The effect of controllability and causality on counterfactual thinking

Caren A. Frosch (c.frosch@le.ac.uk)

School of Psychology, University of Leicester

Suzanne M. Egan (suzanne.egan@mic.ul.ie)

Department of Psychology, Mary Immaculate College,

University of Limerick, Ireland

Emily N. Hancock (e.n.hancock@reading.ac.uk)

Department of Psychology, University of Reading

Corresponding author*:

C.A. Frosch*

School of Psychology

University of Leicester

Leicester

LE1 9HN

E: c.frosch@le.ac.uk

T: +44 (0)116 229 7188

F: +44 (0)116 229 7196

S. M. Egan

Department of Psychology

Mary Immaculate College

Limerick

Ireland

E: Suzanne.Egan@mic.ul.ie

T: +353 61 204333

F: +353 61 313632

E.N. Hancock

Department of Psychology

University of Reading

Reading

RG 6 6AL

E: e.n.hancock@reading.ac.uk

Abstract

Previous research on counterfactual thoughts about prevention suggests that people tend to focus on enabling rather than causing events and controllable rather than uncontrollable events. Two experiments explore whether counterfactual thinking about enablers is distinct from counterfactual thinking about controllable events. We presented participants with scenarios in which a cause and an enabler contributed to a negative outcome. We systematically manipulated the controllability of the cause and the enabler and asked participants to generate counterfactuals. The results indicate that when only the cause or the enabler is controllable participants undid the controllable event more often. However, when the cause and enabler are matched in controllability participants undid the enabler slightly more often. The findings are discussed in the context of the mental model, functional and judgment dissociation theories as well as previous research on counterfactual thinking. The importance of controllability and possible reasons for the special role of enablers is considered.

Keywords: counterfactuals; causality; enabling conditions; controllability; blame

Introduction

Imagine sitting at your computer and hearing a big bang followed by a cloud of smoke rising from your hard drive. Unfortunately you haven't backed your files up for the last few months and you discover they cannot be recovered. Your thoughts turn to the cause of this loss, the fan stopped working and so your hard disk melted. Next you think about how you could have prevented this loss of files, you think about what might have been. There are a number of thoughts you could generate when thinking counterfactually (e.g., if only you had paid attention to the funny noise made by the fan; if only you had had the computer serviced), all of which would undo the outcome and should be equally imaginable. However, rather than focusing on the cause (i.e. the malfunctioning fan), many counterfactual thoughts about an unexpected event like this focus on events that enable the negative outcome (i.e., if only I had backed up my files).

In the past researchers have reported that people tend to generate counterfactuals about events that enable an outcome to occur and we see this tendency in the spontaneous counterfactual thoughts generated in response to unexpected negative events reported in the media. For example, after the 9/11 terrorist attacks many thoughts focused on things that enabled the attack to take place (e.g., if only the 9/11 terrorists had been prevented from getting on board; if only airport security had been better) rather than about the causes of the attack (e.g. if only the terrorists had had second thoughts; if only the terrorists did not have such violent hatred for the USA) (for a review see Byrne, 2005). However, research has also shown that people generate more counterfactuals about controllable rather than uncontrollable events (e.g., Girotto, Legrenzi, & Rizzo, 1991; [Mandel & Lehman, 1996](#)). The question arises of whether people tend to mutate enablers because there is something special about them (e.g., see Byrne, 2005) or whether enablers just tend to be perceived as more controllable (e.g., stopping terrorists from boarding a plane is more controllable than

changing their beliefs) (e.g., see Chang & Herrmann, 2007; Mandel, 2003a). The aim of this paper is to disentangle the contribution of controllability and causal status on the generation of counterfactual thoughts. We discuss previous research on counterfactual thinking and the distinctions that have been made between different types of causal events (i.e. causes and enablers). We then report the results of two experiments and consider the implications of the findings.

Counterfactual thinking

This ability to consider what might have been is an important and pervasive part of everyday thought (e.g., Byrne, 2005; Epstude & Roese, 2008; Kahneman & Tversky, 1982).

Counterfactuals have been studied by philosophers (e.g., Lewis, 1973; Stalnaker, 1968), linguists (e.g., Athanasiadou & Dirven, 1997), psychologists (e.g., Kahneman & Tversky, 1982; Thompson & Byrne, 2002) and used in history, politics (e.g. Tetlock & Belkin, 1996) and artificial intelligence (e.g., Costello & McCarthy, 1999). Counterfactual thinking has implications for how we assign blame (Creyer & Guerhan, 1997; Miller, Handley, Markman, Miller, 2010), and in emotions such as guilt, shame and regret (Mandel, 2003b). It is also important in helping people to learn from their past mistakes, e.g. in future I will back up my files frequently (Roese, 1994) and in giving meaning to their lives by thinking about pivotal experiences, e.g., if I hadn't studied psychology my life would be very different (Kray, et al, 2010).

Several decades of research into counterfactual thinking have revealed that the counterfactuals people generate in response to unexpected events follow regular patterns. Counterfactuals tend to focus on exceptional rather than routine events (Kahneman & Tversky, 1982) and socially undesirable actions are more frequently undone than socially acceptable actions (e.g., McCloy & Byrne, 2000; N'gbala & Branscombe, 1995). People

generate more counterfactuals about actions than inactions (Kahneman & Tversky, 1982).

Counterfactual thoughts also tend to be about the first event in a dependent causal sequence of events (Wells, Taylor, & Turtle, 1987).

