2.20, *p* < 0.01). They also changed the actions of the second actor more often than they changed the actions of both actors (4%; binomial, *n* = 19, *z* = 3.90, *p* < 0.00005). Finally, participants in this condition changed the actions of the first actor significantly more often than they changed those of both actors (27% versus 4%; binomial, *n* = 8, *z* = 2.12, *p* < 0.02). The results therefore replicate the findings of previous experiments by showing a temporal order effect in counterfactual thinking - people primarily focus on the second of two actors in their counterfactual “if only” thoughts (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990).

In contrast, in the “even if” condition the most common response was to change the actions of both of the actors mentioned in the scenario (50%). Participants in the “even if” condition mentioned both actors significantly more often than they mentioned the first actor alone (22%; binomial, *n* = 23, *z* = 1.88, *p* < 0.03). They also mentioned both actors significantly more often than they mentioned the second actor alone (16%; binomial, *n* = 21, *z* = 2.40, *p* < 0.008). There was no significant difference between the frequency with which participants in this condition changed the actions of the first actor alone and the second actor alone (22% versus 16%; binomial, *n* = 12, *z* = 0.58, *p* < 0.3). The results show that there is not a temporal order effect in participants’ “even if” responses. As we had predicted, participants instead focus on changing the actions of *both* of the protagonists in their semifactual thoughts.

Guilt judgments

When participants were asked who they would predict would experience more guilt, the first actor, the second actor, or neither, there was no significant difference between the pattern of responding in the “if only” condition and that in the “even if” condition (chi-square = 0.20, df = 2, $p < 0.9$; see Table 5.5). 60% of participants in the “if only” condition considered that the second actor would experience more guilt⁶. This is significantly more than those who considered that the first actor would experience more guilt (8%; binomial, $n = 17$, $z = 3.15$, $p < 0.001$), and than those who considered that neither would experience more guilt (32%; binomial, $n = 23$, $z = 1.46$, $p < 0.07$), although this second difference is only marginally significant. Significantly more people thought that neither protagonist would feel more guilt than thought that the first actor would feel more guilt (binomial, $n = 10$, $z = 1.90$, $p < 0.03$). Again, this result replicates previous studies by showing that, following the generation of counterfactual “if only” thoughts, people attribute more guilt to the second of two protagonists (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990).

Table 5.5: Percentage of participants in each condition giving each of the three responses to the guilt question in Experiment 10

	<i>First actor</i>	Protagonist <i>Second actor</i>	<i>Neither</i>
Mutation task			
<i>if only</i> ($n = 25$)	8	60	32
<i>even if</i> ($n = 32$)	6	66	28

Likewise, in the “even if” condition, 66% of participants considered that the second actor would experience more guilt. This is significantly more than considered that the first actor would experience more guilt (6%; binomial, $n = 23$, $z = 3.96$, $p < 0.0001$) or that neither would experience more guilt (28%; binomial, $n = 30$, $z = 2.19$, $p < 0.01$). Again, significantly more people thought that neither protagonist would experience more guilt than thought that the first actor would feel more guilt (binomial, $n = 11$, $z = 2.11$, $p < 0.02$). As we predicted, participants in the “even if” condition also attribute more guilt to the second of two actors, despite mutating the actions of both protagonists in their “even if” thoughts.

⁶ One person failed to answer this question

Blame judgments

When participants were asked who would blame the other more, the first actor, the second actor, or neither, there was again no significant difference between the pattern of responding in the “if only” and “even if” conditions ($\chi^2 = 0.06$, $df = 2$, $p < 0.97$). In the “if only” condition more participants considered that the first actor would blame the second actor more (50%) than thought that the second actor would blame the first (12%; binomial, $n = 16$, $z = 2.50$, $p < 0.006$), and then considered that neither would blame the other more (38%; binomial, $n = 23$, $z = 0.63$, $p < 0.26$) although this second difference is not significant. Significantly more people thought that neither would blame the other more than thought that the second actor would blame the first (binomial, $n = 13$, $z = 1.94$, $p < 0.03$). This again replicates the results of previous studies by showing that, following counterfactual “if only” thinking, people suggest that the second of two actors will blame the second more for producing the outcome (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990).

Table 5.6: Percentage of participants in each condition giving each of the three responses to the blame question in Experiment 10.

	<i>Second actor</i>	<i>Protagonist First actor</i>	<i>Neither</i>
Mutation task			
<i>if only</i> ($n = 26$)	12	50	38
<i>even if</i> ($n = 32$)	13	49	41

In the “even if” condition the pattern is similar. Significantly more people thought that the first actor would blame the second more (49%) than thought that the second actor would blame the first (13%; binomial, $n = 19$, $z = 2.52$, $p < 0.006$), but not more than thought that neither would blame the other more (41%; binomial, $n = 28$, $z = 0.38$, $p < 0.35$). More people considered that neither would blame the other more than thought that the second actor would blame the first (binomial, $n = 17$, $z = 2.18$, $p < 0.02$). This result is in line with our predictions. Participants in the “even if” condition also suggested that the first of two actors would blame the second more, despite mutating the actions of both protagonists in their “even if” thoughts.

The results of Experiment 10 confirmed our predictions. Based on the logical

structure of the task, we had predicted that, although people's "if only" thoughts would focus on mutating the actions of the second of two actors (whose actions occur in an independent, temporally ordered sequence), their "even if" thoughts would not exhibit a temporal order effect, and would instead change the actions of both protagonists, as this is the only alternative model of the situation in which the outcome remains unchanged. This prediction was confirmed by participants responses in the two mutations tasks.

We also suggested two competing hypotheses concerning the pattern of participants' responses to the guilt and blame questions following the generation of semifactual "even if" thoughts. The results support the second of these two hypotheses, which was that people would attribute more guilt and blame to the second of two actors following the generation of both counterfactual "if only" and semifactual "even if" mutations. Had the results supported the first hypothesis, we would have found that, following the generation of "even if" thoughts participants would have responded that neither protagonist would feel more guilt or would be blamed more for the outcome. We had suggested that the semifactual model, which involves changes to the choices of both protagonists, is more difficult to generate and keep in mind than either of the two counterfactual models. The results suggest that, when people are no longer constrained by the need to make their responses conform to the logical structure of a semifactual, as in the guilt and blame questions, they revert to making their responses based on the easiest alternative model that they can generate based on the factual situation. In the scenario used, the easiest alternative model to generate involves changing the actions of only the second of the two actors, as they are not constrained in any way. This alternative model is identical to the one which participants consider in their counterfactual "if only" mutations, and hence their responses are the same following semifactual thinking as following counterfactual thinking. People attribute more guilt and blame to the second of two actors following the generation of "if only" and "even if" thoughts. We will return to a discussion of the mental models involved in counterfactual and semifactual thinking in Chapter 6.

General Discussion

In this chapter we set out to explore the kinds of factual events that people focus on in their counterfactual "if only" and semifactual "even if" thoughts. In the introduction to the chapter we discussed two hypotheses that made competing predictions about the events that people should focus on in their "if only" and "even if" thoughts. The first hypothesis was a goal-driven one which suggested that, as the goal of counterfactual thinking (undoing an

outcome) is different from that of semifactual thinking (leaving an outcome unchanged), people's counterfactual and semifactual thoughts should focus on different kinds of factual events. People's counterfactual "if only" thoughts should focus on events that were causally related to an outcome, and which could therefore be altered to change that outcome. In contrast, people's semifactual "even if" thoughts should focus on events that were not causally related to the outcome, so that any alteration to those events would leave the outcome unchanged. The second hypothesis was based on the *mental models* theory (e.g., Byrne et al., 1997; Johnson-Laird & Byrne, 1991). This hypothesis suggested that, as both counterfactual and semifactual thinking involve the mutation of aspects of the factual situation, both will be constrained by the mental representations that people construct of the factual situation. Certain kinds of events are more likely than others to be explicitly represented in people's models of a factual situation (e.g., Byrne & McEleney, 1997; 1999), and it is these events that will form the focus of both counterfactual and semifactual mutations. Counterfactual "if only" and semifactual "even if" thinking should therefore focus on the same kinds of factual events.

In Experiments 8 and 9 we tested these two predictions on a well established mutability effect - the *controllability* effect (e.g., Girotto et al., 1991; Markman et al., 1995). The results of the experiments conclusively demonstrated that both counterfactual "if only" and semifactual "even if" thinking focus on controllable events (decisions) more often than on uncontrollable events. This supports the predictions that we had made on the basis of the mental models theory - counterfactual and semifactual thinking do focus on the same kinds of factual events.

In these two experiments we were also interested in examining whether, by varying the nature of the explicit alternatives that we presented for different decisions, we could vary the controllable events that people focus on in their "if only" and "even if" thoughts. The results of Experiments 8 and 9 showed that people's counterfactual "if only" thoughts focus on decisions for which there is an explicit alternative that would undo an outcome (a *counterfactual* alternative). In contrast, their semifactual "even if" thoughts focus on decisions for which there is an explicit alternative that would not undo an outcome (a *semifactual* alternative), and also on decisions for which there is an explicit alternative that would undo an outcome (a *counterfactual* alternative). We suggest that this result is consistent with the account of counterfactual and semifactual thinking based on mental models put forward in Chapter 4 (see pages 113-114). In this account, we suggested that when people generate counterfactuals they consider at least two different situations - the

factual situation and a counterfactual alternative situation - whereas, when they generate semifactuals they instead consider at least three different situations - the factual situation, a counterfactual alternative situation, and a semifactual alternative situation. We suggest that counterfactual thinking focuses on decisions with an explicit counterfactual alternative, and that semifactual thinking focuses on decisions with both explicit counterfactual and semifactual alternatives, because these alternatives are available in the explicit representations that people construct in generating counterfactual “if only” and semifactual “even if” thoughts. We return to this mental models based account in more detail in the next chapter.

Having established that we could *explain* the results of our experiments from a mental models perspective (Johnson-Laird & Byrne, 1991), in Experiment 10 we set out to test some novel *predictions* that the mental models theory had for possible differences between counterfactual and semifactual thinking. To do so we turned to another mutability effect that had already been studied from a mental models perspective - the *temporal order* effect (e.g., Byrne et al., in press).

