Reducing the impact bias in judgments of post-decisional affect: Distraction or task interference?

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Abstract

People overestimate their affective reactions to future events and decisions — a phenomenon that has been termed "impact bias." Evidence suggests that completing a diary detailing events contemporaneous with the focal one de-biases judgments of affect. It is generally assumed that this is because diary completion helps people to realize that they will be distracted from the focal event. However, there is another possibility: de-biasing may occur because diary completion interferes with the processing responsible for the bias. In a first experiment, we showed that diary completion also lowers affect associated with past decisions. In a second experiment, we showed that solving anagrams has the same effect. A third experiment demonstrates that this is not because affect judgments are influenced by mood changes brought about by solving anagrams. Indeed, monitoring moods lowered affect in the same way as diary completion. It appears that cognitive tasks of any sort interfere with the processing required by judgments of affect.

Keywords: affect, regret, focalism, impact bias, task switching.

1   Introduction

Recent evidence suggests that people estimate that their affective reactions to future events will be more intense than they actually are (e.g., Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000; Gilbert, Morewedge, Risen, & Wilson, 2004; Sevdalis & Harvey, 2007). These misjudgments have been termed "impact bias" (Wilson et al., 2000). Wilson et al. (2000) suggested that the psychological mechanism that underlies this phenomenon is what they termed "focalism". In Wilson et al.'s words, when people generate predictions about how they will be feeling after a future event "people focus too much on the event in question and not enough on the consequences of other future events" (Wilson et al., 2000, p. 821; see also Schkade & Kahneman, 1998).

Focalism has also been found to influence people's judgments of their affective reactions to past events (Mitchell, Thompson, Petterson, & Cronk, 1997; Wilson, Meyers, & Gilbert, 2003). For example, Mitchell et al. (1997) found that people's retrospective judgments of enjoyable events, such as bicycle trips and vacations, were more positive than their judgments that were contemporaneous with these events. It has been suggested that retrospective focalism arises for the same reason as

prospective focalism: people pay too much attention to the focal event and not enough to the consequences of other events that occur at the same time as the focal event (Wilson et al., 2000).

Wilson et al. (2000, study 1) demonstrated that asking people to complete a diary of activities in which they expected to be engaged around the time of the focal event reduced the intensity of the emotions associated with that event. They argued that the diary manipulation had its effect by reducing focalism: specifically, they suggested that the effect of diary completion is to reduce the extent to which people expect to be thinking about the focal event after it has occurred. They suggested that this effect could be brought about in one of two ways. First, asking people to complete a diary may make them realize that other events would occupy their thoughts and thereby distract them from thinking about the target event. As a result, they would ensure that they moderated their affective forecasts. Second, people may focus their attention on the affective consequences of the other events rather than on the likelihood of being distracted by those events. In other words, they may believe that the affective consequences of the focal event will be diluted or cancelled out by the affective consequences of the other events occurring around the same time. As a result, they attenuate their affective forecasts of the focal event. In fact, Wilson et al. (2000, study 4) found that the affective valence of events in participants' diaries had no effect on the level of affect that was forecast for the focal event. Consequently, these researchers concluded that the affective competition hypothesis was not viable; the distraction hypothesis pro-

vided the more plausible account of their diary manipulation.

Here we have two aims. First, we aim to investigate whether diary completion attenuates retrospective judgment of post-decisional affect (i.e., regret, disappointment) as well as prospective judgments of affect. Second, we aim to investigate the adequacy of the distraction account as an account of defocusing of both retrospective and prospective judgments. In particular, we shall contrast it with a task interference account. According to this alternative view, defocusing occurs because processing subserving affect assessment is impaired by costs associated with task-switching. More specifically, judgments of affect associated with a particular event are likely to involve cognitive processes that operate on the contents of working memory. Requiring people to perform an additional task (diary completion) disrupts these processes because it makes its own demands on working memory. This interference account predicts that additional tasks other than diary completion will also disrupt people's judgments of affect and hence produce a de-focusing effect.