People's counterfactual thoughts also focus on controllable rather than uncontrollable events, such as being home late due to the decision to go to a bar compared to being delayed due to having an asthma attack (Giroto et al., 1991). Previous research has demonstrated that people tend to focus on such controllable enabling events in their counterfactual thoughts (N'gbala & Branscombe, 1995; Mandel & Lehman, 1996). In line with Giroto et al. (1991) we note that controllable events are events which involve a voluntary decision or carelessness (i.e. are unconstrained) on the part of the actor whereas uncontrollable events tend to be constrained by the circumstances and involve accidents and actions taken out of ignorance. It may be that focusing on controllable enabling events (e.g., not backing up files, poor airport security) provides the most useful insight into behaviour modification from a functional perspective of counterfactual thinking (Epstude & Roese, 2008). Indeed, according to judgment dissociation theory proposed by Mandel (2003a), counterfactual thoughts tend to focus on a controllable event that would have been sufficient to prevent an outcome from happening rather than focusing on undoing a necessary cause that did in fact bring about a particular outcome.

By understanding the typical thought processes people engage in, in response to negative events, it is possible to develop interventions that can build on these thought processes to bring about future behaviour change. By encouraging counterfactual and future hypothetical thinking it may be possible to alter behaviour, such as not backing up files regularly or inadequate airport security checks. This view is consistent with Epstude and Roese (2008) who argue that counterfactual thinking is primarily functional as its role is to identify a deficit. This identification of a deficit results in behavioural intentions which in

turn result in behaviour change. Of course, such behavioural change is only possible if the intentions focus on something within an individual's control (Ajzen & Madden, 1986).

While the ability to avoid future negative outcomes may be a positive feature of counterfactual thinking there is also a negative side to it as well. Previous research shows that when people are directed to think counterfactually about an event/person that led to a negative outcome more blame is assigned to that event/person (Branscombe, Owen, Garstka, & Coleman, 1996). So although counterfactual thoughts may be functional and improve future behaviour, such as airport security, they may lead to more blame being directed to an aspect of behaviour (security checks) that was not actually the cause of the negative outcome (the attacks). This could lead to poor mental health and feelings of depression/guilt etc. In contrast to Branscombe et al.'s (1996) findings, N'gbala and Branscombe (1995) found that participants generated counterfactuals about an enabler but blamed a cause for a negative outcome. For this reason, it is important to understand why people choose the content of the counterfactual thoughts that they choose (i.e., whether it is just that the things they choose are more controllable than other mutable events or whether there is something special about a particular category of events (i.e., enablers).

Causal thinking

Causal and counterfactual thinking are closely linked as counterfactual thoughts about how events could have turned out differently are often of a causal nature; people consider how a different antecedent could result in a different consequence (Epstude & Roese, 2008). In order for counterfactual thoughts about how an outcome could have been different to make sense people must perceive a causal connection between the event to be changed and the outcome. For example, a counterfactual such as 'if the sky had not been blue Peter would not have broken the chair' does not make sense unless people can perceive a causal link between

the sky being blue and Peter breaking the chair. However, a counterfactual such as ‘if Mary had taken the shortcut then she would have arrived on time’ makes sense as people can immediately see the causal connection between the event (‘Mary took the shortcut’) and the outcome (‘she arrived on time’). Lewis (1973) suggests that a cause is something that makes a difference, a difference which would not have occurred had the cause not been present.

Causal events differ in terms of how necessary and sufficient they are to produce an outcome and consequently some, such as Johnson-Laird and Byrne (1991), have made a very clear distinction between causes and enabling conditions. An enabling condition is necessary to produce the outcome but not sufficient, such as not backing up the files enables the loss of those files when the malfunctioning fan causes the computer to break. This example illustrates the relationship between causes and enablers; causes are the events that bring about an outcome, such as the malfunctioning fan that causes the loss of files, and enablers make the outcome possible, such as not backing up the files which makes it possible for the malfunctioning fan to result in the irrecoverable loss of files. Or put differently, causes tend to be sufficient to bring about an outcome whereas enablers are only necessary for the outcome (Goldvarg & Johnson-Laird, 2001). Further evidence to support the view that causes are interpreted in terms of sufficiency and enablers are more likely than causes to be interpreted in terms of necessity comes from Frosch and Johnson-Laird (2011) who examined the types of refutations people seek in order to demonstrate that a causal or enabling relationship does not exist. Similarly, Mandel (Mandel & Lehman, 1998; Mandel 2003a) has also demonstrated that people interpret causes as being sufficient in bringing about an outcome and not in terms of necessity, using both open ended and forced choice questions.

However, drawing such a clear distinction between the two types of events is not uncontroversial. Philosophers such as Mill (1843/1973) argued the choice of cause from a set of events was often capricious. Psychologists have not disagreed on the distinction between

causes and enablers, but have proposed different ways in which this distinction can be made. Many have argued that there is no difference in meaning but have instead referred to a number of pragmatic factors that distinguish the two, such as normality (enablers are normal whereas causes are abnormal events) (Einhorn & Hogarth, 1986), constancy (enablers are constant whereas causes are inconstant) (Cheng & Novick, 1991), and conversational relevance (people refer to causes in conversation but not enablers) (Turnbull & Slugoski, 1988; Hilton & Erb, 1996).

Which is more important: Controllability or Causality?

Byrne (2005) suggests that people tend to focus on enablers, rather than causes, in their counterfactual thoughts because they have different mental representations for enablers and causes, that is, they keep different possibilities in mind for enablers and causes (see Goldvarg & Johnson-Laird, 2001). According to the mental model theory of causality, people just keep one possibility in mind for causes, the occurrence of the cause and its outcome (the malfunctioning fan and the loss of files). But for enablers they mentally represent the presence of the enabler and its outcome (not backing up the files and losing them) as well as the absence of the enabler and the lack of the outcome (backing up the files and not losing them). This second possibility provides a ready-made counterfactual and hence people tend to generate counterfactuals about enablers rather than causes. Byrne further asserts that if an outcome is associated with multiple enablers it makes it easier for a person to identify a controllable enabler to mentally alter the outcome.