We hypothesised that the models of the factual situation that people would construct in understanding the scenarios used by previous researchers (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990) were such that they would easily support counterfactual mutations, but that, in order to generate a logically valid semifactual model, people would have to make more complex mutations to the factual situation. Based on the logical structure of the scenario, we made two predictions. The first was that, although people’s counterfactual “if only” thoughts would focus on changing the actions of the second of two actors described in scenarios of this sort - the standard temporal order effect (Byrne et al., in press; Miller & Gunasegaram, 1990) - their semifactual “even if” thoughts would focus on changing the actions of *both* of the actors, as this was the only alternative model that corresponded to a logically valid semifactual. We also proposed that this mutation would be difficult to generate and to keep in mind (Johnson-Laird & Byrne, 1991). Therefore, we suggested that when the constraint of producing logically valid answers was removed, people would revert to making responses based on the simplest alternative that they could generate based on the factual situation. This constraint is removed when we ask participants which of the two protagonists in the scenario will feel more guilt, and which will blame the other more. In this scenario, the easiest alternative that can be generated is the counterfactual alternative in which only the choice of the second actor in the scenario is changed. Hence we predicted that people’s responses to the guilt and blame questions which we presented would be the same following both counterfactual and semifactual thinking. Both of our predictions

were supported by the results of Experiment 10. People showed a temporal order effect in their counterfactual “if only” thinking, but not in their semifactual “even if” thinking, where they instead change the actions of both of the protagonists of the scenario. People’s responses to the guilt and blame questions were the same following both counterfactual and semifactual thinking, participants attributed more guilt and blame to the second of the two actors in the scenario. This occurred despite the fact that the pattern of people’s mutations is different in their “if only” and “even if” thoughts. Again, we will return to the theoretical issues discussed above in our final chapter (Chapter 6).

Chapter 6 Discussion

Aims

At the end of Chapter 1, we set out the two main aims of this thesis. The first aim was to find out more about an area that we argued has been central to research on thinking about what might have been, that is, how people think about controllable events. The second main aim of our research was to examine a kind of thinking about what might have been that has rarely been considered in previous research - semifactual “even if” thinking about how things might have turned out the same. We set out to compare semifactual “even if” thinking about how things could have turned out the same, about which little is known, to counterfactual “if only” thinking about how things could have turned out differently, which has to date been the main focus of research into thinking about what might have been. Across all of our experiments we have also been interested in examining how these two aims may be interrelated. In the next sections we will firstly summarise the findings of each of our ten experiments in turn, and go on to draw some conclusions from these with respect to the two goals mentioned above. Following this we will discuss the implications that our experiments have, both for past and future research. Finally, we will discuss what we propose may be the structure of the mental representations underlying counterfactual “if only” and semifactual “even if” thinking about what might have been.

Counterfactuals and Controllable Events

In the experiments reported in Chapter 2 (Experiments 1-3) we were interested in examining whether some kinds of controllable events are more mutable than others. Previous research had shown that events that are exceptional with respect to intrapersonal or habitual modes of behaviour are more mutable than those which are normal (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982). Based on the results of an earlier experiment (see McCloy & Byrne, in press; Experiment 1), which showed that people mutate inappropriate controllable events more often than appropriate or neutral controllable events, we suggested that mutations of controllable events could be affected by a different kind of normality. We argued that people will be more likely to mutate events that deviate from prevailing social, interpersonal norms (e.g., because they are inappropriate), than those events that adhere to those norms (e.g., because they are appropriate). In the three experiments reported in Chapter 2 we explored the link between interpersonal normality and the mutability of controllable events further.

In our first two experiments we attempted to rule out two alternative explanations for why inappropriate controllable events are more mutable than appropriate controllable events, in favour of an explanation based on the interpersonal normality of such events. The first alternative explanation was that people were undoing inappropriate events more often because they were more exceptional with respect to intrapersonal, habitual norms than were appropriate events. The second alternative explanation was that people were focusing on inappropriate controllable events more often in their counterfactual “if only” thoughts because they were more negative than appropriate controllable events. However, we argued that, if these explanations held true, inappropriate events would only be more mutable than appropriate events in scenarios with negative and exceptional outcomes (e.g., Girotto et al., 1991; McCloy & Byrne, in press). In order to undo normal outcomes, people have instead been shown to be more likely to focus on normal events in their “if only” thoughts, and in order to undo positive outcomes, people have been shown to focus on positive events (e.g., Bouts et al., 1992; Gavanski & Wells, 1989; Klauer et al., 1995). Therefore, following either normal outcomes (intrapersonal normality) or positive outcomes (valence), people might be more likely to focus on appropriate controllable events than on inappropriate controllable events.

In Experiment 1 we ruled out both of these alternative explanations - participants’ responses to a scenario describing the exam preparation of a girl called Karen focused on undoing the same events in all conditions. They focused on undoing an inappropriate inhibitory event (drinking) and an appropriate facilitatory event (studying extra references) whether her exam performance was described as normal or exceptional. They also focused on undoing the inappropriate inhibitory event and the appropriate facilitatory event in order to undo both negative (failing the exam) and positive (getting a good mark) outcomes. However, in this experiment we did not find that inappropriate controllable events are more often the focus of people’s counterfactual thoughts than are appropriate controllable events (McCloy & Byrne, in press), nor that people focus on events that inhibit success in order to undo failure, but focus on events that facilitate success to undo success (Roese & Olson, 1993a). We suggested that this failure to replicate the findings of previous research might have been due to our participants’ familiarity with the situation described in the scenario, and hence we decided to carry out a second experiment using different materials that described events that would be less familiar to our student participants in order to try to replicate previous findings.

The results of Experiment 2 were clearer than those of Experiment 1. When we

employed a scenario that was less likely to be affected by participants' background knowledge we once again showed that interpersonal social normality is distinct from intrapersonal habitual normality. In this experiment we also replicated the findings of previous experiments. In response to a scenario that described a man's attempts to get to a stereo sale on time, participants' counterfactual "if only" thoughts focused on inappropriate controllable events more often than on appropriate controllable events, regardless of whether the outcome of the scenario was described as exceptional or normal with respect to intrapersonal norms (past performance), and also of whether the outcome was positive or negative. This ruled out any explanation as to why inappropriate events are more mutable based on either the intrapersonal normality or the valence of inappropriate and appropriate events, replicating the findings of Experiment 1, and additionally replicated McCloy & Byrne's (in press) result that inappropriate controllable events are more psychologically mutable than appropriate controllable events. Additionally, the results of the experiment showed that participants were undoing the inappropriate inhibitory event in order to undo failure outcomes and the inappropriate facilitatory event to undo success outcomes, replicating Roese and Olson's (1993a) earlier finding. These experiments produced a number of novel findings. They showed that the interpersonal normality of controllable events is distinct from their intrapersonal normality and from whether they are positive or negative. Inappropriate controllable events are more mutable than appropriate controllable events, not because they are more intrapersonally exceptional, nor because they are more negative, but because they deviate more from interpersonal social norms. The experiments also showed that this effect is robust, occurring as it does both for scenarios with exceptional and normal outcomes, and for scenarios with negative and positive outcomes.

In Experiment 3, we examined whether an event which deviated from interpersonal norms along another dimension - selfishness - would be more mutable than events that did not. We were also interested in testing whether the effects of interpersonal normality could interact with those of another constraint on counterfactual "if only" thinking - the *temporal order* effect (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). The results of the experiment provided the first demonstration that an event that was carried out purely for the self (reading a magazine) was more often the focus of people's counterfactual thoughts than events that were done for others (household chores). Secondly, the results showed that the mutability of the selfish event differed depending on its position in an independent temporal sequence. It was more mutable when it occurred last in the sequence rather than when it occurred earlier, with selfish events occurring in the middle of the scenario being particularly

immutable. The experiment is the first one to show that there is an interactive relationship between the effects of interpersonal normality and those of temporal order. Thirdly, the results replicated the finding that events that occur last in a temporal sequence are more mutable than events that occur earlier (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990).

Counterfactuals and Semifactuals

In Chapter 3 we moved on to consider the counterfactual and semifactual thoughts that people generate in response to controllable events. In the two experiments reported in this chapter (Experiments 4 & 5) we had the aim of establishing whether counterfactual thoughts about how things could have been different were reliably evoked in response to “if only” generation tasks, and whether semifactual thoughts about how things could have turned out the same were reliably evoked in response to “even if” generation tasks. We were therefore interested in the imaginary alternatives to reality that people focus on in their “if only” and “even if” thoughts. In both of the experiments we presented participants with scenarios in which a protagonist made a decision between three options on a menu. Their choice resulted in a negative outcome (a bad meal in one scenario, and an allergic reaction in the other). We varied the nature of the other two alternatives on the menu as to whether neither would have resulted in a different outcome to the factual situation, one would have resulted in a different outcome and the other would not, or both would have resulted in a different outcome.

The results of Experiment 4 showed that, when participants were asked to generate “if only” statements they focused on whichever alternative on the menu would have resulted in a different outcome, for example, “if only he had chosen the banana split, he would not have had an allergic reaction”. When participants were asked to generate “even if” statements they focused instead on whichever alternative would have resulted in the same outcome as the factual situation, for example, “even if he had chosen the chocolate sundae, he still would have come out in a rash”. The results therefore supported the idea that counterfactual thoughts can readily be expressed by “if only” assertions and that semifactual thoughts can readily be expressed by “even if” assertions. This experiment was the first to show that the nature of the alternatives available to a decision (whether neither, one, or both would undo the outcome) can influence the focus of people’s counterfactual “if only” and semifactual “even if” thoughts. For example, when neither alternative would undo the outcome, participants’ counterfactual “if only” thoughts focused on changing something about the

factual choice itself (e.g., “if only my meal had not contained the allergic ingredient...”), whereas their semifactual “even if” thoughts focused on the alternatives presented in the scenario (e.g., “even if I’d chosen something else...”).

In Experiment 4 we also asked participants to indicate how inevitable and controllable the outcome of the scenario was. The results of the experiment were the first to suggest that people’s counterfactual and semifactual thinking, and the alternatives that were considered in making a decision, may have different consequences for how people judge controllability and inevitability. Participants rated the outcome of the scenario as most inevitable when neither of the alternatives presented would undo the outcome. When one of the alternatives presented would undo the outcome and the other would not they rated the outcome as moderately inevitable. Participants rated the outcome as least inevitable when both of the alternatives presented would undo the outcome. Surprisingly, participants also rated the outcome as more controllable when neither alternative would undo the outcome than when one alternative would undo the outcome. Participants rated the outcome as more controllable after generating “if only” thoughts than after generating “even if” thoughts. However, the mutation task that participants carried out did not affect their inevitability ratings. Participants rated the outcome of the scenario as just as inevitable following the generation of “if only” thoughts as following the generation of “even if” thoughts.

In Experiment 4 we did not vary the order in which we presented the alternatives within the scenario and we found that the alternative that was mentioned first in the scenario was more often the focus of people’s “if only” and “even if” thoughts than the alternative that was mentioned second. As we were concerned that this may have affected our results, we carried out a second experiment in an attempt to replicate some of the key findings of Experiment 4 once this extraneous factor was controlled for.

Experiment 5 was therefore almost a direct replication of Experiment 4, with the one change that we varied the order of presentation of the three items on the menu (the factual choice and the two alternatives) so that each item occurred equally as often in each position in the scenario. The results replicated the key findings of Experiment 4. People’s “if only” responses were counterfactual in structure, focusing on alternatives that would have resulted in a different outcome to that of the factual situation. Their “even if” responses were semifactual in structure, focusing on alternatives that would have resulted in the same outcome as the factual situation. The nature of alternatives once again influenced the focus of people’s counterfactual “if only” and their semifactual “even if” thoughts. Even when the order of presentation of events is controlled for, people focus on different imaginary

alternatives to reality in their counterfactual “if only” thoughts from those that they focus on in their semifactual “even if” thoughts.