2 Experiment 1

Our aim was to establish whether diary manipulations attenuate judgments of affect relating to past events as well as to future ones. Thus we tested the following hypothesis:

H1. Affect will be lower in the diary condition than in the no-diary/control condition.

2.1 Method

We asked participants to recall a real-life, regrettable decision of theirs and to record their regret. Before reporting their regret, half of the participants filled in a diary of events that occurred to them at the same time as the decision they recalled. We anticipated that if affective reactions to past decisions exhibit focalism, participants who fill in a diary (i.e., who are de-focused from the decision in question) would report lower regret than participants who do not fill in a diary.

Participants. Fifty-six students of a London university volunteered for the study (Mage = 19.82, SD = 3.03 years; 43 females). The majority of participants were recruited during a group laboratory demonstration session, and were not paid. Others were recruited via notices in buildings of the university campus and were paid £5.

Design, materials, and procedure. This was a two independent groups design (Control vs. Diary), with 28 participants in each group. Participants were first instructed to recall and describe a regrettable real-life decision. Sub-

sequently, "diary" participants were requested to write down as many events as they could that occurred to them contemporaneously with the decision they had described. There was no filler task for control participants. Finally, all participants recorded their regret (1 = moderately, 8 = very much).

2.2 Results and discussion

"Diary" participants reported marginally lower regret (M = 5.39, SD = 2.17) than control participants (M = 6.36, SD = 1.42; t(54) = 1.97, p = .054).

The attenuation of reported regret by the diary manipulation provides support for our hypothesis, H1, and shows that Wilson et al.'s (2000) distraction hypothesis can be extended to judgments of post-decisional affect.

Before concluding that the diary manipulation did indeed produce a distraction effect, we need to exclude the possibility that it disrupted emotional processing of the focal event that had been retrieved from memory. Experiment 2 was designed to do this.

3 Experiment 2

In Experiment 1, the diary was inserted between recall of an emotional event and assessment of the emotion associated with that event. If the act of retrieval of an emotional event itself elicits some emotional response and if that response is used in the assessment, then interposing the diary completion task between event retrieval and assessment may have its effect by displacing the cues used for assessment from working memory. In other words, the effect of the diary may have been to interfere with emotional processing rather than to lower it as the distraction account suggests.

If the interference account is correct, then interposing tasks irrelevant to the retrieved emotional event should also displace information required for emotional assessment from working memory. Any task that has this effect should produce interference. In this study, we examined whether solving anagram problems has any effect on judgments of emotions associated with the target event. Thus the experiment comprised three conditions: diary, anagrams, and control (neither diary nor anagrams). The distraction account predicts that affective judgments should be lower in the diary condition than in the other two conditions. The interference account predicts that judgments in both the diary and the anagrams conditions should be lower than judgments in the control condition.

Participants rated the regret and the disappointment that they associated with a recalled decision of theirs. We tested three hypotheses. The first is akin to the hypoth-

esis tested in Experiment 1 and is consistent with both models:

H1. Affect will be lower in the diary condition than in the control condition.

The second is derived from the interference account:

H2. Affect will be lower in the anagrams condition than in the control condition.

The third is predicted by the distraction account but not by the interference account:

H3. Affect will be lower in the diary condition than in the anagrams condition.

Results consistent with H1 and H3 but not H2 would support the distraction account, whereas results consistent with H1 and H2 but not H3 would support the interference account. Finally, results consistent with all three hypotheses would indicate that both distraction and interference accounts are viable.

3.1   Method

Participants. Ninety-six students of a London university volunteered for the study (M_{age} = 18.31, SD = 2.69 years; 73 females). Most participants were recruited during a group laboratory demonstration session and were not paid. Others were recruited individually and they were paid £3.

Design, materials, and procedure. This was a three independent groups design (Control vs. Diary vs. Anagrams), with 32 participants in each group.