Similarly, Mandel (2007) also identifies *controllable* disablers as particularly likely candidates for counterfactual thoughts (Mandel, 2007). According to judgement dissociation theory (Mandel & Lehman, 1996; Mandel, 2003a) counterfactual selection serves a person's goal to exert control over their environment whereas a person's goal to predict events is

reflected in how they identify causal events. Hence, causal judgments focus on antecedents which could predict an outcome, whereas counterfactual judgments focus on controllable antecedents (Mandel & Lehman, 1996). Furthermore, judgment dissociation theory posits that counterfactual selection focuses on events which are sufficient to have prevented an outcome; both disablers (not discussed here) and negated enablers fulfil this role. Therefore, judgment dissociation theory predicts a role for both controllability and causal role in counterfactual selection.

Mental model theory and judgement dissociation theory both identify controllability and causality as being important in counterfactual thinking. However, it is not clear from the theories which factor is more important, or if they are equally important when people undo past events. For example, Chang and Herrmann (2007) suggest that Byrne is proposing two distinct explanations for the counterfactual focus on controllable enablers. The first explanation relates to people's preference to undo enablers rather than causes because of the possibilities people keep in mind. The second explanation relates to the preference to undo controllable rather than uncontrollable events. In some situations, such as the example of 9/11, it so happens that the enabling event (security checks) is more controllable than the cause (the mindset of the terrorists) so there is a confound. As Chang and Herrmann point out though, this need not necessarily be the case and they suggest that the controllable versus uncontrollable distinction may be more important than the cause versus enabler distinction.

In the two experiments we report below we attempt to address this question empirically and distinguish between the influence of controllability and of causality-causal status on counterfactual thinking by manipulating the relative controllability of causes and enablers that lead to a negative outcome. If enablers are undone more often than causes because of the possibilities people keep in mind then we would expect participants to think counterfactually about the enabler more than the cause, regardless of controllability. If,

however, the relative controllability of the cause versus the enabler is important then we would expect systematic differences to arise in whether the cause or the enabler is the focus of counterfactual thoughts depending on the controllability of the events.

Experiment 1

Previous research examining the events counterfactual thoughts focus on have typically employed a single scenario or used only a limited number of scenarios (Mandel & Lehman, 1996, McEleney & Byrne, 2006, N'gbala & Branscombe, 1995). One problem with only using a small number of scenarios is that there is no way to tell if the results are due to the specific content used and if the same pattern of results would be observed across a greater variety of different contents. Furthermore, these scenarios do not always undergo pre-testing to ensure that an event the experimenter intends to be a cause or enabler, controllable or uncontrollable, is interpreted by the participants in that way. For these reasons we created a large set of scenarios with different contents.

Previous studies have looked at the role of controllability in relation to causes and enablers but it is difficult to draw firm conclusions from them for methodological reasons. For example, N'gbala and Branscombe (1995) examined how controllability and morality affect mental simulation and causal attribution of enablers and causes. The experimental materials they used manipulated controllability of the cause and the enabler, but the cause was always immoral. A further concern is that in their Experiment 2 the scenario contained a number of additional actors to the cause and the enabler which distracted attention from the two key events. As a result some of the fault assignments and counterfactual thoughts related to some of the additional actors.

Mandel and Lehman (1996) showed a clear dissociation between causal ascriptions and counterfactual thoughts. Participants had a strong tendency to blame-select the cause ~~for~~ as having predictive value for the outcome but to generate counterfactuals about actions which they believed could have prevented the outcome. Unfortunately, Mandel and Lehman only manipulated the controllability of the enablers and not the cause.

We therefore felt it was prudent to create a bank of scenarios that allow this topic to be investigated in a systematic way. We created a pool of 18 scenarios that systematically allowed us to manipulate the controllability of the causes and enablers and we checked whether the participants could identify our manipulations of controllability and causality. We kept the scenarios very simple so that each scenario only mentioned the cause, the enabler and the negative outcome. Participants were asked about how the negative outcome could be prevented.

The scenarios we generated involved more mundane everyday negative outcomes such as getting a parking ticket, losing computer files or getting a flat tyre as opposed to extreme negative outcomes such as the rape or death of one of the protagonists which have been depicted in much of the previous research on counterfactual thinking. Counterfactual thinking occurs regularly and spontaneously in response to everyday events as well as in response to unusual or extreme events. We chose to focus on scenarios with negative outcomes because the majority of counterfactual thoughts in everyday life are generated after a negative, rather than positive, event (Markman, Gavanski, Sherman, & McMullen, 1993). In each scenario a cause and an enabler produced a negative outcome. We systematically manipulated whether the cause and the enabler were controllable. But other than that, we varied the number of protagonists (one or two) and whether it was actions or inactions which led to the negative outcome. We developed a broad set of scenarios in order to investigate

whether a preference for undoing controllable/enabling events can be seen across multiple contents.

Method

Participants

We tested 31 Psychology students (29 females and 2 males) with a mean age of 24 (range 18-51 years) who took part for course credit.

Materials and Design

We generated 18 vignettes which described two antecedent events (a cause and an enabler) and a negative outcome, such as:

Richard is writing up his thesis and cannot be bothered to spend a few minutes backing it up to the University server (enabler). When he checks his emails he opens an email from a stranger with an attachment containing a virus (cause) which renders his computer and all the files on it useless (outcome).

In this scenario not backing up the thesis is the controllable enabler and opening the email with the virus is the controllable cause. In each vignette we manipulated the controllability of each of the two antecedent events, which resulted in four different versions of each vignette: (i) matched controllable condition, i.e., cause and enabler are both controllable (as above), (ii) matched uncontrollable condition (the virus checker is faulty and Richard is unable to back up his thesis as he has not been given access to the University server), (iii) controllable cause condition (uncontrollable enabler present also) (opening the email and unable to back up), and (iv) controllable enabler condition (uncontrollable cause present also) (the virus checker

is faulty and chose not to back up). All four versions of a scenario resulted in the same negative outcome (the loss of computer files). In some scenarios the cause occurred first (6 of the 18 scenarios) and in others the enabler occurred first (12 of the 18 scenarios). See the Appendix for the scenarios used.