Consequences of Counterfactual and Semifactual Thinking

Given that people’s counterfactual “if only” and semifactual “even if” thoughts focus on different imaginary alternatives to reality, we hypothesised that they would have different consequences for people’s causal judgments and their emotional reactions. In Experiment 6 we examined whether counterfactual “if only” thoughts have different effects on people’s causal judgments from semifactual “even if” thoughts - thinking counterfactually about a decision can increase the amount of causality it is ascribed (e.g., Wells & Gavanski, 1989; Williams et al., 1991), does thinking semifactually decrease causal ascriptions? We also examined the effect on causal judgments of varying the nature of the alternatives available to a decision.

The scenario we used was once again based on a protagonist making a choice from a menu that led to a negative outcome. However, in this experiment we included a causal rating task either before or after the “if only” and “even if” mutation tasks. We found that, when people generate counterfactual “if only” thoughts before making causal ratings, they assign greater causality to a decision, than if they make causal ratings before generating “if only” thoughts. Generating counterfactual thoughts can increase how causal a controllable event (decision) is seen as being (Wells & Gavanski, 1989; Williams et al., 1991). However, when people generate semifactual “even if” thoughts before making causal ratings, they rate a decision as just as causal as when they make causal ratings before generating “even if” thoughts. Generating semifactual thoughts did not effect causal ratings. We argued that this may suggest that semifactual “even if” thoughts, for example, “even if I had remembered my umbrella I would be wet”, are represented, not as the explicit denial of a causal link (e.g., Goodman, 1973), but as the weakening of a causal link. This experiment was the first study specifically designed to examine the consequences of semifactual thinking.

The results of the experiment also showed that varying the nature of the alternatives available to a decision (whether neither, one, or both would undo the outcome) did not effect how causal that decision was seen as being. People do not rate a decision as more causal when all of the alternatives to that decision would undo an outcome, than when one alternative would undo the outcome and the other would not, or when neither of the alternatives would undo the outcome, as would have been predicted from the *crediting*

causality theory of causal judgments based on probability change (Spellman, 1997).

The results replicated the findings of Experiment 4 and 5 - “if only” thoughts focus on alternatives that would undo an outcome, “even if” thoughts focus on alternatives that would not undo an outcome, and the focus of people’s counterfactual “if only” and semifactual “even if” thoughts is influenced by the nature of the alternatives rejected in making a decision. We had once again controlled for the order of presentation of the alternatives within the scenario. This experiment extended the findings to a slightly different scenario, and, as the experiment was conducted in Spanish, to another language and culture. This experiment was the first to demonstrate that counterfactual “if only” and semifactual “even if” thinking have different effects on people’s causal judgments.

In Experiment 7 we examined not only the consequences that counterfactual and semifactual thinking have for people’s causal judgments, but also the consequences they have for people’s emotional reactions. Counterfactual thinking has been argued to affect emotional reactions by way of two different mechanisms, contrast and causal inference (e.g., Markman et al., 1993; Roese, 1994). We argued that semifactual thinking was unlikely to influence emotional reactions by way of a contrast mechanism, as the imagined outcome is the same as the factual outcome. Therefore, we hypothesised that, were semifactual “even if” thinking to effect people’s emotional reactions, it would occur by way of causal inferences based on the semifactual scenario generated. In Experiment 7 our first aim was to attempt to replicate the novel finding of Experiment 6, that counterfactual and semifactual thinking have different effects on causal judgments, using a different scenario and a different experimental design. Our second aim was to examine whether counterfactual “if only” and semifactual “even if” thinking also have different consequences for people’s emotional reactions - does semifactual thinking decrease emotional reactions in situations where counterfactual thinking increases them?

We used a scenario based on that by Boninger et al. (1994) which described an Olympic runner who injured herself the day before a race. The runner made a decision between two drugs with the result that they experienced side effects and narrowly missed winning a medal. The results showed that, compared to situations where no information concerning an alternative outcome was presented (the side effects of the alternative drug were unknown), participants who read that an alternative would have led to a different outcome than that of the factual situation (a *counterfactual* alternative - the alternative drug had no side effects) judged a decision as more causal and regretted it more. Again, compared to situations in which no alternative outcome information was presented, those participants who

read that an alternative would have led to the same outcome (a *semifactual* alternative - the alternative drug had the same side effects as the drug chosen) judged a decision as less causal and regretted it less. The results also showed that, compared to participants who generated no mutations, those participants who generated “even if” statements judged a decision as less causal and felt less bad about the outcome. There was no difference between those who generated “if only” statements and those who made no mutations. Thinking counterfactually about how things could have been different increases both judgments of causality and emotional reactions, whereas thinking semifactually about how things could have turned out the same decreases people’s causal judgments and their emotional reactions. As people’s emotional reactions appear to mirror their causal judgments the results of our experiment appear to support the hypothesis that semifactual “even if” thinking has its effects on emotional reactions by way of a causal inference mechanism (Roese & Olson, 1995a). The experiments reported in this chapter therefore resulted in two major novel findings. Counterfactual and semifactual thinking have different consequences for people’s causal judgments, and for emotional reactions, such as regret and feeling bad.

Factual Focus of Counterfactual and Semifactual Thinking

In the previous chapters we had provided the first experimental demonstrations that counterfactual “if only” and semifactual “even if” thinking are logically distinct, and that, as a result, they have different consequences for people’s causal judgments and their emotional reactions. In our final series of experiments, reported in Chapter 5, we turned to study the factual focus of counterfactual and semifactual thinking, an area in which we predicted that there would be commonalities between people’s “if only” and “even if” thoughts. We were interested in examining whether people’s counterfactual “if only” and semifactual “even if” thoughts focus on making mutations to the same kinds of factual events.

In Experiments 8 and 9 we returned to the theme of Chapter 2, and examined whether semifactual thinking, like counterfactual thinking, is subject to a *controllability* effect (e.g., Girotto et al., 1991). Do people’s “even if” thoughts focus on controllable events more often than on uncontrollable events? In Experiment 8 we presented participants with a scenario concerning a car crash that was preceded by three main events. Two of these events were controllable, as they were decisions made by the protagonist (choosing to take his car rather than the bus, choosing to take the main road rather than the coast road), and the third event was uncontrollable (the brakes on the protagonist’s car failing). We found that people focused on the controllable events described in the scenario more often than on the

uncontrollable event in both their “if only” and “even if” thoughts. Both counterfactual and semifactual thinking are subject to a controllability effect.

Of the decisions described in the scenario, the alternative to one (taking the bus) would have undone the outcome, whereas the alternative to the other (taking the coast road) would not have undone the outcome. We found that this affected the focus of people’s “if only” and “even if” thoughts. Participants’ “if only” thoughts focused on the decision with the alternative that *would undo* the outcome (a *counterfactual* alternative). In contrast, participants’ “even if” thoughts focused on the decision with the alternative that *would not undo* the outcome (a *semifactual* alternative), and on the decision with the alternative that *would undo* the outcome. We found this second result surprising as, in previous experiment (Experiments 4, 5 & 6), we had found that people’s “even if” thoughts focus on imaginary alternatives to reality that would not undo an outcome. We had therefore predicted that people’s “even if” thoughts would also focus on decisions for which there was available such a semifactual alternative. We believed that the result may have occurred because the events of the scenario were such that the first decision (taking the car instead of the bus) was open to both counterfactual and semifactual mutations (e.g., “if only he had not taken the car he would not have had an accident” and “even if he had taken the bus he might still have been involved in an accident”). The second decision (taking the main road instead of the coast road) was open only to semifactual mutations (e.g., “even if he had taken the coast road he would still have had an accident”). As this may have affected the results of Experiment 8, we conducted a second experiment in which we controlled for the content of each of the specific decisions we used, by varying the nature of the alternatives we presented to each decision (i.e., whether they would or would not undo the outcome).

In Experiment 9, we once again showed that people’s “if only” and their “even if” thoughts tend to focus on controllable events (decisions). In this experiment the scenario we used once again contained two decisions made by the protagonist that led to a negative outcome. He chose between two possible roads, and between two possible car parks, with the result that he ran into heavy traffic, had problems parking his car, and arrived late at his destination. In one version of the scenario, the alternative to the road he took would have undone the outcome (the traffic on the other road was light), and in another version the alternative to the car park he chose would have undone the outcome (there were plenty of spaces in the other car park). We again found that participants’ focused on the decision with the counterfactual alternative in their “if only” thoughts, and that they focused on the decision with the semifactual alternative and also on the decision with counterfactual alternative in

their “even if” thoughts. The fact that we were able to replicate this finding suggested that it was not just a content effect as we had originally considered. It is a real effect that may be able to tell us something about the representations that people construct in generating counterfactual and semifactual thoughts.

The key finding of Experiments 8 and 9 - that both counterfactual and semifactual thinking focus on controllable events - is consistent with the mental models theory as it applies to thinking about what might have been (e.g., Byrne, 1997; Byrne & McEleney, 1997; 1999). This theory suggests that the various mutability effects that are observed in counterfactual thinking arise because the counterfactual mutations people generate are constrained by the mental representations that they construct to understand the factual situation. Due to the constraints of working memory, people represent some kinds of factual events explicitly in their models of the factual situation and other kinds of factual events implicitly (Johnson-Laird & Byrne, 1991), and it is these explicitly represented events that are more frequently the focus of people’s counterfactual mutations (e.g., Byrne & McEleney, 1997; 1999). As both counterfactual and semifactual thinking proceed by way of mutations to factual events, we predicted that semifactual thinking would be subject to the same constraints as counterfactual thinking, and hence that it would focus on the same kinds of factual events. This prediction was confirmed by the results of Experiments 8 and 9 - both counterfactual “if only” and semifactual “even if” thinking are subject to a controllability effect. Taking the mental models theory as our guide we were also able to provide an explanation for why people’s counterfactual and semifactual thoughts focus on different kinds of controllable events, as shown in both experiments. We shall return to this models based explanation later in the chapter.

In Experiment 10 we turned our attention to the *temporal order* effect (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). Byrne et al. (in press) used a scenario involving a card choice game. Two protagonists pick cards from separate decks. If the cards that they select are the same colour (i.e., both black or both red) they win the game. However, the outcome of the scenario is that the cards that the protagonists select do not match (i.e., one is black, one is red) and hence they do not win the game. In scenarios such as these people’s counterfactual “if only” thoughts have been shown to change the choice of the protagonist who acted second in order to undo the outcome, rather than of the protagonist who acted first (see also Miller & Gunasegaram, 1990). However, given the logical structure of this scenario (in which changes to either one of the protagonists choices would result in a different outcome to that of the factual situation), we predicted that were people to generate

“even if” thoughts about the same scenario, they would instead change the choices of *both* protagonists, thus preserving the mismatch between their card choices, and leaving the outcome of the scenario unchanged (they still lose the game). The results of Experiment 10 supported our predictions. In response to a similar scenario, our participants focused on changing the choice of the protagonist who acted second in their “if only” thoughts, but of both protagonists in their “even if” thoughts. This experiment produced the novel finding that people’s counterfactual and semifactual thoughts are not only influenced by people’s mental representations of the factual situation (as in Experiment 8 & 9), but also by the logical structure of the alternatives that can be generated on the basis of that situation.

