THE INFLUENCE OF REGRET ON CHOICE:

THEORETICAL AND APPLIED PERSPECTIVES

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Thesis submitted in fulfilment of requirements for the degree of Doctor of Philosophy

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June 2004

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Acknowledgements

The research presented in this thesis was funded by Research Studentship Award number 317441 from the Engineering & Physical Sciences Research Council (EPSRC) as part of the Dependability Interdisciplinary Research Collaboration (DIRC) Project. Many people have helped me to complete my research, but I would like to specifically acknowledge and thank the following:

- Professor Peter Ayton from the Department of Psychology, City University, who enthusiastically supervised my research and provided valuable advice, suggestions and insights.
- Professor Bev Littlewood, Principal Investigator for the DIRC Project, from the Centre for Software Reliability at City University, who generously agreed to reimburse my research expenses and travel expenses to conferences.
- Professor Lorenzo Strigini and Dr Andrey Povyakalo from the Centre for Software Reliability at City University, who provided technical expertise for the development of the materials used for the research reported in Chapter 6.
- Professor Cliff Jones, David Greathead, Dr John Fitzgerald and Dr Cristina Gacek from the Centre for Software Reliability at the University of Newcastle, and Dr Peter Popov from the Centre for Software Reliability at City University, London who facilitated the data collection from their Computer Science students for the research reported in Chapter 6.
- Ceyda Djemal, who assisted with the data collection for the research reported in Chapter 2 and acted as the second coder for the research reported in Chapter 4.
- The lecturing staff at City University, London and at London Metropolitan University, who facilitated the data collection from undergraduate and postgraduate students for the research reported in Chapters 2, 3, and 5.
- The academic staff who form the Cognition & Memory Research Group ('Quirks') in the Department of Psychology at City University and the London Judgment & Decision-Making Group for their valuable feedback on my research.
- My family and friends who provided moral support and encouragement throughout my studentship.
- All the participants who took part in the experiments reported in this thesis.

Declaration

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Abstract

Recent psychological theory and research suggests that emotions can have an important influence on human decision making – the literature supporting this view is reviewed. Two theories in the field which are of particular relevance to this thesis are Decision Justification Theory (Connolly & Zeelenberg, 2002) and Regret Theory (Bell, 1982; Loomes & Sugden, 1982).

Five scenario-based questionnaire studies explore theoretical aspects of regret in decision making which arise from the recently proposed Decision Justification Theory (DJT). The results from these studies suggest that the two hypothesised core components of regret – decision (or self-blame) regret and outcome regret – share similar antecedents in that the nature of the outcome of a choice appears to affect individuals' perceptions of the quality of the decision process. Thus outcome severity can influence both regret about a bad outcome and regret about making a bad decision. Nonetheless, there was some support for Decision Justification Theory's proposals – there was some evidence that decision regret was reduced when participants believed the choice was justifiable. Overall, outcome regret tended to be rated as slightly greater than decision regret.

A content analysis of reported biggest regrets derived from a search of UK newspaper articles also found that people mention regrettable outcomes more frequently than they mention regrettable decisions. However, the findings of this newspaper review also indicated that individuals may not distinguish between 'regret' and 'disappointment' as clearly as researchers and theorists do.

Taking an applied perspective and based on the proposals of Regret Theory, four experiments investigate whether focusing students on the potential for experiencing future regret has any influence on their future choices in relation to sunbathing and computing. The results suggest that participants who had considered how they might feel if their choices turned out badly did change their cognitions and behavioural intentions in the short term, particularly those who anticipated higher levels of regret. In two of the studies, participants also reported changes in their actual behaviour at follow-up. However, one sunbathing study also revealed that changes in behavioural intentions and actual behaviour were reported by participants in a control group who had not focused on their future regret. Thus, whilst a regret-based intervention of this kind does appear to influence the way people think and act in the future, the effects cannot yet be specifically attributed to anticipating regret.

The implications of the research findings for the development of Decision Justification Theory and emotion-based persuasion are discussed. Suggestions for future research in the area are also made.

Chapter 1

Introduction

Many of the traditional theories of decision-making have overlooked the effects that emotions might have on choice, tending to view emotions as having a somewhat disruptive influence on human rationality (Finucane, Alhakami, Slovic & Johnson, 2000; Mellers, 2000). Until relatively recently, theories have assumed that decision-making is an entirely cognitive activity whereby individuals make their decisions in a rational way, evaluating and integrating all available information relevant to the decision problem. According to one of the dominant approaches, subjective expected utility theory (Edwards, 1992), individuals weigh up the (subjective) likelihood and severity of different outcomes and select the option associated with the greatest expected value or utility. However, research has not always supported this view of decision-making – because of limited cognitive resources and a series of cognitive biases, it appears that people do not always make choices as though they were maximising expected utility (Bell, 1982). It may be simply too cognitively demanding in all circumstances to compute which is the 'best' decision in this way; rather it appears that individuals use mental shortcuts to simplify their decisions. As a result, normative theory cannot always accurately describe or predict the choices that people make in real life (Mellers, 2000; Loomes & Sugden, 1982; Bell, 1982). According to Bell (1982), expected utility theory 'fails' because it relies on a single definition of the outcome (usually monetary gains or losses) which is insufficient. Bell (1982) proposes that when decision makers learn the outcomes of their choice and the outcome of the alternative choice that was available, they may experience regret about making the wrong decision if the foregone option would have resulted in a more desirable outcome. That is, as well as objective (gain/loss) outcomes, decisions also have emotional outcomes. To avoid experiencing post-decisional regret when their decisions turn out badly, decision-makers may be willing to trade off monetary gain and thus their observed behavioural choices do not map onto those predicted by normative theory. Loomes & Sugden (1982) argue

that the fact that observed behavioural choices violate normative theory should not be used as evidence that individuals are behaving irrationally – instead, decision makers can be considered to be behaving rationally if they are taking their feelings into account (see also Zeelenberg, 1999a).

More recently, neurologist Antonio Damasio has suggested that, rather than disrupting cognitive processes, emotions could be essential for good decision making (Damasio, 1994; Damasio, 2003). Damasio has observed that patients who have sustained damage to areas of the brain associated with emotional experience are unable to make sound decisions – and, in some cases, unable to make a decision at all – even though they show no deterioration in cognitive function or IQ. In his Somatic Marker Hypothesis, Damasio argues that, before we conduct any cognitively demanding cost-benefit analyses of available options in a decision situation, some options will automatically (and immediately) be excluded from the choice set – and in some cases the process leading to such rejection of options may be quite unconscious. According to the hypothesis, we learn from experience that certain situations or objects are associated with unpleasant emotional consequences. In our minds, these objects are 'marked' by negative somatic markers – when we are exposed to the objects or consider them in the future, we experience unpleasant gut feelings, which act as an alarm signal to avoid this option. Conversely, objects that are associated by past experience with pleasant feelings are marked with positive somatic markers – when we are confronted by these objects in the future, we experience pleasant gut feelings, which act as "a beacon of incentive" (Damasio, 1994, p.174) and so the option remains a viable candidate in the choice set. These automatic emotional responses to objects highlight certain options as unfavourable and eliminate them from further consideration, thus reducing the number of alternatives the decision maker must actively choose between. After this initial

filtering process, the individual may apply to the reduced choice set a more reasoned analysis that enables them to make their final selection. Thus, according to Damasio (1994), "somatic markers probably increase the accuracy and efficiency of the decision process" (p.173), while the absence of somatic markers (as was the case for some of Damasio's neurological patients) makes the decision process much more difficult. The Somatic Marker Hypothesis proposes that there are two parallel systems operating in human decision-making – one based on emotion and experience, the other based on rational-analytic processes.

In the field of social psychology, there has also been recognition that there may be two parallel, yet distinct, routes through which individuals can process information. Various theories have been proposed, including the Heuristic-Systematic Model (Chaiken, 1980), the Elaboration Likelihood Model (Petty & Cacioppo, 1981), Cognitive-Experiential Self-Theory (Epstein, 1991; Epstein, Pacini, Denes-Raj & Heier, 1996) and Sloman (1996)'s Dual-Process Model of Reasoning. Whilst these models are qualitatively different (e.g. in terms of the labels assigned to the two routes, whether the two routes operate independently, sequentially or simultaneously, and what determines which route is used in any situation), they also have in common three basic assumptions (Smith & DeCoster, 1999). All the models propose there is one type of processing (e.g. the "heuristic" route in Chaiken's model) that involves the use of simple, learned decision rules whereby positive or negative evaluations can be made based on learned associations triggered by salient cues, including affect. This tends to be regarded as a fast, intuitive and 'low effort' default mode which is used to process information "unless special circumstances intervene" (Smith & De Coster, 1999). All the models propose a second way in which information can be processed, whereby relevant information about the situation is sought and there is a logical evaluation of arguments

(e.g. the "systematic" route in Chaiken's model). In contrast to the 'default' mode, this route requires conscious effortful processing and thus requires both cognitive capacity and time since the process is less automatic. However, this rational-analytic route tends to result in more enduring attitude change that is resistant to counter-arguments. Finally, all of the models suggest that the systematic route is employed when the person is sufficiently motivated to engage in effortful processing (e.g. by a need to be accurate, defend a view or create a positive impression) and they have sufficient time and cognitive capacity to engage in this type of processing. The models disagree however as to whether, if it is used, the systematic route is employed instead of the associationistic route, in addition to it in a sequential fashion or simultaneously. Nonetheless, all of the models suggest a means whereby evaluations may be based on processes other than a purely cognitive/rational analysis, including reference to feelings associated with attitude objects or message sources. More recently, Forgas (1995) has proposed a multi-route model of how affect might influence judgment – the Affect Infusion Model. According to Forgas, there are two strategies whereby affect has the potential to influence evaluations – labelled 'High Affect Infusion Strategies' in the model. For example, affect may be used as a cue in its own right for evaluating a target object ('Heuristic Processing') or it may bias thinking via its effects on the cognitive processes of attention, encoding, retrieval and association ('Substantive Processing'). The model also proposes two further strategies ('Low Affect Infusion Strategies') whereby affect is likely to have little influence on judgment – in situations where strong prior attitudes exist ('Direct Access') and under high elaboration conditions ('Motivated Processing'). According to Forgas (1995), affect infusion (heuristic or substantive processing) is likely to occur in many everyday judgment situations – particularly where information is complex and constructive processing is required – with important consequences for decision making.

Attempts have been made to explore the effects of emotions on choice and to incorporate these into models of judgment and decision-making (see Mellers, 2000 for a review). Some theories have focused on experienced emotions, while others have focused on anticipated emotions (Schwarz, 2000). Research has demonstrated that an individual's current affective state (mood) can influence a range of different cognitive processes, including problem-solving, memory, risk perception, information searching and information processing (Mellers, 2000). For example, in a series of experiments, Johnson & Tversky (1983) asked participants to estimate the incidence of a range of causes of death after they had read a brief story designed to induce either positive or negative mood. The results showed that manipulating participants' mood had a global effect on their estimates. Negative mood was associated with increased frequency estimates of causes of deaths, not just for the threat featured in the story, but also for other related risks and even for dissimilar risks. Conversely, the induction of positive mood had the effect of reducing risk estimates, again for risks featured in the story and also for related and unrelated threats. The findings suggest that people make judgments that are compatible with their current mood, even if the cause of that mood is unrelated to the decision problem, and they may well be unaware of these effects. Emotions experienced at the time of decision-making can also affect individuals' choices in gambling and lottery experiments. Isen & Geva (1987) and Isen & Patrick (1983) found that positive mood (induced by small gifts) generally produced risk-averse behaviour but, in tasks where the risk was low (i.e. there was a high probability of winning), positive mood gave rise to risk-seeking behaviour. These effects have been explained by way of a mood regulation model which hypothesises that individuals are motivated to maintain their positive moods and repair negative moods. Options perceived as highly risky are rejected by an individual in a positive mood because any loss is likely to upset

their good mood state. However, a highly likely gain from a low-risk decision would enhance their positive mood further, or at least maintain it (Mano, 1994). It also appears that mood may affect the strategies individuals use to process information. Negative moods are more likely to promote analytic processing (using more rational, elaborative strategies) while positive moods tend to be associated with the use of simpler, heuristic strategies (Hockey, Maule, Clough & Bdzola, 2000).

It is not only our general mood state that can influence the way we think. Other research has suggested that individuals use their overall feelings about an object to make judgments and/or choices about it. For example, Finucane et al (2000) have argued – in line with Damasio's Somatic Marker Hypothesis (Damasio, 1994; 2003) – that objects or images are marked by positive and negative feelings and it is these that guide many forms of judgment and decision making. When judging an object, people refer to their 'affective pool' (made up of all the positive and negative affective tags associated with the item) and use this overall feeling about the object to make their evaluations and choices. Finucane et al (2000) have named this mental short cut as the 'affect heuristic' and argue it is particularly likely to be used when judgments and decisions are complex or when time or mental resources are limited. The results of a series of experiments suggest that people make risk and benefit judgments based on their overall feelings about the risk object (Finucane et al, 2000). When provided with information that an object (e.g. nuclear power) had high benefits, participants tended to infer that the risks were low and, when provided with information that it had low benefits, they tended to infer that the risks were high. Similarly, when told that the risks of nuclear power were low, participants rated the benefits as high; when informed the risks were high, they inferred that the benefits were low. Thus participants made judgments that were affectively congruent with the information manipulated by the experimenters. One

explanation for the observed inverse relationship between perceived risk and benefit is that participants were using the affect heuristic to make their judgments. When given negative information about the object (that the risks are high or the benefits are low), the affective pool associated with the object was negative and thus they judged the object negatively. Conversely, when given positive information about the object (that the risks were low or the benefits were high), they referred to a positive affective pool, which influenced their subsequent judgments of the object. The findings are consistent with the 'affect-as-information' hypothesis (Clore, Schwarz & Conway, 1994) which argues that social judgments (e.g. of other people) are influenced directly by the judge's positive and negative feelings of liking and disliking for the item or person being judged.

Not only do emotions affect the way we think, but the way we think can influence how we feel about events. Roese (1994) observed that it is a common feature of the human mind to imagine or mentally simulate different versions of events – what might have been. People's satisfaction with their circumstances can be influenced by how they think their circumstances compare with other people's circumstances or other circumstances the individual expected to happen or imagined could have happened (Medvec, Madey & Gilovich, 1995). This tendency to compare obtained outcomes with alternative outcomes is known as 'counterfactual thinking' (Kahneman & Miller, 1986) and the thought typically takes the form of an antecedent ("If only I hadn't ..." or "If only I had ...") and a consequent (... "then I might have ...") (Roese, 1994). Wells, Taylor & Turtle (1987) propose that this type of thinking is particularly likely to be evoked when a chain of events produces a negative outcome. As a general rule, when an obtained outcome is compared with a better outcome (upward counterfactual), it is likely to produce negative affect. However, if the outcome were to be compared to a

worse outcome (downward counterfactual), it is likely to produce positive affect (see Buunk, Collins, Taylor, van Yperen & Dakof, 1990 for an alternative view). Thus, someone who is objectively worse off (e.g. a bronze medal winner) may actually feel happier than a person who is objectively better off (e.g. a silver medal winner) – it all depends on the counterfactual outcome they imagine (Medvec, Madey & Gilovich, 1995). The bronze medal winner may imagine a situation whereby they could have ended up with no medal at all, while the silver medal winner may imagine scenarios where, if things had gone differently, they might have won gold. However, research suggests that, when confronted with a negative outcome, people are most likely to generate upward counterfactuals – imagining how things might have turned out better, seemingly adding to their misery (Nasco & Marsh, 1999). One explanation for this tendency has been that upward counterfactual thoughts may be functional and can lead to improved future performance in similar situations (Roese, 1994) by focusing the individual on the causes of the negative outcome and the strategies they could adopt in the future to avoid a repetition of the outcome, thus gaining some sense of control over the situation (Nasco & Marsh, 1999).

The intensity of an individual's emotional reaction to an outcome can be influenced by a number of factors, including how easy it is to imagine a (better or worse) outcome occurring and how abnormal the events leading up to the outcome were (Kahneman & Miller, 1986). For example, participants typically rate a traveller who missed their scheduled flight by five minutes as being more upset than a traveller who missed their flight by half an hour (Kahneman & Tversky, 1982). This 'emotional amplification' is believed to occur because, despite the fact that both travellers experience the same outcome (missing their flight), it would be easier for the first traveller to imagine mentally undoing events so that they could have gained five minutes and arrived for

their flight on time. In a similar way, participants typically rate a driver who has an accident on the rare occasion they decide to drive home via a different route to usual as being more upset than a driver who has an accident while driving home on their normal route – the first driver can easily imagine avoiding the accident if they had driven home as usual (Kahneman & Miller, 1986).

In addition to experienced emotions, it has also been proposed that anticipated emotions can influence the choices we make and there is a growing body of research evidence to support this view. Some theories have focused on more global affective experiences – e.g. Decision Affect Theory and Subjective Expected Pleasure Theory (Mellers, 2000; Mellers, Schwartz, Ho & Ritov, 1997) – while others have focused on the effects of specific emotions – e.g. Regret Theory (Loomes & Sugden, 1982; Bell, 1982) and Disappointment Theory (Loomes & Sugden, 1986; Bell, 1985).

Mellers, Schwartz & Ritov (1999) measured the pleasure associated with different gambling outcomes. Participants were presented with pairs of hypothetical gambles on a computer screen and were asked to select which gamble they would prefer to play. The outcome of the selected gamble was then made known and participants were asked to rate the pleasure they anticipated they would experience if the gamble had been real. In some of the experiments, participants also discovered the outcomes of the unchosen gamble. The results of the research showed three effects: first, there was an effect of outcome – as the imagined win increased, so did the amount of pleasure participants anticipated. There was also a comparison effect – anticipated pleasure associated with imagined outcomes was reduced when the outcome of the foregone option was better and increased when the outcome of the foregone option was worse. Thus losses can still feel like wins if a larger loss was avoided. Finally, there was a surprise effect whereby

surprising outcomes were associated with stronger anticipated emotions than unsurprising outcomes – a positive outcome felt good, but a surprising positive outcome felt even better; conversely, a negative outcome felt bad, but a surprising negative outcome felt even worse. Further studies (Mellers, 2000) measured the anticipated pleasure and experienced pleasure of individuals who actually made real-life choices. For example, students predicted (prior to taking a test) the grade they thought they would achieve and rated their anticipated pleasure for each of the possible grades they could receive. After taking the test and receiving their grade, the same students reported their actual grade and their emotional reaction. Similar measures were also taken for groups of dieters in relation to their weight loss targets, and for women undergoing pregnancy testing. Overall, the results of these studies were consistent with Decision Affect Theory and they confirmed the presence of the three effects (outcome, comparison and surprise) observed in the original gambling experiments.

In proposing Subjective Expected Pleasure Theory, Mellers et al (1999) argue that, when an individual has a choice between two options, each of which can lead to one of two different outcomes, the individual estimates the average anticipated pleasure associated with each choice option by considering in turn the pleasure they imagine they will feel if they experience each of the possible outcomes and weighting their estimate by the perceived probability that the outcome will actually occur and finally summing the two weighted feelings. Having thus derived an averaged anticipated pleasure estimate for each choice option, the individual will select the one associated with the greatest averaged pleasure. Mellers (2000) reports a series of gambling studies that test this idea. The correlations between predicted choice (based on equations derived from Subjective Expected Pleasure Theory and assuming maximisation of pleasure) and actual choice proportions made by participants ranged from 0.66 to 0.86. None of the

other theories or hypotheses tested (e.g. Subjective Expected Utility Theory, Regret Theory, minimising displeasure without regard for pleasure, maximising pleasure without regard for displeasure) predicted participants' gambling choices better than Subject Expected Pleasure Theory. The results therefore suggest that "choices are generally predictable from the theory that decision makers anticipate the pleasure and pain of monetary outcomes and select the gamble with greatest average pleasure" (Mellers, 2000, p. 918).

As Mellers & McGraw (2001) point out, an important question for theories of choice based on the anticipation of emotion is "How accurately do individuals forecast their future affect?". If individuals are poor at predicting their future emotions, they may make the wrong decisions based on inaccurate affective information – if there is a tendency to overpredict future emotions, decision makers may unnecessarily avoid options that they think will cause them more future discomfort than they actually would or select options that they think will make them happier than they in actual fact do; conversely, if there is a tendency to underpredict future emotions, individuals may not avoid choices that will in fact cause them future displeasure or may forego options that would have made them happier than they imagined. Data from a series of experiments by Mellers and her colleagues (see Mellers, 2000) suggested that, in laboratory gambling experiments, participants' affective predictions were quite accurate for both losses and gains – participants' mean anticipated pleasure ratings prior to the gamble mapped almost exactly onto the mean experienced pleasure ratings that participants gave after they played the gamble. When looking at real-world choices, however, the results were more variable. For some types of forecasts there were differences between anticipated and experienced pleasure, with a tendency for participants to overpredict their displeasure for negative outcomes. It appears that previous experience with similar

outcomes may influence the accuracy of individuals' affective forecasting. In one study (Mellers et al, 1999), students predicted their course grade and the pleasure they expected to feel for each grade. Four months later, they reported their actual course grade and how pleased they were with it. The results suggest that the students were fairly accurate in their predictions of their pleasure, perhaps because they had repeated past experience of assessments in their educational careers and were familiar with how good or bad different outcomes can feel. In other studies, women who were undergoing pregnancy testing were slightly less (though still reasonably) accurate at predicting their feelings about the test results – on the whole, experienced pleasure was greater than anticipated pleasure, particularly for undesired results. Mellers (2000) observes that these mispredictions of future affect may reflect the women's unfamiliarity with the situation: many were having their first pregnancy test. However, a similar pattern of results was found for dieters who predicted their feelings about weight loss or gain. Although most dieters might also have experience of the emotional consequences of unsuccessful attempts at weight loss, participants in the study still tended to overpredict their displeasure, particularly where they failed to achieve their target weight loss. Fredrickson (2000) argues that predictions about future happiness which guide choices are often based on evaluations of past affective experiences. However, rather than considering past emotional experiences in their entirety, these evaluations tend to be strongly influenced by the emotions felt during two specific moments of the previous experience – the moment of peak intensity and the ending of the affective experience. One consequence of this 'peak-and-end rule' is that the duration of affective episodes may be neglected and over-reliance on the peak and end heuristic may sometimes result in the individual making a choice whereby they choose more pain rather than less (Fredrickson, 2000).

Other research suggests that individuals are not always accurate in predicting the duration of their future negative emotions. In terms of general happiness measures, people seem to be quite good at anticipating the duration of their emotional reactions to positive events but are less accurate in their predictions of the duration of the emotional consequences of negative events (Gilbert, Pinel, Wilson, Blumberg & Wheatley, 1998). Based on the results of six studies – using both cross-sectional and longitudinal designs – that compared predicted and actual emotional reactions to a range of different life events (e.g. the break up of romantic relationships, failing to achieve tenure, electoral defeat, negative personal feedback), participants appeared to overestimate the duration of their unhappiness following a negative event. The findings suggest that, whether negative or positive events are experienced, people's general level of happiness returns to a 'baseline' level fairly quickly after the event, so that what one might imagine would be powerful life experiences actually have less psychological impact in the longer-term than one might think. As Gilbert et al (1998) comment, "most people are reasonably happy most of the time and most events do little to change that for long".