Participants were first instructed to recall and describe a regrettable real-life decision. Subsequently, a third of the participants ("diary" group) received a context elicitation manipulation directly analogous to that used in Experiment 1. Another third of participants ("anagrams" group) were asked to solve 13 four-letter anagrams, all of which had a solution. There was no filler task for the remaining third of the participants (control group). Finally, all participants reported their regret and disappointment (1 = very slightly/not at all, 5 = extremely).

3.2   Results and discussion

Regret and disappointment across the two experimental groups and the control group are shown in Table 1. A one-way ANOVA on regret judgments revealed differences between the groups ($F(2, 93)$ = 3.08, p = .051). Analyses of contrasts yielded empirical support for our first hypothesis, H1: regret was lower in the "diary" condition than in the control condition ($t(93)$ = 1.99, p = .05). A similar analysis on disappointment judgments also yielded significant differences between the groups ($F(2, 93)$ = 4.59, p < .05). Like regret, disappointment was marginally lower in the "diary" condition than in the

Table 1: Regret and disappointment across experimental conditions, Experiment 2.

Condition:	Control		Diary		Anagrams	
	M	SD	M	SD	M	SD
Regret	4.31	1.06	3.69	1.36	3.59	1.34
Disappointment	3.53	1.41	2.84	1.51	2.47	1.34

control condition ($t(93)$ = 1.93, p = .056). These findings provide empirical support for our first hypothesis, H1, and replicate the finding of Experiment 1.

To test our second hypothesis, H2, we compared levels of regret and disappointment reported by participants who solved anagrams with those reported by the control group. Participants who solved anagrams reported significantly lower regret ($t(93)$ = 2.28; p < .05) and disappointment ($t(93)$ = 2.99; p < .01) than participants in the control group. Consistent with this, there was no significant difference between participants who solved anagrams and those who completed diaries in their reported levels of regret ($t(93)$ = 0.30; p = .77) and disappointment ($t(93)$ = 1.06; p = .29, in the direction opposite to that predicted by the alternative hypothesis that negative emotion is specific to the diary condition).

In summary, participants who recalled events that occurred at the same time as their poor decisions reported lower regret and lower disappointment than participants who did not recall such events. In Experiment 2, however, we also found a similar affect-attenuating effect of anagram-solving. Participants who solved anagrams after they had recalled a poor decision but before they had reported how they felt about it recorded lower regret and lower disappointment than control participants.

What triggered attenuation of regret and disappointment in the anagram-solving group? A first possibility is that diary completion and anagram-solving attenuated regret and disappointment for different reasons. On the one hand, diary completion may reduce negative affect by altering the way participants construe their decision. The context of the poor decision that is elicited through diary completion may lead participants to judge that they were less responsible for the poor outcome and that external factors contributed to it. As a result of this re-construal, decisions were seen as less regrettable and disappointing. On the other hand, the joy of successful anagram-solving may temporarily counteract the negative affect associated with the recalled decision. (The anagrams were very simple; virtually all participants solved all of them correctly.) This would happen if people cannot keep simultaneous emotions arising from different causes psychologically separate (i.e., a "spill-over" effect).

Alternatively, the two tasks may have attenuated affect for the same reason. Because diary completion and anagram-solving are interposed between the decision recall and the judgments of affect, they may hinder the processing of the affective properties of the recalled decision in working memory. In other words, affect attenuation in both conditions may occur as a result of interference with the processing of the affective properties of the decision (Engle, 1996; Stoltzfus, Hasher, & Zacks, 1996). We tested these possibilities in Experiment 3.

4 Experiment 3

Four different groups of participants recalled a regrettable real-life decision and then recorded their regret and disappointment, their personal responsibility for the poor outcome and the contribution of external factors to it. Participants in the first experimental group ("diary") recorded their mood, recalled a decision, completed a diary, and, finally, recorded their mood once again. Participants in the second experimental group ("anagrams") went through the same experimental procedure, but instead of eliciting a context they solved anagrams.