Previous studies have also shown a temporal order effect in people’s guilt and blame judgments in following scenarios like those described above. Following counterfactual “if only” thinking, people attribute more guilt and blame to the protagonist who acted second than to the protagonist who acted first (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). The results of Experiment 10 showed this also occurs following semifactual “even if” thinking. We suggested that this occurs because the logical structure of the scenario forces people to mentally mutate the choices of both of the protagonists in their “even if” thoughts, something which is very difficult to do. The mental models theory suggests that such complex mutations are difficult to keep in mind (e.g., Byrne, 1997; Johnson-Laird & Byrne, 1991) and therefore, when the constraints of logic are removed (as they are in the guilt and blame questions, where responses are required to be neither counterfactual nor semifactual in nature), people may instead base their judgments on the easiest alternative model that they can construct. This alternative model is the same one on which people focus in their counterfactual “if only” thoughts. Hence participants may show no difference in their attributions of guilt and blame following the generation of “if only” and “even if” thoughts. This is also a novel result, and one for which we were able to provide an account based on the mental models that people may construct in such situations. We will discuss these models in more detail later in the chapter.

Overall the results of the ten experiments discussed above represent a number of original findings with respect to controllable events and with respect to semifactual thinking. The experiments showed that controllable events are central to how people think about what might have been. When people generate counterfactual “if only” thoughts and when they generate semifactual “even if” thoughts they tend to focus on controllable events. The experiments also showed that some controllable events are mutated more often than others. Within counterfactual “if only” thinking, controllable events which are seen as exceptional

with respect to interpersonal norms for behaviour (e.g., inappropriate events) are more mutable than those which are seen as normal (e.g., appropriate events). This result not only extends previous work on controllable events (e.g., Girotto et al., 1991), but also extends previous experimental work on norms and exceptions, which has focused primarily on events and outcomes that are exceptional or normal with respect to intrapersonal, habitual norms (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982). The experiments also showed that not only do counterfactual and semifactual thinking focus on controllable events, but that they can also affect how controllable those events are seen as being. People perceive outcomes to have been more controllable following the generation of counterfactual “if only” thoughts than following the generation of semifactual “even if” thoughts.

Our experiments also resulted in some novel findings with respect to semifactual “even if” thinking. They demonstrated that semifactual “even if” thinking and counterfactual “if only” thinking are two distinct forms of thinking about what might have been that have different logical structures. People’s “if only” thoughts focus on imaginary alternatives to reality that would undo an outcome and their “even if” thoughts focus on alternatives to reality that would leave an outcome unchanged. The experiments also showed that, as a result of these differences in underlying logical structure, semifactual “even if” thinking has different judgmental and affective consequences from counterfactual “if only” thinking. The experiments also showed that the focus of people’s counterfactual and semifactual thinking change in different ways depending on the nature of the alternatives considered in making a decision. Although our experiments showed that semifactual “even if” thinking differs from counterfactual “if only” thinking in a number of ways, they also demonstrated that there are similarities between these two kinds of thinking. As we mentioned above, people tend to focus on controllable events in both their counterfactual and semifactual thoughts.

Implications

Controllable Events

In the previous sections we highlighted what we believe are the key findings reported in this thesis with respect to our two main aims, the study of controllable events and that of semifactual “even if” thinking. What are the implications of these results?

Our experiments have been the first to demonstrate, for example, how the interpersonal normality of controllable events can influence their mutability. In addition, we have demonstrated that semifactual thinking is not only logically distinct, but it also has its own distinct affective and judgmental consequences. We have shown that there was more to

discover about controllable events and semifactual thinking, and that there is still more that is yet to be discovered. These two areas of research are still full of possibilities.

What do the results of our experiments suggest? In their paper, Girotto et al. (1991) looked at the implications of focusing on controllable events in counterfactual thinking for the understanding and prevention of accidents. They suggested that, the more psychologically mutable an event is, the more responsibility it is assigned in producing an outcome (c.f. Wells & Gavanski, 1989), and hence people would tend to attribute responsibility for accidents to factors that were under the control of a focal individual. For example, in explaining a car accident, people may attribute more responsibility to actions or decisions made by the driver (e.g., deciding to take the car out on a cold day), rather than to features of the car (e.g., badly designed tyres), or to other uncontrollable factors (e.g., ice on the road).

Although in many cases this may be functional in helping people prevent further accidents, it could be that this tendency can on some occasions obscure the real cause of such events. Take the case of a car whose wheels have gone out of alignment. As changes such as this one tend to occur gradually, the driver of the car may have unconsciously come to change his driving style to take account of the change, holding the steering wheel at an angle, rather than straight (e.g., Reason, 1990). One day the driver takes his hands briefly off the steering wheel whilst driving along a straight stretch of road, the car veers to the left and collides with a wall. In this case, focusing on the driver's actions (the controllable event) would not be functional in preventing further accidents, as in a normally functioning car they would not have resulted in an accident. From examples like these we can see that people's tendency to focus on controllable events in their counterfactual thoughts may have serious consequences for how people attribute responsibility.

How does this relate to our results? We found that controllable events that are exceptional with respect to interpersonal, social norms are more often the subject of people's counterfactual thoughts than those which are normal. Following the same reasoning as Girotto et al. (1991) we suggest that people may be held as more responsible for an outcome (or that an outcome may seem *less* accidental) when their prior actions deviate from prevailing social norms for behaviour, than when their actions are in line with those norms (see also Buck & Miller, 1994). For example, a woman may be seen as more responsible for her fate if she is attacked after drinking alone in a bar, than after drinking with friends. There are many other examples that could be used to illustrate this point, and it is relatively easy to see where a bias of this sort could effect people's everyday lives. Questions of

responsibility arise frequently in a range of different settings, perhaps most importantly in legal settings, where differences in levels of responsibility can mean the difference between a greater or a lesser crime and punishment (e.g., Branscombe et al., 1996; Macrae et al., 1993). However, it is not only judgments of responsibility that may be affected. Focusing on controllable events that go against social norms could also affect matters of sympathy and of compensation. For example, a child who chokes on the last sweet in a packet might receive more sympathy if they had given all of the other sweets away (a selfless act - see Experiment 3), than if they had refused to share and kept the packet to themselves (a selfish act).

The results of our experiments on controllability and interpersonal normality also have implications for previous research. We have shown that the interpersonal normality of events is an important factor in determining their mutability. This finding is consistent with the predictions of Kahneman and Miller's (1986) norm theory and with the broad definitions of norms and exceptions that they employ. However, in our experiments we have demonstrated an effect distinct from those which so far have been discussed under the heading of an *exceptionality* effect in counterfactual thinking (e.g., Gavanski & Wells, 1989; Kahneman & Tversky, 1982). These studies defined norms and exceptions with respect to intrapersonal, habitual norms for behaviour. Our experiments suggest that a wider conception of normality is required to account for the patterns observed in people's thoughts about what might have been. Indeed, it may be the case that there are further kinds of normality, based on different sets of norms, that have not yet been explored. The results of our experiments suggest that, in studying the effects of normality, people should take into account not only whether an event differs from a person's habitual mode of behaviour, but also whether it deviates from prevailing social norms.

Our experiments, particularly those that focused on people's reactions to decisions, also have implications for the relationship between thinking about what might have been and other kinds of higher level cognition, particularly decision making. Legrenzi et al. (1993) have suggested that similar processes underlie decision making and counterfactual thinking, and hence that they are subject to similar effects and biases (e.g., the *focus* effect discussed earlier). It has been suggested that thinking about what might have been can effect people's subsequent decisions (e.g., Miller & Taylor, 1995). The results of our experiments suggest that people's decision making may have consequences for their counterfactual and semifactual thinking, and hence that this relationship may be a reciprocal one. In particular, our results suggest that the alternatives that a person considers in making a decision can

effect, firstly, whether counterfactual “if only” or semifactual “even if” thoughts are relatively more available following the outcome of that decision and, secondly, the focus of these “if only” and “even if” thoughts. For example, consider two individuals making the same decision. Suppose all of the alternatives considered by one person result in very different outcomes, whereas all of the alternatives considered by the other would result in very similar outcomes. What happens if both individuals make the same decision and experience the same negative outcome? We would suggest that the first individual may be more likely to engage in counterfactual “if only” thinking, thinking that, had he or she chosen one of the other alternatives they had considered, the outcome might not have happened. The second individual may instead be more likely to engage in semifactual “even if” thinking, thinking that, had he or she chosen one of the other options they considered, the outcome may still have occurred. Thus the alternatives considered in making a decision may effect the kind of “might have been” thoughts that people generate and, from the results of our experiments, could therefore go on to effect people’s judgments and their emotional reactions. We would therefore suggest that there is more to be learned about thinking about what might have been, not only from looking at the alternatives that people generate in their “if only” and “even if” thoughts, but also at the alternatives that they generate in making decisions.

Semifactual Thinking

What about the things that we discovered about semifactual thinking? As we mentioned above, at a very broad level we can say that the results of our experiments show that semifactual “even if” thinking is an important topic to study within the field of thinking about what might have been. The number of significant findings that we have made concerning semifactual thinking in these experiments suggests that it may have been unduly ignored by previous researchers. Our experiments have shown, firstly, that semifactual thinking is logically distinct from counterfactual thinking. Secondly, semifactual thinking has its own particular consequences for people’s causal judgments and their emotions. Our results therefore have implications for the conclusions of previous studies on counterfactual thinking. Several studies of the consequences of counterfactual thinking have compared the effects of presenting an alternative that would undo an outcome (a *counterfactual* alternative) to a baseline condition in which an alternative was presented that would leave the outcome unchanged (e.g., Boninger et al., 1994; Wells & Gavanski, 1989). Our experiments have shown that this baseline condition, which effectively consists of a *semifactual* alternative,

has its own independent properties, and hence it may not be a suitable baseline against which to judge the effects of counterfactual thinking. However, our experiments have supported many of the conclusions of previous studies with respect to counterfactual thinking (e.g., that thinking counterfactually can increase the experience of emotions like regret; Boninger et al., 1994), once both counterfactual and semifactual thinking are taken into account. In future, studies into the consequences of thinking about what might have been must take into account both the effects of counterfactual and semifactual thinking in order to fully reflect the consequences of thinking about what might have been. In addition, they must employ more neutral baselines, that do not involve the presentation of either counterfactual or semifactual alternatives, in order to establish the distinct effects of counterfactual and semifactual thinking.