It appears that people find ways of coping with adverse experiences and that even the initial happiness experienced after life's most positive experiences tend to fade in time. For example, Brickman, Coates & Janoff-Bulman (1978) compared the psychological wellbeing of paraplegics and lottery winners against a group of control participants. They found no significant differences between lottery winners' and control participants' ratings of general happiness or the pleasure they derived from everyday events. Paraplegics were significantly less happy than controls (in the present) but still rated their general happiness above the mid-point of the scale and did not report deriving any less pleasure from everyday life events than did controls. Gilbert et al (1998) suggest that there are a number of coping mechanisms that work to soften the impact of negative

events (collectively referred to as a 'psychological immune system') and these mechanisms may be overlooked or underestimated when people consider their future feelings. Such 'immune neglect' might be one explanation for the observation that people tend to mispredict their longer-term emotional reactions to negative outcomes. Other possible explanations include a motivated distortion, whereby people overestimate their affective responses to brace themselves against the negative event so that, should it actually occur, it does not feel as bad. In addition, there may be a tendency for the individual to focus too heavily on the negative event when forecasting their future happiness and fail to consider that other events that may also impact on their overall happiness will occur in their lives after the focal event – thus, subsequent positive events will to some extent cancel out the negative affect associated with the focal event, leaving the individual happier overall than they might imagine (Gilbert et al, 1998). In response to disappointing outcomes, Tykocinski (2001) has demonstrated that individuals adjust their perception of the likelihood that a hoped-for outcome would have occurred, making the negative outcome they experience seem unavoidable or inescapable. This cognitive adjustment appears to serve as a defensive mechanism whereby the individual can alleviate their disappointment and repair their mood.

Having considered the effects of a global measure of affect in their research, Mellers & McGraw (2001) nonetheless acknowledge that emotional experiences are likely to be much more complex that a single pleasure-pain dimension. People can experience a range of different emotions in response to an event – which may be positive, negative or even a combination of both positive and negative emotions. Emotion researchers have identified the antecedents and qualities of a number of different emotions (Frijda, Kuipers & ter Schure, 1989; Roseman, Wiest & Swartz, 1994). Not only are emotions distinguished by how people appraise and report their experiences of them, research in

the field of judgment and decision making suggests that not all moods or emotions of the same valence have exactly the same impact on judgment and choice. When comparing emotions that fall into different quadrants of the hypothesised 'Affect Circumplex' formed by two dimensions of arousal and pleasantness, different effects have been observed (Mano, 1994, Leith & Baumeister, 1996; Zeelenberg & Pieters, 1999; Raghunathan & Pham, 1999; DeSteno, Petty, Wegener & Rucker, 2000; Lerner & Keltner, 2000; Zeelenberg, van Dijk, Manstead & van der Pligt, 2000). Therefore, researchers have begun to explore the effects of specific emotions on judgment and decision-making, including regret, disappointment, guilt, shame, embarrassment, anger. A large proportion of this work has investigated the influence of the emotion of regret – which is also the focus of this thesis. Interest in the effects of this particular emotion began with the proposition of Regret Theory by economists Bell (1982) and Loomes & Sugden (1982).

Bell (1982) and Loomes & Sugden (1982) separately noted that there was evidence that decision makers do not always make choices about monetary gains as though they were maximising expected utility and questioned the usefulness of expected utility theory as a guide to choice. According to Bell (1982), using a single definition of an outcome which is purely monetary is insufficient. Likewise, Loomes & Sugden (1982) argued that the way in which decision makers' behaviour differed from that predicted by economic theory was "neither small-scale nor randomly distributed", suggesting that other factors (not incorporated into traditional expected utility models) influence choice. Regret Theory (Bell, 1982; Loomes & Sugden, 1982) therefore proposes that, having made their choice and discovered the outcome of that choice and the foregone choices, decision makers may discover that an alternative choice would have been associated with a more desirable outcome. As a result, they may experience regret about their

choice, even if it appeared to be the best option at the time they made their decision. Conversely, if they discover that the obtained outcome is better than any of the outcomes associated with the foregone options, the decision maker will experience increased satisfaction (rejoicing) with the obtained outcome, because it is apparent that they made the best choice. Therefore Regret Theory argues that, in addition to the outcome itself, decision makers experience emotional consequences of their decision making. According to Bell (1982), when making decisions, individuals can anticipate the emotional consequences of their choice and take these future emotions into account, trading off the "disadvantages of regret ... against the value of assets received" (p. 963) – they aim to achieve a balance between minimising regret and maximising (monetary) gains. Thus anticipated regret may modify the expected utility of an outcome, depending on the degree to which it is considered in the situation (Zeelenberg, van Dijk, Manstead & van der Pligt, 2000). Loomes & Sugden (1982) emphasise that, when an individual chooses a course of action which subsequently turns out badly, the outcome will be more painful than a situation where the same negative outcome arises as a result of circumstances beyond their control – the fact that they believe they might have avoided the negative outcome by choosing differently amplifies the negative affect they experience about the outcome. Thus the experience of regret arises from a comparison of two outcomes – "what is" and "what might have been". According to Loomes & Sugden (1982), regret may be independent of the nature of the outcome itself. It is the gap between "what is" and "what might have been" that is most important – the greater the gap, the greater the regret (or rejoicing) experienced. Bell (1982) also notes that the degree of regret experienced after a disappointing outcome may also be influenced by how much thought was put into the decision, how nearly the decision maker chose the foregone option that turned out better and the original 'status quo'. Whilst it may not explain all the observed violations of expected utility theory, Regret Theory argues that

regret and 'choiceless utility' (the pleasure derived from an outcome had it been imposed, rather than chosen) are nonetheless significant factors in decision making. Thus, when individuals act in accordance with the principles of Regret Theory, according to Loomes & Sugden (1982), they should be regarded as behaving rationally, since they are taking their future feelings into account.

In his concluding remarks, Bell (1982) identified a need for research to explore the role of regret in decision making. There is a growing body of research that appears to support the view that anticipated regret does influence choice, both under experimental conditions in gambling tasks, scenario-based tasks and interpersonal decision making tasks (Zeelenberg, 1999b) and in relation to 'real life' decisions (Zeelenberg & Pieters, 2004). For example, Ritov & Baron (1990) found that women were more reluctant to have their child vaccinated if they anticipated regret over their child dying as a result of having the vaccination. This was the case even when the chances of dying of the disease itself were far greater than the chances of dying as a result of having the vaccination. In general, individuals appear to make choices so as to avoid experiencing future regret. However, the effects of regret appear to depend on the availability of feedback about the outcomes of foregone options. When feedback is expected, individuals tend to exhibit risk-averse choices but, when feedback about the outcomes of foregone options is not expected, they may exhibit risk-seeking choices. Since, in the latter case, individuals will not discover what the alternative choices would have lead to, the 'what is' vs. 'what might have been' comparison (counterfactual thinking) is unlikely to occur (Zeelenberg, Beattie, van der Pligt & de Vries, 1996; Zeelenberg & Beattie, 1997; Zeelenberg, 1999b; Zeelenberg & Pieters, 2004).

Given that decision makers are assumed to take account of their future regret when

making their choices, a number of studies have explored whether focusing individuals on the regret they might feel if their choice turned out badly can influence their subsequent behavioural choice. All of this research has investigated the effectiveness of a regret-based approach to persuasion in relation to health issues (Richard, van der Pligt & de Vries, 1996; Murgraff, McDermott, White & Phillips, 1999; Abraham & Sheeran, 2003) or road safety (Parker, Stradling & Manstead, 1996). Three studies have shown promising effects in terms of changing drivers' attitudes to speeding (Parker et al, 1996), behavioural intentions in relation to safer sex (Richard et al, 1996) and actual safer sex and exercise behaviour as reported at follow up (Richard et al, 1996, Abraham & Sheeran, 2003). However, one study failed to replicate the effect in relation to risky single-occasion binge drinking (Murgraff et al, 1999) and it has been suggested that the effectiveness of regret as a means of persuasion may largely depend on the characteristics of the risky behaviour targeted. None of the published studies have included a control group that was not asked to consider their emotions in some way or another – and no studies appear to have explored the usefulness of a regret-based intervention in other choice domains. Part of the research reported in this thesis has therefore tried to address some of these gaps in the literature.

More recently, researchers have begun to explore the nature and effects of different types of the same emotion – e.g. person-related disappointment and outcome-related disappointment (van Dijk & Zeelenberg, 2002). In a similar vein – in relation to regret – Decision Justification Theory (DJT) has recently proposed that there are two "core components" of regret (Connolly & Zeelenberg, 2002). One component relates to regret about having made a bad or unjustifiable choice (self-blame or decision-related regret) while the other component relates to regret about a poor outcome which falls below some ideal (outcome-related regret). According to DJT, the two components of regret

can occur together, or might – in certain circumstances – occur somewhat more independently. For example, an individual may make a justifiable decision which nonetheless turns out badly – in this case, they would feel outcome-related regret but little or no self-blame (decision) regret since they made a good decision. In contrast, an individual may make an unjustifiable choice that, somewhat fortuitously, turns out well – in this case (if they consider regret at all), they would feel no outcome-related regret but may experience some degree of self-blame regret for making a bad decision. In the case where a poor decision results in a bad outcome, the decision maker will experience both components of regret and thus their overall experience of regret is likely to be greater than that experienced by the individuals in the previous two examples. The theory is intuitively appealing and can account for some of the conflicting findings in the earlier regret research literature – e.g. concerning the relationship between regret and responsibility, and regret about actions vs. inactions (see Connolly & Zeelenberg, 2002). However, the relationships between the two hypothesised components of regret and their antecedents have not yet been clearly defined. For example, it is not clear whether decision justifiability affects only the self-blame component or whether it may also impact on outcome-related regret too. Similarly, it is unclear whether outcome severity affects only outcome-related regret or whether it may also influence the degree of self-blame (decision) regret experienced. Part of the research included in this thesis therefore aims to develop these aspects of DJT further.

Overview of thesis

The thesis is submitted in the form of a series of publishable papers (Chapters 2 to 6), which are intended to be able to be read as 'stand-alone' papers – each with a review of the relevant literature and its own reference list. As the thesis title suggests, some of the

chapters relate to theoretical issues relating to the influence of regret on choice, while others take a more applied perspective.

Chapters 2 to 4 address theoretical perspectives on regret and decision-making that arise following the proposition of Decision Justification Theory (DJT) by Connolly & Zeelenberg (2002). Chapter 2 describes a series of three experiments which explore in more detail the relationship between regret about bad decisions (self-blame regret) and regret about bad outcomes (outcome regret) and attempts to establish whether the two 'core components' proposed by DJT are independent or inter-related in terms of their antecedents. Chapter 3 describes two experiments which follow up the observation made in Chapter 2 that participants' ratings of decision justifiability appear to be strongly related to their perceptions of the seriousness of the outcome that follows the decision; this finding further calls into question any view of the 'core components' of DJT being totally independent. Finally, Chapter 4 describes a review of newspaper articles where individuals have discussed their real-life biggest regrets, with the aim of determining whether people report more frequently experiencing outcome-related regrets or decision-related (self-blame) regrets. The paper also discusses whether, in the lay person's view – as in the theorists' view – there is a distinction between the two emotional experiences labelled as disappointment and outcome-related regret.

The second half of the thesis presents more applied perspectives of regret and decision-making. Specifically, two papers investigate whether focusing individuals on the potential for experiencing future regret can be effective in persuading individuals to make alternative behavioural choices. As already mentioned, a limited body of previous research has reported somewhat varying results about the usefulness of this type of intervention in relation to health and road safety issues. The methodology employed in

previous regret-based intervention research is developed further and is tested in two different risky choice domains – health choices and computing choices. Chapter 5 describes three experiments which together test the efficacy of a regret-based intervention in changing students' attitudes, risk perceptions and behaviour in relation to sunbathing (which carries the future risk of developing skin cancer). None of the studies that have found effects of anticipated regret on behavioural choice (Richard et al, 1996; Abraham & Sheeran, 2003) have included a control group that was not focused on affect at all. The third experiment in the series includes a no-intervention control to determine whether any changes in behaviour can be specifically attributed to the influence of affect. Chapter 6 describes one longitudinal study which explores whether similar regret-based interventions can influence choice in domains other than health and safety, focusing on computing science students' choices in relation to backing up their work and internet security.

Finally, Chapter 7 summarises the findings of the research and discusses the contribution of this thesis to knowledge about the influence of regret on choice.

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Chapter 2

Decision Justification Theory: An exploration of the relationship between the two components of regret

Decision Justification Theory: An exploration of the relationship between the two components of regret

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Research funded by Engineering & Physical Sciences Research Council (EPSRC) Research Studentship Award Number 317441 as part of first author's PhD dissertation.

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Abstract

Decision Justification Theory (Connolly & Zeelenberg, 2002) has identified two core components that contribute to feelings of regret in decision-making: regret about poor decisions (self-blame regret) and regret about bad outcomes (outcome regret). The theory proposes that self-blame regret is influenced by decision justifiability while outcome-regret is influenced by outcome severity. Three scenario-based experiments explored the relationship the two types of regret have with each other and with decision justifiability and outcome seriousness. The results indicated that outcome-regret was consistently rated higher than self-blame regret, although the difference was typically rather small. We also found some evidence that decision justifiability moderated this difference in ratings. Self-blame regret and outcome-regret both correlated negatively and equally strongly with decision justifiability and positively and equally strongly with outcome seriousness, suggesting that the two components share common antecedents and thus cannot be considered as being completely independent of each other.

Key words: Regret, Decision Making, Decision Justification Theory.

Introduction

Over recent years, the judgment and decision-making literature has recognised and started to explore the effects of emotions in human choice and decision-making, adding to the more traditional focus on purely cognitive processes (Mellers, 2000; Schwarz, 2000). Much of the research has focused on the effects of two specific emotions – regret and disappointment. The focus of this paper is on regret.

Regret is a frequent emotional experience (Shimanoff, 1984). The judgment and decision-making literature defines regret as a "negative, cognitively-based emotion that we experience when realizing or imagining that our present situation would have been better had we decided differently" (Zeelenberg, 1999b, p. 94). Typically, regret is felt when a decision turns out badly and results from the mental comparison of the actual experienced outcome and the outcome that we know, or imagine, would have occurred had we chosen differently (Zeelenberg, van Dijk, Manstead, & van der Pligt, 1998). This type of thinking (comparing reality to what might have been) is known as counterfactual thinking (Kahneman & Miller, 1986; Boninger, Gleicher & Strathman, 1994). Regret is particularly associated with situations where there is a perception of control over or self-blame for the outcome – 'if only' we had chosen differently, the unfavourable outcome might have been avoided. Thus, the feeling of regret involves thinking and, in turn, the experience of regret may influence subsequent thinking and choice. It focuses the decision-maker on how the negative event may have occurred, how they might have prevented or changed it, or how they might avoid a similar event in the future (Zeelenberg, 1999a; Zeelenberg et al., 1998).

According to Regret Theory (Bell, 1982; Loomes & Sugden, 1982), decision-makers experience emotions (such as regret) as a consequence of their decision-making. In addition, they can anticipate the affective consequences that may accompany different outcomes and take these into account when choosing between available options. As a general rule, where there is an expectation of feedback about foregone options, decision-makers tend to opt for the choice that minimises the possibility of experiencing negative post-decisional affect – that is, they tend to be "regret-averse" and make "regret-minimising choices" (Zeelenberg, 1999a). Janis & Mann (1977) have also argued that anticipating future regret encourages individuals to make more rational decisions because their anxieties motivate them to stop and think more elaborately about the choice ahead of them.

There is a growing body of evidence to suggest that anticipated regret does indeed influence choice and decision-making, under experimental conditions in gambling tasks, scenario-based tasks and in interpersonal decision making tasks, such as the ultimatum game (Zeelenberg, 1999a). More recently, Zeelenberg & Pieters (2004) have explored the influence of anticipated regret and feedback about foregone outcomes in relation to 'real life' decisions. Data from their studies suggest that the anticipation of future regret does influence participants' decisions to play in the Dutch Postcode Lottery. As the name suggests, winners in this particular draw are selected by their postcode and all residents in the winning postcode with a ticket share the lottery prize. Therefore living in the winning postcode area but not having bought a ticket would evoke regret for non-players – they are (literally) faced with the knowledge that their neighbours have shared the prize and that they could have done too, 'if only' they had chosen to play. To avoid this unpleasant experience, people are motivated to buy a lottery ticket.

Research has also tested whether anticipation of regret can be used as an intervention strategy in relation to health and safety choices, to alter individuals' cognitions, intentions and behaviour in a way likely to protect them from experiencing future regret. By highlighting the possibility of post-decisional regret, studies have, for example, changed drivers' attitudes towards exceeding the speed limit (Parker, Stradling & Manstead, 1996), influenced students' risk perceptions, behavioural intentions and subsequent behaviour in relation to sunbathing (Wright & Ayton, 2004), and promoted safer sexual behaviour (Richard, van der Pligt, & de Vries, 1996) and regular exercise (Abraham & Sheeran, 2003). The fact that a regret-focused intervention should promote more health-protective cognitions and behaviour suggests that some individuals may not necessarily anticipate regret, until they are prompted to focus on the possible affective consequences of their choices.

Whilst there is evidence to suggest there are wide-ranging individual differences in the intensity of emotional experiences (Larsen, Diener & Emmons, 1986) and in the general propensity to engage in social comparison processes that might evoke emotions such as regret (van Dijk & Zeelenberg, 2003), there may also be factors about the particular decision context that influence the amount of regret experienced or anticipated. Some (but not all) regret theorists have assumed that responsibility is an essential component of regret. For example, Sugden (1985) defined regret as having two components - a wish that you had acted differently and a feeling of self-blame for the original decision. However, more recent research has suggested that responsibility is not essential for the experience of regret (Connolly, Ordóñez, & Coughlan, 1997; Zeelenberg, van Dijk, & Manstead, 1998; Ordóñez & Connolly, 2000; Zeelenberg, van Dijk, & Manstead, 2000). In these scenario-based experiments, participants considered the regret experienced by students who were either randomly assigned by a computer to change to a specific

course or actively chose to change to a specific course. Some students in the scenario ended up on a better course, while others ended up on a worse course and some stayed on the same course. As expected, participants rated the students who chose to change to the worse course as more regretful than students who had been randomly assigned to it. However, they still imagined that the computer-assigned students (ie. 'non-responsible' individuals) would experience moderate amounts of regret, even though the decision to switch courses was beyond their control (Ordóñez & Connolly, 2000). A conclusion from this work is that, whilst responsibility can certainly intensify the experience of regret, it "is not a necessary precondition" for it (Zeelenberg et al., 2000).

Intuitively, the severity of the outcome of a decision should also affect the intensity of regret, in that the outcome needs to be 'painful' enough to evoke counterfactual thinking and the experience of regret. This was recognised by Regret Theory. In an unpublished study (Wright & Ayton, 2004), participants were asked to imagine their regret if they found themselves in a situation where they had just been diagnosed either with a malignant melanoma (high seriousness outcome) or with a benign skin cancer (low seriousness outcome). In the scenarios, these events either occurred because the individual had regularly sunbathed without protecting their skin (high responsibility) or because they had a previously undetected genetic predisposition to the disease (low responsibility). As well as the expected effect of responsibility on regret ratings, there was also an independent effect of outcome seriousness, whereby participants who visualised the 'high seriousness' outcome rated their regret as significantly greater than those who imagined the 'low seriousness' outcome.

Decision justifiability may also be an important influence on the intensity of regret experienced when decisions turn out worse than hoped (Inman & Zeelenberg, 2002). In

a consumer choice scenario, when strong reasons were presented for a decision to switch brands, even if the chosen product subsequently performed badly, participants rated the actor's regret as being less intense than that of someone who made a decision to switch to the alternative brand after a history of positive experiences with the original brand. It appears that "feelings of regret are mitigated to the extent to which the consumer reflects and concludes that the decision was appropriate given the available information" (Inman & Zeelenberg, 2002, p126). Decision justifiability has become an important element in current theoretical approaches to regret in decision making. Consistent with this, Connolly & Zeelenberg (2002) recently proposed Decision Justification Theory (DJT), which describes two 'core components' that contribute to the affective experience of regret in decision making and choice. One component (hereinafter referred to as 'outcome regret') relates to an evaluation of the outcome of the choice or decision, usually involving a comparison with some kind of 'standard' (such as the outcome of the unchosen option or an expected outcome). The other component relates to perceptions of the quality of the decision or choice itself. In retrospect, the decision-maker may feel that they made a poor or unjustifiable choice. Hence this component of regret is associated with a feeling of self-blame or reproachment (hereinafter referred to as 'self-blame regret').

DJT has identified the two components of regret but is as yet rather imprecise about the relationship between them and does not specify whether decision justifiability affects only self-blame regret (and not outcome regret) while outcome severity affects only outcome-regret (and not self-blame regret). This issue would seem to merit investigation in terms of further development of the theory. Whilst not claiming that the two components are necessarily independent, Connolly & Zeelenberg (2002) have suggested that – in certain circumstances – they can occur one without the other. For

example, an individual may feel they made a bad decision, even if the outcome turns out to be good. They may recognise that their poor choice could easily have led to an undesirable outcome, but they fortuitously 'got away with it' on this occasion. Conversely, in another decision situation, they may feel they made a totally justifiable decision, even though the outcome turned out to be worse than it might otherwise have been. According to DJT, both these examples would result in less intense overall regret than that experienced by a person who felt they made an unjustifiable decision which then also turned out badly. In the first example, the individual experiences self-blame regret but not outcome-regret (as things turned out alright) and, in the second instance, they experience outcome-regret, but no element of self-blame regret (since they made a 'good decision'). In the final instance, the decision-maker experiences both types of regret. Recent work by Pieters & Zeelenberg (2003) supports the view that there are two different aspects to the experience of regret in decision-making. Their series of six studies, using a range of different methodologies, samples and decision problems (including real life choices), concludes that "the quality of the decision process influences the experience of regret, independent of the valence of the decision outcomes".

According to Connolly & Zeelenberg (2002), some of the apparently conflicting results and recent debates in regret research might be accounted for in terms of DJT's two components of regret. For example, there has been some dispute in the literature as to whether people regret their actions or their inactions most intensely, with research evidence appearing to exist for both possibilities. Connolly & Zeelenberg (2002) propose that it is the justifiability of the action or the inaction that determines the amount of experienced regret, not the fact that they are actions or inactions per se. If the action/inaction is justified in the circumstances, then there will be less intense self-

blame regret than there would be if the action/inaction were unjustifiable. This reduction in (or absence of) the self-blame component will have an impact on the overall amount of regret reported. Similarly, with regard to the relationship between responsibility and regret discussed earlier, the observation that non-responsible actors are still judged by participants as experiencing moderate amounts of regret (Connolly, Ordóñez & Coughlan, 1997; Zeelenberg, van Dijk & Manstead, 1998; Ordóñez & Connolly, 2000; Zeelenberg, van Dijk & Manstead, 2000) could be accounted for by them experiencing only outcome-regret (because of the bad outcome), but not self-blame regret.

Overview of the present studies

The current series of experiments was designed to explore three issues arising out of DJT's proposals:

Firstly, can (and do) decision-makers make a distinction between the proposed 'core components' when they consider or anticipate their experience of regret? Can people partition out a discrete element of outcome-regret from one that is related to making a poor decision? That is, does manipulating the focus of the regret measure (on self-blame regret or outcome regret) have an effect on participants' regret ratings? It may be the case that DJT is correct, even if people cannot clearly distinguish between the two components when asked to rate these separately – the components may have an effect on the intensity of overall regret even if they cannot be measured separately through verbal behaviour. However, if participants do distinguish between self-blame regret and outcome regret, this might have implications for how future researchers ask individuals about their imagined or experienced regret.

Secondly, if the two components are separable, do perceptions of decision justifiability only influence ratings of self-blame regret? For example, if it is the case that self-blame regret and outcome-regret do vary independently of each other, one would expect that manipulations of decision justifiability would affect self-blame regret, but not outcome-regret. It may however be that, in practice, people to some extent include decision justifiability in their perception of the outcomes, so there may well be an effect of justifiability on both types of regret. Nonetheless, one might still anticipate that justifiability should influence self-blame regret more than it influences outcome-regret.

Thirdly, do perceptions of the severity of the outcome influence only ratings of outcome-regret? One interpretation of DJT might be that the seriousness of an obtained outcome only affects outcome-regret and not self-blame regret. However, it might also be argued that outcome seriousness could influence both components of regret in as much as it may be difficult to consider a decision in isolation from the outcome that follows it. Decision outcomes - especially where they are extreme - may be seen as a strong heuristic cue to decision quality. This may particularly be the case when participants are asked to consider hypothetical scenarios where they have limited information about the decision process. Nonetheless, in principle, where decision quality could be clearly evaluated independently of decision outcomes (eg. choice between gambles with known probabilities and pay-offs), the hypothesis that outcome seriousness will influence outcome-regret more than it influences self-blame regret would be plausible. This is a somewhat "weaker" hypothesis than the idea that the two components are entirely independent but nonetheless preserves the suggestion that there are two distinguishable components of regret.