The third and fourth groups consisted of control participants. In the first control group ("control/mood monitoring"), participants recorded their mood, recalled a decision, and then recorded their mood once again before, finally, they reported their post-decisional emotions. In the second control group ("control/no mood monitoring"), participants recalled a decision and reported their post-decisional emotions without recording their mood at any point. Inclusion of this second control group allows us to determine whether monitoring of moods itself affects the post-decisional emotions that participants report. If the monitoring of moods does not affect the regret and disappointment ratings, then participants in both control groups should report similar levels of these emotions. If, on the other hand, monitoring of moods interferes with people's assessment of their emotions in the same way that completing diaries and solving anagrams do, then we would expect ratings of regret and disappointment to be lower in the control group in which people monitored their moods than in the one in which they did not.

Our first hypothesis, H1, was that regret and disappointment would be lower in the diary condition than in the control conditions. Our second hypothesis, H2, was that these emotions would be lower in the anagram-solving condition than in the control conditions. H1 and H2 are identical to the hypotheses that we tested in Experiment 2.

In addition, we tested whether diary completion and anagram-solving attenuate affect for different reasons. If anagram-solving temporarily boosts participants' moods, then "anagrams" participants' moods should be significantly better that the moods of the participants in the other groups. This was hypothesis H3a. Symmetrically, if context elicitation alters the construal of the decision, then "diary" participants should perceive themselves less personally responsible for the poor decisions than participants in the other groups (cf., Zeelenberg, van der Pligt, & de Vries, 2000). This was hypothesis H3b. Lack of support for H3a and H3b would suggest that the two manipulations have their affect-attenuating effect via the same route — arguably via interference with the processing of the affective properties of the decision.

Our final hypothesis, H4, was that monitoring moods would itself reduce the impact bias. This predicts that regret and disappointment will be lower in the "control/mood monitoring" group than in the "control/no mood monitoring" group.

4.1 Method

Participants. Eighty-five students of various London universities volunteered for the study (Mage = 25.78; SD = 8.25 years; 60 females). Most participants were recruited individually and they were paid £8 (to take part in a number of studies, including this one).

Design, materials, and procedure. This was a four independent groups design (Control/mood monitoring vs. Control/no mood monitoring vs. Diary vs. Anagrams), with 21–22 participants in each group.

"Control/no mood monitoring" participants were first instructed to recall and describe a regrettable decision. Subsequently, they reported their regret and disappointment (1 = very slightly/not at all, 5 = extremely). They also assessed the extent to which they felt personally responsible for the poor outcome and the extent to which they thought that external factors had contributed to it (1 = not at all, 8 = very much).

Participants in the other three groups were first instructed to record their current mood using the two 10-item mood scales that comprise the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The positive affect (PA) scale comprises the items: attentive, interested, alert, excited, enthusiastic, inspired, proud, determined, strong, and active. The negative affect (NA) scale consists of the items: distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, and afraid. These emotions are assessed on five-point scales (1 = very slightly/not at all, 5 = extremely).

Next, these participants were instructed to recall and describe a regrettable decision. After recalling a decision, "diary" participants completed a diary of events concurrent with their decisions, whereas "anagrams" participants solved anagrams. Both manipulations were directly analogous to those used in Experiments 1 and 2.

Table 2: Positive Affect (PA) and Negative Affect (NA) before and after the decision recall task across experimental conditions, Experiment 3.

		Control/mood monitoring		Diary		Anagrams	
		M	SD	M	SD	M	SD
Before decision recall	PA	28.51	8.27	26.32	5.25	26.27	6.23
	NA	14.91	5.05	14.24	4.70	16.59	6.03
After decision recall	PA	25.43	9.47	24.23	7.84	25.46	9.19
	NA	16.14	5.13	15.24	4.25	18.05	7.93

There was no filler task for "control/mood monitoring" participants.

Next, participants in the "diary", "anagrams", and "control/mood monitoring" groups recorded their mood once again, using the PANAS. The order of the items in the scales was randomised across the stages of the experiment. Finally, participants in these three groups recorded their regret and disappointment and they assessed their personal responsibility and the contribution of external factors to the poor decision outcome using the same items as "control/no mood monitoring" participants.