The studies discussed above represent just one area of research on thinking about what might have been in which semifactual “even if” thinking has been ignored. Of all of the studies we discussed in Chapter 1, only one explicitly considered both counterfactual and semifactual thinking (Branscombe et al., 1991). Although our experiments have gone some way to redressing this balance, there is still much that remains to be done. Some of the aspects of semifactual thinking that future research may address are:

1. What are the antecedents of semifactual thinking? Is it spontaneously evoked in the same situations as counterfactual thinking, for example, following negative outcomes and disconfirmed expectancies, or is it more common in different situations? Do some people think “even if” more often than others?
2. What constraints are there on the semifactual thoughts that people consider? Our experiments suggest that counterfactual and semifactual thinking are, under most circumstances, subject to the same constraints. However, there is still more work to be done to see if these results generalise from the controllability effect that we studied to other mutability effects (e.g., exceptionality, causal order, action).
3. What are the consequences of semifactual thinking? In Chapters 3 and 4 we looked at some of the consequences that semifactual thinking might have for perceived controllability, causal judgments and emotions such as regret, feeling bad and self-blame. In addition, Branscombe et al. (1996) looked at the effects of generating semifactual “even if” thoughts on people’s

judgments of blame. However, it is possible that semifactual thinking has other consequences from the ones that have already been considered. How might it impact on, for example, compensation judgments or on positive emotions?

4. What real-life semifactuals do people consider? Studies of real-life thinking about what might have been (e.g., Davis et al., 1995) have focused their attention on people's counterfactual "if only" thinking. This has been a rich source of data with regard to how people actually think about what might have been, and future research could add to this by including a measure of people's everyday semifactual "even if" thoughts.

In what circumstances might semifactual thinking be important? As counterfactual "if only" thinking has been shown to be central to many aspects of people's day to day cognition, we would also expect semifactual "even if" thinking to play an important role in many different situations. People may engage in semifactual thinking independently or in concert with counterfactual thinking as they think and reason about the events of their everyday lives. For example, the generation of semifactual "even if" thoughts may be involved in helping people to cope with negative life events. Following traumatic events people often respond with a wide range of emotions such as regret and self blame, often for outcomes that they neither caused nor could control. It is these emotions to which counterfactual thinking is most often linked (e.g., Boninger et al., 1994). How do people come to cope with these events? It may be that, although counterfactual thoughts of how they could have prevented the negative event are more available shortly after such events, over time people come to generate semifactual thoughts about their behaviour as well. As we have seen from the results of our experiments, semifactual thoughts about how an outcome might still have occurred "even if" a person had acted differently, can decrease the amount of causality they are ascribed in producing an outcome and can reduce negative affect. The semifactual thoughts that people generate may act to counter the effects of any regret or blame eliciting counterfactual thoughts by instead suggesting that the person was in no way responsible for the negative event. Counterfactual "if only" thinking, in particular about how things could have been worse (*downward* counterfactuals), has also been shown to be important in how people cope with negative life events (e.g., Davis & Lehman, 1995), and it would be interesting to see how these different kinds of thinking interact.

However, the effects of semifactual thinking may not be all positive. Our

experiments also showed that, following the generation of semifactual thoughts people reported that an outcome was less controllable than following the generation of counterfactual thoughts. The perception of negative outcomes as uncontrollable has long been linked to the experience of depression (e.g., Abramson, Seligman & Teasdale, 1978; Seligman, 1975). Although counterfactual “if only” thinking may result in perceptions of control where, in reality, there is none, semifactual “even if” thinking may, in contrast, engender feelings of a lack of control in situations where a person can in fact influence the outcome, resulting in feelings of hopelessness and helplessness. The role of thinking about what might have been in such emotional disorders has yet to be extensively explored and it may be a fruitful area for further research.

Finally, the results of our experiments on counterfactual and semifactual thinking have implications for theories of thinking about what might have been. A well rounded theory in this area should be able to account for the phenomena associated with both counterfactual and semifactual thinking. As semifactual “even if” thinking has been relatively ignored, it has not been included in any of the theories we discussed in Chapter 1 (see pages 40-48). In the next section we will attempt to integrate what we now know about semifactual thinking into one of these theories, the *mental models* theory, and we will examine the implications our results have for the structure of the mental representations underlying thinking about what might have been.

Obviously, there are a number of limitations to the scope of the research reported in this thesis. In our experiments on the consequences of and the mutability effects that apply to semifactual thinking, we have only covered a few of the factors discussed in the literature on counterfactual thinking. So although we have studied causal judgments, regret, self-blame and feeling bad, we have not examined the consequences of semifactual thinking for preventability judgments (e.g., Mandel & Lehman, 1996) or for emotions such as guilt and shame (Niedenthal et al., 1994). Also, although we have examined the controllability and temporal order effects, we have not considered whether semifactual “even if” thinking is subject to other mutability effects, for example, the causal order effect (e.g., Wells et al., 1987) or the action effect (e.g., Byrne & McEleney, 1999; Gleicher et al., 1990; Landman, 1987). However, as we have stressed throughout this thesis, compared to the large number of studies that have been carried out on counterfactual thinking, there have to date been very few studies that have examined semifactual thinking. For this reason, the experiments reported in this thesis are necessarily of a preliminary and explorative nature. We had aimed to show that semifactual thinking is not only logically distinct from counterfactual thinking,

but also that it can have its own distinct consequences, and that it may be subject to similar mutability effects as counterfactual thinking. We believe that our experiments have accomplished these aims.

A second limitation is that we have employed a scenario-based methodology in all of our experiments. Within the literature on counterfactual thinking there are a range of studies that have used more action-based experimental designs (e.g., Markman et al., 1995; Miller & Gunasegaram, 1990), or that have studied counterfactuals in real-life settings (e.g., Davis et al., 1995; Landman & Manis, 1992; Medvec et al., 1995). However, in our experiments we have been concerned with establishing some very basic findings about semifactual thinking, of the kind that have also been studied in counterfactual thinking using a similar scenario methodology (e.g., Girotto et al., 1991; Kahneman & Miller, 1986; Wells & Gavanski, 1989; Wells et al., 1987). In addition, the research literature on counterfactual thinking suggests that the results of such scenario based studies generalise well to real-life settings (e.g., Davis & Lehman, 1995; Gilovich & Medvec, 1994).

Mental Representations in Thinking about What Might Have Been

In Chapter 1 and elsewhere we described the *mental models* approach to counterfactual thinking adopted by Byrne and her colleagues (e.g., Byrne, 1997; Byrne et al., in press). When people think counterfactually about how things might have been different, the mental models theory suggests that they must keep in mind at least two different models (e.g., Byrne, 1997). One of these models corresponds to the factual situation in which both the antecedent event and the consequent outcome occurred, and the other corresponds to a counterfactual situation in which neither occurred (Johnson-Laird & Byrne, 1991). For example:

1. factual:	forget	wet
counterfactual:	not-forget	not-wet
...		

This represents the factual situation:

2. I forgot my umbrella and I am wet

and its corresponding counterfactual:

3. if only I had not forgotten my umbrella I would not be wet.

The three dots shown in the model indicate that there may be other possible counterfactual models, but that they have not been fully fleshed out (Johnson-Laird et al., 1992). The mental models theory suggests that, as a result of the structure of these initial models and of the processes involved in generating such models, counterfactual thinking will have certain characteristics. Firstly, people's counterfactual thoughts will tend to be based on mutations to events that have been explicitly represented in a person's models of the factual situation. This has been suggested to account for many of the mutability effects that have been reported in the literature on counterfactual thinking. For example, the *action* effect, that actions are more psychologically mutable than inactions, has been suggested to occur because actions are represented explicitly and inactions are represented implicitly in people's models of factual situations (Byrne & McEleney, 1997; 1999). We suggest that this explanation may also apply to the results of our first three experiments (Experiments 1-3), in which we showed that controllable events that deviate from interpersonal social norms are more often the focus of people's counterfactual "if only" thoughts than are controllable events that adhere to those norms (see also McCloy & Byrne, in press, Experiment 1). Events that are, for example, inappropriate or selfish may be more likely to be explicitly represented in people's models of a factual situation than those which are appropriate or selfless.

A second characteristic of counterfactual thinking suggested by the mental models theory is that, when people generate counterfactuals they initially consider only one counterfactual alternative to the factual situation. This may arise because people tend to represent as little information as possible explicitly in their models of a situation, due to constraints on working memory. Hence people consider the minimum number of models necessary in any situation (Johnson-Laird & Byrne, 1991). In Chapter 1 we discussed the evidence from studies of counterfactual generation that supports these representational claims (e.g., Byrne & McEleney, 1997; Byrne et al., in press). In addition, there have been a number of studies of reasoning from counterfactual premises that suggest that when people represent counterfactual premises they do so by constructing at least two explicit models, like those described above (e.g., Byrne & Tasso, 1999).

Can we apply the mental models theory to semifactual thinking? In Chapter 5 we suggested that, if both counterfactual and semifactual thinking can be accounted for in the mental models theory, we would expect them to be subject to the same kinds of constraints. As both counterfactual and semifactual thinking proceed by way of mutations to factual events, we argued that semifactual "even if" thinking should also be constrained by people's

representations of the factual situation, and that counterfactual and semifactual thinking should therefore be subject to similar *mutability effects* . In Experiments 8 and 9 we showed that both counterfactual and semifactual thinking are subject to a controllability effect. People tend to focus on controllable events in both their “if only” and “even if” thoughts. These results suggest that semifactual thinking is indeed subject to similar constraints as counterfactual thinking, and that we may therefore be justified in applying a similar mental models based analysis to understanding people’s semifactual “even if” thinking.

What models do people construct when they generate “even if” thoughts? The results of our experiments (reported in Chapters 4 & 5) suggested that when people generate semifactual “even if” thoughts they construct at least three explicit models - one representing the factual situation in which both an antecedent event (p) and an outcome (q) occurred, one representing a counterfactual alternative situation in which neither occurred, and one representing a semifactual alternative situation in which the outcome occurred but the antecedent event did not:

4.	factual:	p	q
	counterfactual:	not-p	not-q
	semifactual:	not-p	q

In Chapter 4 we compared the consequences that counterfactual “if only” and semifactual “even if” thinking have for people’s causal judgments and their emotional reactions. In Experiment 6 we showed that counterfactual “if only” thinking increased people’s judgments of the causal role of an antecedent event (c.f., Wells & Gavanski, 1989; Williams et al., 1996). People’s causal ratings were increased when they generated “if only” thoughts before making causal ratings compared to when they made causal ratings before generating “if only” thoughts. This occurs because, when people generate a counterfactual, the explicit models that they represent are similar to those of a strong causal relation between an antecedent events and an outcome. The mental models theory suggests that, when people generate counterfactual “if only” thoughts they explicitly represent at least two situations, the factual situation in which both the antecedent event (p) and the outcome (q) occurred:

5.	factual:	p	q
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and a counterfactual situation in which neither occurred:

6.	counterfactual:	not-p	not-q
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(e.g., Byrne, 1997). The combination of these two explicit models:

7.	factual:	p	q
	counterfactual:	not-p	not-q
		...	

is equivalent to those for strong causation if people forget the implicit model represented by the three dots(Johnson-Laird & Byrne, 1991) as within the confines of the two explicit models the occurrence of the antecedent event and the outcome covaries perfectly. There is a good deal of evidence to suggest that people’s causal judgments are heavily influenced by covariation information (e.g., Mandel & Lehman, 1996), and that the more strongly an antecedent event covaries with an outcome, the more causal that event is seen as being. As people explicitly represent this kind of strong causal relation when they generate counterfactual thoughts, their judgments of the strength of a causal relation increases following counterfactual thinking.