We used a within participants design so each participant received all 18 scenarios. Thus each participant saw at least four vignettes from each condition (but they did not see different versions of the same scenario). We also included four filler items which described either two causes, or a cause and an irrelevant action.

Participants were asked whether each of the two antecedent events a) caused, b) enabled or c) had nothing to do with the outcome. At the top of each page we provided a definition for a cause and enabler. It read as follows: '*A cause brings about an outcome. An enabler makes it possible for an outcome to occur*'. Participants were then asked to judge how controllable each event was on a 7 point scale (where 1 was not at all controllable and 7 was very controllable). Additionally, participants were asked to rate how much blame should be assigned to each of the events on a 7 point scale (where 1 was not at all to blame and 7 was a lot to blame) but these data are reported elsewhere (Frosch, Egan & Hancock, 2014).

Finally, participants were asked to list one way in which they thought the outcome could have been prevented. There were no restrictions on what the participants might write so that they could choose to list the cause, the enabler, both the cause and the enabler or neither the cause or enabler.

Procedure

The scenarios were presented in booklets in different random orders. Participants were tested in groups of up to 10 people.

Results

Preliminary Analyses

A total of 549 statements were generated by participants across all scenarios and all conditions describing how the outcome could be prevented. The statements generated were categorised by two raters as focusing on the cause, the enabler, both the cause and enabler or some other event (interater reliability was 93% and any disagreements were resolved by discussion). The majority of participants suggested changes to either the cause (44%) or the enabler (45%) to prevent the outcome. Very few participants chose both the cause and enabler (3%) or some other event (8%) to prevent the outcome and so our analysis focuses on the 89% of responses which suggested either the cause or the enabler. Hence, we report the number of counterfactuals in each category as percentages for ease of comparison. The percentage choosing the cause or the enabler was similar regardless of whether the cause or the enabler occurred first in the scenario, $p \geq .25$, as Table 1 shows.

Insert Table 1 about here

Prior to any analysis we wanted to check that our manipulations of controllability and causality were successful. Participants rated the controllability of the two events leading to the negative outcome on a 7 point scale. In order to check whether our manipulation of controllable and uncontrollable events worked, for both causes and enablers, we conducted a 2x2 repeated measures ANOVA on the controllability ratings using as factors the type of causal event (cause versus enabler) and the intended controllability of the event (controllable versus uncontrollable). The results indicated that the manipulation was successful: participants rated events that were intended to be controllable higher on the controllability scale than events that were intended to be uncontrollable (6.16 versus 3.70); $F(1,17) = 90.87$, $p < .001$, $\eta_p^2 = .84$. There was no difference in the overall controllability ratings of causes and

enablers (4.89 versus 4.98); $F(1,17) = .06, p = .82, \eta_p^2 = .003$, and the factors did not interact,

$F(1,17) = .39, p = .54, \eta_p^2 = .02$. An examination of the mean controllability scores for each cause and each enabler in each scenario in each condition revealed that 92% of controllability ratings by participants were in line with whether an event was intended to be controllable or uncontrollable.

Overall, participants were quite good at identifying both causes and enablers, categorising over two thirds of events correctly (69%). We conducted a 2x2 repeated measures ANOVA on the number of correctly identified events, using as factors the type of causal event (cause versus enabler) and the event controllability (controllable versus uncontrollable). Participants were marginally better at correctly identifying enablers than causes (73% versus 65%) $F(1,18) = 4.24, p = .06, \eta_p^2 = .2$, and correctly identified more controllable than uncontrollable events (73% versus 64%), $F(1,18) = 7.49, p = .01, \eta_p^2 = .306$, but there was no interaction between the factors, $F(1,18) = 1.08, p = .31, \eta_p^2 = .06$.

Although there was a high average rate of correctly identifying the cause and the enabler across all scenarios, there was variation between the scenarios. For example, in different scenarios the correct identification of the cause ranged between 33% and 94% and the correct identification of the enabler ranged between 47% and 97%. In order to investigate the influence of event controllability versus event causality on counterfactual thinking further analysis was only conducted on scenarios with a high rate of correctly identified causes and enablers (over two thirds of participants correctly identify them). This process resulted in 8 scenarios being used in subsequent analysis (see Appendix). For these eight scenarios the causes were on average identified correctly 76% of the time and the enablers 79% of the time. In order to ensure the controllability of the events in 8 scenarios were as intended we again examined of the mean controllability ratings for each cause and each enabler in each of the chosen scenarios in each condition. Similar to the 18 scenarios, the scores indicated that

92% of controllability ratings by participants were consistent with whether the event was intended to be controllable or uncontrollable.

Prevention Focus

We conducted a 3 way repeated measures ANOVA on the proportion of causes and enablers focused on to prevent the outcome across the 8 scenarios using as factors the controllability of the cause (controllable versus uncontrollable), the controllability of the enabler (controllable versus uncontrollable) and the causality of the event (cause versus enabler). The results indicated that there was a significant interaction between all three factors; $F(1, 18) = 6.78, p = .018, \eta_p^2 = .274$. There were no other significant interactions or main effects. The results indicate that whether people focused on causes or enablers was influenced by the controllability of the cause and the enabler. Figure 1 below shows that when the controllability of cause and enabler were matched, either both controllable or both uncontrollable, participants tended to undo a similar proportion of causes and enablers. However, when the controllability was not matched, participants tended to undo the

controllable event.¹ ~~We conducted a similar analysis using all 18 scenarios and found a similar pattern of results, with controllability and causality interacting to influence how often the participants focused on the cause or the enabler, $p < .01$. This interaction was again due to differences between the two unmatched conditions, i.e. where either the cause or the enabler was controllable. Even though participants may not have explicitly identified causes and enablers in all of the scenarios this finding suggests that participants may have had some awareness of the distinction between them regardless.~~

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Insert Figure 1 about here

Summary

The results indicate support for Chang and Herrman's (2007) views with respect to the role of controllability in counterfactual selection. When the cause and the enabler were not matched for controllability, participants tended to focus on the controllable event more often than the uncontrollable event, regardless of whether it was a cause or an enabler, when thinking about how to prevent a negative outcome. When the cause and enabler were matched for controllability participants focused on the enabler and the cause equally often. The findings across the four conditions suggest that when it comes to prevention, the controllability of the event is more important than the causal status of the event.