Experiment 1

Experiment 1 manipulated 'focus of regret' as a between-groups factor, to test whether there are differences in how respondents rate their regret in response to a hypothetical scenario, depending on whether they are focused either on regret about the decision (self-blame regret) or on regret about the outcome (outcome regret). The seriousness of the outcome described in the scenario was also manipulated between-groups.

Method

Design

The experiment employed a 2 (seriousness of outcome: high or low) x 2 (focus of regret: self-blame or outcome) x 6 (scenario topic: icy road, coffee shop, TV holiday prize, traffic jam, driving without insurance, travel vaccination) mixed factorial design, with 'seriousness of outcome' and 'focus of regret' manipulated as between-groups factors. 'Scenario topic' was a within-groups factor. The effects of outcome seriousness and regret focus on participants' ratings of regret were measured.

Participants

One hundred and forty-one undergraduate students from various disciplines at City University, London, participated for course credit points or for a small confectionery gift. The sample was predominantly female (83%) aged between 18 and 41 years (M = 21 years). Participants were randomly assigned to one of four experimental groups: either high seriousness-focus on self-blame regret (HSFD); high seriousness-focus on

outcome-regret (HSFO); low seriousness-focus on self-blame regret (LSFD); low seriousness-focus on outcome-regret (LSFO).

Procedure and materials

Participants were presented with a series of six short scenarios. The order of presentation of the different scenarios was counterbalanced. Typically, the scenarios described the situation leading up to the individual's decision, stated their decision, gave a brief justification or rationale for it and then described the outcome (either high or low seriousness) of that decision. Examples of the scenarios used appear at the end of the thesis.

For each scenario, participants were asked to read and imagine themselves in the situation and then, still imagining themselves in the events described, complete a series of 7-point rating scales that measured their response to the scenario. The rating scales, as they appeared in the questionnaires, were as follows:

(a) Regret item: Participants were asked either "How much do you think you would now be regretting your decision?" (Focus on self-blame regret groups) or "How much do you think you would now be regretting your current situation?" (Focus on outcome-regret groups). The response scale was anchored at 1 (Not at all regretful) and 7 (Extremely regretful).

(b) Seriousness of outcome (manipulation check): "How serious do you feel the outcome is?" (1 = Not at all serious; 7 = Extremely serious).

(c) Responsibility: "How responsible do you think you are for the situation you now find yourself in?" (1 = Not at all responsible; 7 =Completely responsible).

(d) Justifiability of decision: "To what extent do you feel you could justify your decision to … [e.g. take your usual route]?" (1 = Totally justifiable; 7 = Not at all justifiable).

(e) Repeat decision: "Looking back, would you … [e.g. take your usual route]… again?" (1 = I definitely would; 7 = I definitely would not).

(f) Worry: "How worried do you think you would now be?" (1 = Not at all worried; 7 = Very worried).

(g) Happiness: "Generally speaking, how happy do you think you would now be feeling?" (1 = Very happy; 7 = Very unhappy).

Results

Manipulation checks

The experimental manipulation of outcome seriousness was successful for all six scenarios. Participants who read the high seriousness version rated the outcome as significantly more serious than participants who read the low seriousness version of the same scenario (ps < .05). Mean ratings on the non-regret measures in the questionnaire appear in Table 2.1. To aid interpretation, three of the scales were reverse-scored before data analysis. For decision justifiability, overall happiness and repeat decision ratings, higher values now denote stronger perceived justification, more happiness and a greater inclination to repeat the decision in future, respectively.

Participants who read high seriousness outcomes rated their responsibility, $F(1, 137) = 12.020$, $MSE = 0.778$, and their anticipated worry, $F(1, 137) = 29.230$, $MSE = 0.902$, as greater than those who read low seriousness outcomes, ps ≤ .001. They also rated the

Table 2.1

Mean ratings by experimental group – computed across all scenarios (Experiment 1)

Rating	High serious decision focus (n=48)	High serious outcome focus (n=30)	Low serious decision focus (n=31)	Low serious outcome focus (n=31)	All groups (N=141)
Seriousness	5.50 (.79)	5.41 (.80)	4.41 (.88)	4.34 (.75)	4.98 (.97)
Responsibility	5.80 (.77)	5.59 (.84)	5.18 (1.08)	5.17 (.88)	5.48 (.92)
Justifiability	3.76 (.96)	3.25 (1.03)	4.30 (.84)	4.05 (.80)	3.84 (.98)
Repeat decision	2.84 (.94)	2.85 (1.06)	3.65 (.87)	3.52 (.89)	3.18 (1.02)
Worry	4.96 (1.03)	5.28 (.91)	4.26 (.84)	4.21 (.96)	4.70 (1.04)
Happiness	2.50 (.99)	2.29 (.84)	3.49 (.97)	3.16 (.92)	2.82 (1.04)

Notes: Higher values denote more perceived seriousness, responsibility, justifiability, worry, happiness and greater inclination to repeat the decision in future. Standard deviations are in parentheses.

decision as significantly less justifiable, F (1, 137) = 18.121, MSE = 0.837, and were less happy, F (1, 137) = 33.445, MSE = 0.881, than those who read low seriousness outcomes, ps < .001. Participants exposed to high seriousness outcomes were less likely to repeat the same decision in future than those exposed to low seriousness outcomes, F (1, 137) = 18.615, MSE = 0.924, p < .001.

Regret ratings

Mean regret ratings (computed across all scenarios) as a function of the focus of the regret item and outcome seriousness appear in Table 2.2. As might be expected, given the variation in content of the scenarios, a mixed ANOVA revealed a significant main effect for scenario topic, F (1, 120) = 28.165, MSE = 1.991, p < .001. Mean regret ratings according to scenario topic appear in Table 2.3. Generally speaking, although there was some variation in the intensity of the regret evoked by the scenarios, all mean ratings were above the mid-point of the regret scale; that is, they were all seen as regretful to some extent.

Across all scenarios, there was a significant main effect for focus of regret, F (1, 120) = 3.915, MSE = 6.349, p = .05. Overall, participants who focused on their outcome-regret rated the intensity of their regret differently to participants who focused on their self-blame regret, suggesting that the two components of regret are not exactly the same. Outcome-regret was more intense than self-blame regret, although it should be noted that the difference between the mean ratings, whilst statistically significant, was somewhat small. This effect was, however, qualified by a significant 'Scenario topic x Focus of regret' interaction, F (1, 120) = 6.884, MSE = 1.991, p < .001. For four of the six scenarios, there was no significant difference between the regret ratings of

Table 2.2

Mean regret ratings by experimental group – computed across all scenarios (Experiment 1)

	Seriousness of outcome		
Regret component	High	Low	All groups
Self-blame regret	5.86 (.85)	5.03 (1.35)	5.54 (1.14)
Outcome regret	6.09 (.95)	5.37 (.82)	5.72 (.95)
All groups	5.95 (.89)	5.20 (1.11)	5.62 (1.06)

Note: Higher values denote greater anticipated regret. Standard deviations are in parentheses.

Table 2.3

Mean regret ratings by scenario (Experiment 1)

		Focus of regret item		High Seriousness versions			Low Seriousness versions		
Scenario	Overall regret (N = 141)	Self-blame regret (n = 79)	Outcome regret (n = 62)	Self-blame regret (n = 48)	Outcome regret (n = 30)	Overall regret (n = 78)	Self-blame regret (n = 31)	Outcome regret (n = 32)	Overall regret (n = 63)
Icy Road	5.67 (1.574)	5.46 (1.745)	5.95 (1.286)	5.77 (1.533)	6.00 (1.339)	5.86 (1.457)	4.97 (1.958)	5.91 (1.254)	5.44 (1.692)
Coffee Shop	5.48 (1.447)	5.47 (1.501)	5.48 (1.388)	5.69 (1.339)	5.77 (1.305)	5.72 (1.318)	5.13 (1.688)	5.22 (1.431)	5.17 (1.551)
TV Prize Draw	4.48 (2.154)	3.99 (2.279)	5.11 (1.808)	4.42 (2.268)	5.55 (1.804)	4.84 (2.165)	3.32 (2.166)	4.72 (1.746)	4.03 (2.071)
Traffic Jam	5.79 (1.624)	5.95 (1.640)	5.60 (1.594)	6.48 (0.989)	6.23 (1.331)	6.38 (1.131)	5.13 (2.078)	5.00 (1.606)	5.06 (1.839)
Driving Insurance	6.24 (1.249)	6.11 (1.335)	6.37 (1.149)	6.09 (1.355)	6.40 (1.303)	6.24 (1.329)	6.13 (1.335)	6.34 (1.004)	6.24 (1.174)
Travel Vaccine	6.03 (1.474)	6.23 (1.339)	5.77 (1.606)	6.69 (0.879)	6.53 (1.137)	6.63 (0.982)	5.52 (1.610)	5.03 (1.663)	5.27 (1.641)

Note: Higher values denote greater anticipated regret. Standard deviations are in parentheses.

participants who focused on outcome-regret and participants who focused on self-blame regret (ps > .05). Only for the TV Prize Draw scenario, t (138) = -3.264, p = .001, and the Icy Road scenario, t (139) = -1.942, p = .054, was outcome-regret significantly more intense than self-blame regret. The difference between outcome-regret and self-blame regret ratings approached significance for the Travel Vaccine scenario, t (138) = 1.836, p = .068, but in this case self-blame regret was greater than outcome-regret.

Across all scenarios, there was also significant main effect of seriousness of outcome, F (1, 120) = 13.378, MSE = 6.349, p < .001. In line with the findings of previous research, participants who read about more serious outcomes rated their regret as more intense than other participants who read about less serious outcomes. This effect was qualified by a significant 'Scenario topic x Seriousness of outcome' interaction, F (1, 120) = 4.654, MSE = 1.991, p = .001. For four of the six scenarios, there were significant differences between regret ratings of participants who read the high seriousness version and participants who read the low seriousness version of the scenario, with high seriousness outcomes again evoking more intense regret – Coffee Shop, t (139) = 2.249, p = .026; TV Prize Draw, t (138) = 2.252, p = .026; Traffic Jam, t (139) = 4.990, p < .001; Travel Vaccine, t (138) = 5.731, p < .001. This pattern was not however evident for the Icy Road scenario or for the Driving Insurance scenario, where both high and low seriousness outcomes evoked similar levels of regret (ps > .05).

Effect of decision justifiability on regret

To explore the effect of perceived decision justifiability on ratings of regret, the mixed ANOVA across all scenarios was repeated, with an average decision justifiability rating entered as a covariate. This model produced very different results. Justifiability proved

to be a significant covariate, F (1, 119) = 36.855, MSE = 4.889, p < .001. When controlling for variation in participants' perceived decision justifiability, the previously observed main effects on regret ratings no longer reached statistical significance for seriousness of outcome, F (1, 119) = 2.904, MSE = 4.889, p = .091, for focus of regret, F (1,119) = 1.685, MSE = 4.889, p = .197, or for scenario topic, F (1, 119) = 1.537, MSE = 2.006, p = .176. These findings suggest that the observed differences between ratings of outcome-regret and self-blame regret are moderated by perceived decision justifiability, as proposed by DJT.

Finally, an ANOVA was conducted across all scenarios to explore whether decision justifiability was influenced by the focus of the regret item that participants responded to. The results revealed a main effect of focus of regret on ratings of justifiability, F (1, 137) = 5.786, MSE = 0.837, p = .017. Participants whose question focused them on outcome-regret rated the decision as less justifiable than participants who focused on self-blame regret. It appears that, when asked to focus on their self-blame regret, participants may have been more motivated to justify the decision taken. Justifiability was also influenced by seriousness of outcome, F (1, 137) = 18.121, MSE = 0.837, p < .001. Decisions that were followed by more serious outcomes were seen as less justifiable than those that were followed by less serious outcomes.

Correlational analysis

In all six scenarios, there were negative correlations between ratings of decision justifiability and regret – the more justifiable a decision was perceived to be, the less intense was the regret reported (see Table 2.4). There were positive correlations between regret and outcome seriousness ratings - more serious outcomes were

Table 2.4

Correlations between ratings by scenario and regret focus (Experiment 1)

Scenario	Focus of regret condition	Regret-Justifiability	Regret-Seriousness	Justifiability-Seriousness	Regret-Justifiability controlling for Seriousness	Regret-Seriousness controlling for Justifiability
Icy road	Self-blame regret	-0.36	0.55	-0.41	-0.18*	0.47
	Outcome-regret	-0.44	0.45	-0.38	-0.32	0.34
Coffee shop	Self-blame regret	-0.35	0.59	-0.35	-0.20	0.54
	Outcome-regret	-0.28	0.71	-0.28	-0.12*	0.68
TV prize draw	Self-blame regret	-0.23	0.50	-0.25	-0.13*	0.47
	Outcome-regret	-0.26	0.61	-0.57	-0.10*	0.58
Traffic jam	Self-blame regret	-0.34	0.74	-0.42	-0.05*	0.70
	Outcome-regret	-0.48	0.73	-0.45	-0.25	0.66
Driving insurance	Self-blame regret	-0.51	0.54	-0.36	-0.40	0.44
	Outcome-regret	-0.44	0.69	-0.53	-0.12*	0.60
Travel vaccine	Self-blame regret	-0.54	0.69	-0.52	-0.30	0.56
	Outcome-regret	-0.52	0.69	-0.41	-0.36	0.62

Note: Pearson's r correlation coefficients significant at $p \leq .05$, except * which denotes non-significant correlations (1-tailed tests)

associated with more intense regret. Given the hypothesised antecedents of the two regret components, one might expect that self-blame regret should be correlated more strongly with decision justifiability than with outcome seriousness, and that outcome-regret should be correlated more strongly with outcome seriousness than with decision justifiability. However, this pattern of correlations was not observed. In all six scenarios, both components of regret were associated most strongly with outcome seriousness than with decision justifiability. The strong association of self-blame regret with outcome seriousness supports the view that participants make reference to the seriousness of the outcome when they judge the quality of a decision.

For all the scenarios, there were significant relationships between outcome seriousness and decision justifiability ratings (see Table 2.4), whereby the more serious the outcome the less justifiable was the decision. This again lends support to the notion that people may judge decision quality heuristically by reference to decision outcomes. The fact that outcome seriousness and decision justifiability correlate with each other raises concerns that the observed correlations of the regret components with each might be due to outcome seriousness and decision justifiability being confounded. To explore this possibility, partial correlations were computed (see Table 2.4). These show that, even when partialling out the effects of justifiability, outcome seriousness is still strongly correlated with both self-blame regret and with outcome-regret. The result of partialling out the effects of seriousness on the association between decision justifiability and regret is greater; nevertheless, all the correlations are in the correct direction and half of them are statistically significant. The partial correlations broadly affirm the correlational analysis that both outcome seriousness and decision justifiability influence both types of regret.

To further explore the relative patterns of association between ratings of the two components of regret and justifiability and outcome seriousness, non-parametric correlation coefficients were computed between these variables for each participant in turn, using their ratings from all six scenarios. The resulting coefficients were then contrasted between-groups to determine whether, compared to self-blame regret, outcome-regret correlated more strongly with outcome seriousness and whether, compared to outcome-regret, self-blame regret correlated more strongly with decision justifiability.

There was no significant difference in the strength of correlation between self-blame regret and seriousness (mean Spearman's rho = 0.581) and the strength of correlation between outcome-regret and seriousness (mean Spearman's rho = 0.635), t (127) = -0.885, p = .378. This suggests that, whether considering self-blame regret or outcome-regret, participants' ratings were strongly influenced in a similar manner by the seriousness of the outcome.

In addition, there was no significant difference in the strength of correlation between self-blame regret and justifiability (mean Spearman's rho = -0.431) and the strength of the correlation between outcome-regret and justifiability (mean Spearman's rho = -0.363), t (126) = -0.914, p = .362. This again implies that, whether reflecting on decision or outcome-regret, participants' ratings are influenced in similar ways by their perceptions of decision justifiability. That regret is more influenced by outcome seriousness than decision justifiability is revealed by the fact that the correlations of each of the two regret components with outcome seriousness are both significantly stronger than their corresponding correlations with decision justifiability, t (70) = 14.074, $p < .001$ for self-blame regret, and t (55) = 12.526, $p < .001$ for outcome-regret.

Discussion

Using a between-groups design and across all six scenarios, the intensity of regret was influenced both by manipulations of the focus of the regret item and by the seriousness of the outcome. As might be expected, high seriousness outcomes were more regrettable than low seriousness outcomes.

Outcome-regret and self-blame regret items did not always evoke the same responses, suggesting that the proposed two components of regret are somewhat distinct in the minds of individuals. Outcome-regret was typically rated as more intense than self-blame regret. Although the magnitude of the difference was usually somewhat small, this pattern of responding may reflect that people feel more defensive about their decision than they do about the outcome, since they may perceive they had some control over (and thus might be held responsible for) their choice, whereas the outcome is comparatively less controllable. It may represent early attempts to make a negative experience seem less painful, by reducing any self-blame resulting from feeling one made a poor quality decision (cf. Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Tykocinski, 2001). Alternatively, the effect may be related to the nature of the task, in that participants were asked to imagine themselves in the scenario and the choice described therein may not necessarily have been one they would have made for themselves in such a situation. Hence they may not have been so readily able to identify with regret about the decision as they might with regret about the negative outcome.

Whilst there was some evidence to suggest that the 'core components' of regret may be distinguishable, in that they are rated differently (albeit only slightly), there was also evidence that the two concepts are nonetheless somewhat inter-related. Self-blame

regret and outcome-regret are correlated with both outcome seriousness and decision justifiability, though both are more strongly correlated with outcome seriousness than with decision justifiability - this is particularly evident when we look at the partial correlations. The finding that outcome-regret and self-blame regret are similarly strongly influenced by outcome seriousness is perhaps not totally unexpected, since factors relating to the outcome may impact upon participants' perceptions of the justifiability of the decision itself. It may be the case that decisions that are followed by more serious outcomes need to be more strongly justifiable than decisions that are followed by less severe outcomes – a justification that is acceptable when the outcome is less severe may not be so acceptable when the outcome is very serious.

A somewhat more unexpected finding was that ratings of both types of regret were equally associated with decision justifiability. However, one might argue that regret about an outcome could be influenced by whether or not the decision seems justifiable, if knowledge of the decision taken forms part of the outcome that people experience. Participants' judgments about the seriousness of outcomes may include everything that they know at the time they occur, including a belief that they made the 'wrong' decision and might have avoided the negative outcome if they had decided differently. It is worth noting that, once outcome seriousness is partialled out, decision justifiability can be seen to have a relatively modest association with both forms of regret; for our participants, the nature of outcomes is plainly more important than the justifiability of decisions for envisaging their regret.

Nevertheless, regret ratings were influenced by decision justifiability. Notwithstanding the limited correlation of decision justifiability with regret when outcome seriousness is partialled out, analysis of covariance shows the main effects of 'focus of regret' and

'outcome seriousness' disappear when variation in perceived decision justifiability is controlled for. This finding is consistent with Connolly & Zeelenberg's (2002) description of DJT, namely that self-blame regret is likely to be less intense when there is a strong justification for the decision.

In a between-groups design, the pattern of results may reflect the fact that participants always rated either self-blame regret or outcome-regret. Accordingly, they may have been influenced by both types of regret when they responded, since the distinction between the two components was not otherwise made clear. In the next experiment, this possibility is addressed.

Experiment 2

The context in which choices and judgments are made can influence the evaluations that participants make and the preferences they exhibit (Hsee, 1998). For example, when asked to evaluate options that are presented separately and evaluated by different groups of individuals, respondents rate them very differently to how they rate them when the options are presented simultaneously and rated by the same individuals (Hsee, 1998; Hsee & Leclerc, 1998; Hsee, Loewenstein, Blount & Bazerman, 1999). It appears that people use different types of information in the different evaluation situations. When in 'separate evaluation mode', there is nothing for the individual to directly compare the option against, and so they use whatever reference point seems salient to them in the situation - and this may not be 'best' reference in normative terms. In contrast, when in 'joint evaluation mode', each of the options becomes a convenient reference point against which to judge the other option and the difference between the two options becomes much more transparent (Hsee, 1998). In such situations, people may place less

weight on the information they would otherwise have used in a separate evaluation context. Experiment 2 tested the same hypotheses as Experiment 1, but participants rated both their self-blame regret and their outcome-regret in relation to each scenario, in an attempt to make the distinction between the two components more obvious. In addition to varying outcome seriousness, we also attempted to manipulate decision justifiability in the scenarios.

Method

Design

The experiment employed a 2 (seriousness of outcome: high or low) x 4 (decision justifiability: strong, weak, none or self-generated) x 2 (focus of regret: decision and outcome) x 6 (scenario topic: as in Experiment 1) mixed factorial design, with 'seriousness of outcome' and 'decision justifiability' manipulated as between-groups factors. 'Focus of regret' and 'scenario topic' were within-groups factors. The effects of outcome seriousness and decision justifiability on participants' ratings of the two components of regret were measured.

Participants

Two hundred and seventy-six undergraduate students from various disciplines at City University, London, participated for a small confectionery gift. The sample was predominantly male (67%), aged between 17 and 33 years (M = 20 years). Participants were randomly assigned to one of eight experimental groups: high seriousness-strong justification (HSSJ); high seriousness-weak justification (HSWJ); high seriousness-no

justification (HSNJ); high seriousness-self-generated justification (HSSG); low seriousness-strong justification (LSSJ), low seriousness-weak justification (LSWJ); low seriousness-no justification (LSNJ); low seriousness-self-generated justification (LSSG).

Procedure and materials

Participants were presented with the same series of six scenarios used in Experiment 1. The content of the scenarios was identical to those in the first experiment, except that both the seriousness of the outcome and the type of justification for the decision given in the scenario were varied. For 'Self-generation' and 'No justification' conditions, there was no information to suggest why the person in the scenario had taken the decision they did. The order of presentation of the different scenarios was again counterbalanced. Examples of the scenarios used appear at the end of the thesis.

As in the previous experiment, participants were asked to read and imagine themselves in each of the situations and then, still imagining themselves in the events described, to complete a series of 7-point scales that measured their response to the scenario. The rating scales were the same as those used in Experiment 1 except that, in this experiment, all participants rated both their regret about their decision (self-blame regret) and their regret about the outcome (outcome regret). The order of presentation of the self-blame regret and outcome-regret items was counterbalanced. The regret items were reworded as follows in an attempt to make the difference between the two regret components more apparent:

(a) Decision (self-blame) regret item – "How much do you think you would now be regretting your decision … [e.g. to not have the vaccination]?" (1 = Not at all regretful; 7 = Extremely regretful)

(b) Outcome regret item – "How much do you think you would now be regretting the outcome of your decision?" (1 = Not at all regretful; 7 = Extremely regretful)

For the 'Self-generated' conditions only, participants completed a further item, which asked: "Imagine you are now telling one of your friends about what has happened and they ask you why you decided to act in the way you did. What reason do you think you could give them for choosing to [e.g. not have the vaccination]? Please write this reason in the space below." The 'No justification' participants were not prompted to think about reasons for the choice.

Results

Manipulation checks

For five of the six scenarios, high seriousness outcomes were rated as significantly more serious than low seriousness outcomes – Icy Road, t (260) = 4.187, $p < .001$; TV holiday prize, t (264) = 2.738, $p = .007$; Traffic Jam, t (268) = 5.915, $p < .001$; Driving Insurance, t (266) = 5.262, $p < .001$; Travel Vaccine, t (263) = 4.907, $p < .001$. For the Coffee Shop scenario, although high seriousness outcomes were rated as more serious than low seriousness outcomes, this difference did not reach statistical significance, t (261) = 1.265, $p = .207$.