4.2 Results

First, we consider whether changes in participants' moods over the period of the experiment depended on the experimental condition. Next, we report findings on participants' assessments of their personal responsibility for the poor decision outcomes. Finally, we report findings on the participants' regret and disappointment.

4.2.1 Moods across experimental conditions

We summed separately the positive and the negative items of the PANAS to obtain measures of PA and NA before and after the recall task (Table 2). The mean Cronbach α across the relevant experimental conditions was 0.78 for the PA scale (range: 0.67–0.88) and 0.80 for the NA scale (range: 0.75–0.82) before the decision recall, and 0.91 for the PA scale (range: 0.89–0.93) and 0.81 for the NA scale (range: 0.75–0.89) after the decision recall.

We submitted the PA and NA before and after the decision recall to a Condition x Time x Affect mixed ANOVA, with Condition (Control/mood monitoring vs. Diary vs. Anagrams) and Time (Before recall vs. After recall) as between-subjects factors and Affect (PA vs. NA) as a within-subjects factor. The analysis yielded a main effect of Affect ($F(1, 61) = 109.00$, $p < .001$): participants reported overall higher levels of PA than NA. This effect

was qualified by a Time x Affect interaction ($F(1, 61) = 8.46$, $p < .01$). Whereas participants' PA was lower after the tasks than before ($t(63) = 2.72$, $p < .01$), their corresponding NA was marginally higher after the tasks than before ($t(63) = 1.91$, $p = .06$).

Importantly, there was no suggestion of an interaction between Time and Condition. Solving anagrams did not affect participants' moods more (or less) than context elicitation. Thus the hypothesis H3a that anagram-solving reduces regret and disappointment via a boost in positive affect and a subsequent "spill-over" effect does not appear viable.

4.2.2 Perceived personal responsibility for the decision

Participants' perceptions of their personal responsibility and of the contribution of external factors to the poor decision outcomes (Table 3, bottom two rows) were submitted to a mixed ANOVA with Condition (Control/no mood monitoring vs. Control/mood monitoring vs. Diary vs. Anagrams) as a between-subjects factor and Responsibility (Personal responsibility vs. External factors) as a within-subjects factor. The analysis yielded only a main effect of Responsibility ($F(1, 81) = 9.26$, $p < .01$): participants perceived the poor decision as their own responsibility rather than as the result of external factors.

Importantly, there was no suggestion of an interaction between Responsibility and Condition. In other words, participants did not consider themselves less responsible for the decision when they had completed a diary than when they had not. Thus the hypothesis H3b that diary completion reduces regret and disappointment via a change in the construal of the poor decision does not appear viable.

4.2.3 Post-decisional affect

Regret and disappointment are shown in Table 3 (upper two rows). Before testing the hypotheses, H1 and H2,

Table 3: Regret, disappointment, perceived personal responsibility and perceived contribution of external factors across experimental conditions, Experiment 3.

Condition:	Control		Control		Diary		Anagrams	
Mood monitoring:	No		Yes		Yes		Yes	
	M	SD	M	SD	M	SD	M	SD
Regret	4.14	1.11	2.91	1.64	2.52	1.47	3.00	1.45
Disappointment	4.10	1.26	2.48	1.66	2.14	1.42	2.59	1.50
Personal responsibility	6.14	1.79	5.91	0.70	6.00	1.84	6.55	1.47
External factors	5.23	2.00	5.43	2.23	5.14	1.91	4.50	1.92

that relate to the effects that completing diaries and solving anagrams had on these emotions, we sought to determine whether mood monitoring affected the ratings of regret or disappointment. We found that control participants who did monitor their mood reported lower regret ($t(81) = 2.81$, $p < .01$) and lower disappointment ($t(81) = 3.57$, $p < .001$) than control participants who did not monitor their mood. Thus mood monitoring had an affect-attenuating effect similar to the effects of diary completion and anagram-solving in Experiment 2. This finding supports H4.