These findings contradict the judgment dissociation theory and the mental model theory predictions that causal role should have an impact on causal selection. However, Mandel (2005) has suggested that counterfactual thought generation might be influenced by prior considerations of causal roles in that a causal rating task creates high availability of all involved parties. Similarly, Spellman, Kincannon, and Stose (2005) also suggest that a person who is asked to consider counterfactual alternatives is influenced by the external availability of information provided in the scenario (e.g., the focus of the story). However, if this person is first asked to make causal ratings about all of the actors then their counterfactual thoughts are also influenced by this information. In particular, an action which was rated as highly causal (one that raises the probability of the outcome more than other actions) would be more likely to be considered as a counterfactual candidate. In the next experiment we therefore examined spontaneous counterfactual thoughts unaffected by judgments of causality.

Experiment 2

In this experiment we examined spontaneous counterfactual thoughts by asking participants to complete the sentence ‘Things could have turned out differently: If only...’ which is another way of exploring how an outcome could have been prevented (Mandel & Lehman, 1996).

Method

Participants

We tested 78 Psychology students (69 female and 9 male) with a mean age of 21 (range 18-51 years) who took part for course credit.

Materials and Design

We used the 8 scenarios (see Appendix) identified in the previous experiment for which participants identified the cause and enabler with a good level of accuracy, as described above. As in the previous experiment we manipulated controllability for the cause and the enabler and therefore had four versions of each vignette. Each participant was tested in only one condition, we thus employed a between participants design.

Participants were asked to generate a counterfactual in response to each scenario, by completing the following sentence: ‘Things could have turned out differently: If only...’.

Additionally, similar to Experiment 1, participants were asked to rate how much blame they would assign to the cause and the enabler on a 7 point scale where 1 indicated no blame at all and 7 indicated a lot to blame) and these data are reported elsewhere (Frosch, Egan & Hancock, 2014).

Procedure

As in the previous experiment participants completed the booklets in groups of up to 10. Participants saw each of the eight vignettes, which were presented in a random order, and then generated a counterfactual.

Results

The counterfactuals generated were categorised by two raters as altering either the cause, the enabler, both the cause and enabler or some other event (interater reliability was 90% and any disagreements were resolved by discussion). Similar to the previous experiment the majority of the counterfactuals generated (94%) either altered the cause or the enabler, so our analysis focuses on these two categories.

We conducted a 3 way mixed ANOVA on the proportion of causes and enablers focused on to undo the outcome across the 8 scenarios using as factors the controllability of the cause (controllable versus uncontrollable), the controllability of the enabler (controllable versus uncontrollable) and the causal role of the event (cause versus enabler). The results indicated that there was a significant main effect of the causal role of the event with enablers being undone more often overall than causes (55% versus 38%); $F(1, 74) = 20.66, p < .001, \eta_p^2 = .218$. However, the causal role of the event also interacted significantly with the controllability of the event for both the cause, $F(1, 74) = 21.76, p < .001, \eta_p^2 = .227$, and the enabler, $F(1, 74) = 21.41, p < .001, \eta_p^2 = .224$. There were no other significant interactions or main effects. Figure 2 below shows that when the controllability of cause and enabler were not matched participants tended to undo the controllable event. This replicates the finding in Experiment 1 regarding the importance of controllability versus causal role.

Insert Figure 2 about here

Figure 2 also illustrates the difference between the proportions of causes and enablers focused on in the matched conditions (where both the cause and enabler were controllable or uncontrollable). In these conditions participants focused more on the enabler than the cause in their counterfactual thoughts (56% versus 37%); $F(1,37) = 11.23, p = .002, \eta_p^2 = .23$. This finding lends support to the idea that there is something unique about enablers (Byrne, 2005; [Mandel, 2003a](#)) and that people prefer to undo enablers rather than causes in their counterfactual thoughts.

Summary

This experiment largely replicates the findings of Experiment 1. The results indicate that participants prefer to undo controllable events more so than enabling events as we saw in the condition where the cause was controllable but the enabler was not, as Chang and Herrmann (2007) suggest. However, we also identified an influence of causal role. In this experiment counterfactual selection was uninfluenced by a prior causal ratings task and hence, when causes and enablers ~~are~~were matched in controllability participants tendeded to undo the enabler. These findings are consistent with the suggestion ~~that~~ ng there may be something unique about the enabler (Byrne 2005) and provide further support for judgment dissociation theory (Mandel, 2003a). Additionally, both Byrne (2005) and Mandel (2003a) identify controllable rather than uncontrollable events and enablers rather than causes as being the focus of counterfactual thoughts and this pattern is borne out in particular in the condition where the enablers is controllable and the cause is not. Across all conditions and combinations of controllability and causality, the controllable enabler, as they suggest, is undone the most.

Discussion

The effect of controllability and causality on counterfactual thinking

Previous research has established that when people think counterfactually their thoughts focus on enablers rather than causes and controllable rather than uncontrollable events (e.g., Mandel 2003a; Byrne, 2005). In particular controllable enablers are prime targets for undoing. However, the aim of our research was to investigate which of the two factors was more important. Specifically, we set out to investigate whether there was something unique about enablers (e.g., Byrne, 2005) or whether it was just that they are often more controllable than causes (Chang & Herrmann, 2007).