For all scenarios, except for the TV holiday prize scenario, strong justifications were rated as more justifiable than weak justifications. However, this difference in perceived justifiability was only statistically significant for the Travel Vaccine scenario, t (132) = -2.092, p = .038. For the other five scenarios, the difference in ratings of decision justifiability for strong and weak justification versions did not reach statistical significance - Icy Road, t (128) = -1.548, p = .124; Coffee Shop, t (128) = -0.762, p = .447; TV holiday prize, t (130) = 1.101, p = .273; Traffic Jam, t (129) = -0.054, p = .957; Driving Insurance, t (132) = -0.257, p = .798.

Across-scenarios analysis

A mixed ANOVA was initially carried out across all scenarios, including 'focus of regret', 'scenario topic', manipulated 'outcome seriousness' and manipulated 'justifiability' as factors. Only the strong and weak levels of the decision justifiability factor were entered into the model. The TV holiday prize scenario was excluded, because the means showed that the decision in the weak justification version had been rated as more justifiable than the decision in the strong justification version. Mean regret ratings as a function of focus of regret, justifiability, seriousness and scenario appear in Table 2.5.

The ANOVA across all scenarios revealed a significant main effect of focus of regret, F (1, 122) = 10.844, MSE = 1.363, p = .001, with outcome-regret being rated as slightly more intense than self-blame regret. As was the case in Experiment 1, there was also a significant main effect of scenario topic on regret ratings, F (4, 488) = 4.381, MSE = 3.228, p = .002.

Table 2.5

Mean regret ratings by regret focus, justifiability, seriousness and scenario (Experiment 2)

Regret component*		Decision justifiability		Outcome seriousness	
Self-blame regret	Outcome regret	Strong justification	Weak justification	High seriousness	Low seriousness
5.14 (1.33)	5.36 (1.22)	5.17 (1.25)	5.32 (1.10)	5.42 (1.34)	5.08 (1.03)

Notes: * denotes a significant effect, $p = .001$ (2-tailed test). Standard deviations are in parentheses.

Scenario topic				
Icy road	Coffee shop	Traffic jam	Driving insurance	Travel vaccine
5.04 (1.63)	5.19 (1.56)	5.01 (1.74)	5.47 (1.65)	5.52 (1.56)

Note: Standard deviations are in parentheses.

There were no significant main effects of manipulated decision justifiability, F (1, 122) = 0.486, MSE = 13.817, p = .0487, or manipulated outcome seriousness, F (1, 122) = 2.659, MSE = 13.817, p = .106. None of the interactions of particular interest to our research questions reached statistical significance – 'Regret focus x Decision justifiability', F (1, 122) = 0.628, MSE = 1.363, p = .430, 'Regret focus x Outcome seriousness', F (1, 122) = 1.418, MSE = 1.363, p = .236, 'Regret focus x Decision justifiability x Outcome seriousness', F (1, 122) = 0.276, MSE = 1.363, p = .600, 'Regret focus x Decision justifiability x Outcome seriousness x Scenario topic', F (1, 122) = 1.869, MSE = 0.891, p = .174.

Individual scenario analyses

As reported above, the manipulations of decision justifiability was successful for only one scenario (Travel Vaccine) in terms of producing a statistically significant difference in perceived justifiability ratings between the strong and weak justification groups ($p < .05$). For the remaining scenarios, there were no significant differences in justifiability ratings between these two conditions. Therefore, for each of these five scenarios, participants were divided into strong or weak justifiability groups, according to their actual rating of perceived justifiability (using median splits). This created four 'groupings' – high seriousness-strong justifiability perceived (HSSJ); high seriousness-weak justifiability perceived (HSWJ); low seriousness-strong justifiability perceived (LSSJ); low seriousness-weak justifiability perceived (LSWJ).

Because some participants fell into different justification groups (based on their justifiability ratings) across the different scenarios, separate ANOVA analyses were carried out for each scenario individually (except for the Coffee shop, which was

dropped from the analysis because of the failure of the seriousness manipulation). Mean regret ratings as a function of focus of regret, rated justifiability and manipulated outcome seriousness appear in Table 2.6. The results of the individual scenario analyses are summarised in Table 2.7.

Focus of regret had a significant main effect on regret ratings in each of the five scenarios analysed, as in Experiment 1, with outcome-regret always being rated as more intense than self-blame regret. Again, this may suggest that outcome-regret and self-blame regret are not exactly the same. As with the across-scenario analysis, although the effect was statistically significant, the difference between outcome regret and self-blame regret was relatively small (the differential between the two components of regret ranged from 0.18 to 0.41 points on a 7-point scale).

Perceived decision justifiability also had a significant influence on regret in all of the analysed scenarios, with decision justifications seen as weak being rated as more regrettable than those perceived as strong. There was a significant effect of outcome seriousness on regret ratings in three of the five scenarios, with high seriousness outcomes being rated as more regrettable than low seriousness outcomes.

For the Traffic Jam scenario only, there was a 'Focus of regret x Perceived decision justifiability' interaction (see Figure 2.1). Where participants thought justifications were strong, outcome-regret ($M = 4.63$, $SD = 1.99$) was rated significantly higher than self-blame regret ($M = 4.21$, $SD = 2.00$), $t\ (89) = -2.505$, $p = .014$. For weaker justifications, the two components of regret were rated equally ($M = 5.80$ and. 5.81, $SD = 1.48$ and 1.60, respectively), $t\ (112) = 0.089$, $p = .929$. This finding is in line with

Table 2.6

Mean regret ratings by focus, justifiability and seriousness (Experiment 2)

	Regret component		Justifiability		Seriousness	
Scenario	Self-blame	Outcome	Strong	Weak	High	Low
Icy road	4.71 (1.87)	5.12 (1.73)	4.26 (1.73)	5.56 (1.37)	5.01 (1.70)	4.81 (1.55)*
TV prize draw	3.50 (2.24)	3.87 (2.05)	3.03 (1.81)	4.34 (1.87)	4.12 (1.95)	3.25 (1.76)
Traffic jam	5.01 (1.95)	5.21 (1.83)	4.42 (1.84)	5.80 (1.45)	5.36 (1.75)	4.86 (1.70)
Driving insurance	5.43 (1.90)	5.71 (1.71)	4.82 (1.76)	6.32 (1.19)	5.79 (1.61)	5.35 (1.65)
Travel vaccine	5.37 (1.81)	5.55 (1.62)	4.62 (1.76)	6.29 (1.00)	5.60 (1.54)	5.32 (1.57)*

Notes: * denotes non-significant differences between high and low outcome seriousness versions of the scenario (2-tailed tests). Standard deviations are in parentheses.

Table 2.7

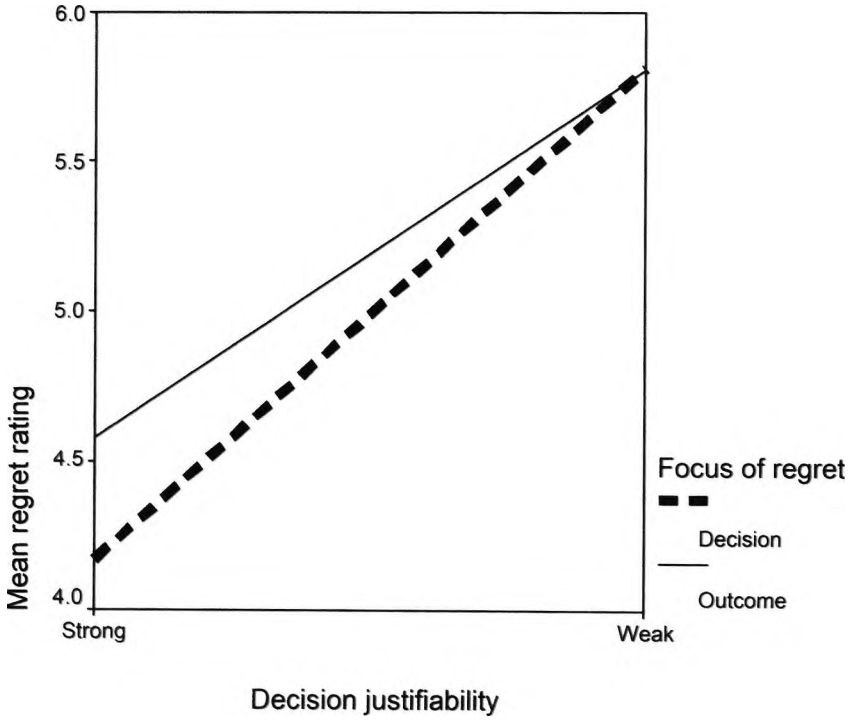
Individual scenario ANOVAs significant* main effects and interactions (Experiment 2)

Scenario	Significant main effects and interactions	ANOVA statistics and significance
Icy road	'Focus of regret'	F (1,196) = 11.884, MSE = 1.419, p = .001
	'Justifiability'	F (1,196) = 35.192, MSE = 4.790, p < .001
TV prize draw	'Focus of regret'	F (1,217) = 8.161, MSE = 1.852, p = .005
	'Justifiability'	F (1,217) = 29.156, MSE = 6.386, p < .001
	'Seriousness of outcome'	F (1,217) = 12.893, MSE = 6.386, p < .001
Traffic jam	'Focus of regret'	F (1,199) = 4.826, MSE = 0.850, p = .029
	'Justifiability'	F (1,199) = 36.509, MSE = 5.228, p < .001
	Seriousness of outcome'	F (1,199) = 4.698, MSE = 5.228, p = .031
	'Focus x Justifiability'	F (1,199) = 5.618, MSE = 0.850, p = .019
Driving insurance	'Focus of regret'	F (1,214) = 8.570, MSE = 0.996, p = .004
	'Justifiability'	F (1,214) = 50.420, MSE = 4.583, p < .001
	'Seriousness of outcome'	F (1,214) = 4.269, MSE = 4.583, p = .04
Travel vaccine	'Focus of regret'	F (1,202) = 3.925, MSE = 0.823, p = .049
	'Justifiability'	F (1,202) = 69.799, MSE = 3.981, p < .001

Note: * using 2-tailed tests

Figure 2.1

Effect of focus and decision justifiability on regret ratings for Traffic Jam scenario (Experiment 2)



Connolly & Zeelenberg's (2002) proposal that, where decisions are perceived to be strongly justified, the self-blame component of regret is likely to be reduced. However, it is also noteworthy that when the justification for the decision was perceived as being weak, as well as self-blame regret being significantly higher than it was where the justification was perceived as strong, t (201) = -6.356, $p < .001$, outcome regret was also rated significantly higher than it was where the justification was perceived as strong, t (201) = -4.867, $p < .001$. It appears that perceiving a weak justification amplified both components of regret.

Correlational analysis

Although two levels of decision justifiability and two levels of outcome seriousness were studied in the analyses of variance, correlational analysis enables us to study the associations between variables as they were perceived, using the full range of participant ratings rather than the binary levels resulting from the experimental manipulations (or median split groupings). Correlations between the ratings obtained for each scenario were computed and are shown in Table 2.8. To aid interpretation of the correlations, justifiability ratings were reverse-scored before this data analysis, so that higher values now denote stronger perceived justification.

Uniformly, there were negative correlations between regret and perceived justifiability ratings. The more justifiable a decision was, the less regrettable it was. There were positive correlations between regret and outcome seriousness ratings, so that more serious outcomes were associated with greater regret. There were also strong positive correlations between self-blame regret and outcome-regret ratings.

Table 2.8

Correlations between ratings by scenario and focus (Experiment 2)

Scenario	Self-blame regret – Outcome regret	Justifiability-Seriousness	Regret component	Regret-Justifiability	Regret-Seriousness	Regret-Justifiability controlling for Seriousness	Regret-Seriousness controlling for Justifiability
Icy road	0.63	-0.29	Self-blame	-0.34	0.42	-0.24	0.36
			Outcome	-0.25	0.47	-0.12	0.44
Coffee shop	0.62	-0.10*	Self-blame	-0.23	0.53	-0.21	0.51
			Outcome	-0.22	0.50	-0.20	0.49
TV prize draw	0.62	-0.35	Self-blame	-0.33	0.47	-0.20	0.40
			Outcome	-0.32	0.45	-0.20	0.38
Traffic jam	0.74	-0.31	Self-blame	-0.40	0.62	-0.28	0.56
			Outcome	-0.31	0.64	-0.15	0.59
Driving insurance	0.69	-0.40	Self-blame	-0.43	0.57	-0.27	0.49
			Outcome	-0.37	0.62	-0.18	0.55
Travel vaccine	0.70	-0.40	Self-blame	-0.46	0.56	-0.31	0.46
			Outcome	-0.47	0.54	-0.32	0.44

Note: Pearson's r correlation coefficients significant at $p \leq .05$, except * which denotes a non-significant correlation (1-tailed tests)

As in Experiment 1, in all the scenarios, self-blame regret correlated more strongly with perceived outcome seriousness than with decision justifiability. Likewise, outcome-regret correlated more strongly with perceived outcome seriousness than with decision justifiability. These results - this time obtained using a within-subjects design - once more suggest that, in the minds of our participants, both of the proposed 'core components' of regret are similarly associated with both decision justifiability and outcome seriousness.

As with Experiment 1, there were significant relationships between outcome seriousness and decision justifiability ratings (in five of the six scenarios - see Table 2.8), whereby decisions were seen as less justifiable, the more serious the outcome was, again suggesting that people judge decision quality by reference to decision outcomes. To explore the possibility that the inter-correlation of the two types of regret might be due to the scenarios confounding outcome seriousness and decision justifiability, partial correlations were computed (see Table 2.8). These show that, even when partialling out the effects of justifiability, outcome seriousness is still significantly correlated with both self-blame regret and outcome-regret in all scenarios. Similarly, even after partialling out the effects of outcome seriousness, both self-blame and outcome-regret significantly correlate with decision justifiability in all scenarios. However, the partial correlations reveal that outcome seriousness is a stronger correlate than decision justifiability of both forms of regret.

As in Experiment 1, non-parametric correlation coefficients were computed for each participant in turn, using their ratings of self-blame regret, outcome-regret, decision justifiability and outcome seriousness for all six scenarios. The resulting coefficients were then contrasted within-groups to determine whether, compared to self-blame

regret, outcome-regret correlated more strongly with outcome seriousness and whether, compared to outcome-regret, self-blame regret correlated more strongly with decision justifiability. Again, there was no significant difference in the strength of correlation between self-blame regret and outcome seriousness (mean Spearman's rho = 0.445) and the strength of correlation between outcome-regret and seriousness (mean Spearman's rho = 0.450), t (256) = -0.009, p = .993. Similarly, there was no significant difference in the strength of correlation between self-blame regret and justifiability (mean Spearman's rho = -0.318) and the strength of the correlation between outcome-regret and justifiability (mean Spearman's rho = -0.321), t (251) = 0.328, p = .743. Both self-blame regret and outcome-regret are both influenced by outcome seriousness and decision justifiability. For each type of regret, outcome seriousness is the stronger determinant.

Discussion

Across the five scenarios analysed, the intensity of regret ratings was affected by the focus of the regret item, as in Experiment 1. The same pattern occurred, whereby outcome-regret was rated as significantly more intense than self-blame regret, even when both measures were rated by the same participants in a repeated measures design. This provides further evidence that the two components are somewhat distinct, although the difference between mean ratings of the two components was again relatively small.

Manipulation of decision justifiability in the scenarios proved difficult. It appeared that participants varied in what they found convincing as a reasonable justification for a decision, as has been suggested by Connolly & Zeelenberg (2002). However, when participants were divided into two levels of justification strength according to their actual justifiability ratings and this grouping was used as a between-groups factor,

perceived decision justifiability had a significant influence on the intensity of regret reported. For all five scenarios that were analysed, strong justifications were associated with significantly less overall regret than those that were perceived as being weak justifications.

In one scenario (Traffic jam) there was a significant 'Focus of regret x Perceived decision justifiability' interaction, whereby the difference between outcome- and self-blame regret was apparent for strongly justified decisions, but not for the weakly justified decisions. Participants who perceived that the decision-maker had made a more justifiable decision in the circumstances rated their regret about the decision as significantly less intense than their regret about the bad outcome. This finding is in line with DJT's suggestion that strong justifications can reduce the amount of self-blame regret experienced.

Seriousness of outcome also had an effect on the intensity of overall regret ratings, although this was only the case for three of the five scenarios analysed. Where the effect occurred, it was always the high serious outcome that evoked more intense regret than the less serious outcome. However, we found no specific evidence that outcome severity affected only outcome regret.

The correlational analyses also replicated the findings reported in Experiment 1, this time using a within-subjects design. Again, there was some evidence that, whilst they may be distinguishable to some extent, the two components of regret are not completely unrelated in people's minds. Self-blame regret and outcome-regret ratings correlated equally strongly with perceived decision justifiability. The two regret ratings also correlated equally but more strongly with perceived outcome seriousness. Rather than

self-blame regret being influenced purely by decision justifiability, and outcome-regret influenced purely by outcome seriousness, it appears that participants took into account how justifiable the decision seemed as well as how serious the outcome was when reporting both types of regret.

In the current experiment, seriousness of outcome and decision justifiability were manipulated as between-groups factors, so that participants read, for every scenario, either only high or only low seriousness outcomes, always coupled with either only strong or only weak decision justifications. This feature of the design could have affected ratings of regret and account for the weak manifestation of the 'Focus of regret' effect and limited evidence for the 'Regret focus x Decision justifiability' interaction one might expect if in fact the two components do have separate antecedents. This possibility is examined in Experiment 3, to determine whether these effects are apparent when there is a totally within-groups context.

Experiment 3

This experiment attempted to manipulate all the factors of interest within-groups. All participants were exposed to a number of different scenario topics, with a range of different levels of outcome seriousness and decision justifiability, to provide a richer context in which to make their judgments. As in the previous experiment, each participant rated both their outcome-regret and self-blame regret. The impact of the manipulations of outcome seriousness and decision justifiability on the rated intensity of both components of regret was measured.

Method

Design

The experiment employed a 2 (focus of regret: self-blame and outcome) x 4 (seriousness-justifiability condition: HSSJ, HSWJ, LSSJ and LSWJ) x 4 (scenario topic: icy road, coffee shop, traffic jam and TV prize draw) factorial design, with 'focus of regret', 'condition' and 'scenario topic' all manipulated as within-groups factors. The effects of decision justifiability and outcome seriousness on participants' ratings of the two components of regret were measured.

Participants

Ninety-two post-graduate and undergraduate students from various disciplines at City University, London, participated for a small confectionery gift. The sample was predominantly female (81%), aged between 18 and 47 (M = 25 years).

Procedure and materials

Participants were presented with a series of four short scenarios. The order of presentation of the scenarios was counterbalanced. The scenarios and the rating scales were the same as those used in Experiment 2. To shorten the task, and because they evoked the highest regret ratings in Experiments 1 and 2, the Travel Vaccine and Driving Insurance scenarios were not included in the series. Each participant read one scenario of each type ('condition') – for example, Icy Road (HSSJ), TV Prize Draw (HSWJ), Traffic Jam (LSSJ) and Coffee Shop (LSWJ). The order of presentation of

these conditions was fully counterbalanced across participants and scenarios, giving 24 different orders. The order of the two regret items was also counterbalanced. In total, there were 96 possible versions of the questionnaire (2 x 24 x 2). Questionnaires were randomly distributed amongst the group of participants.

As in previous experiments, for each scenario, participants were asked to read and imagine themselves in the situation described and then, still imagining themselves in the events, complete a series of 7-point rating scales that measured their response to the scenario. Participants rated both their regret about the decision (self-blame regret) and their regret about the outcome (outcome regret) – see Experiment 2 for the wording of these items. They also rated how serious they felt the outcome was, how responsible they were for the situation, how much they could justify the decision taken, how worried they would be feeling and how happy they would be feeling – see Experiment 1 for the wording of these items. Examples of the scenarios used appear at the end of the thesis.

Results

Manipulation checks

For all scenarios, 'high seriousness' outcomes were perceived by participants as being significantly more serious than 'low seriousness' outcomes (Icy Road, t (88) = 2.535, p = .013; Coffee Shop, t (89) = 3.728, $p < .001$; Traffic Jam, t (90) = 5.588, $p < .001$; TV Prize Draw, t (88) = 2.083, p = .040).

For two of the four scenarios used in the experiment, 'strong justification' decisions were rated as significantly more justifiable than 'weak justification' decisions (Coffee

shop, t (89) = -3.187, p = .002; Traffic Jam, t (90) = -3.314, p = .001). However, for the Icy Road scenario and the TV Prize Draw scenario, manipulating justifiability proved more difficult. There was no significant difference in perceived justifiability between 'strong' and 'weak' justification groups (Icy Road, t (89) = -1.144, p = .256; TV Prize Draw, t (88) = 1.083, p = .282).

An initial repeated measures ANOVA looked at all four scenarios together, using the manipulated seriousness-justifiability condition as a within-groups factor. Further analyses were then conducted on each of the individual scenarios, using median split groupings for decision justifiability where the experimental manipulation of this factor had failed.

Repeated measures analysis

A repeated measures ANOVA was conducted with 'focus of regret' and manipulated 'seriousness-justifiability condition' as within-groups factors. The results of this analysis are summarised in Table 2.9. There was a significant main effect of 'Focus of regret', with outcome-regret (M = 5.21, SD = 0.981) being rated as more intense than self-blame regret (M = 5.06, SD = 1.011). Whilst the difference between the means was statistically significant, it was, in real terms, relatively small (difference = 0.15) – as had been the case in Experiments 1 and 2.

There was also a significant main effect of 'Condition', with HSSJ versions (M = 5.63, SD = 1.471) being significantly more regrettable than LSSJ versions (M = 4.58, SD =

Table 2.9

Repeated measures ANOVA significant main effects and interactions (all scenarios) (Experiment 3)

Significant main effects and interactions	ANOVA statistics and significance
'Focus of regret'	F (1,87) = 5.158, MSE = 0.803, p = .026
'Condition' (seriousness x justifiability)	F (3, 261) = 15.513, MSE = 15.583, p < .001
'Focus x Condition'	F (3, 261) = 4.145, MSE = 2.545, p = .007

1.661), t (87) = 4.604, p < .001, and HSWJ versions (M = 5.81, SD = 1.536) being more regrettable than LSWJ versions (M = 4.53, SD = 2.020), t (87) = 5.433, p < .001. However, there were no significant differences in regret ratings between HSSJ and HSWJ versions, t (87) = -0.957, p = .341, or between LSSJ and LSWJ versions, t (87) = 0.174, p = .862. This pattern of results suggests that the differences in overall regret ratings between conditions reflect an effect of outcome seriousness, rather than an effect of decision justifiability.