Given that mood monitoring had this attenuating effect for regret and disappointment, we were not surprised to find that there were no significant differences in the regret or disappointment between the "control/mood monitoring" group and the "diary" group, or between the former group and the "anagrams" group. We did, however, obtain the differences that we predicted when we compared the experimental groups with the "control/no mood monitoring" group. Regret was lower in the "diary" condition than in the "control/no mood monitoring" condition ($t(81) = 3.67$, $p < .001$) and so was disappointment ($t(81) = 4.31$, $p < .001$). These findings provide support for H1.

We obtained very similar findings when we compared the "control/no mood monitoring" group with the "anagrams" group. In the "anagrams" condition, participants reported lower regret ($t(81) = 2.62$, $p < .01$) and lower disappointment ($t(81) = 3.36$, $p < .001$) than in the "control/no mood monitoring" condition. These findings provide support for H2.

4.3 Discussion

Experiment 3 replicates the affect-attenuating effect of diary completion found in both our previous experiments and of anagram-solving found in Experiment 2. Participants who completed diaries of events concurrent with their decisions expressed lower regret/disappointment than participants who did not complete such diaries.

Moreover, participants who solved simple anagram problems after they recalled a decision but before they reported their emotions about it also expressed lower regret/disappointment than participants who did not engage in such task.

In addition, Experiment 3 was designed to test two hypotheses regarding the mechanism underlying this affect-attenuating effect. According to the first hypothesis, diary completion and anagram-solving attenuate affect for different reasons. On the one hand, completing a diary leads participants to perceive themselves as less at fault for the poor decision outcomes, thereby reducing post-decisional negative affect. On the other hand, solving anagrams successfully temporarily boosts participants' mood, thereby reducing post-decisional negative affect via a "spill-over" effect. Experiment 3 did not furnish any evidence to support these hypotheses. Participants who completed a diary did not perceive themselves as less at fault for the poor outcome than participants who did not. Moreover, participants who solved anagrams were not in better moods than participants who did not. These findings suggest that the affect-attenuating effects of the two manipulations did not occur for different reasons. Thus we should give serious consideration to the more parsimonious view that they occurred for the same reason.

Experiment 3 produced another important finding: mood monitoring throughout the experiment had an affect-attenuating effect similar to that brought about by eliciting a context and solving anagrams. Participants who monitored their mood reported lower regret/disappointment than those who did not. Thus it appears that any task that is interposed between the recall of the affect-laden decision and the reporting of the emotions associated with it (diary completion, anagram-solving, or mood monitoring) attenuates post-decisional affect. This finding reinforces our view that affect attenuation occurs because of interference with the processing of the affective properties of the decision.

5   General discussion

Previous studies of the impact bias have shown that the bias can be reduced by asking people to complete a diary of their activities around the time of the focal event (Wilson et al., 2000). In these studies, diary completion was found to lower the level of affect that people associate with the focal event, thus reducing the bias. Our experiments were designed to investigate whether the effect is reproducible in retrospective judgments of decision-related affect and to explore the reason for this de-focusing (i.e., affect-attenuating) effect.

In Experiment 1, we demonstrated that the effect of diary completion that Wilson et al. (2000) had shown for judgments relating to future events extends to those relating to past ones. Wilson et al. (2000) argued that such effects occur because completing the diary makes people realize that other events that provide context to the focal one would also influence their level of affect. People lower their judgments of affect to allow for the effects of this distraction (the distraction account). Our Experiment 2 showed that solving anagrams has the same effect as completing a diary. Since it is rather implausible to argue that solving anagrams makes people realize that the focal event is embedded in other affect-inducing events, we considered a dual route explanation, in which the distraction account was retained for diary completion and an affect-transfer account (via a "spill-over" effect) was proposed to explain the effects of anagram solving. Experiment 3 showed that solving anagrams had no more favorable effects on participants' moods than completing diaries. This renders the affect-transfer account untenable. Furthermore, mood-monitoring itself was found to have the same affect-attenuating properties as diary completion and anagram solving.