In Experiment 1 participants were asked about preventing a negative outcome and in Experiment 2 they were asked how things could have turned out differently ‘if only...’. The results indicate that controllability has an important role to play in which event is chosen, as could be seen in the unmatched conditions. When the cause was controllable and the enabler was not, people focused their counterfactual thoughts on the cause; when the enabler was controllable and the cause was not people focused their counterfactual thoughts on the enablers. This finding is consistent with previous research that controllability is important in counterfactual thinking (Giroto et al., 1991; Mandel & Lehman, 1996; N’gbala & Branscombe, 1995).

Judgement dissociation theory (Mandel, 2003a) predicts that people will undo controllable rather than uncontrollable events because it is consistent with the goals of individuals to control their environment. He further argues that counterfactuals focus on controllable events that would have been sufficient to prevent an outcome or a similar outcome like it.

In a similar vein, The functional theory of counterfactual thinking (Epstude & Roese, 2008; 2011) proposes that counterfactual thoughts are primarily useful and beneficial to

individuals. By focusing on how things could have turned out differently people can learn from their past mistakes (e.g., Nasco & Marsh, 1999) ~~or~~ and gain an insight into how they might regulate behaviour or improve future performance (e.g., Egan & Byrne, 2012; Maloney & Egan, 2014). However, learning from past mistakes ~~or~~ and improving future performance can only be achieved if people focus on things they can change in the future (i.e., controllable aspects of the event or behaviour). Just generating counterfactual thoughts may not be sufficient in and of itself to benefit individuals and recent research found that people were more likely to generate controllable thoughts when thinking hypothetically about the future (prefactual thinking) than when thinking hypothetically about the past (counterfactual thinking) (Ferrante, Giroto, Straga, & Walsh, 2013). It may be the case that prefactual thoughts are more functional than counterfactual thoughts, although individual differences may play a role in modifying the functionality of counterfactual thoughts. For example, Maloney and Egan (2014) found that when generating counterfactual thoughts after attempting an anagram task, individuals high in autonomy focused on more controllable aspects of behaviour than individuals low in autonomy. This effect was only apparent when individuals actually attempted the task, rather than just read about the task. The focus on controllable aspects of behaviour subsequently led to greater performance improvement on a second anagram task, compared to individuals who focused on uncontrollable aspects of behaviour.

Epstude and Roese (2008) propose two pathways by which counterfactual thoughts can influence behaviour. The first is a content-specific pathway which places the emphasis on the actual content of the counterfactual thought (e.g., about not studying hard enough, about not parking on a double yellow line) and the information is used to modify future behaviour in that particular domain (e.g., Smallman & Roese, 2009). The second pathway is content-neutral and influences future behaviour by activating an information processing style or mind

set or motivational approach that is adaptive (e.g., Markman, Lindberg, Kray & Galinsky, 2007). Another way this pathway operates is by increasing perceptions of control (Nasco & Marsh, 1999) when individuals focus on controllable aspects of their own behaviour. This idea is consistent with the emphasis on undoing controllable events that was demonstrated in the two experiments reported in this paper and provides additional evidence for the existence of the content-neutral pathway.

The judgement dissociation theory and the functional theory of counterfactual thinking offers ~~one~~ possible explanations for why people focus on controllable events. Another possible explanation for why people choose more controllable than uncontrollable events may be to do with the possibilities they keep in mind (Johnson-Laird & Byrne, 1991). Girotto et al. (1991) point out that controllable actions tend to be the result of decisions and hence tend to evoke a counterfactual alternative in the form of the potential actions an individual did not take. For example, when a person thinks about what to undo they think about not only the controllable event happening (e.g., opening the email) and the outcome happening (e.g., loss of files), but also the controllable event not happening (e.g., not opening the email) and the outcome not happening (e.g., no loss of files), which provides the counterfactual. However, when they think about an uncontrollable event happening (e.g., faulty virus checker) and the outcome happening they may not as readily think about the uncontrollable event not happening and so it is more difficult to imagine how this situation could be brought about (as it is not controllable). Hence, a person's mental representation of a controllable action is likely to contain a readymade counterfactual alternative which makes it an ideal candidate for mutation. Note that this mental model explanation is not inconsistent with judgement dissociation theory or the functional theory of counterfactual thinking. As Epstude and Roeser (2008, p.169) point out, the different approaches to counterfactual thinking may be operating at different levels with the mental model approach operating at a

lower level providing the “building blocks of reasoning” while the functional theory operates at a higher level focusing more on “top-down rather than bottom-up processes”.

Although the experiments indicate that controllability is important, Experiment 2 suggests that causality may still have a role to play. The results showed that when causes and enablers were matched for controllability participants tended to undo the enabler more often than the cause. While controllability is important, there may also be something unique about enablers that means they are more mutable than causes when thinking counterfactually. One explanation for this increased mutability explanation is that people tend to mutate enablers rather than causes because enablers tend to occur prior to causes. This explanation is consistent with the finding that people tend to mutate the first event in a sequence of causally dependent events (Wells et al, 1987). However, it is not clear whether causes are regarded as causally dependent on enablers. Enablers do not cause a cause to bring about an effect, in the way that not backing up your files does not cause a malfunctioning fan to lose your files. Instead enablers work together with a cause to bring about an outcome. Hence, if enablers and causes are recognised as two independent events, then, based on previous research, people should undo the cause and not the enabler. This preference for mutating the most recent event in an independent sequence of events was demonstrated by Kahneman and Miller (1986) who gave participants an ordered sequence of two letters (e.g., X-F) and asked them to quickly replace one. Participants tended to undo the second rather than the first letter.