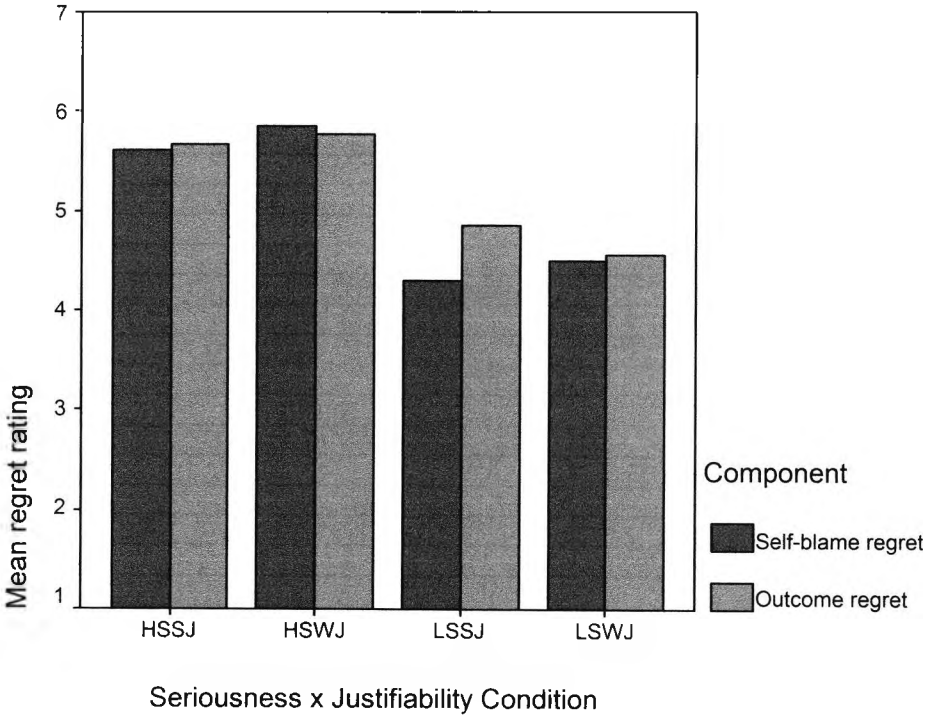
These main effects were qualified by a significant 'Focus of regret x Condition' interaction – see Figure 2.2. Post-hoc analyses (Related t tests) showed that, for the LSSJ conditions only, outcome regret ratings (M = 4.86, SD = 1.676) were significantly greater than self-blame regret ratings (M = 4.29, SD = 1.954), t (87) = -3.573, p = .001. For the HSSJ conditions, participants did rate their outcome regret (M = 5.66, SD = 1.701) as slightly higher than their self-blame regret (M = 5.60, SD = 1.513) but this difference was not significant, t (87) = -0.408, p = .685. For the HSWJ conditions, self-blame regret (M = 5.84, SD = 1.701) was rated as higher than outcome regret (M = 5.77, SD = 1.638) but again this difference was not significant, t (87) = 0.488, p = .627. For the LSWJ conditions, outcome regret (M = 4.56, SD = 2.028) was slightly higher than self-blame regret (M = 4.50, SD = 2.139), but not significantly so, t (87) = -0.522, p = .603.

Individual scenario analyses

As described above, for two scenarios, the manipulation of decision justifiability proved difficult and participants were therefore divided into strong or weak justification levels according to their actual ratings of justifiability. This meant that some participants were

Figure 2.2

Effect of outcome seriousness and decision justifiability on ratings of self-blame regret and outcome regret (Experiment 3 – all scenarios)



Note: HSSJ = High seriousness-strong justification condition; HSWJ = High seriousness-weak justification condition; LSSJ = Low seriousness-strong justification condition; LSWJ = Low seriousness-weak justification condition.

not exposed to all possible levels and combinations of outcome seriousness and decision justifiability. To examine the effects of perceived decision justifiability and outcome seriousness on the intensity of regret ratings, separate mixed ANOVA analyses were carried out for each scenario, with 'decision justifiability' (as manipulated, where the manipulation was successful; otherwise using the median-split grouping) and manipulated outcome seriousness included as between-groups factors. Mean regret ratings by focus of regret, decision justifiability and manipulated outcome seriousness, for each of the four scenarios, appear in Table 2.10. The results of the ANOVAs (see Table 2.11) provide additional evidence broadly consistent with DJT; while significant effects are not always observed, no findings directly contradict DJT.

A significant difference between the two components of regret was found for two of the four scenarios (1-tailed tests). As had been the case in Experiments 1 and 2, where this main effect of 'Focus of regret' was found, outcome regret exceeded self-blame regret. In the Icy Road and TV Prize Draw scenarios, outcome-regret was rated as significantly more intense that self-blame regret.

Perceived decision justifiability also had a significant influence on regret ratings in two of the four scenarios, where justifiability groupings had been determined by median split reassignment (Icy Road and TV Prize Draw). As in previous experiments, justifications that were perceived as weak were rated as more regrettable than justifications that were perceived as strong. In addition, there was a significant main effect of outcome seriousness in all four scenarios, with high seriousness outcomes being more intensely regretted than low seriousness outcomes.

Table 2.10

Mean regret ratings by scenario, focus of regret, justifiability and seriousness (Experiment 3)

	Regret component		Decision justifiability		Outcome seriousness	
Scenario	Self-blame regret	Outcome regret	Strong justification	Weak justification	High seriousness	Low seriousness
Icy road	5.10	5.32	4.84	5.58	5.79	4.64
	(1.80)	(1.64)	(1.80)	(1.46)	(1.34)	(1.73)
Coffee shop	5.41	5.39*	5.24	5.56*	5.82	4.98
	(1.65)	(1.64)	(1.47)	(1.65)	(1.24)	(1.73)
Traffic jam	5.77	5.92*	5.77	5.92*	6.33	5.36
	(1.56)	(1.55)	(1.50)	(1.43)	(1.38)	(1.38)
TV prize	3.50	3.92	2.74	4.67	4.45	2.97
	(2.24)	(2.04)	(1.26)	(1.72)	(1.66)	(1.66)

Notes: * denotes that pairs of regret ratings (by focus or justifiability levels) are not significantly different ($ps > .05$; 2-tailed tests). Standard deviations are in parentheses.

Table 2.11

Individual scenarios ANOVA: significant main effects and interactions (Experiment 3)

Scenario	Significant main effects and interactions	ANOVA statistics and significance
Icy road	'Focus'*	$F(1,86) = 2.991$, $MSE = 0.637$, $p = .087$
	'Justifiability'	$F(1,86) = 4.889$, $MSE = 4.566$, $p = .03$
	'Seriousness'	$F(1,86) = 11.964$, $MSE = 4.566$, $p = .001$
Coffee shop	'Seriousness'	$F(1,87) = 6.846$, $MSE = 4.632$, $p = .01$
Traffic jam	'Seriousness'	$F(1,88) = 11.535$, $MSE = 3.698$, $p = .001$
	'Seriousness x justifiability'	$F(1,88) = 5.515$, $MSE = 3.698$, $p = .021$
	'Focus x seriousness x justifiability'	$F(1,88) = 4.877$, $MSE = 0.561$, $p = .03$
TV prize draw	'Focus'	$F(1,86) = 3.865$, $MSE = 1.770$, $p = .053$
	'Justifiability'	$F(1,86) = 21.823$, $MSE = 3.871$, $p < .001$
	'Seriousness'	$F(1,86) = 37.539$, $MSE = 3.871$, $p < .001$

Note: * denotes effect approached but did not reach statistical significance (2-tailed test) but is significant on a 1-tailed test

For one of the scenarios (Traffic Jam), there was a significant 3-way 'Regret focus x Seriousness x Justifiability' interaction – see Figure 2.3. Post-hoc analyses (Related t tests) showed that, for the LSSJ (low seriousness-strong justification) version of the scenario, outcome-regret (M = 5.30, SD = 1.579) was rated as being significantly greater than self-blame regret (M = 4.65, SD = 1.748), t (22) = -2.182, p = .040. For each of the other three versions of that scenario, there was no significant difference between participants' ratings of the two components of regret (HSSJ, t (21) = 0.204, p = .840; HSWJ, t (22) = -1.164, p = .257; LSWJ, t (23) = 0.891, p = .382).

Correlational analysis

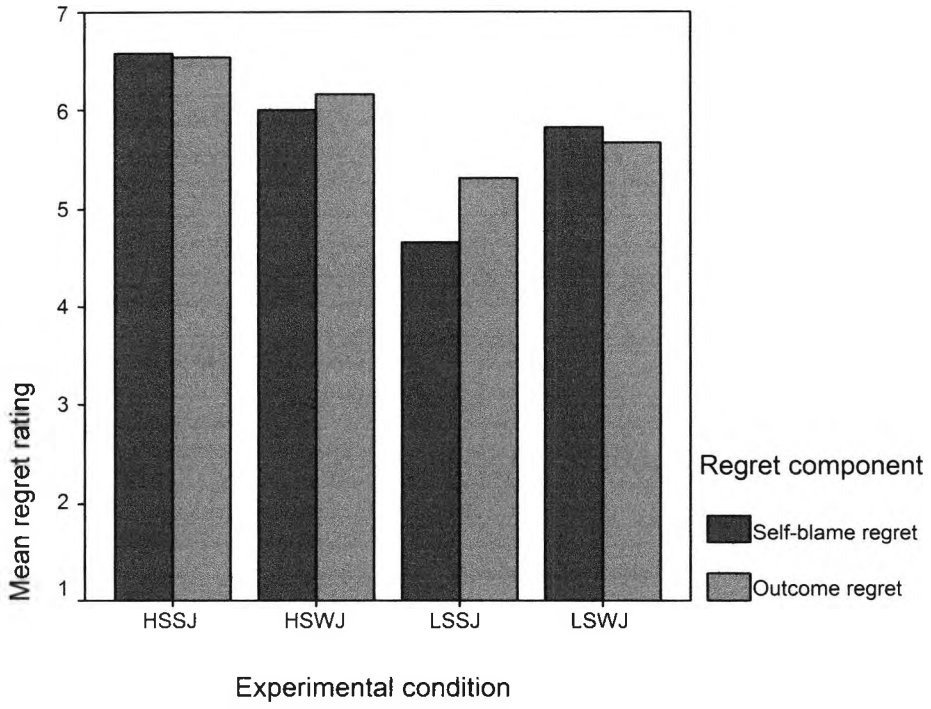
As in the previous two experiments, the relationships between perceived decision justifiability and self-blame regret ratings, and between perceived outcome seriousness and outcome-regret ratings were explored (see Table 2.12). To aid interpretation of the correlations, decision justifiability ratings were reverse-scored before data analysis, so that higher values now denote stronger perceived justification.

The results were similar to Experiment 2. Self-blame regret correlated more strongly with outcome seriousness than with decision justifiability in all but one scenario. Outcome-regret also correlated more strongly with outcome seriousness than with decision justifiability in all but one scenario. These results are further evidence that self-blame regret and outcome-regret have common antecedents and therefore cannot be regarded as totally independent components.

As in the previous two experiments, there were significant relationships between outcome seriousness and decision justifiability ratings for all the scenarios - decisions

Figure 2.3

Effect of outcome seriousness and decision justifiability on self-blame regret and outcome regret ratings: Traffic Jam scenario (Experiment 3)



Note: HSSJ = High seriousness-strong justification condition; HSWJ = High seriousness-weak justification condition; LSSJ = Low seriousness-strong justification condition; LSWJ = Low seriousness-weak justification condition.

Table 2.12

Correlations between ratings by scenario and regret component (Experiment 3)

Scenario	Self-blame regret – Outcome regret	Justifiability-Seriousness	Regret component	Regret-Justifiability	Regret-Seriousness	Regret-Justifiability controlling for Seriousness	Regret-Seriousness controlling for Justifiability
Icy road	0.79	-0.25	Self-blame	-0.39	0.56	-0.31	0.52
			Outcome	-0.44	0.64	-0.36	0.60
Coffee shop	0.81	-0.38	Self-blame	-0.28	0.59	-0.08*	0.54
			Outcome	-0.24	0.59	-0.02*	0.55
Traffic jam	0.75	-0.27	Self-blame	-0.40	0.70	-0.32	0.67
			Outcome	-0.35	0.74	-0.23	0.72
TV prize draw	0.62	-0.41	Self-blame	-0.62	0.55	-0.51	0.41
			Outcome	-0.57	0.41	-0.48	0.23

Note: Pearson's r correlation coefficients significant at $p < .05$, except * which denotes non-significant correlations (1-tailed tests)

were seen as less justifiable when outcomes were more serious.

Again, we explored the possibility that the inter-correlation of the two types of regret might be due to the scenarios confounding outcome seriousness and decision justifiability by computing partial correlations. These show that, even when partialling out the effects of decision justifiability, seriousness is still significantly correlated with both self-blame regret and with outcome-regret in all scenarios. After partialling out the effects of outcome seriousness, both self-blame regret and outcome-regret significantly correlate with decision justifiability in three of the four scenarios. However, the partial correlations reveal that seriousness is a stronger correlate than decision justifiability of both forms of regret in three of the four scenarios.

As in Experiments 1 and 2, correlation coefficients were computed between self-blame regret, outcome-regret, justifiability and seriousness for each participant in turn, using their ratings from all four scenarios. The resulting coefficients were then contrasted within-groups to determine whether, compared to self-blame regret, outcome-regret correlated more strongly with outcome seriousness and whether, compared to outcome-regret, self-blame regret correlated more strongly with decision justifiability.

As was the case in the previous experiments, there was no significant difference in the strength of correlation between self-blame regret and seriousness (mean Spearman's rho = 0.551) and the strength of correlation between outcome-regret and seriousness (mean Spearman's rho = 0.604), t (82) = -0.808, p = .421. Similarly, there was no significant difference in the strength of correlation between self-blame regret and justifiability (mean Spearman's rho = -0.487) and the strength of the correlation between outcome-regret and justifiability (mean Spearman's rho = -0.433), t (79) = -1.028, p = .307. Both

self-blame regret and outcome-regret are both influenced by outcome seriousness and decision justifiability although again, for each type of regret, outcome seriousness is the stronger determinant.

Discussion

When considered across all scenarios, 'focus of regret' had a significant effect on ratings of regret, with outcome-regret being slightly more intense than self-blame regret, as in the previous two experiments. In addition, there was a significant effect of outcome seriousness on regret ratings, with more serious outcomes being more regrettable than less serious ones. Whilst there was no main effect of decision justifiability on regret ratings, there was a 'focus x condition' interaction in the across scenarios analysis. For low seriousness outcomes only, where the scenario offered a stronger justification for the decision taken, there was a significant difference in participants' ratings of anticipated outcome-regret and self-blame regret - the decision was less regrettable than the outcome. However, where there was a weaker justification for the decision, there was no difference between self-blame regret and outcome-regret. This pattern of results was not, however, present for high seriousness outcomes. It appears that decisions that lead to more serious outcomes may need stronger justifications in order to reduce self-blame regret than is the case for decisions that lead to less serious outcomes.

When looking at the scenarios individually, the effects were less consistent – although this may, at least in part, reflect the difficulties in manipulating decision justifiability in the scenarios. The predicted 'focus of regret' effect was present only in two scenarios (Icy road and TV prize). There was an effect of decision justifiability in the same two scenarios (where median splits had been used to determine decision justifiability

groupings). The effect of outcome seriousness was more robust, being evident in all four scenarios.

When analysed separately, there was no evidence for the 'focus x justifiability' interaction in any of the four scenarios. However, in one scenario (Traffic jam), there was a three-way 'focus x seriousness x justifiability' interaction. In this case, as in the across scenarios analysis, there was a significant difference between rated outcome-regret and self-blame regret only where a strong justification for the decision was paired with a less serious outcome - again, outcome-regret was greater than self-blame regret in this condition.

Contrary to expectations, self-blame regret and outcome-regret correlated equally strongly with decision justifiability. Similarly, self-blame regret and outcome-regret correlated equally strongly with outcome seriousness. These patterns of association suggest that participants' perceptions of the two components of regret were influenced in similar ways by both decision justifiability and outcome seriousness. It appears that, while subtly discriminable, self-blame regret and outcome-regret are not psychologically completely independent of each other in the minds of individuals. It seemed difficult for respondents to consider their self-blame regret without taking into account the outcome and similarly difficult for them to rate their outcome-regret without considering the justifiability of the decision.

General Discussion

The three experiments offer some evidence that partially supports the proposals of DJT, insofar as participants consistently rated self-blame regret and outcome-regret

differently, both in between-subjects and within-subjects designs – suggesting the two components may be somewhat distinct. In all the experiments, outcome-regret tended to be greater overall than self-blame regret but the difference between the two components was usually rather small – the largest difference between decision- and outcome-regret ratings was less than 0.5 points on a 7-point scale.

In addition, decision justifiability did have a significant effect on the overall regret ratings of participants. Where they perceived a strong justification for the decision taken, participants rated their regret as significantly less than where they perceived a weak justification for the decision. In Experiment 1, decision justifiability was not manipulated, but there was evidence to suggest that variation in perceived justifiability across scenarios moderated the difference between self-blame regret and outcome-regret. In Experiment 2, where decision justifiability was manipulated between-subjects, stronger justifications were associated with less overall regret than weaker justifications.

The 'focus x justifiability' interaction was found in some instances, but not consistently in all the experiments. In Experiment 2, the interaction was found in only one of the six scenarios, and was not apparent when analyses were performed across all the scenarios together. However, in Experiment 3, where participants were exposed to a range of different levels of justifiability and outcome seriousness, there was evidence to suggest that – where outcomes were less severe – increasing decision justifiability reduced the amount of self-blame regret reported, but did not influence the amount of outcome-regret reported. However, when outcomes were more severe, increasing decision justifiability did not reduce the amount of self-blame regret reported – both components of regret were rated the same. Future research might explore whether decisions that are

followed by worse outcomes require much stronger justifications in order to reduce self-blame regret compared to decisions that are followed by less severe or positive outcomes.

The correlational analyses for all three experiments provided some evidence to suggest that, whilst they may be distinguishable to some extent, the two 'core components' are not completely independent of one another, but rather are both influenced by common factors, namely decision justifiability and outcome seriousness.

Decision justifiability correlated with self-blame regret but it also correlated to the same extent with outcome-regret. Why is regret about the outcome so strongly associated with perceived decision justifiability? Perhaps participants viewed bad outcomes as being all the worse because – not only was it a bad outcome – they also believed it was the result of a bad decision. However, the evaluation of the decision process as poor should, if the components are unrelated, affect the experience of self-blame regret, rather than outcome-regret.

Outcome seriousness correlated with outcome-regret (as suggested by DJT) but it also correlated to the same extent with self-blame regret. The latter finding is perhaps a little less unexpected. As described earlier, whilst they were given a justification for the decision, participants otherwise had limited information by which to judge the reasonableness of the decision, apart from the outcome that followed it. Where the outcomes were extreme (as they were in most of the scenarios), they appear to have been used as a heuristic cue to judge decision quality.

The results of the experiments suggest that, whilst they may be subtly discriminable, the

two components of regret are influenced similarly by both decision justifiability and outcome seriousness and cannot therefore be regarded as completely independent. It might be argued that, with the scenarios used here, it may be difficult for the subjects to evaluate decision justifiability without strong regard for the outcomes since the choices described in the scenario were hypothetical and there was little information in the scenario to indicate whether the decision was reasonable in the circumstances. However, if strong information about the decision quality that was quite independent of the outcomes described in the scenario had been available, it may have been that we would have observed a corresponding independence in the two components of regret – future research might wish to address this possibility.

There was correlational evidence of a relationship between decision justifiability and outcome seriousness. The more serious the outcome was perceived to be, the less justifiable the decision was rated as being. The results of other research (see Chapter 3) provide evidence for such a link between decision justifiability and outcome seriousness, which may help to explain the pattern of correlations found in the current experiments and the lack of total independence between the two components of regret (Wright & Ayton, 2004b). Participants were asked to rate the justifiability of a decision described in a scenario before they knew the nature of the outcome. Then they were provided with information about the outcome and asked to rate again how justifiable the decision was. Participants who read a positive outcome changed their evaluation of the decision, perceiving it as being more justifiable than they had previously indicated. Conversely, participants who read about a negative outcome altered their rating of the decision to rate it as less justifiable than they had done originally. These results suggest that, when evaluating a decision, people cannot help but be influenced by what they know about the outcome.

Overall, the data from the current experiments demonstrate that, in response to hypothetical scenarios, participants' regret ratings can be influenced by a number of different factors relating to the situation or the task - for example, outcome seriousness, decision justifiability and even the focus of the regret item that probes their emotional reaction.

All of the experiments found the effect of 'focus' on regret ratings, with outcome-regret typically being greater than self-blame regret. Even though the difference between the two ratings was typically rather small, it does raise the question of why should outcome-regret so consistently exceed self-blame regret - and not only for strong justifications?

This pattern of responding may reflect early attempts of sub-conscious psychological mechanisms to maintain a positive mood or positive self-image by protecting the individual from the experience of self-blame or blame by others. A decision-maker may quite readily publicly acknowledge that the outcome is regrettable but, at the same time, defensively play down their own hand in the situation by being somewhat more resistant to admitting they made a bad decision. Previous social cognition research and theory offers support for this idea.

Thornton (1984) noted that defensive attribution processes can operate when people are asked to make judgments about personal responsibility. Observers tend to "defend cognitively against the threat ... [that a similar misfortune could happen to them] ... by distorting their perceptual judgments of the victim's causal role". This is particularly the case if they view themselves to be in some way similar to the victim, who they then rate as having less responsibility and less to blame for the outcome. Thornton (1984)

further argues that it is the arousal of threat that mediates these cognitive processes - when participants are focused on their own affective reaction to the scenario, they are more likely to demonstrate defensive attribution, whereas, if their attention is focused elsewhere, the mechanisms tend to be attenuated.

In the current experiments, participants were indeed focused on their own (imagined) affective responses and it is possible that, since they were also asked to imagine it was themself in the situation (ie. personal similarity was implied), they attributed responsibility away from the decision-maker. As already discussed, there is a link between regret and responsibility (Connolly, Ordóñez & Coughlan, 1997; Zeelenberg, van Dijk & Manstead, 1998; Ordóñez & Connolly, 2000; Zeelenberg, van Dijk & Manstead, 2000). Whilst participants may acknowledge that the outcome was regrettable, they may not acknowledge any responsibility (self-blame) for the decision leading to the outcome, since, because of defensive attribution processes, they view the events as being beyond the actor's control. Hence, their regret about the decision (self-blame) may have decreased.

Earlier work by Festinger (1957) also proposed that, when individuals experience discrepancy between cognitions, or when they act in a way that threatens their self-concept as a rational person, this produces an unpleasant psychological state, known as cognitive dissonance, which they are then motivated to reduce. One of the ways they may achieve this is by attempting to justify their behaviour, either by altering their existing cognitions to make them more consonant with their behaviour, or by adding new cognitions that support their action. Gilbert, Pinel, Wilson, Blumberg & Wheatley (1998) also describe a range of different cognitive strategies and mechanisms (including self-justification, self-deception and motivated reasoning) whereby "... the human mind

ignores, augments, transforms and rearranges information" in order to maintain psychological well-being and a positive self-concept. Gilbert et al. argue that, together, these processes form a kind of "psychological immune system that serves to protect the individual from an overdose of gloom" resulting from negative events and that this system appears to function without awareness on the part of the individual. More recently, Tykocinski (2001) has demonstrated that, to cope with disappointing outcomes and make them "more palatable", in both hypothetical scenarios and in real life experiences, individuals will ex post adjust their perceptions of likelihood that certain outcomes would have occurred, making the negative outcome they experience seem unavoidable or inescapable. This is apparently done to bring the individual some psychological relief and repair their mood. It may be that, to maintain a positive self-concept and mood, individuals are motivated to engage in defensive cognitive mechanisms that attempt to justify their choice and thus ameliorate their feelings of self-blame or regret about having made what appears to be a sub-optimal decision.

Another question that arises is whether it is necessary for researchers to measure the two components of regret separately, as two distinct items, or whether it is appropriate to simply measure an overall feeling of regret, as previous research has tended to do? The results of the current experiments suggest that, although respondents do rate the two items differently, the margin of difference is rather small. It therefore seems that how regret is measured is more likely to depend on what aspect of regret is of interest to the researcher. It would seem that, if one is interested in helping people to make 'better' decisions, one might be more interested in focusing on self-blame regret, since this is the component of regret that is hypothesised to be linked to a poor quality decision process. As Connolly & Zeelenberg (2002) suggest, good decisions may on occasion still be followed by negative outcomes that are themselves regrettable or disappointing,

and objectively bad decisions can sometimes result in outcomes that are not regrettable. It might seem counterproductive, then, if one is interested in improving the quality of decision-making, to focus too heavily on outcome-regret, since it appears this may 'muddy' individuals' perceptions of the quality of the decision process itself. Regardless of the outcome, people may have made the best possible decision in the circumstances and it would seem somewhat unreasonable and undesirable for them to change their decision in a similar situation in the future, based purely on the unlucky outcome of their previous experience. Future research may wish to explore the effects of each of the hypothesised components of regret on subsequent choice. For example, is it the experience (or anticipation) of self-blame regret in particular that provokes changes in behavioural choice – after feeling one has made an unjustifiable decision is one more likely to make a different choice if a similar situation is encountered in the future? Or is it specifically the experience of a bad (regrettable) outcome which motivates individuals to change their choice in the future?