In Experiment 6, we showed that generating semifactual “even if” thoughts had no effect on people’s causal judgments. Our results showed that people rated antecedent events as just as causal when they generated “even if” thoughts before making causal ratings compared to when they made causal ratings before generating “even if” thoughts. This may have occurred because the three explicit models constructed in generating semifactual “even if” thoughts are instead equivalent to those of a weak causal link (Johnson-Laird & Byrne, 1991). Within these models:

8.	factual:	p	q
	counterfactual:	not-p	not-q
	semifactual:	not-p	q

there is a moderate degree of covariation between the occurrence of the antecedent event and the outcome, although it is not as strong as in the models of counterfactual assertions described above. Therefore, semifactual “even if” thinking may not have a strong effect on people’s causal judgments.

However, in Experiment 7, we did find that people’s causal judgments were affected by semifactual “even if” thinking. The results of this experiment showed that people’s causal judgments were reduced when they generated semifactual thoughts. As we suggested above,

when the three explicit models constructed in generating a semifactual are taken together they suggest the weakening of a causal link, and this may result in semifactual “even if” thinking having little effect on people’s causal judgments. It is, however, possible that different situations may result in some models being more salient than others (for example, if information is provided in a different order; Girotto et al., 1997). We suggest that, in Experiment 7, the semifactual model constructed in generating “even if” thoughts was made salient by the situation described in the scenario. The scenario used in this experiment concerned a runner attempting to win an Olympic medal, and narrowly failing to do so. However, winning such a medal is a rare event, and hence semifactual alternatives (in which the outcome - not winning a medal - are the same as that of the factual situation) may be relatively more available in this situation. Because they focus on the semifactual model, the representations that participants constructed in generating “even if” thoughts in this experiment may initially have contained only two explicit models:

9.	factual:	p	q
	semifactual:	not-p	q
		...	

In these two models the outcome is seen as occurring both with and without the occurrence of the antecedent event. So although the antecedent and the outcome co-occur in one model, their occurrence or non-occurrence does not covary across models. Therefore, thinking semifactually in this situation may result in the denial of the existence of a causal link between the antecedent event , and so people’s judgments of that event’s causal role in producing an outcome are reduced.

What about the effects that counterfactual and semifactual thinking have on people’s emotional reactions? As we discussed in Chapter 4, we believe that these underlying differences in causal structure are what results in the different emotional consequences of counterfactual and semifactual thinking. In Experiment 7 we showed that people’s emotional reactions closely mirrored their causal judgments, in that, when counterfactual “if only” thinking increased causal judgments, it also increased emotion ratings. When semifactual “even if” thinking reduced causal judgments it also reduced emotion ratings. We suggested that, for example, people regret their actions to the extent that they believe them to have caused a negative outcome. As thinking counterfactually about an event increases how causal that event is seen as being, and thinking semifactually about an event reduces how causal it is

seen as being, they have complementary effects on people’s emotional reactions.

We also applied a mental models account to the results of our final three experiments (Experiments 8-10). In Experiments 8 and 9 we presented our participants with scenarios in which two decisions on the part of the protagonist (decisions A & B) led to a negative outcome (C). One of the decisions in the scenario (decision A) was presented with an explicit alternative that *would undo* the outcome of the scenario (a *counterfactual* alternative). The other decision (decision B) was presented with an explicit alternative that *would not undo* the outcome (a *semifactual* alternative). We suggested that, in generating counterfactual “if only” thoughts in response to scenarios such as these, people may again construct at least two explicit models:

10.	factual:	A	B	C
	counterfactual:	not-A		not-C
			...	

As these models suggest, when people generate “if only” thoughts, they should focus on the decision in the scenario for with the explicit counterfactual alternative. This is exactly what the results of Experiments 8 and 9 showed.

In generating semifactual “even if” thoughts, we suggested that people may again construct at least three explicit models:

11.	factual:	A	B	C
	counterfactual:	not-A		not-C
	semifactual:		not-B	C
			...	

Complex multiple models such as these are difficult to keep in mind due to the constraints of working memory (Johnson-Laird & Byrne, 1991). It may be that, particularly under conditions of high cognitive load, people may not flesh out all of these models to be fully explicit. It is therefore possible that people may only flesh out their models to contain one of the two imaginary alternative situations available in the models shown above - the *counterfactual* situation:

12.	factual:	A	B	C
	counterfactual:	not-A		not-C
			...	

or the semifactual situation:

13.	factual:	A	B	C
	semifactual:		not-B	C
			...	

The results of Experiments 8 and 9 support this idea. They showed that, when people generate “even if” thoughts in response to scenarios like these, they are are equally as likely to focus in their responses on the decision with an explicit counterfactual alternative, as on the decision with an explicit semifactual alternative. This result suggests that people construct both counterfactual and semifactual alternatives when they think semifactually about how things could have turned out the same.

The models discussed above can also explain why, overall, we found that decisions with an explicit counterfactual alternative are more psychologically mutable than those with an explicit semifactual alternative (c.f., Wells & Gavanski, 1989). We suggest that this difference arises because a model representing a counterfactual alternative is present in the initial explicit models that people construct to represent counterfactual “if only” thoughts, *and* in the initial explicit models that they construct to represent semifactual “even if” thoughts, whereas an explicit model representing a semifactual alternative is only present in people’s initial representations of semifactual “even if” thoughts. When people think about what might have been, counterfactual alternatives are therefore more readily available than semifactual alternatives.

In Experiment 10 we used a scenario describing a game of chance that could be won if two individuals picked matching cards. The protagonists involved picked different cards and lost the game. The logical structure of this task is as follows:

14.	factual:	black	red	lose
	counterfactual (1):	black	black	win
	counterfactual (2):	red	red	win
	semifactual:	red	black	lose

There are therefore two possible counterfactual models that people can construct (“if only the

second actor had picked black” or “if only the first actor had picked red”), but only one semifactual model (“even if the first actor had picked red and the second actor had picked black they would have lost”). On the basis of this logical structure we predicted that people would therefore focus on undoing the choices of both protagonists in their semifactual “even if” thoughts, and this is exactly what we found.

However, previous research into the temporal order effect (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990) has shown that, people tend to focus on the first counterfactual model described above (in which the choice of the second actor is changed) in their counterfactual “if only” thoughts, rather than on the second counterfactual model (in which the choice of the first actor is changed). We replicated this result in Experiment 10. Byrne et al. (in press) have suggested that this temporal order effect arises because the actions of the first actor in the scenario act as a context against which those of the second actor are judged. Hence they are presupposed in people’s models of the factual situation and are more difficult to mentally undo.

People also show this temporal order effect in their guilt and blame judgments (e.g., Byrne et al., in press; Miller & Gunasegaram, 1990). Following the generation of counterfactual “if only” thoughts people tend to respond that the second actor would feel more guilt and would be blamed more for the outcome than the first actor. In Experiment 10 we also found this pattern of guilt and blame judgments following the generation of semifactual thoughts, despite the fact that participants in the “even if” condition focused on changing the actions of both protagonists. Why does this occur?

We suggest that the alternative model that people must generate in order to produce a logically valid semifactual:

15. semifactual: red black lose

is difficult for participants to generate and keep in mind. This model involves changing the actions of the first actor, something that the existing literature on counterfactual thinking suggests people do not naturally do (e.g., Byrne et al., in press). It also involves changing the actions of the both protagonists. This violates the principle of minimal mutations, which suggests that in constructing alternative models, people prefer to make as few changes as possible to the factual situation (e.g., Byrne, 1997). The more changes a mutation involves, the more difficult people find it to generate and to keep in mind.

As the semifactual model is difficult to keep in mind, we argue that when people

come to make guilt and blame judgments following semifactual thinking they no longer consider this model¹. In the guilt and blame questions, the constraint of producing a logically valid response is removed - people are no longer compelled to produce responses that conform to the logical structure of either a counterfactual or a semifactual. They may therefore base their responses on the easiest alternative model that they can generate. The evidence from studies of counterfactual thinking suggests that this corresponds to the first counterfactual model:

16. counterfactual: black black win

in which the choices of the second actor is changed (e.g., Byrne et al., in press). As this is also the model that people focus on in their counterfactual “if only” thoughts, people show the same pattern of guilt and blame judgments following both counterfactual and semifactual thinking in response to this scenario.

In conclusion, we suggest that when people think semifactually about how things could have turned out the same “even if” something else had happened, they normally bear in mind at least three different situations:

17.	factual:	p	q
	counterfactual:	not-p	not-q
	semifactual:	not-p	q

They think of the factual situation in which both a particular antecedent event and the outcome occurred. They also think of an imaginary counterfactual alternative situation, in which neither the antecedent event nor the outcome occurred. Finally, they think of an imaginary semifactual alternative situation, in which the antecedent event did not occur but the outcome still occurred.

When our results deviate from the patterns predicted based purely on these models (e.g, the causal rating results in Experiment 7), we argue that they have done so for three different reasons, all of which are consistent with the mental models theory - because of *focusing* in models, because of the *fleshing out* of models, and because of the difficulties that people have in dealing with *complex and multiple models* (e.g., Johnson-Laird &

¹ Note that this was not the case in our other experiments. The scenarios involved in those experiments where one’s in which participants could generate a simple semifactual model on the basis of the scenarios used. Hence we argue that they did bear the semifactual model in mind in making later judgments (e.g., causality - Experiments 6 & 7).

Byrne, 1991; Johnson-Laird et al., 1992; Legrenzi et al., 1993).

If we are correct about these models, there are a number of further predictions that we can make about semifactual thinking. Firstly, we would expect that semifactual thinking would be more difficult and less likely to spontaneously occur than counterfactual thinking. Research into the mental models theory has shown that the more models a person must keep in mind in order to make an inference, the more difficult that inference is (e.g., Johnson-Laird & Byrne, 1991), and we would expect the same difficulties to occur in imaginary thinking as occur in reasoning about factual events. Secondly, we would expect that, in conditions where the number of models that people can consider is restricted (e.g., by high working memory load, Johnson-Laird & Byrne, 1991), people may fail to generate semifactuals, even when explicitly asked to do so. We would instead expect them to be more likely to generate the relatively more available counterfactual alternatives in these situations.