An alternative explanation, consistent with the mental model theory, could be due to the different possibilities people keep in mind for causes and enablers, as Byrne (2005) suggests. She proposes that enablers are understood by keeping in mind two possibilities; enabler & outcome and no enabler & no outcome; whereas causes tend to be understood by keeping in mind only one possibility; cause & outcome. As a result it is easier for people to think counterfactually about an enabler than about a cause. Evidence to support this proposal

about different possibilities being kept in mind for causes and enablers comes from priming studies (Frosch & Byrne, 2012) and reasoning studies (Goldvarg & Johnson-Laird, 2001).

Mandel (2003a, 2005) provides a different explanation for why counterfactuals focus on enabling conditions. As described in relation to controllability, According to judgment dissociation theory people are guided by the *substitution principle* in their counterfactual thinking. This means they focus on events which would have been sufficient to disable or prevent the outcome from occurring. These disabling events need not have been directly involved in bringing about the actual outcome rather they fall into a category of events that would have been sufficient to prevent the outcome from occurring.

Overall the results showed that people prefer to undo controllable rather than uncontrollable events and enablers rather than causes across a range of contents. Similar to the types of events that lead to counterfactual thinking in everyday life, the scenarios used in the experiments reported above covered a variety of types of negative outcomes which were brought about in a variety of ways (e.g., by multiple protagonists, by a single protagonist, by actions, inactions, decisions, accidents, etc.). The results presented reveal a pattern that holds across these variations in the materials. However, caution should be exerted when interpreting the findings from these scenarios because the effect of causal role and controllability on counterfactual thinking may differ when people experience a negative outcome themselves, as opposed to reading about someone else experiencing a negative outcome. Recent research indicates that actors and readers focus on different things when thinking counterfactually and further research is required to investigate if the findings reported here regarding controllability and causality extend to actors (Giroto, Ferrante, Pighin & Gonzalez, 2007; Pinghin, Byrne, Ferrante, Gonzalez & Giroto, 2011; Ferrante, Giroto, Straga & Walsh, 2013; Maloney & Egan, 2014).

Similarly, it could be fruitful for future research to investigate the effects of controllability and causality in relation to other known aspects of counterfactual thinking such as the preference to undo actions, rather than inactions, or to consider more serious negative outcomes such as those studied in previous counterfactual thinking research (e.g., rape, assault). It may be the case that results will vary systematically with the extent of the negativity of the outcome or with other factors such as the normativeness or social acceptability of the cause or the enabler. However, given the wide variety of contents used in the two experiments presented in this paper and previous research (Giroto et al, 1991; Mandel & Lehman, 1996; N'gbala & Branscombe, 1995) it seems that controllability and causal role may be particularly important factors in counterfactual thinking. In support of this idea it is noteworthy that the controllable causes tended to be 'undone' in the controllable cause condition but not in the matched controllable cause and enabler condition. Hence, if the cause had been particularly striking as an event that counterfactuals are known to focus on (e.g., an event that was an action or that was socially unacceptable), then presumably that should have meant that it was the focus of the counterfactual regardless of whether the enabler was controllable or uncontrollable. The pattern we found highlights the importance of the relative controllability of the cause and enabler.

Conclusion

The aim of this paper was to explore whether people focus on enablers because they are unique or because they tend to be more controllable than causes. Our results indicate that for counterfactuals the controllability of the event may be more important than the causal status of the event, but consistent with judgment dissociation theory causal status may still have a role to play. As previous research shows, serious judgements can be affected by thinking

counterfactually about particular events. Understanding why an event is chosen and the role it plays in bringing about an outcome may therefore have implications for psychologists, philosophers and the legal domain (Frosch, Johnson-Laird, & Cowley, 2007).

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Appendix

Experimental materials for the matched controllable cause and enabler condition and the matched uncontrollable cause and enabler condition with causes marked in bold and enablers marked in italics. All 18 scenarios were included in the initial analysis in Experiment 1. The first 8 scenarios were used in Experiment 2 and in the main analysis in Experiment 1.

Controllable	Uncontrollable
Richard is writing up his thesis and <i>cannot be bothered to spend a few minutes backing it up to the University server</i> . When he checks his emails he opens an email from a stranger with an attachment containing a virus which renders his computer and all the files on it useless.	Richard is writing up his thesis and still <i>hasn't been given access to the University server, so he is unable to back it up</i> . The virus checker is faulty and as a result he opens a file containing a virus which renders his computer and all the files on it useless.
Jane <i>decided to take a different route home</i> to her normal route. On the way she encountered a rough stretch of road that was being resurfaced and had a 10mph speed limit. Jane drove too quickly over this road, resulting in her getting a flat tyre.	<i>An accident on Jane's normal route home forced her to take an alternate route</i> . On the way she encountered a rough stretch of road where a lorry had shed its load. A nail got stuck in her tyre , resulting in her getting a flat tyre.
Whilst working on a building site Tim was <i>wearing trainers rather than the required steel-toed shoes, because he thought his trainers looked cooler</i> . John carelessly threw a bag of cement over to Tim, which landed on his foot and broke his big toe.	Whilst working on a building site Tim was <i>wearing trainers rather than the required steel-toed shoes, because it was his first day</i> . John lost his balance and dropped a bag of cement which landed on Tim's foot and broke his big toe.
Anna is on her way to a job interview and <i>decides not to wear her rain mac</i> as she does not like the look of it. As Anna is walking down the street, Phoebe, who is driving her van particularly fast, speeds straight through a puddle , splashing Anna and soaking her clothes.	Anna is on her way to a job interview and is unable to wear <i>her rain mac as her sister borrowed it without asking permission</i> . As Anna is walking down the street, Phoebe, who is driving her van, swerves to avoid hitting a dog and drives straight into a puddle , splashing Anna and soaking her clothes.
Oscar <i>decides to take the lift to the top floor</i> of the library because he is too lazy to take the stairs. When Oscar reaches the top floor the lift door gets stuck and won't open because James, the lift maintenance worker, didn't bother to oil the lift machinery that morning.	Oscar <i>has to take the lift to the top floor of the library because the stairs are closed for repairs</i> . When Oscar reaches the top floor the lift door gets stuck and won't open because James, the new lift maintenance worker, didn't realise that the lift machinery had to be oiled every day .