Compared to 'focus of regret', the effects of outcome seriousness and decision justifiability on regret ratings were much larger in our experiments. Researchers might therefore wish to consider whether they need to include information about the decision process (e.g. decision justifiability) in their scenarios, as well as information about the outcome itself. However, it proved difficult in Experiments 2 and 3 to reliably manipulate decision justifiability. As suggested by Connolly & Zeelenberg (2002), there may be individual differences in what people perceive as a good justification for a decision and future research may need to more systematically explore what makes for a 'strong justification' or a good quality decision.

The current experiments do, of course, have their limitations. In all studies, participants

were asked to focus on imagined scenarios, not real-life decisions taken by the participants themselves and this lack of realism may have influenced our results. Participants may have found it difficult to imagine and quantify their regret and their perceptions of decision justifiability or outcome seriousness, and perhaps did not feel particularly engaged in the task, particularly when asked to consider multiple scenarios. Given that the scenarios were relatively short, there may not have been sufficient information available by which participants could judge whether the decision had been well reasoned. This may have lead to them using the information about the outcome as a heuristic cue to decision quality. Future research might wish to explore the relationships the two components of regret have with decision justifiability and outcome severity where decisions are more clearly justifiable or unjustifiable and result in outcomes that are clearly negative or positive. In addition, no information was included in the scenarios about the likelihood of a negative outcome occurring, although one might argue that such information is not always readily available in real-life decisions either. Nonetheless, some of the negative outcomes described in our scenarios may have been perceived by participants as being overly dramatic or rather unlikely to happen in real life and hence rather unpredictable at the point of decision-making. This may account for the less intense self-blame regret.

While the use of a within-subjects manipulation of 'focus of regret' may have highlighted a distinction between self-blame regret and outcome-regret, this was not explicitly defined and hence it may still not have been totally clear to participants precisely where the distinction lay. Future experiments might begin by defining what we mean by self-blame regret and outcome regret and make transparent the factors believed to influence each type of regret in decision-making. This limitation in our experiments may account for the somewhat small and rather inconsistent effects and the

patterns of results found in the correlational data. As has been pointed out in previous research papers, there may well be differences in how researchers and theorists define discrete emotions, such as regret and disappointment, and how the public at large define them or understand them in common usage of everyday language (Ordóñez & Connolly, 2000; Zeelenberg, van Dijk & Manstead, 2000) – see Chapter 4 of this thesis for a further discussion of this issue.

Other matters arise from a consideration of the nature of experiments requiring participants to give ratings of their experience that discriminate between two sources of regret. While the origins of experienced regret may indeed reflect separate contemplations of the decision quality and the resultant outcome, it may not be possible for people to reliably dissociate and separately report these different aspects in introspective reports of their regret experience. Thus it is possible that the two components become blurred in participants' reports as a function of the task demands of the experiments. Alternatively, even assuming reliable introspections, it may ultimately be impossible in principle for decision-makers to entirely dissociate outcome-regret from self-blame regret, because evaluations of outcomes may automatically include memories of the decision that lead up to it and evaluation of decision quality may inevitably refer to outcomes. A number of issues remain to be addressed in future studies of the nature and role of regret in decision making.

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Chapter 3

Do people judge the quality of the decision process by reference to the outcome that follows it? Implications for Decision Justification Theory

RUNNING HEAD: JUDGING DECISIONS BY THEIR OUTCOMES

Do people judge the quality of the decision process by reference to the outcome that follows it?

Implications for Decision Justification Theory

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The authors gratefully acknowledge the assistance of Ceyda Djemal in collecting and coding the data for the first experiment. The research was funded by Engineering & Physical Sciences Research Council (EPSRC) Research Studentship Award Number 317441 as part of first author's PhD dissertation. Correspondence concerning this article should be addressed to Chris Wright, Department of Psychology, City University, Northampton Square, London, EC1V 0HB, United Kingdom. Telephone: +44 (0)20 7040 8526, Fax: +44 (0)20 7040 8581. Electronic mail may be sent to: C.A.Wright@city.ac.uk or P.Ayton@city.ac.uk

Abstract

Previous research suggests that regret about making a bad choice (decision regret) can be influenced both by how justifiable the decision seems and by how bad the outcome that follows it appears to be. Two scenario-based experiments investigated whether participants change their views of decisions after they discover the valence of the subsequent outcome. The results showed that, when choices were followed by negative outcomes, participants rated the decision as being of poorer quality than they did before the outcome was known. Conversely, when choices were followed by positive outcomes, the decision was rated as being of better quality than it was before the outcome was known. This suggests that, to some degree, decision-makers judge the quality of the decision process by reference to how that decision turns out. Thus they may regret a perfectly reasonable decision simply because it turns out badly. The implications for decision making and Decision Justification Theory are discussed.

Key words: Decision Justification Theory, Regret, Decision Making, Decision Quality

Introduction

> [Gandalf] turned. "Come, Aragorn son of Arathorn!", he said. "Do not regret your choice in the valley of the Emyn Muil, nor call it a vain pursuit. You chose amid doubts the path that seemed right: the choice was just, and it has been rewarded. For so we have met in time, who otherwise might have met too late".
>
> *The Lord of the Rings*
> *J.R.R. Tolkien (1954)*

Recent research has begun to explore the emotional consequences of decision making and how these emotions influence our thoughts and the choices we subsequently make (Schwarz, 2000). A significant proportion of this body of research has focused on two specific and cognitively-based emotions – regret and disappointment. Regret is experienced when a person compares the outcome that follows their choice with an alternative outcome that would have occurred had they chosen another option (Zeelenberg, 1999a). Thus the individual may feel some responsibility for the outcome, since they had a choice (and therefore some control) in the situation – by choosing differently, they could have experienced a different (better) outcome. In contrast, disappointment is experienced when an outcome is worse than expected, but the situation was beyond the individual's control. The outcome was not a result of their own choice; rather it was influenced by external factors – had a different state of the world existed, they might have experienced a better outcome (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998). Therefore, regret is the emotion of particular interest when researchers are investigating choice.

The experience of regret focuses the decision-maker on how the negative outcome might have occurred, how they might have prevented it or changed it and how they

might avoid a similar occurrence in the future (Zeelenberg, 1999b; Zeelenberg et al, 1998). Thus, feeling regret about decisions that turn out worse than hoped for may be functional (Zeelenberg, 1999b), if the individual learns from the experience. Studies focusing on consumer decision-making suggest that, when customers experience regret about their choices between services or products, they have a tendency to switch to a different service provider or product in the future – that is, they make a different choice after experiencing regret over an earlier decision (Inman & Zeelenberg, 2002). The amount of regret consumers feel about their choices appears to be influenced by how justifiable they perceive their choice to have been, given the circumstances and information available at the time of their choice (Inman & Zeelenberg, 2002). Decision justifiability has become an important element in current theoretical approaches to regret in decision making. Consistent with this approach, Connolly & Zeelenberg (2002) recently proposed Decision Justification Theory (DJT) which they argue can explain some of the hitherto conflicting findings in the regret literature (see Connolly & Zeelenberg, 2002).

DJT proposes two 'core components' to regret. One component relates to the evaluation of the outcome of a choice, usually involving a comparison of that outcome with some kind of 'standard' (e.g. the outcome of the foregone option or an expected outcome). Thus this component relates to the bad outcome ('outcome regret'). The other component involves an evaluation of the decision process itself. In retrospect, the decision-maker may feel that they made a poor quality or unjustifiable choice and therefore they are in some way to blame for the events that followed it ('decision regret' or 'self-blame regret'). Together, these two components are assumed to contribute to an overall feeling of regret. In their original paper, Connolly & Zeelenberg (2002) point out that the two components may co-occur (the decision-maker experiences both regret

about the bad outcome and 'self-blame' regret about the quality of the decision) or it might be possible to experience one component without the other – the decision-maker may experience only regret about a bad outcome if they feel they made a justifiable decision, or they may experience only 'self-blame' regret if they feel they made an unjustifiable decision which, by chance, nonetheless turned out alright. DJT has identified the components of regret. A question that now arises relates to the extent to which (if at all) the two components are independent of each other (with separate and distinct antecedents) and which (if any) of the two components of regret has an effect on future decision making. It would seem desirable for future research to untangle some of these issues. If decision-makers base their future choices purely on regret about a previous bad outcome (even though they do not experience regret about the decision process or justifiability of the decision), this would seem somewhat undesirable – they made a good decision but were somewhat unlucky in that it did not turn out as well as it might have done. Sometimes good (justifiable) decisions go awry and sometimes bad (unjustifiable) decisions turn out alright. It seems important, therefore, to determine whether individuals do separate out the various components of regret that are proposed by DJT and recognise situations where good quality decisions were made, irrespective of the outcomes that followed them.

Earlier research (Baron & Hershey, 1988) suggests that individuals do take information about the outcome of a decision into account when they are judging the quality of a decision. In a series of five experiments, focusing on medical decisions (taken by physicians or by patients themselves) and gambling decisions, participants rated the quality of decisions that turned out well as higher than matched decisions that turned out badly. Similar effects were found on participants' evaluations of the competence of the decision maker and their willingness to let them make choices on their behalf. It

appears that outcome information biased participants' perceptions of the decision process, even though they were given probabilistic information about the likely outcomes and were told that they had no more information than the decision maker had at the time they made their choice. Baron & Hershey (1988)'s data also provides evidence that good outcomes increase the salience of arguments in favour of the decision, while bad outcomes increase the salience of arguments against the decision. In one experiment, participants were asked in the debriefing whether they felt one should take the outcome into account when rating the quality of the decision or the competence of the decision maker, and whether the participants felt they had done this. Most agreed that the outcome was irrelevant and should not influence their evaluation of the decision itself (even though the data suggested this had occurred). Some students did acknowledge that, despite believing this, they thought their evaluations had been influenced by the outcome information – although some did not appear conscious of this influence until they discussed this possibility in the debriefing. Some participants, however, felt that it was inevitable and therefore appropriate to judge decision quality by the outcome, believing that the outcome was an indication of how well the decision had been made or that the outcome was the most important thing in judging a decision maker's competence (especially in the case of medical decision making where lives are at stake). However, as Baron & Hershey (1988) point out, whilst judging decisions by their outcomes may in general terms be a reasonable rule, good outcomes are not always preceded by good decisions and nor are bad outcomes always preceded by bad decisions. Thus they warn against over-application of the general rule and highlight a need for judges of decision quality to discriminate between the decision maker's wisdom and their misfortune.

Recent research (Wright, Ayton & Djemal, 2004a) suggests that the two components of

regret proposed by DJT are not entirely independently determined. In a series of three scenario-based experiments, it was apparent that participants' ratings of regret about the decision and ratings of regret about the outcome were influenced both by the severity of the outcome and by how justifiable the decision was perceived to be. The results suggested that regret about making a poor decision ('self-blame' aspect) was more strongly influenced by the valence of the outcome than it was by the justifiability of the decision. In short, it appeared that the two components of regret were somewhat inter-related, with information about a bad outcome influencing participants' views of the quality of the decision, as suggested by Baron & Hershey (1988). In Wright et al's (2004) studies, participants imagined themselves in short scenarios which described the situation leading up to the choice, the choice made, the reason for the choice and then the outcome of the choice. Participants then rated their regret about the quality of the decision and their regret about the nature of the outcome. They also rated how justifiable they thought the decision was and how serious they thought the outcome was. Because the scenarios contained no indication of the likelihood of different outcomes, it could be argued that the scenarios used did not provide participants with information by which they could judge the quality of the decision independently of the outcome that followed it. In addition, as was the case in Baron & Hershey (1988)'s experiments, all ratings about the decision were made after participants knew the outcome of the choice.

The current experiments therefore aim to address these shortcomings of previous studies. Experiment 1 uses the same scenarios used by Wright et al (2004) in their previous three experiments, but presents the scenarios in two halves. In the first half of each scenario, participants are provided only with information about the decision process before being asked to rate the quality of the decision. Then, in the second half of the scenario, participants discover how the choice turns out and they are asked to re-

rate the quality of the decision, rate how bad the outcome is and indicate the level of regret they imagine they would feel about the decision and the level of regret they imagine they would feel about the outcome. The effect of outcome information on perceptions of the quality of the decision is measured. Experiment 2 uses a different gambling scenario, but a similar design, whereby participants are provided with information about the quality of the decision in the first half of the scenario in the form of the probability of achieving a favourable outcome – thus, when rating the quality of the decision process after reading the first half of the scenario, participants are obliged to judge the decision process independently of the outcome that they read about in the second half of the scenario. Having discovered the outcome of the scenario, the extent to which they still rely on probabilistic information to judge the quality of the decision process (rather than using information about the outcome itself) can be measured.

Experiment 1

Experiment 1 was designed to test whether participants' judgments about the quality of the decision are influenced by information about the valence of the outcome that follows it. If this were the case, then it would offer further evidence that the two components of regret proposed by DJT are not completely independent from each other, because they share common antecedents and are both strongly associated with outcome seriousness.

Method

Design

The experiment employed a 2 (time: pre- or post-outcome information) x 3 (decision

justifiability: strong, weak or no justification) x 3 (outcome seriousness: high seriousness, low seriousness or positive outcomes) mixed factorial design. 'Time' was a within-groups factor. 'Decision justifiability' and 'outcome seriousness' were manipulated as between-groups factors. There were four measures of decision quality (decision justifiability, decision evaluation, decision regret and overall happiness). Participants completed the rating tasks for four different scenarios (icy road, coffee shop, traffic jam and travel vaccination).

Participants

Two hundred and fifty-nine undergraduate students from various disciplines at City University, London participated for a small confectionery gift. The sample comprised 52% male and 44% female participants (gender information was missing for 4%), aged between 18 and 47 years (M = 21 years).

Procedure and materials

Participants were randomly assigned to one of the nine experimental conditions, where each condition represented a combination of one level of outcome seriousness and one level of decision justifiability – i.e. High Seriousness/Strong justification (HSSJ), High Seriousness/Weak justification (HSWJ), High Seriousness/No Justification (HSNJ), Low Seriousness/Strong justification (LSSJ), Low Seriousness/Weak Justification (LSWJ), Low Seriousness/No Justification (LSNJ), Positive outcome/Strong Justification (POSJ), Positive outcome/Weak Justification (POWJ) or Positive Outcome/No Justification (PONJ).

Participants were presented with a series of four scenarios. The order of presentation of the scenarios was counterbalanced across participants. Each scenario was divided into two parts. For each scenario in turn, participants were asked to imagine themselves in the first part of the scenario, which described the situation leading up to the decision and stated the choice made by the individual. Scenarios read by participants in the 'strong justification' (SJ) or 'weak justification' (WJ) conditions provided reasons why the person made the decision they did. This information was not given in the 'no justification' (NJ) versions of the scenarios. An example of one of the scenarios is given below (full versions of all scenarios appear at the end of the thesis):

Traffic Jam scenario - Part One

You receive a sudden phone call from the hospital informing you that a loved one has had a serious accident and you are asked to go in as soon as possible. As you set out, you hear on the radio that there is traffic on your usual route ... [However, you decide to still take your usual route (No justification version)] ... OR ... [However, you decide to still take your usual route, as the only other available route is one you have used just once before and you got lost that time. On this occasion, you don't want to get lost and you think the traffic will have time to clear before you get to that part of the route (Strong justification version)] ... OR ... [However, you decide to still take your usual route, as you believe this is your 'lucky' route and, if you take it, things will work out fine (Weak justification version)].

After reading the first part of the scenario – and still imagining themselves as the person in the situation described – participants were asked to rate four different measures:

(a) Decision justifiability: "Given the information available, to what extent do you think you could justify your decision to [e.g. take your usual route]?" (1 = Totally justifiable; 7 = Not at all justifiable)

(b) Anticipated decision-regret: "To what extent do you think you might feel any regret about this decision at some point in the future?" (1 = Not at all regretful; 7 = Extremely regretful)

(c) Decision quality evaluation: "Overall, given the information available, to what extent do you think that the decision to [e.g. take your usual route] is good or bad?" (1 = Extremely bad decision; 7 = Extremely good decision)

(d) Happiness: "Overall, given the information available, how happy do you think you would be feeling?" (1 = Very unhappy; 7 = Very happy).

Participants were then instructed to turn the page and imagine themselves in the second part of the scenario, which described the outcome of the decision - either a high seriousness (HS), low seriousness (LS) or positive outcome (PO), depending on the condition to which participants had been assigned. The example of the Traffic Jam scenario continues below:

Traffic Jam scenario - Part Two

[Halfway through your journey, you get stuck in traffic and what would have been a 20 minute journey had you taken the other route (friends took the other route after they heard of the traffic) ended up taking you one hour. When you get to the hospital, you are told that your loved one died 20 minutes earlier (High seriousness versions)] ... OR ...

[Halfway through your journey, you get stuck in traffic and what would have been a 20 minute journey had you taken the other route (friends took the other route after they heard of the traffic) ended up taking you one hour. When you get to the hospital, you are told that your loved one went into theatre 20 minutes ago and so you won't be able to see them for a few hours. You are however informed that they will be alright (Low seriousness versions)] ... OR ...

[You reach the hospital in the usual 20 minutes and you find your relative on the ward. Friends who took the other route don't arrive for another 40 minutes and they miss seeing your relative before they go into theatre (Positive outcome versions)].

Having read about the outcome, participants were asked to complete a series of 7-point rating scales that measured their response to the complete scenario. The items included:

(a) Decision justifiability: "Given the information now available, to what extent do you think you could justify your decision to [e.g. take your usual route]?" (1 = Totally justifiable; 7 = Not at all justifiable)

(b) Decision quality evaluation: "Overall, to what extent do you think that the decision you made was good or bad?" (1 = Extremely bad decision; 7 = Extremely good decision)

(c) Decision-regret: "To what extent do you think you would now be regretting your decision to [e.g. take your usual route]?" (1 = Not at all regretful; 7 = Extremely regretful)

(d) Outcome-regret: "To what extent do you think you might now be regretting the outcome?" (1 = Not at all regretful; 7 = Extremely regretful)

(e) Seriousness of outcome (manipulation check): "How serious do you feel this outcome is?" (1 = Not at all serious; 7 = Extremely serious)

(f) Happiness: "Overall, given the information available, how happy do you think you would be feeling?" (1 = Very unhappy; 7 = Very happy).

Results

To aid interpretation, participants' responses on the decision justifiability item were reverse-scored. Therefore, high scores on the four rating scales relating to the decision process indicate a strongly justifiable decision, a high quality decision, high levels of regret, and high levels of happiness.

Effect of outcome information on judgements about the decision

In some of the scenarios, the manipulations of decision justifiability and outcome seriousness were not successful. Separate repeated measures ANOVAs were conducted for each of the four scenarios in turn, so that the effects of outcome information on participants' evaluations of the decision could be explored. The ANOVA models

incorporated 'Time' and 'Measure' as within-subjects factors, with 'Condition' as a between-subjects factor. The results for each scenario are reported below.

Icy road scenario. The manipulation of outcome seriousness was successful (F (2, 249) = 67.899, MSE = 2.112, p < .001) with 'high seriousness' outcomes being rated as more serious than 'low seriousness' outcomes and 'positive outcomes', and 'low seriousness' outcomes being rated as more serious than 'positive outcomes' (Tukey HSD, ps < .001). However, the manipulation of decision justifiability was not successful at all three levels of the factor (F (2, 250) = 7.128, MSE = 2.842, p = .001) . 'Strong justifications' were perceived as being more justifiable than 'weak justifications' (Tukey HSD, p = .001) and more justifiable than 'no justifications' (Tukey HSD, p = .012), but there was no significant difference in justifiability ratings between 'weak justifications' and 'no justifications' (Tukey HSD, p = .796). Therefore, in subsequent analyses, only 'strong justifications' and 'weak justifications' were contrasted ('no justification' conditions were excluded). As a result, there were six conditions included in the analysis – HSSJ, HSWJ, LSSJ, LSWJ, POSJ and POWJ.

Table 3.1 shows the mean ratings of participants by experimental condition before and after they had received information about the outcome in the icy road scenario. The means suggest that the patterns of change in ratings varied according to the version of the scenario that participants had read (see Figure 3.1). The results of the repeated measures ANOVA are shown in Table 3.2. There was a significant main effect of 'Condition' and there were three significant 2-way interactions – 'Time x Condition', 'Time x Measure' and 'Measure x Condition'. However, these were all qualified by a significant 'Time x Measure x Condition' interaction. Post-hoc analyses (Related *t* tests) showed that, whilst the changes in ratings were in the predicted directions, these

Table 3.1

Mean pre- and post-outcome ratings of the decision process – Icy Road scenario (Experiment 1)

	Decision justifiability*		Decision evaluation		Overall happiness		Decision regret		Outcome regret
Condition	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Post-
HSSJ	4.24	3.79	3.72	2.79 [a]	4.00	2.79 [a]	3.86	5.14 [a]	5.59
(n = 29)	(1.883)	(2.007)	(1.688)	(1.780)	(1.604)	(1.878)	(1.903)	(2.117)	(1.991)
HSWJ	3.22	2.63 [b]	3.22	2.48 [b]	3.93	2.37 [a]	4.26	5.30 [a]	5.77
(n = 27)	(1.826)	(1.822)	(1.502)	(1.929)	(1.299)	(1.822)	(1.583)	(1.750)	(1.478)
LSSJ	4.41	3.93	3.44	3.26	4.00	3.41 [b]	4.52	5.04	5.19
(n = 27)	(1.575)	(1.685)	(1.396)	(1.430)	(1.468)	(1.760)	(1.602)	(1.911)	(1.922)
LSWJ	3.29	2.50 [b]	2.96	2.18 [a]	3.93	2.68 [a]	4.54	5.75 [a]	5.96
(n = 28)	(1.902)	(1.876)	(1.427)	(1.278)	(1.331)	(1.634)	(1.815)	(1.456)	(1.401)
POSJ	4.37	4.77	3.80	4.93 [a]	3.93	5.57 [a]	3.90	2.70 [a]	2.69
(n = 30)	(1.671)	(1.924)	(1.400)	(1.574)	(1.574)	(1.357)	(1.647)	(1.822)	(1.966)
POWJ	3.93	4.69 [a]	3.48	4.66 [a]	4.34	5.45 [a]	3.83	2.66 [a]	2.21
(n = 29)	(1.361)	(1.795)	(1.299)	(1.876)	(1.421)	(1.502)	(1.513)	(1.838)	(1.544)

Notes: Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret and greater happiness/satisfaction about the decision. [a] denotes a significant difference between pre- and post-outcome ratings (Related t tests, ps < .05, 2-tailed tests). [b] denotes a marginally significant difference between pre- and post-outcome ratings (Related t tests, ps < .08, 2-tailed tests). Standard deviations appear in parentheses.