In addition to accounting for phenomena of semifactual thinking that we have highlighted, we suggest that both the differences and the similarities that we have observed between counterfactual “if only” and semifactual “even if” thinking can be explained with reference to the mental models involved. The models involved in counterfactual and semifactual thinking are logically distinct, however, they are constructed and evaluated in the same ways, and are subject to similar constraints. This is not to say that there are no limitations to the use of the mental models theory in this case. For the most part, although the explanations that we have provided are consistent with the phenomena observed, they have been ad hoc in most instances. Also, as we mentioned in Chapter 1 (page 48), the mental models theory is a relatively new theory in this domain and still requires substantial work. Even within counterfactual thinking, it has only been applied to a few of the observed phenomena, and many of its predictions remain untested. These criticisms also apply to any application of the mental models theory to the phenomena of semifactual thinking. However, despite these limitations, we can conclude that the mental models theory provides a useful and fruitful account of the processes involved when people think about what might have been which has provided a satisfactory account of the findings of our experiments, and has resulted in some novel predictions that have been supported by our results.

Conclusions

The experiments that we have reported extend our knowledge of this area along two main fronts. Firstly, our experiments have demonstrated that there is more to be discovered about counterfactual “if only” thinking. We have shown that the counterfactual mutability of events can be influenced, not only by whether those events differ from intrapersonal, habitual norms, but also by whether they differ from interpersonal, social norms. This is the first time that interpersonal social normality has been studied in this context. We have shown that the increased counterfactual mutability of controllable events can be mediated by their status with respect to such social norms, and that the effects of social norms can interact with other factors (e.g., temporal order) in determining whether an event is open to counterfactual mutation. Again, these are novel findings with regards to counterfactual thinking.

Secondly, the experiments that we have reported represent the first systematic attempt to understand people’s semifactual “even if” thinking. Our experiments showed that there are at least two psychologically distinct forms of thinking about what might have been - counterfactual “if only” thinking about how things might have been different, and semifactual “even if” thinking about how things might have turned out the same. This distinction arises due to differences in logical structure between the models that people construct in representing counterfactual and semifactual assertions. As a result of these differences, counterfactual “if only” and semifactual “even if” thinking also have distinct consequences for people’s judgments and for their emotional reactions. These results suggest that this area has been unduly ignored in past research. In order to truly understand how people think about what might have been, researchers must take into account both people’s counterfactual and semifactual thoughts. We argue that, by focusing on people’s counterfactual thoughts of how things could have been different, past research may only have considered one side of the story.

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Appendix 1 - Sample experimental materials

(a) Experiment 1

Scenario:

Karen is a third year student at university. She is a good (poor) student in most respects, coming near top (near bottom) in her class in her last two years. Karen has an important exam coming up the next afternoon. She decides to go and look up some extra reference materials in the library which is something that she rarely does. She then completes her studying and goes home. On arriving home, despite not being much of a drinker, Karen decides to see if a few glasses of wine will help her settle. They have the desired effect and she is soon soundly asleep.

The next morning she hears a call for blood donors on the radio. Although she has never given blood before, she decides to do so and calls in at the local blood donation centre on her way to college. She then goes on to her exam. The exam itself is about as difficult as she had expected. Her book bag is at her feet and, although it is not something she would usually do, she glances at her notes to find the answer to one of the questions. She then completes the rest of the paper. When the results of the exam are announced several weeks later Karen discovers that she has as usual (unusually) passed with a good mark (failed).

Mutation task:

In the space below please list any things that you can think of that could have been different to have changed Karen's performance on the exam.

(b) Experiment 2

Scenario:

Alan likes music a lot. There is one stereo shop in particular that he frequents. This shop has a good sale on a limited amount of stock once a year. It is very popular and the best deals usually go within the first half hour. Alan tries to make it to the sale on time every year. So far he has always succeeded/failed.

It is the morning of the sale and there are a number of things that Alan wants to do . He gets into his car and leaves home in good time to make it to the sale. Alan starts his morning by taking a shortcut through some side streets. He then goes to the post office to post a letter. Next, Alan stops at a tobacconists to buy some cigarettes. Coming up to the stereo shop, Alan drives through a red light. Alan arrives at the shop half an hour after the sale starts (only) to find that he is just in time to get the last stereo (the last stereo had just been sold). Alan is really pleased (annoyed), he thinks “Things would have been different if...” How does he complete this thought ? Please write four likely completions.

(c) Experiment 3

Scenario (Spanish - end condition):

María es una ama de casa. Una mañana antes de salir lavo los platos. Entonces, preparo unos bocadillos. Después, hizo las camas. Seguidamente, quito el polvo. Entonces, limpio la nevera. Luego, puso una lavadora. Después, barrió el suelo. Luego, plancho la ropa. Después, leyó una revista. Cuando se fue, tuve un accidente de coche.

English translation:

Maria is a housewife. One morning, before going out, she did the dishes. Then she made some sandwiches. After that she made the beds she ironed the clothes. Following that she did the dusting. Then she cleaned the fridge. Later she put on the washing machine. Then she swept the floor. Later she did the ironing. After that she read a magazine. When she left, she had an accident in the car.

Mutation task (Spanish):

Completa la siguiente afirmación:

María piensa que podría haber evitado el accidente si no hubiera realizado algunas de las tareas anteriores, por ejemplo, si.....

English translation:

Complete the following sentence:

Maria thinks that she could have avoided the accident if she had not carried out some of the previous tasks, for example, if...

(d) Experiment 4

Restaurant scenario:

Mary goes to a restaurant to have lunch. She looks at the specials board for the day:-

- Specials

Roast chicken

(Chicken with traditional gravy, carrots and peas)

Steak and mushroom pie

(Puff pastry with round steak, mushrooms and gravy)

Chicken in a wine and mushroom sauce

(Chicken, mushrooms and onions in a rich wine sauce)

All the above served with potatoes

Mary thinks that all three sound good. She eventually decides to have the chicken in a wine and mushroom sauce. She does not enjoy her meal as all the mushrooms / the chicken / the potatoes / the wine sauce used that day had gone off. She looks at the menu and her choice of meal. Mary thinks about whether or not things could have been different. She says “if only...” / “even if...”.

How does she complete this sentence? Please give four likely completions.

Rating tasks:

How inevitable was the outcome of this situation (i.e. Mary not enjoying her meal)?

Not at all inevitable

Totally inevitable

123456789

How much control did Mary have over the outcome of the situation ?

Not at all controllable

Totally controllable

123456789

Ice-cream parlour scenario:

Philip goes into an ice-cream parlour. He looks at the menu for ice-cream sundaes:-

<u>Sundaes</u>
Banana Split
Ice cream (Strawberry and Vanilla), Banana, Cream and Butterscotch Sauce
Knickerbocker Glory
Ice-cream (Strawberry, Chocolate and Vanilla), Fruit, Jelly and Cream
Chocolate Sundae
Ice-cream (Chocolate and Vanilla), Chocolate flake, Cream and Chocolate sauce

He's not sure which to choose, but eventually decides on the knickerbocker glory. While eating it he starts to come out in a rash. When he asks he finds out that the chocolate ice-cream / the strawberry ice-cream / the vanilla ice-cream / the jelly used contains an ingredient to which he is allergic. He looks at the menu and his choice of sundae. Philip thinks about whether or not things could have been different. He says "even if..." / "if only..."

How does he complete this sentence ? Please write four likely completions.

Rating tasks:

Inevitability:

How inevitable was the outcome of this situation (i.e. Philip eating something he's allergic to)?

Not at all inevitable									Totally inevitable
	1	2	3	4	5	6	7	8	9

Controllability:

How much control did Philip have over the outcome of the situation ?

Not at all controllable									Totally controllable
	1	2	3	4	5	6	7	8	9

(e) Experiment 5

Restaurant scenario:

Mary goes to a restaurant to have lunch. She looks at the specials board for the day:-

Specials

Roast chicken

(Chicken with traditional gravy, carrots and peas)

Steak and mushroom pie

(Puff pastry with round steak, mushrooms and gravy)

Chicken in a wine and mushroom sauce

(Chicken, mushrooms and onions in a rich wine sauce)

All the above served with potatoes

Mary thinks that all three sound good. She eventually decides to have the chicken in a wine and mushroom sauce. She does not enjoy her meal as all the mushrooms / the chicken / the potatoes / the wine sauce used that day had gone off. She looks at the menu and her choice of meal. Mary thinks about whether or not things could have been different. She says “if only...” / “even if...”. How does she complete this sentence? Please give four likely completions.

Ice-cream parlour scenario:

Philip goes into an ice-cream parlour. He looks at the menu for ice-cream sundaes:-

Sundaes

Banana Split

Ice cream (Strawberry and Vanilla), Banana, Cream and Butterscotch Sauce

Knickerbocker Glory

Ice-cream (Strawberry, Chocolate and Vanilla), Fruit, Jelly and Cream

Chocolate Sundae

Ice-cream (Chocolate and Vanilla), Chocolate flake, Cream and Chocolate sauce

He's not sure which to choose, but eventually decides on the knickerbocker glory. While eating it he starts to come out in a rash. When he asks he finds out that the chocolate ice-cream / the strawberry ice-cream / the vanilla ice-cream / the jelly used contains an ingredient to which he is allergic. He looks at the menu and his choice of sundae. Philip thinks about whether or not things could have been different. He says “even if...” / “if only...” How does he complete this sentence ? Please write four likely completions.

(f) Experiment 6

Scenario (Spanish):

Felipe entra a una heladeria. Lee el menu de las copas de helados.

Helados

Copa de chocolate

Helado (chocolate, vainilla), chocolate, nata, salsa de chocolate

Copa de la casa

Helado (chocolate, fresa, vainilla), fruta, nata, caramelo

Copa de fresa

Helado (fresa, vainilla), fresas, nata, salsa de fresa

No esta seguro de cual elegir, pero se decide por la copa de casa. Mientras se la esta comiendo, empieza a sailirle una erupcion. Cuando pregunta, averigua que el helado de fresa / el helado de chocolate / el helado de vainilla / el caramelo utilizado contiene una ingrediente al que el es alergico.

English translation:

Philip goes into an ice-cream parlour. He reads the menu for ice-cream sundaes.

Ice-creams

Chocolate sundae

Ice-cream (chocolate, vanilla), chocolate, cream, chocolate sauce

House sundae

Ice-cream (chocolate, strawberry, vanilla), fruit, cream, caramel sauce

Strawberry sundae

Ice-cream (strawberry, vanilla), strawberries, cream, strawberry sauce

He's not sure which to chose, but he decides on the house sundae. While he is eating it he starts to come out in a rash. When he asks he discovers that the strawberry ice-cream / chocolate ice-cream / vanilla ice-cream / caramel sauce used contains an ingredient to which he is allergic.