In view of these findings, rather than retaining the distraction model for diary completion and developing other models to explain why anagram solving and mood monitoring produce similar effects, we should prefer to provide a unitary account for all these phenomena. We propose that they all arise when a secondary task (diary completion, anagram solving, mood monitoring, or some other task) interferes with the cognitive processing subserving the primary task of affect assessment.

Our interference account of these phenomena is consistent with a consensus about the operation of working memory and its limitations and with research on task-switching (Monsell, 2003). Hasher and Zacks (1988) argued that efficient operation of working memory requires inhibitory processing. When people switch from one task to another, they must use inhibition to eliminate information relevant to the first task before embarking on processing of information relevant to the second one. If they are unable to do this adequately, there will be interference: material relevant to the first task will interfere with the processing of material relevant to the second one.

There is considerable support for this notion (e.g., Bjork, 1989; Dempster, 1991; Engle, 1996; Hasher, Stoltzfus, Zacks, & Rypma, 1991; Kane, Hasher, Stoltzfus, Zacks, & Connelly, 1994; Stoltzfus, Hasher, & Zacks, 1996). For example, working memory declines with age and data are consistent with the notion that this is because older people do not have the same level of inhibitory resources as younger ones. Older people have more difficulty filtering out irrelevant material (Connelly, Hasher, & Zacks, 1991; Rabbitt, 1965). They also include more irrelevant information in their narratives (Arbuckle & Gold, 1993). Their performance is poorer in directed forgetting experiments (Zacks, Radvansky, & Hasher, 1994). They also produce more intrusions in free recall of sentences (Stine & Wingfield, 1987) and they are more likely to produce responses that they have already produced (Kliegl & Linderberger, 1993).

Evidence that effective working memory operation requires good inhibition of previously presented information is not restricted to work on aging. Researchers on individual differences in working memory typically divide their participants into low-span and high-span groups. For instance, Rosen and Engle (1998) required people of both types to retrieve as many exemplars of an animal category as possible without repeating any of the exemplars that they had already produced. Low-span participants produced more repetitions. This suggests that people with more limited working memory are less able to inhibit previously processed material. Other research on individual differences in working memory is also consistent with this conclusion (e.g., Cantor & Engle, 1993).

Switching from performing one task to performing another incurs a cost. The second task is not performed as quickly or as well as it would have been if the first task had not been previously performed. This phenomenon has been known for some time (Jersild, 1927) but has been intensively researched only in the last 15 years (see Monsell, 2003, for a review). Much of this research has been concerned with switches from one task in which people respond to a set of stimuli in a particular manner to another task in which they respond to the same set of stimuli in a different manner (e.g., Allport, Styles, & Hsieh, 1994; Allport & Wylie, 1999; 2000). In this case, it is possible that at least some of the task switching cost is produced by specific interactions between the two task sets. For example, certain stimulus-response associations in the first task set may proactively interfere with certain other stimulus-response associations in the second task set. Alternatively, certain stimulus-response associations that were inhibited to enable performance of the first task may continue to be inhibited when they are needed for performance of the second task.

Thus our argument, supported by evidence from research on working memory and task switching, is that defocusing manipulations (diary completion, anagram solving, mood monitoring, and others) are successful because they degrade the processing that underlies judgments of affect. Degradation of processing implies that output will be closer to whatever the default value is prior to any processing. Intervening tasks do not so much lower levels of judged affect as prevent them from moving as far from their default value as they would otherwise. What would the default value have been in our experiments? It is most likely to have been the centre of the rating scales (i.e., 3.00). Inspection of Tables 1 and 3 does indeed reveal that ratings are closer to this default value when the effect of an interference-inducing manipulation was significant.

Our data indicate that diary completion and other "de-focusing" tasks reduce impact bias not by distracting people's attention away from the affective consequences of the target event but by interfering with the cognitive processes that underlie affect assessment. We suspect that other manipulations that reduce the affective impact of events also have their effect by producing interference.