Figure 3.1

Change in decision-related ratings according to experimental condition: Icy road scenario (Experiment 1)

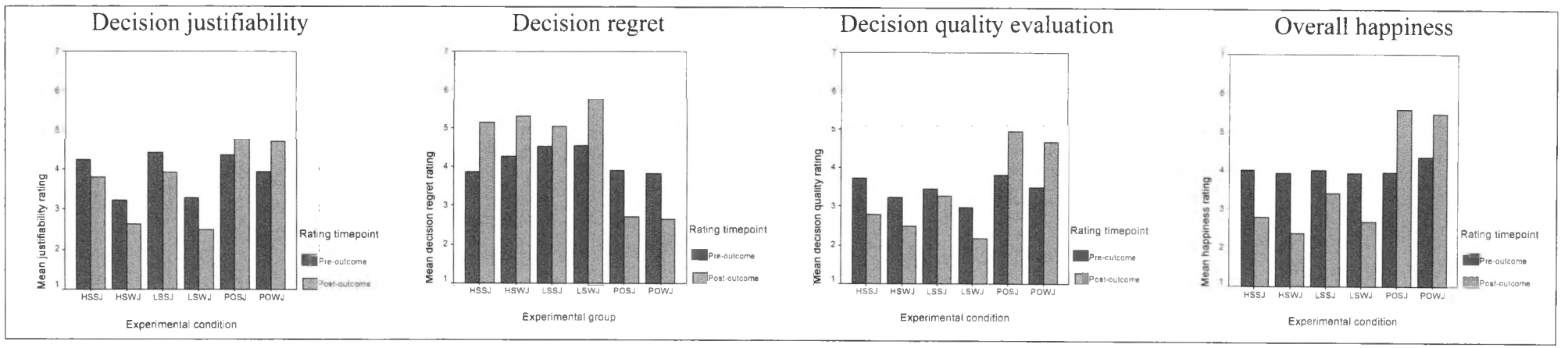


Table 3.2

Repeated measures ANOVA results – Icy Road scenario (Experiment 1)

Main effect or interaction	F statistic and significance
'Time'	$F(1, 164) = 0.985$, $MSE = 1.692$, $p = .322$
'Measure'	$F(1, 164) = 3.512$, $MSE = 5.953$, $p = .063$
'Condition'	$F(5, 164) = 7.311$, $MSE = 3.589$, $p < .001$
'Time x Condition'	$F(5, 164) = 6.452$, $MSE = 1.692$, $p < .001$
'Measure x Condition'	$F(15, 492) = 8.621$, $MSE = 5.953$, $p < .001$
'Time x Measure'	$F(3, 492) = 3.325$, $MSE = 1.862$, $p = .024$
'Time x Measure x Condition'	$F(15, 492) = 10.889$, $MSE = 1.862$, $p < .001$

Note: Emboldened effects or interactions were statistically significant (ps < .05, 2-tailed)

did not reach statistical significance for all measures in all experimental conditions.

As predicted, when participants read about negative outcomes (HS and LS versions), they rated the decision as less justifiable than they had before the outcome was known. When participants read about positive outcomes (PO versions), they rated the decision as more justifiable than they had previously done. These changes in rated decision justifiability were statistically significant for participants in three of the six conditions (1-tailed tests) - HSWJ (t (26) = 1.844, p = .039), LSWJ (t (27) = 1.983, p = .029)and POWJ (t (28) = -2.087, p = .023). Similar patterns of change were present for the remaining three conditions but these did not reach statistical significance (1-tailed tests) - HSSJ (t (28) = 1.436, p = .081), LSSJ (t (26) = 1.161, p = .128) and POSJ (t (29) = -1.508, p = .071). It seems that where stronger reasons were given for the choice in the scenario, participants' perceptions of decision justifiability were more resistant to the influence of outcome information.

When looking at evaluations of the quality of the decision (good vs. bad decision), for negative outcomes (HS and LS), the decision was rated as being of poorer quality once the outcome was known. Conversely, for positive outcomes (PO), the decision was rated as being of higher quality once the outcome was known. Decision evaluation ratings changed significantly in the predicted directions for five of the conditions (1-tailed tests) - HSSJ (t (28) = 2.830, p = .004), HSWJ (t (26) = 1.951, p = .031), LSWJ (t (27) = 3.306, p = .001), POSJ (t (29) = -4.070, p < .001) and POWJ (t (28) = -3.306, p = .001). Although the pattern of change was in the predicted direction for the LSSJ condition, this did not reach statistical significance (t (26) = 0.926, p = .181, 1-tailed test).

Decision-regret ratings also changed significantly in the predicted direction for five of the six scenarios (1-tailed tests) - HSSJ (t (28) = -3.294, p = .001), HSWJ (t (26) = -3.092, p = .002), LSWJ (t (27) = -3.117, p = .002), POSJ (t (29) = 2.983, p = .003) and POWJ (t (28) = 3.407, p = .001). The pattern of change was in the predicted direction for the LSSJ condition, but this did not reach statistical significance (t (26) = -1.548, p = .067, 1-tailed test). Participants who read negative outcomes (HS and LS) reported more regret about their decision to take the icy route after the outcome was known than they had previously anticipated. Participants who read positive outcomes (PO) rated their decision-regret as being less after reading the outcome than they had earlier anticipated.

In terms of happiness, participants in all conditions showed significant differences between their pre- and post-outcome information ratings (1-tailed tests) - HSSJ (t (28) = 3.130, p = .002), HSWJ (t (26) = 4.029, p < .001), LSSJ (t (26) = 1.772, p = .044), LSWJ (t (27) = 3.722, p < .001), POSJ (t (29) = -5.289, p < .001) and POWJ (t (28) = -3.231, p = .001). As might be expected, when they read that the outcome had been negative, participants rated themselves as less happy with the situation than they had previously been but, when they read that the outcome had been positive, participants' happiness increased.

Coffee shop scenario. The manipulation of decision justifiability was successful (F (2, 250) = 17.487, MSE = 3.064, p < .001) with 'strong justifications being rated as more justifiable than 'weak justifications' (Tukey HSD, p < .001) and 'no justifications' (Tukey HSD, p = .057), and 'weak justifications' being perceived as more justifiable than 'no justifications' (Tukey HSD, p = .001). However, the manipulation of outcome seriousness was not successful at all levels of the factor (F (2, 249) = 2.981, MSE =

2.630, p = .053). 'High seriousness' outcomes were not perceived as being more serious than 'low seriousness' outcomes (Tukey HSD, p = .662), and 'low seriousness' outcomes were not seen as being more serious than 'positive outcomes' (Tukey HSD, p = .281). 'High seriousness' outcomes were however rated as significantly more serious than 'positive outcomes' (Tukey HSD, p = .044). Therefore, in subsequent analyses, contrasts were only made between 'high seriousness' and 'positive' outcomes ('low seriousness' outcome conditions were excluded). As a result, there were six conditions included in the analysis – HSSJ, HSWJ, HSNJ, POSJ, POWJ and PONJ.

Table 3.3 shows the mean ratings of participants by experimental condition before and after they had received information about the outcome in the coffee shop scenario. The patterns of change in ratings again varied according to the version of the scenario that participants had read (see Figure 3.2). The results of the repeated measures ANOVA are shown in Table 3.4. There were significant main effects of 'Time', 'Measure' and 'Condition'. There were also two significant 2-way interactions – 'Time x Condition' and 'Measure x Condition'. These effects were all qualified by a significant 'Time x Measure x Condition' interaction. Post-hoc analyses (Related *t* tests) showed that, whilst the changes in ratings were in the predicted directions, these did not reach statistical significance for the happiness ratings of participants in the PONJ experimental condition.

Decision justifiability ratings changed significantly for participants in all six conditions (1-tailed tests) - HSSJ (t (28) = 4.688, p < .001), HSWJ (t (26) = 2.650, p = .007), HSNJ (t (29) = 3.204, p = .001), POSJ (t (28) = -2.544, p = .008), POWJ (t (28) = -2.985, p = .003) and PONJ (t (26) = -2.935, p = .003). Participants who read about a negative outcome (HS versions) rated the decision as less justifiable once they knew what the

Table 3.3

Mean pre- and post-outcome ratings of the decision process – Coffee shop scenario (Experiment 1)

	Decision justifiability*		Decision evaluation		Overall happiness		Decision regret		Outcome regret
Condition	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Post-
HSSJ	5.48	4.00 [a]	4.76	3.17 [a]	5.41	3.41 [a]	3.38	5.34 [a]	5.38
(n = 29)	(1.639)	(1.813)	(1.806)	(1.872)	(1.053)	(2.044)	(1.656)	(1.914)	(1.840)
HSWJ	4.22	3.22 [a]	4.22	2.41 [a]	4.26	2.74 [a]	3.85	5.30 [a]	5.48
(n = 27)	(1.908)	(1.928)	(1.396)	(1.152)	(1.347)	(1.534)	(1.512)	(1.489)	(1.784)
HSNJ	4.67	3.33 [a]	4.60	2.73 [a]	4.53	2.70 [a]	3.53	5.30 [a]	5.20
(n = 30)	(1.988)	(1.918)	(1.499)	(1.507)	(1.592)	(1.343)	(1.479)	(1.601)	(1.710)
POSJ	4.83	5.55 [a]	4.28	6.14 [a]	4.62	5.86 [a]	4.52	2.31 [a]	2.38
(n = 29)	(1.814)	(1.404)	(1.279)	(1.026)	(1.237)	(1.552)	(1.455)	(1.834)	(1.879)
POWJ	3.79	4.76 [a]	3.38	5.48 [a]	4.24	5.59 [a]	4.31	2.31 [a]	2.07
(n = 29)	(1.878)	(1.640)	(1.347)	(1.617)	(1.480)	(1.547)	(1.538)	(1.650)	(1.624)
PONJ	4.52	5.67 [a]	4.37	5.70 [a]	4.70	5.15	3.96	2.30 [a]	2.19
(n = 27)	(1.602)	(1.441)	(1.043)	(1.382)	(1.137)	(1.994)	(1.427)	(1.514)	(1.442)

Notes: Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret and greater happiness/satisfaction about the decision. [a] denotes a significant difference between pre- and post-outcome ratings (Related t tests, ps < .05, 2-tailed tests). Standard deviations appear in parentheses.

Figure 3.2

Change in decision-related ratings according to experimental condition: Coffee shop scenario (Experiment 1)

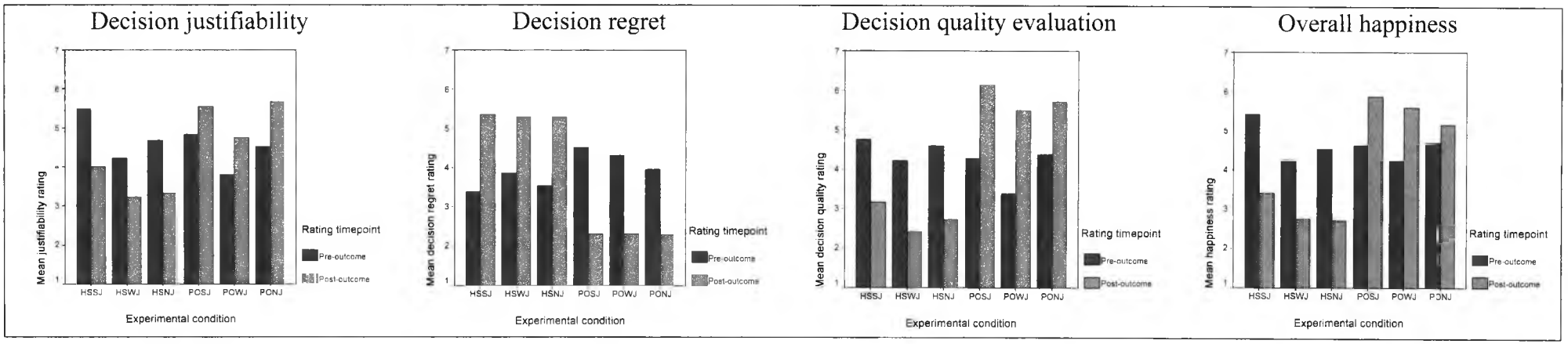


Table 3.4

Repeated measures ANOVA results – Coffee Shop scenario (Experiment 1)

Main effect or interaction	F statistic and significance
'Time'	F (1, 165) = 5.191, MSE = 1.796, p = .024
'Measure'	F (3, 495) = 8.706, MSE = 4.505, p < .001
'Condition'	F (5, 165) = 11.856, MSE = 2.639, p < .001
'Time x Condition'	F (5, 165) = 14.415, MSE = 1.796, p < .001
'Measure x Condition'	F (15, 495) = 7.842, MSE = 4.505, p < .001
'Time x Measure'	F (3, 495) = 1.139, MSE = 2.680, p = .326
'Time x Measure x Condition'	F (15, 495) = 23.984, MSE = 2.680, p < .001

Note: Emboldened effects or interactions were statistically significant (ps < .05, 2-tailed)

outcome was than they had before they knew it. Conversely, participants who read about a positive outcome (PO versions) rated the decision as more justifiable after they knew the outcome than they had previously.

Decision evaluation ratings also changed significantly in the predicted directions for all six conditions (1-tailed tests) - HSSJ (t (28) = 2.924, p = .003), HSWJ (t (26) = 5.828, p < .001), HSNJ (t (29) = 5.521, p < .001), POSJ (t (28) = -7.126, p < .001), POWJ (t (28) = -5.549, p < .001) and PONJ (t (26) = -4.000, p < .001). Participants who read about a negative outcome (HS versions) perceived the decision to be poorer once they knew the outcome than they had done previously; in contrast, participants who read about a positive outcome (PO versions) rated the decision to be of better quality after they knew the outcome than they had done previously.

In all conditions, there were significant differences between participants' ratings of decision-regret before they knew the outcome and their ratings of decision-regret after they knew the outcome (1-tailed tests) - HSSJ (t (28) = -4.442, p < .001), HSWJ (t (26) = -3.814, p < .001), HSNJ (t (29) = -5.029, p < .001), POSJ (t (28) = 6.265, p < .001), POWJ (t (28) = 5.160, p < .001), PONJ (t (26) = 3.998, p < .001). The changes in ratings were in the predicted directions, according to the valence of the outcome that participants read about. Those who read about a negative outcome imagined themselves to regret their decision to buy the coffee shop more than they had expected to do previously, while those who read about a positive outcome envisaged less decision-regret after the outcome was known than they had done beforehand.

In terms of happiness, there were differences between participants' pre- and post-outcome information ratings in five of the six conditions (1-tailed tests) - HSSJ (t (28) =

4.653, $p < .001$), HSWJ (t (26) = 4.593, $p < .001$), HSNJ (t (29) = 5.514, $p < .001$), POSJ (t (28) = -3.786, $p < .001$) and POWJ (t (28) = -3.983, $p < .001$). Again, all of the changes in ratings were in the predicted directions, according to the valence of the outcome participants had read. Those who imagined a negative outcome (HS versions) rated themselves as being less happy once the outcome was known than they had done beforehand, while those who imagined a positive outcome (POSJ and POWJ) rated themselves as being significantly happier after the outcome was known than they had been previously. Participants in the PONJ condition also rated themselves as being more happy once they knew the outcome, but this difference in ratings did not reach statistical significance (t (26) = -1.055, $p = .150$, 1-tailed test).

Traffic jam scenario. The manipulations of outcome seriousness (F (2, 254) = 36.687, $MSE = 2.526$, $p < .001$) and decision justifiability (F (2, 254) = 15.315, $MSE = 3.278$, $p < .001$) were not successful at all levels of the factors. 'High seriousness' outcomes were perceived as being significantly more serious than 'low seriousness' outcomes and 'positive' outcomes (Tukey HSD, $ps < .001$), but there was no significant difference in perceived seriousness of 'low seriousness' outcomes and 'positive' outcomes (Tukey HSD, $p = .399$). Therefore, in subsequent analyses, contrasts were only made between 'high seriousness' and 'positive' outcome groups ('low seriousness' outcome conditions were excluded). In terms of decision justifiability, 'strong justifications' were perceived as significantly more justifiable than 'weak justifications' and 'no justifications' (Tukey HSD, $ps < .001$); however, 'weak justifications' were not perceived as any more or less justifiable than 'no justifications' (Tukey HSD = .905). Therefore, in subsequent analyses, only 'strong justifications' and 'weak justifications' were contrasted ('no justification' conditions were excluded). Thus, four conditions were included in the analysis – HSSJ, HSWJ, POSJ and POWJ.

Table 3.5 shows the mean ratings of participants by experimental condition before and after they had received information about the outcome in the traffic jam scenario. The pattern of changes in participants' pre- and post-outcome information ratings varied according to condition (see Figure 3.3).

The results of the repeated measures ANOVA are shown in Table 3.6. There were significant main effects of 'Time', 'Measure' and 'Condition. In addition, there were three significant 2-way interactions – 'Time x Condition', 'Time x Measure' and 'Measure x Condition'. However, all of these effects were qualified by a significant 'Time x Measure x Condition' interaction. Post-hoc analyses (Related *t* tests) showed that participants' ratings on all measures changed significantly, with the exception of the decision justifiability ratings made by participants in the HSWJ condition.

In three of the four conditions, there were significant changes in decision justifiability ratings (1-tailed tests) - HSSJ (t (28) = 3.377, p = .001), POSJ (t (28) = -2.730, p = .005) and POWJ (t (28) = -3.562, p < .001). Participants who read a negative outcome (HSSJ version) rated the decision as less justifiable after they knew the outcome than they had done beforehand; conversely, after they had read a positive outcome (PO versions) participants rated the decision as more justifiable than they had done before they knew the outcome. Participants in the HSWJ condition also rated the decision as less justifiable after they discovered the nature of the outcome than they had done previously, but this change in rating did not reach statistical significance (t (26) = 0.880, p = .193, 1-tailed test).

Decision evaluation ratings also showed the predicted patterns of change in all four conditions, according to the valence of the outcome that participants read (1-tailed tests)

Table 3.5

Mean pre- and post-outcome ratings of the decision process – Traffic jam scenario (Experiment 1)

	Decision justifiability*		Decision evaluation		Overall happiness		Decision regret		Outcome regret
Condition	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Post-
HSSJ	5.07	3.97 [a]	4.31	2.79 [a]	3.55	2.07 [a]	3.83	4.90 [a]	5.86
(n = 29)	(1.710)	(2.129)	(1.606)	(1.656)	(1.785)	(1.710)	(1.853)	(2.273)	(1.846)
HSWJ	3.52	3.11	3.19	2.00 [a]	3.19	2.00 [a]	4.78	6.04 [a]	6.33
(n = 27)	(1.889)	(1.908)	(1.145)	(1.387)	(1.618)	(1.569)	(1.528)	(1.255)	(1.301)
POSJ	5.21	5.76 [a]	4.72	5.75 [a]	3.10	4.14 [a]	4.57	1.86 [a]	2.21
(n = 28)	(1.544)	(1.596)	(1.386)	(1.723)	(1.839)	(1.995)	(1.731)	(1.380)	(1.473)
POWJ	3.93	4.93 [a]	3.48	5.10 [a]	3.17	4.90 [a]	4.41	2.17 [a]	2.52
(n = 29)	(1.731)	(1.731)	(1.405)	(1.839)	(1.627)	(1.676)	(1.722)	(1.416)	(1.661)

Notes: Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret and greater happiness/satisfaction about the decision. [a] denotes a significant difference between pre- and post-outcome ratings (Related t tests, ps < .05, 2-tailed tests). Standard deviations appear in parentheses.

Figure 3.3

Change in decision-related ratings according to experimental condition: Traffic jam scenario (Experiment 1)

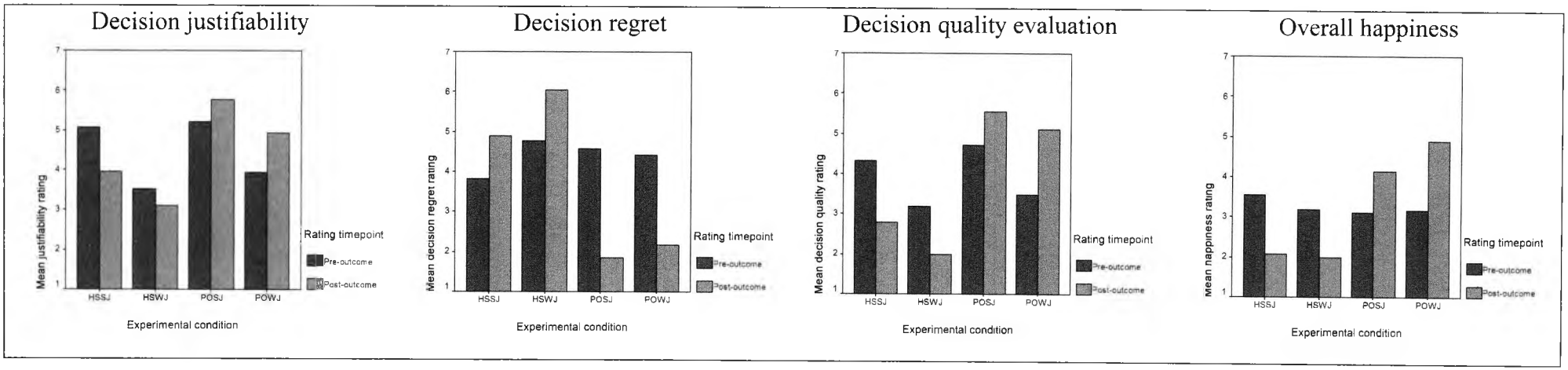


Table 3.6

Repeated measures ANOVA results – Traffic Jam scenario (Experiment 1)

Main effect or interaction	F statistic and significance
'Time'	F (1, 109) = 4.437, MSE = 1.299, p = .037
'Measure'	F (3, 327) = 13.815, MSE = 4.775, p < .001
'Condition'	F (1, 109) = 9.133, MSE = 3.317, p < .001
'Time x Condition'	F (3, 109) = 13.253, MSE = 1.299, p < .001
'Measure x Condition'	F (9, 327) = 13.984, MSE = 4.775, p < .001
'Time x Measure'	F (3, 327) = 2.885, MSE = 2.899, p = .051
'Time x Measure x Condition'	F (9, 327) = 19.787, MSE = 2.899, p < .001

Note: Emboldened effects or interactions were statistically significant (ps ≤ .05, 2-tailed)

- HSSJ (t (28) = 3.718, p < .001), HSWJ (t (26) = 3.509, p = .001), POSJ (t (28) = -2.188, p = .018) and POWJ (t (28) = -3.736, p < .001). After participants had read a negative outcome, they rated the decision as being of poorer quality than they had before they knew the outcome. In contrast, after participants had read a positive outcome, they rated the decision as being of better quality than they had previously done.

Participants also adjusted their ratings of decision-regret after they had read the outcome of the scenario. As predicted, the pattern of changes in ratings varied according to the valence of the outcome and was significant in all four conditions (1-tailed tests) - HSSJ (t (28) = -2.297, p = .014), HSWJ (t (26) = -4.011, p < .001), POSJ (t (28) = 6.183, p < .001) and POWJ (t (28) = 5.092, p < .001). After reading a negative outcome, participants rated their decision to take the congested route to the hospital as being more regrettable than they had anticipated previously; after reading a positive outcome, they rated their decision-regret as being less than they had previously anticipated.

Participants in all four conditions showed significant differences between their pre- and post-outcome information ratings of happiness (1-tailed tests) - HSSJ (t (28) = 3.971, p < .001), HSWJ (t (26) = 4.529, p < .001), POSJ (t (28) = -2.616, p = .007) and POWJ (t (28) = -5.073, p < .001). The pattern of changes was again in the predicted directions, according to the valence of the outcome participants had read. After reading about a negative outcome, they rated themselves as being less happy than they had done before they knew the outcome. After reading about a positive outcome, they rated themselves as being happier than they had previously done.

Travel vaccine scenario. The manipulation of outcome seriousness was successful (F (2, 255) = 44.765, MSE = 2.484, p < .001) with 'high seriousness' outcomes being rated

as more serious than 'low seriousness' outcomes and 'positive outcomes' (Tukey HSD, ps < .001) and 'low seriousness' outcomes rated as more serious than 'positive outcomes' (Tukey HSD, p = .003). However, the manipulation of decision justifiability was not successful for all levels of the factor (F (2, 254) = 1.883, MSE = 3.424, p = .154). 'Strong justifications' were not perceived as being any more justifiable than 'weak justifications' (Tukey HSD, p = .492) or 'no justifications' (Tukey HSD, p = .717), and 'weak justifications' were rated equally as justifiable as 'no justifications' (Tukey HSD, p = .133). Therefore, participants were divided into strong or weak justification groups, according to their actual ratings of justifiability (using a median split). This created six 'outcome/justifiability' groups for the purposes of analysing the data (HSSJ, HSWJ, LSSJ, LSWJ, POSJ and POWJ).

Table 3.7 shows the mean ratings of participants by experimental condition before and after they had received information about the outcome in the travel vaccine scenario. The patterns of change in ratings were as predicted - participants adjusted their decision-related judgments according to the valence of the outcome that they had read for the travel vaccine scenario (see Figure 3.4). The results of the repeated measures ANOVA are shown in Table 3.8. There were significant main effects of 'Measure' and 'Condition. There were also three significant 2-way interactions – 'Time x Condition', 'Time x Measure' and 'Measure x Condition'. These effects were qualified by a significant 'Time x Measure x Condition' interaction. Post-hoc analyses (Related t tests) showed that, whilst the changes in ratings were usually in the predicted directions, these did not reach statistical significance for all measures for all of the groups of participants.