Mutation task (Spanish):

Felipe mira el menu y la opcion que ha elegido. Piensa si las cosas podria o no haber sido diferentes. El dice “Si...” / “Aunque...”

Como crees que teminaria la frase ? Por favor, escribe cuatro posibles finales.

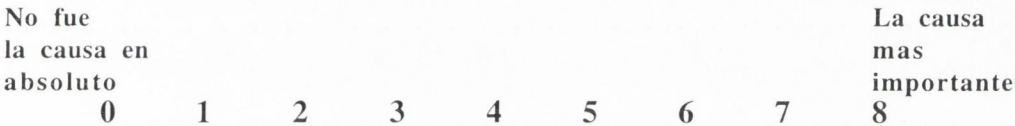
English translation:

Philip looks at the menu and the option he chose. He thinks if things could or could not have been different. He says “If...”/”Even if...”

How do you think he finished this sentence ? Please write four possible completions.

Causal rating task (Spanish):

Cuanto crees que la decision de Felipe fue la causa de lo que ocurrio (el que Felipe comiese algo a lo que era alergico)?



English translation:

How much do you think that Philip’s decision was the cause of what happened (that Philip ate something to which he as allergic) ?



(g) Experiment 7

Scenario:

You are a runner and since the age of eight you have competed in the sprint races in local track and field events. Up through school you had won every race in which you had competed. It was at the age of 13 that you began to dream about the Olympics. At the age of 18, before starting college, you decide to give the Olympics one, all out shot. You make the Irish Olympic team for the 400 metre race.

On the day before the 400 metre race, in a freak accident during training, you sprain your left ankle. Although there is no break or fracture, when you try to run, the pain is excruciating. Your trainer tells you about many advances in pain killing medications and assures you that you will still be able to participate. He recommends that you choose between two drugs, both legal according to Olympic guidelines. One is a well-known pain killer that has been proved effective but also has some serious side effects including temporary nausea and drowsiness. The other pain killer is a newer and less well-known drug. Although the research suggests that the newer drug might be a more effective pain killer, it's side effects are not yet known because it has not been widely used.

After considerable thought, you elect to go with the more well-known drug. On the day of the race, although there is no pain in your ankle, you already begin to feel the nausea and find yourself fighting off fatigue. You finish in fourth place, only 1 tenth of a second from a Bronze medal, 4 tenths from a silver, and 5 tenths from a gold medal.

Different outcome condition:

After the event, you learn that some athletes in other events who were suffering from similar injuries used the other, newer drug. They felt no pain and experienced no side effects.

Same outcome condition:

After the event, you learn that some athletes in other events who were suffering from similar injuries used the other, newer drug. They felt no pain but experienced the same side effects.

Mutation task:

In the days and weeks following the race you think "if only...". How do you complete this thought? Please give four likely completions.

Rating tasks:

Regret:

How much do you regret taking the more well-known drug?

1	2	3	4	5	6	7	8	9
I feel no regret								I feel a great deal of regret

Feeling bad:

To what extent do you feel bad about how things turned out?

1	2	3	4	5	6	7	8	9
I do not feel bad at all								I feel extremely bad

Self-blame:

How much do you blame yourself for not getting an Olympic medal in the 400 metre race?

1	2	3	4	5	6	7	8	9
I do not blame myself at all								I blame myself a great deal

Cause:

To what extent do you think your decision to take the well-known drug led to your failure to obtain an Olympic medal in the 400 metre race?

1	2	3	4	5	6	7	8	9
Definitely did not lead to my failure								Definitely led to my failure

(h) Experiment 8

Scenario:

One day Mr. Ryan was getting ready to go to work. He firstly considered taking the bus, but finally decided to take his car. Mr. Ryan initially thought about driving to work by the coast road, but in the end decided to go by the main road. As he was driving to work, the brakes on his car failed and he was involved in an accident. While he was recovering in hospital, Mr. Ryan thought about whether or not things could have been different. He thought “if only...”/ “even if...”. How did he complete this thought ?

(i) Experiment 9

Scenario:

David likes music a lot. There is one stereo shop in particular that he frequents. This shop has a good sale on a limited amount of stock once a year. It is very popular and the best deals usually go within the first half hour.

It is the morning of the sale and David gets into his car and leaves home in good time to make it to the shop in time for the sale. There are two possible roads that he can take to get there, Church Road or Maple Road. David decides to take Maple Road. However, today the traffic on Maple Road is heavy and this slows him up. David drives on into town and goes to park his car. There are two car parks equally near the stereo shop in which he can park, East and West. David decides to park in the West car park. When he gets there the car park is very full and it takes him some minutes to find a parking space.

David arrives at the shop half an hour after the sale starts to find that the last stereo has just been sold. As he is about to leave he spots his neighbour Jim and goes over to talk to him. David explains the problems that he had getting to the shop. He finds out that, although Jim left at the same time as he did, Jim took Church Road and parked in the East car park. Jim tells him that the traffic on Church Road was light, but that the East car park was also very full. (Jim tells him that the traffic on Church Road was also heavy, but the the East car park had plenty of spaces).

Mutation task:

David thinks about whether or not things could have been different “if only...” (“even if...”) something else had happened. How does he complete this thought?

(j) Experiment 10

Scenario:

Imagine two brothers Alan and Sean who take part in a television game show on which they are offered the following very attractive proposition. Each brother is given a shuffled deck of cards. Half of these cards are green and the other half are blue. If the two cards they pick are of the same colour (i.e. both green or both blue) they both win £1000. However, if the two cards are not the same colour neither brother wins anything. Alan goes first and picks a green card from his deck. Sean goes next and picks a blue card from his deck. Thus the outcome is that neither individual wins anything.

Mutation task:

Alan and Sean would have won if only (even if) one of them had picked a different card, for instance, if...

Guilt question:

Who would you predict would experience more guilt ?

Alan_____ Sean_____ Neither_____

Blame question:

Who would you predict would blame the other more ?

Alan_____ Sean_____ Neither_____

(k) Written instructions received by participants

Experiment 1

On the following page is a short passage. Please read it carefully and answer the question that follows. There are no right or wrong answers. Write down the answers as they occur to you and don't change them after you have written them. Your answers will be treated with the utmost confidentiality. For the purposes of the study will you please record your age and sex below. Thank you for your time.

Experiment 2

Please read the following short passage and answer the questions that follow. Write down your answers as they occur to you and don't change them after you have written them.

Experiment 3

Spanish version

Gracias por tomar parte en este experimento. Te pedimos que leas una historia y contestes una pregunta sencilla. Por favor, presta atención. Recuerda que no se trata de evaluar tus conocimientos.

English translation

Thank you for taking part in this experiment. We ask you to read a story and answer a simple question. Please pay attention. Remember to try not to evaluate your thoughts.

Experiment 4

Please read the instructions carefully and work through the pages of the booklet in the order in which they are presented. This experiment involves two short scenarios. Please read each scenario carefully and answer the questions which follow. There are no right or wrong answers. Write down your answers as they occur to you and please do not go back over previous answers or change your answers once you have written them. Please record your age and gender in the spaces below.

Experiment 5

On the following pages there are two scenarios. Please read these scenarios carefully and answer the questions which follow. There are no right or wrong answers. Please work through the pages of the booklet in the order in which they are presented and do not go back over previous answers or change your answers once you have written them. Check that you have answered every page. For the purposes of the experiment please record your age and gender in the spaces below.

Experiment 6

Spanish version

Gracias por tomar parte en este experimento. Te pedimos que leas una historia y contestes una pregunta sencilla. Por favor, presta atención. Recuerda que no se trata de evaluar tus conocimientos. Escribe tu edad y sexo en los espacios inferiores.

English translation

Thank you for taking part in this experiment. We ask you to read a story and answer a simple question. Please pay attention. Remember to try not to evaluate your thoughts. Write you age and sex in the spaces below.

Experiments 7-10

Thank you for taking part in this experiment. On the following page there is a short scenario. Please read it carefully and answer the questions that follow. There are no right or wrong answers. Please answer the questions in the order that they are presented and don't change your answers once you have written them. For the purposes of this experiment, please record your age and gender in the spaces below.

Appendix 2 - Experiment 2 pretest means

Table 1: Mean rank given to each of 6 inhibitory actions ranked in order of appropriateness (from 1 = most appropriate, to 6 = least appropriate).

<i>Event</i>	<i>Mean rank</i>
Posting a letter	1.9
Getting a book from the library	2.4
Stopping for fast food	3.3
Buying a newspaper	3.6
Buying cigarettes	4.1
Stopping for a drink	5.9

Table 2: Mean rank given to each of 6 facilitatory actions ranked in order of appropriateness (from 1 = most appropriate, to 6 = least appropriate).

<i>Event</i>	<i>Mean rank</i>
Taking a shortcut	1.4
Taking the ring road	2.0
Overtaking a slow driver	2.9
Driving above speed limit	4.3
Going through a stop sign	4.8
Ignoring a red light	5.6

Appendix 3 - Experiment 3 serial order binomials

Table 1: Binomial comparisons of the frequency of mention of events in each of the nine positions in the scenario.

Ninth position versus:

First position	- binomial, $n = 38$, $z = 0.97$, $p < 0.17$
Fifth position	- binomial, $n = 33$, $z = 1.91$, $p < 0.03$
Eighth position	- binomial, $n = 30$, $z = 2.56$, $p < 0.005$
Second and Sixth positions	- binomial, $n = 26$, $z = 3.53$, $p < 0.0002$
Fourth and Seventh positions	- binomial, $n = 24$, $z = 4.08$, $p < 0.00003$
Third position	- binomial, $n = 23$, $z = 4.38$, $p < 0.00003$

First position versus:

Fifth position	- binomial, $n = 27$, $z = 0.96$, $p < 0.17$
Eighth position	- binomial, $n = 24$, $z = 1.63$, $p < 0.05$
Second and Sixth positions	- binomial, $n = 20$, $z = 2.68$, $p < 0.004$
Fourth and Seventh positions	- binomial, $n = 18$, $z = 3.30$, $p < 0.0005$
Third position	- binomial, $n = 17$, $z = 3.64$, $p < 0.0002$

Appendix 4 - List of Publications

- McCloy, R. & Byrne, R.M.J. (1999). Thinking about what might have been: If only, even if, causality and emotions. In M.Hahn & S.C.Stoness (Eds.), *Proceedings of the Twenty First Annual Conference of the Cognitive Science Society*. Mahwah, N.J.: Erlbaum. **(Experiment 7)**
- McCloy, R. & Byrne, R.M.J. (in press). Cognitive processes in counterfactual thinking about controllable events. *Memory & Cognition*. **(Experiment 2)**
- McCloy, R. & Byrne, R.M.J. (in press). Thinking about what might have been: A comparison of if only and even if. In Dunnion, J., Smyth, B., OHare, G. & O'Nuallain, S. (Eds). *AICS 98*. **(Experiment 4)**