Wilson, Centrebar, Kermer and Gilbert (2005) carried out a series of studies showing that people's positive moods arising from an event lasted longer when there was some uncertainty about the occurrence of the event. In their first experiment, they gave people a card with a dollar coin attached. In one condition, the card simply said that the donor was from the Smile Society and they liked to promote random acts of kindness. In another condition, the same information was provided as answers to the questions "Who are we?" and "Why do we do this?" In this second case, the statements were transformed into explanations of the donor's behavior and so reduced the receiver's uncertainty about the reasons for it. Five minutes later participants in both conditions assessed their moods on a nine-point scale. Mean assessment of those in the second (certain) condition were close to the mid-point of the scale (4.93) were as those in the other (uncertain) condition were well above it (6.67).

In Wilson et al's (2005) second experiment, participants watched a documentary film, read two alternative but plausible accounts of what happened to the protagonist after the period covered by the film, and assessed how positive their moods were on a 21-point scale. Mean mood rating was well above the mid-point of the scale (14.33). Half the participants (certain group) were then told which of the two accounts of the protagonist's later life was true whereas the other half (uncertain group) were not. Both groups then assessed their moods again. Mean mood rating of the uncertain group remained high (13.90) but that of the certain group dropped close to the mid-point of the scale (12.75).

Wilson and Gilbert (2008) provided a theoretical account of Wilson et al's (2005) results. They argued that unexplained events (experienced by the uncertain groups) are allocated attention and that the appraisals that result from this produce strong affective reactions. In contrast, explained events (experienced by the certain groups) are dismissed from further consideration because they are either unimportant or are understood and that, as a result, they provoke only weak affective reactions.[1]

We prefer an interference account. We argue that specifying a causal explanation of an event is more likely to increase than to decrease cognitive processing. Once people are certain that one particular explanation is true, they are likely to spend time making inferences from it and focusing on what its implications are. Consequently, load on working memory will be higher in the certain groups. They will have fewer cognitive resources left for affect assessment. As a result, their affect ratings will remain closer to their default value at the mid-point of the scale.

We have argued that "de-focusing" tasks may have their effects by interfering with the cognitive processes underlying affect assessment. How might they do this? One possibility is that they interfere with how well people are able to generate or maintain a cognitive representation of the target event in working memory. Thus an additional task before consideration of the target event is likely to affect how well that event is represented in the first place whereas one performed afterwards is likely to affect how well that representation is maintained until ratings of affect have been made. In either case, the resulting degraded representation of the target event is unlikely to have the affective impact of a representation produced without interference. As a result, the impact bias would be reduced. Another possibility is that performing the additional task makes it difficult to relate the content of the cognitive representation of the target event to the rating scale. In other words, the problem may be one of using rather than generating or maintaining the internal representation of the target event.

There is a long tradition of using secondary tasks to study the characteristics of short-term (and, later, working) memory. For example, interpolation of mental arithmetic between presentation and recall was found to eliminate the recency effect (Glaser & Cunitz, 1966; Postman & Phillips, 1965). Within the models of short-term memory current at the time, this was interpreted as showing that the secondary task "used representations that displaced the recency items from their slots in the short-

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[1]The notion that explained events fail to provoke affect is not always plausible. Knowing that one feels ill because one has terminal cancer does not prevent anguish. Presumably, doctors used to withhold diagnoses from patients because giving them explanations for untreatable illnesses increased their distress.

term store" (Andrade, 2003, p. 7). Although we would not wish to commit ourselves to this particular model of working memory, our proposals for accounting for the effects of secondary tasks on the impact bias are also based on the argument that the processing that they require interferes with that of the primary task.

We have discussed situations in which the secondary task is performed before or after the primary task. However, working memory has also been studied with dual-task paradigms in which the primary task is carried out at the same time as a secondary task (e.g., repeating a set of digits). By studying how well the primary task is performed under the loads imposed by different types of secondary task, researchers have sought both to fractionate working memory into sub-systems (Baddeley, 1996) and to characterize different types of primary task in terms of the demands they make on these sub-systems. By working within this framework, it might be possible to identify the processing requirements of affect assessment in more detail.

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