Controllable	Uncontrollable
Daniel <i>threw a lighted cigarette</i> into a bush. Just as the cigarette was going out, Joseph deliberately threw petrol on it. The resulting fire burnt down his neighbour's house.	Daniel <i>accidentally dropped a lighted cigarette</i> into a bush. Just as the cigarette was going out, Joseph, who was carrying a petrol canister, stumbled and spilled the petrol onto the bush. The resulting fire burnt down his neighbour's house.
Anne decided to park on a double yellow line near the office building as this was the closest place to park. On the way back to the car Anne <i>bumped into her friend and they got chatting</i> . When Anne returned to the car she saw she had just been given a ticket.	Anne parked on a double yellow line near the office building as it was an emergency and there was nowhere else to park. On the way back to the car Anne <i>urgently needed to use the bathroom and returned to the office building</i> . When Anne returned to the car she saw she had just been given a ticket.
Kate took the <i>decision to take the scenic route home</i> rather than her usual route. When Kate came to a junction Tina, who was coming from a different direction, jumped a red light because she was in a hurry and crashed into her.	<i>A diversion forced Kate to take the scenic route home</i> rather than her usual route. When Kate came to a junction Tina, who was coming from a different direction, jumped a red light because the brakes failed and crashed into her.
<i>Scenarios not included in the main analysis in Experiment 1 or used in Experiment 2</i>	
Amy decided to plant some seeds in her garden. As a result of using <i>her sprinkler system</i> the seeds have grown very rapidly and are now taking over the garden.	Some seeds were blown into Amy's garden by the wind. As a result of <i>high rainfall</i> these seeds have grown very rapidly and are now taking over the garden.
Richard <i>chose not to wear his protective suit</i> when he went to service the radioactive plant. Michael was careless and opened a vent just as Richard was walking by . Richard was hospitalised with severe radiation sickness.	The <i>protective suit Richard wore when he went to service the radioactive plant was faulty</i> . Michael tripped and opened a vent just as Richard was walking by . Richard was hospitalised with severe radiation sickness.
Tim decided to go for a run in the park . Tim <i>hadn't bothered taking his heart medication</i> that morning as he felt he no longer needed it. After running a short distance Tim had a heart attack.	Tim was going for a walk in the park when suddenly an aggressive dog began to bark and chase after him . Tim <i>had forgotten to take his heart medication</i> that morning and after running a short distance Tim had a heart attack.

Controllable	Uncontrollable
Sophie is allergic to brazil nuts but <i>decides not to take her medication that morning</i> because it makes her feel tired. Her friend William, who thinks her allergy is all in her head, orders her a chocolate and nut brownie. Unfortunately, Sophie has a severe allergic reaction to the brownie and is taken to hospital.	Sophie is allergic to brazil nuts but <i>forgets to take her medication that morning</i> because she is running late. Her friend William, who does not know about her allergy, orders her a chocolate and nut brownie. Unfortunately, Sophie has a severe allergic reaction to the brownie and is taken to hospital.
Valerie turned on the tap in the kitchen and while it was still running she decided to check the TV to see what programmes were on that evening. When Valerie returned to the kitchen she saw that the sink had overflowed with water due to <i>a blocked pipe that Valerie had not yet bothered to clear.</i>	Valerie turned on the tap in the kitchen and while it was still running she heard a scream coming from the lounge and ran in to see that her son had fallen over and cut his knee. When Valerie returned to the kitchen she saw that the sink had overflowed with water due to <i>a blocked pipe that she did not know about.</i>
Nicola dyed her hair. <i>She chose the hair dye because she liked the look of the packaging.</i> Nicola did not bother to do the recommended patch test with the dye before applying it to her whole head of hair and her hair reacted strangely to it and it turned green.	Nicola dyed her hair. <i>She chose the hair dye because it was the last bottle on the shop shelf.</i> There was an error mixing the dye at the factory and the wrong combination of chemicals were used. Nicola's hair reacted strangely to it and it turned green.
Kelly was meant to be watering Sally's houseplant whilst she was on holiday, but <i>she decided to go away for a couple of days</i> herself. Sally had set the heating on very high so that Kelly wouldn't be cold when she came round. The plant dried up and died.	Kelly was meant to be watering Sally's houseplant whilst she was on holiday, but <i>she had to go away for a couple of days to attend a funeral.</i> The weather was unseasonably hot during this time. The plant dried up and died.
Hannah is babysitting for Emma. Hannah stopped watching the child for a moment because she <i>went into the kitchen to get something to eat.</i> When she returned she found the child had eaten some pills that Emma kept in cupboard and never bothered locking.	Hannah is babysitting for Emma. Hannah stopped watching the child for a moment because <i>the fire alarm was going off in the kitchen, so she ran in to see if everything was okay.</i> When she returned she found the child had eaten some pills that Emma kept in a cupboard that she had accidentally left unlocked.

Table 1: Percentage of events selected to prevent the outcome for all scenarios and for scenarios where the cause or the enabler occurred first.

	Cause	Enabler	Both	Other
Cause occurred 1st	37	46	3	14
Enabler occurred 1st	46	46	3	5
<i>All scenarios</i>	<i>43</i>	<i>46</i>	<i>3</i>	<i>8</i>

Figure captions

Figure 1: Percentage of participants in each condition undoing the cause or the enabler, when asked how they could prevent the negative outcome from happening in Experiment 1. The percentages in each condition do not add up to 100% because the remaining responses either mentioned both the cause and the enabler together or alternative factors.

Figure 2: Percentage of participants in each condition focusing on the cause or the enabler, when asked how things could have turned out differently in Experiment 2. The percentages in each condition do not add up to 100% because the remaining responses either mentioned both the cause and the enabler together or alternative factors.

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