Decision justifiability ratings changed significantly and in the expected directions in

Table 3.7

Travel vaccine scenario: mean decision-related ratings pre- and post-outcome information (Experiment 1)

	Decision justifiability*		Decision evaluation		Overall happiness		Decision regret		Outcome regret
Condition	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Post-
HSSJ	4.72	5.04	4.00	3.20	4.56	2.84 [a]	3.48	4.04	5.17
(n = 25)	(1.696)	(1.306)	(1.915)	(2.062)	(1.805)	(1.951)	(1.661)	(2.263)	(1.834)
HSWJ	2.36	1.44 [a]	2.34	1.86 [a]	3.31	1.67 [a]	5.45	6.36 [a]	6.39
(n = 64)	(1.441)	(.614)	(1.371)	(1.833)	(1.632)	(1.502)	(1.501)	(1.373)	(1.432)
LSSJ	4.10 [a]	5.10	3.16	3.48	4.29	3.39 [a]	4.26	4.32	4.97
(n = 31)	(2.039)	(1.136)	(1.594)	(1.411)	(1.532)	(1.430)	(1.983)	(1.641)	(1.494)
LSWJ	2.20	1.64 [a]	2.05	2.05	3.07	2.89	5.41	5.86 [a]	5.45
(n = 56)	(1.381)	(.749)	(1.166)	(1.381)	(1.582)	(1.569)	(1.745)	(1.470)	(1.834)
POSJ	4.09	5.17 [a]	3.15	4.13 [a]	4.09	4.96 [a]	4.50	3.35 [a]	3.04
(n = 45)	(1.774)	(1.235)	(1.646)	(1.628)	(1.411)	(1.580)	(1.709)	(1.567)	(1.776)
POWJ	1.57	1.77 [a]	1.83	3.14 [a]	2.91	5.11 [a]	5.74	4.31 [a]	3.83
(n = 35)	(.608)	(.646)	(1.071)	(1.942)	(1.380)	(1.605)	(1.633)	(2.083)	(2.229)

Notes: Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret and greater happiness/satisfaction about the decision. [a] denotes a significant difference between pre- and post-outcome ratings (Related t tests, ps $\leq .05$, 2-tailed tests). Standard deviations appear in parentheses.

Figure 3.4

Change in decision-related ratings according to outcome/justifiability grouping: Travel vaccine scenario (Experiment 1)

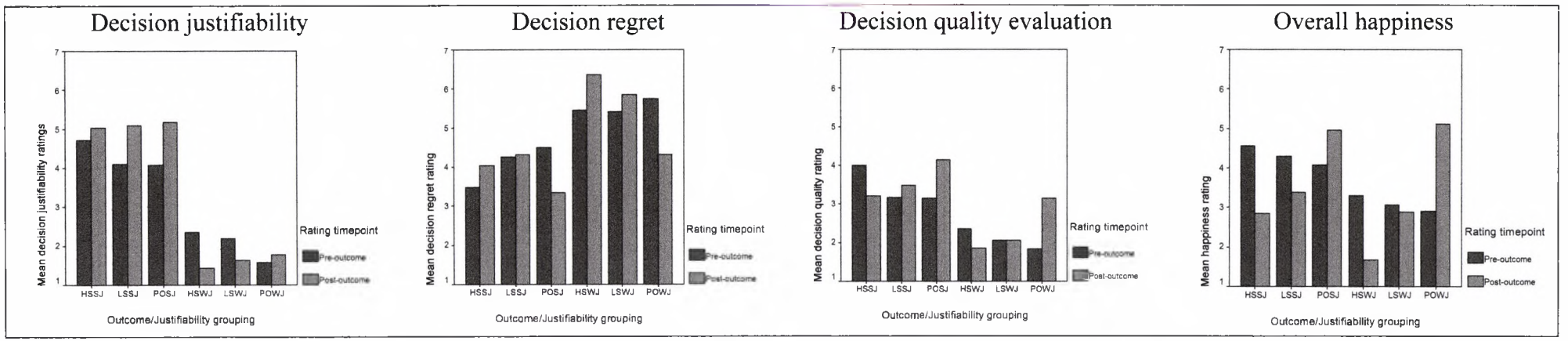


Table 3.8

Repeated measures ANOVA results – Travel Vaccine scenario (Experiment 1)

Main effect or interaction	F statistic and significance
'Time'	F (1, 250) = 0.141, MSE = 1.561, p = .707
'Measure'	F (3, 750) = 92.493, MSE = 4.626, p < .001
'Condition'	F (5, 250) = 35.654, MSE = 2.386, p < .001
'Time x Condition'	F (5, 250) = 11.265, MSE = 1.561, p < .001
'Measure x Condition'	F (15, 750) = 28.591, MSE = 4.626, p < .001
'Time x Measure'	F (3, 750) = 3.543, MSE = 2.022, p = .022
'Time x Measure x Condition'	F (15, 750) = 16.078, MSE = 2.022, p < .001

Note: Emboldened effects or interactions were statistically significant (ps < .05, 2-tailed)

four of the six outcome/justifiability groups (1-tailed tests) - HSWJ (t (63) = 5.421, p < .001), LSWJ (t (55) = 3.482, p = .001), POSJ (t (45) = -3.710, p < .001) and POWJ (t (34) = -2.026, p = .025). When participants had read about negative outcomes (HSWJ or LSWJ versions) they rated the decision as less justifiable than they had done before the outcome was known. Conversely, when they had read about a positive outcome (PO versions), participants rated the decision as more justifiable than they had done originally. There was one exception to this pattern – participants in the LSSJ group showed a significant increase in their ratings of decision justifiability after they discovered the outcome (t (30) = -2.761, p = .010, 2-tailed). However, the low serious outcome described in this scenario was a mild flu-like illness with no long-term consequences for the individual and, prior to discovering the outcome, participants in this group had rated the decision to go on the holiday without the recommended vaccine as justifiable to some extent. Participants in the HSSJ group did show change in their ratings of decision justifiability in the expected direction, but this did not reach statistical significance (t (24) = -0.969, p = .171, 1-tailed).

After they discovered the outcome of the scenario, participants in three of the six outcome/justifiability groupings changed their decision evaluation ratings significantly (1-tailed tests) - HSWJ (t (63) = 2.143, p = .018), POSJ (t (45) = -5.140, p < .001) and POWJ (t (34) = -4.332, p < .001). Their adjustments in ratings followed the predicted pattern whereby, after participants read about a negative outcome, they rated the decision as being of poorer quality than they had done before the outcome was known. After reading about a positive outcome, participants rated the decision as being of better quality than they had done previously. Participants in the HSSJ and LSSJ groups also showed change in their evaluation of the decision in the expected direction, but these changes did not reach statistical significance (t (24) = 1.477, p = .076; and t (30) = -

0.935, p = .183, respectively – both 1-tailed tests). For participants in the LSWJ grouping, there was no change at all in their evaluation of the decision quality (t (55) = 0.000, p = 1.000, 2-tailed test).

In four out of six groups, there were significant differences between participants' ratings of anticipated decision-regret before they knew the outcome and their ratings of decision-regret after they discovered the outcome (1-tailed tests) - HSWJ (t (63) = -4.909, p < .001), LSWJ (t (55) = -2.024, p = .024), POSJ (t (45) = 3.519, p < .001) and POWJ (t (34) = 3.077, p = .002). The changes in ratings were in the predicted direction, varying according to the valence of the outcome participants had read. After reading about a negative outcome, participants who had initially felt the decision was not justifiable rated their decision-regret as greater than they had anticipated before the outcome was known. After reading about a positive outcome (PO versions), participants imagined they would feel less decision-regret than they had anticipated. Participants in the LSSJ and HSSJ groups showed some change in their decision-regret ratings in the expected direction, but these changes did not reach statistical significance (t (24) = -0.165, p = .435; and t (24) = -1.478, p = .076, respectively – both 1-tailed tests). Thus, where there was a negative outcome but they initially perceived the decision to have been somewhat justifiable, participants did not change their view of how regrettable the choice not to have the vaccine would be.

In five of the six outcome/justifiability groupings, participants' ratings of happiness also changed after they discovered the outcome, compared to before they knew about the outcome (1-tailed tests) - HSSJ (t (24) = 3.928, p < .001), HSWJ (t (63) = 6.152, p < .001), LSSJ (t (30) = 2.861, p = .004), POSJ (t (44) = -3.157, p = .001) and POWJ (t (34) = -7.184, p < .001). The changes in ratings were in the predicted direction, varying

according to the valence of the outcome. After reading about a negative outcome (HS and LS versions), participants imagined they would be less happy than they had previously anticipated. After reading about a positive outcome (PO versions), participants rated themselves as being happier than they had previously imagined. Participants in the LSWJ group rated themselves as less happy after they knew the outcome than they had done previously, but this change in ratings did not reach statistical significance (t (55) = 0.927, p = .179, 1-tailed test).

Comparisons of ratings of decision regret and outcome regret

DJT argues that, where there are strong justifications for a choice, there should be a reduction in the amount of decision regret (or self-blame regret) experienced. Tables 3.1, 3.3, 3.5 and 3.7 show participants' mean post-outcome ratings of decision regret and outcome regret in each scenario by experimental condition. For each of the four scenarios, repeated measures ANOVAs were performed, comparing participants' post-outcome ratings of decision regret and outcome regret. 'Regret component' was a within-subjects factor and 'Condition' was a between-subjects factor in these models. The results of these analyses are presented below for each scenario in turn.

Icy road scenario. There was a significant main effect of 'Condition' on regret ratings (F (5, 162) = 25.504, MSE = 5.185 p < .001), this largely reflecting the fact that negative outcomes (associated with strong or weak justifications) were more regrettable than their equivalent positive outcomes. However, there was no significant main effect of 'Regret component' (F (1, 162) = 0.999, MSE = 1.184, p = .319) and no significant 'Regret component x Condition' interaction (F (5, 162) = 1.289, MSE = 1.184, p = .271). Thus, across all the conditions, there was no significant difference between

participants' ratings of decision regret (M = 4.39, SD = 2.303) and outcome regret (M = 4.53, SD = 2.206).

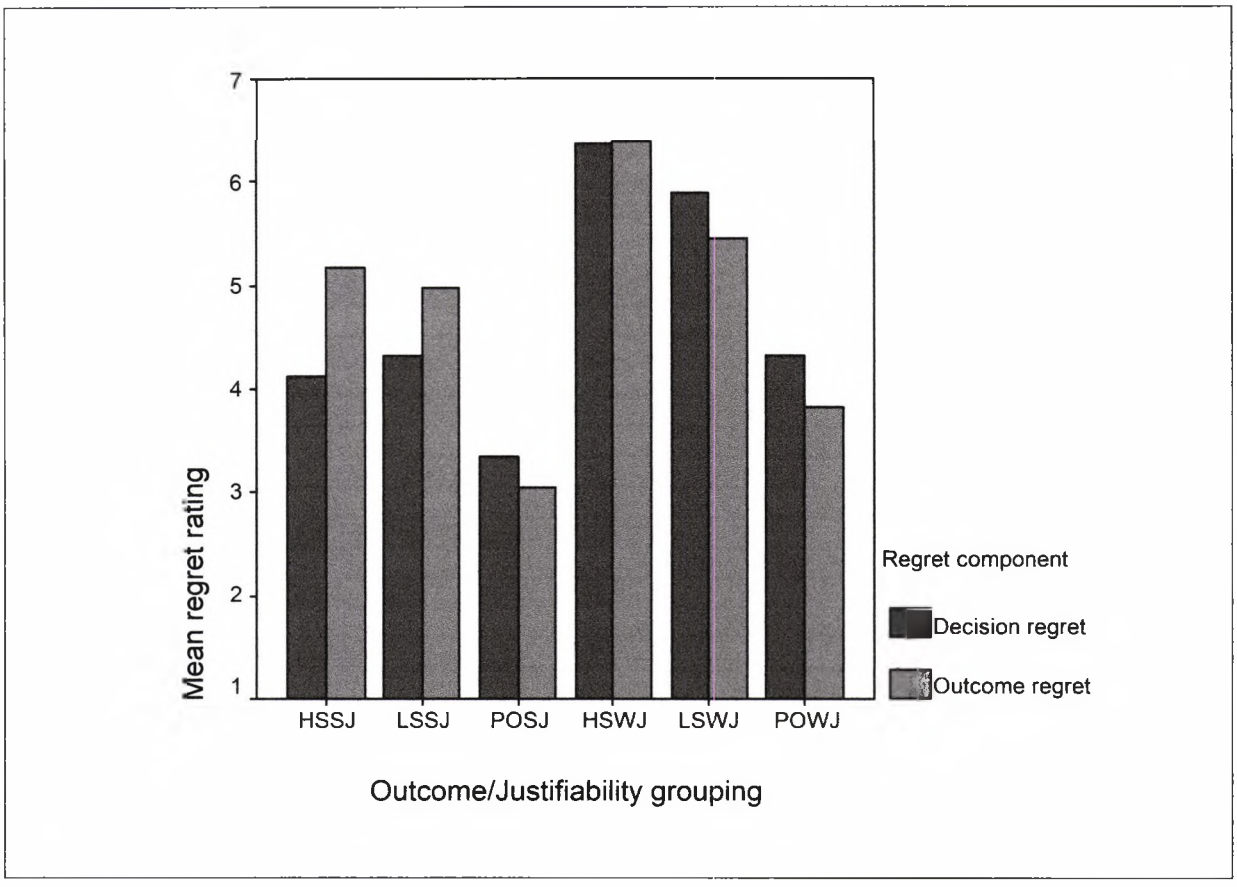
Coffee shop scenario. There was again a significant main effect of 'Condition' on regret ratings (F (5, 165) = 31.806, MSE = 5.084, $p < .001$) but there was no significant main effect of 'Regret component' (F (1, 165) = 0.092, MSE = 0.696, $p = .763$) and no significant 'Regret component x Condition' interaction (F (5, 165) = 0.471, MSE = 0.696, $p = .798$). Thus, in all conditions, there was no significant difference between participants' ratings of decision regret (M = 3.82, SD = 2.238) and outcome regret (M = 3.79, SD = 2.317).

Traffic jam scenario. As in the previous two scenarios, there was a significant main effect of 'Condition' (F (3, 109) = 55.796, MSE = 4.415, $p < .001$). There was also a significant main effect of 'Regret component' (F (1, 109) = 17.489, MSE = 0.807, $p < .001$) but no significant 'Regret component x Condition' interaction (F (3, 109) = 1.740, MSE = 0.807, $p = .163$). Across all conditions, outcome regret (M = 4.19, SD = 2.449) exceeded decision regret (M = 3.72, SD = 2.400).

Travel vaccine scenario. There was no significant main effect of 'Regret component' on regret ratings (F (1, 249) = 0.582, MSE = 1.313, $p = .446$). There was, however, a significant main effect of 'Condition' (F (5, 249) = 29.281, MSE = 4.540, $p < .001$) although this was qualified by a significant 'Regret component x Condition' interaction (F (5, 249) = 4.702, MSE = 1.313, $p < .001$) – see Figure 3.5. Post-hoc analyses (Related *t* tests, 2-tailed) showed that outcome regret was rated as being significantly greater than decision regret by participants in the HSSJ group (t (23) = -2.444, $p = .035$) and participants in the LSSJ group (t (30) = -2.270, $p = .031$). However, participants in

Figure 3.5

Differences in participants' post-outcome ratings of outcome regret and decision regret by outcome/justifiability grouping – Travel vaccine scenario (Experiment 1)



the LSWJ group rated their decision regret as being greater than their outcome regret (t (54) = 2.408, p = .019). There was no significant difference between rated decision regret and outcome regret for participants in the remaining groups – HSWJ (t (63) = -0.212, p = .833), POWJ (t (34) = 1.622, p = .114) or POSJ (t (45) = 1.069, p = .291).

In summary, comparisons of participants' post-outcome ratings of the two components of regret (decision regret and outcome regret) did offer some limited support for DJT's proposal that, where there is a strong justification for a choice, there will be a reduction in the amount of decision regret experienced. However, this effect was statistically significant in only one of the four scenarios (travel vaccine). Furthermore, the data for this scenario suggested that this relative pattern of ratings occurred only where participants had read about a negative outcome (HSSJ and LSSJ groups). When a strongly justified choice was followed by a positive outcome (POSJ group), overall regret was comparatively lower but the two components of regret were not rated as being significantly different. In the same scenario, there was also some support for DJT's proposal that, where an outcome is less serious than it might have been but the decision was poorly justified, decision regret will exceed outcome regret (LSWJ group). However, this pattern of results was present only for outcomes that were somewhat negative (but nonetheless better than they might have been). It was not found for outcomes that were positive in an absolute sense – here (POWJ group), the two components of regret were not rated significantly differently.

Discussion

The results of Experiment 1 suggest that participants did adjust their original judgments about the decision once they had received information about the outcome of that

decision. With one exception (decision justifiability increased rather than decreased for the LSSJ condition in the icy road scenario), the adjustments were in the predicted direction – dependent on the valence of the outcome – although the changes in ratings did not always reach statistical significance for all conditions and all measures. In most (but not all) cases where the change in ratings did not reach statistical significance, the scenario which participants had read contained a strong justification for the choice (e.g. icy road scenario). This suggests that perceptions about the quality of the decision process might be somewhat protected from the influence of information about the outcome when a reasonable justification for the choice existed.

Nonetheless, the overall pattern of results indicates that participants who read a version of the scenario that ended in a negative outcome perceived the decision as less justifiable and of poorer quality than they had done before the outcome was known, and tended to feel more regretful about the decision and less happy about the situation. In contrast, participants who read a version of the scenario that ended in a positive outcome tended to perceive the decision as more justifiable and of better quality than they had before the outcome was known, and tended to feel less regretful about the decision and happier about the situation.

Therefore, participants appear to have judged the quality of the decisions made in the scenario by reference to the outcomes that followed them, or perhaps by reference to their overall feeling (e.g. happiness, regret) about the situation. It may not always be easy for participants to recognise that, even though a choice turns out badly, the choice may nonetheless have been reasonable in the circumstances. A bad outcome appears to taint the quality of the decision that preceded it and thus individuals may not be able to completely separate out what is regret about the decision and what is regret about the

outcome. As discussed in Wright, Ayton & Djemal (2004), outcomes may seem all the worse (and therefore more regrettable) because the individual chose that course of action in the situation and realise that they might have avoided the outcome if they had chosen differently. Thus the decision may seem worse than it actually might be because it turned out badly. Yet this strategy for judging decisions may not always be appropriate – as Connolly & Zeelenberg (2002) and Baron & Hershey (1988) have pointed out, unjustifiable ('bad') decisions can still sometimes turn out well, while justifiable ('good') decisions can sometimes still turn out badly.

It is important to note, however, that the first part of the scenarios used in Experiment 1 did not contain any detailed information by which participants might have judged whether or not the individual made a reasonable decision in the circumstances, independent of how it turned out. Participants may therefore have been 'forced' to use information about the outcome as a kind of heuristic by which to evaluate the quality of the decision process. This possibility was addressed in Experiment 2.

Experiment 2

Experiment 2 explored the effect of including information about the probabilities of the possible outcomes in the first part of a scenario about a gambling choice situation. This type of information should provide participants with an alternative means of judging the quality of the decision without referral to the outcome that follows it. This being the case, one might argue that participants should not be so inclined to adjust their decision-related ratings once the valence of the outcome is known since decision quality can be more clearly judged independently from the outcome that follows. However, if the influence of outcome information is as powerful as previous research appears to suggest,

a similar pattern of adjustment in ratings that was found in Experiment 1 may still be observed.

Method

Design

The experiment employed a 2 (gamble choice: accept or reject gamble) x 2 (dice outcome: throw a six or don't throw a six) x 3 (jackpot size: £5000, £15000 or £1 million) x 2 (time: pre- or post-gamble ratings) mixed factorial design. 'Gamble choice', 'dice outcome' and 'jackpot size' were manipulated between-groups, forming twelve different experimental conditions. 'Time' was a within-groups factor. There were four measures of the quality of the decision process (decision justifiability, decision regret, decision evaluation and overall happiness). Participants completed ratings for one scenario only (TV quiz gamble).

Participants

116 undergraduate students from the Department of Psychology at City University, London participated for course credit points. The sample was predominantly female (89%) and aged between 18 and 38 years (M = 20 years, SD = 3.508).

Procedure and materials

Participants were randomly assigned to one of the twelve experimental conditions, each condition combining one level of gamble choice, one level of dice outcome and one

level of jackpot size – i.e. Accept/Six (£5000), Accept/Not Six (£5000), Reject/Six (£5000), Reject/Not Six (£5000), Accept/Six (£15000), Accept/Not Six (£15000), Reject/Six (£15000), Reject/Not Six (£15000), Accept/Six (£1 million), Accept/Not Six (£1 million), Reject/Six (£1 million), Reject/Not Six or (£1 million). Participants were asked to imagine themselves in a scenario which was divided into two parts and described a TV quiz gambling choice. The content of the first part of the scenario appears below. This described the situation leading up to the gambling choice, described the terms of the gamble and stated the choice made by the individual (to accept or reject the gamble). The first part of the scenario also contained probabilistic information (from which participants could ascertain the likelihood of winning the gamble) and stated the jackpot at stake (£1 million, £15000 or £5000).

TV quiz gamble (Part 1)

Imagine yourself in the following situation …

You have been taking part as a contestant in a game show quiz on television and have been quite successful. In total you have accumulated winnings of £1000 in cash by answering your questions correctly. The game show is almost over. At this point, the quiz host offers you a chance to gamble. Under the conditions of the gamble, you could win a bonus of [£999,000 / £14000 / £4000] and increase your total take-home prize to [£1 million / £15000 / £5000]. To win the bonus, you must roll a dice and throw a six. The dice is a normal, fair dice and you will be the person to throw it. You have one throw only.

However, if you throw anything other than a six (that is, if you throw a 1, 2, 3, 4 or 5), you will lose nearly all of the cash you have accumulated in the quiz. Instead of taking home £1000, you will leave with just £100 to cover your travel expenses to the television studio. That is, if you fail to throw a six, you will lose £900 of your existing prize.

Having explained the terms of the gamble, the quiz master adds that, if you decide to accept the gamble, you will throw the dice and the rules will be applied strictly in the way he has outlined. If you decide not to accept the gamble, you will still be asked to throw the dice - so that the audience can see what might have happened - but, regardless of the outcome of the throw, you will leave with your £1000.

The quiz master now asks what you want to do. After some deliberation, you reply that you have decided [to accept the gamble and throw the dice to see if you can win the jackpot as well as the £1000 you have won in the quiz / not to accept the gamble and just want to keep the

£1000 you have already won in the quiz]. The quiz master now asks you to step up to the podium to throw the dice.

Because the gamble involved rolling a dice to throw a six, the quiz contestant always had a 16.67% (1 in 6) chance of winning the jackpot prize by accepting the gamble. Figure 3.6 shows the expected values for accepting or rejecting each of the gambles, thus indicating what objectively was the 'best choice' in that scenario - accepting the gamble is the 'worst' option for the £5000 jackpot condition, but the 'best' option for the £15000 and £1 million jackpot conditions. After reading the first part of the scenario – and still imagining themselves as quiz contestants – participants were asked to rate five different measures relating to the gamble choice:

(a) Decision justifiability: "How justifiable do you think your decision to [accept/reject] the gamble is?" (1 = Not at all justifiable; 7 = Totally justifiable)

(b) Anticipated decision-regret: "To what extent do you anticipate you might later experience any regret about your decision to [accept/reject] the gamble?" (1 = Not at all regretful; 7 = Extremely regretful)

(c) Decision quality evaluation: "To what extent do you think you have made a good or bad decision in opting to [accept/reject] the gamble?" (1 = Extremely good decision; 7 = Extremely bad decision)

(d) Happiness: "How happy or satisfied are you about your decision to [accept/reject] the gamble?" (1 = Very happy/satisfied; 7 = Very unhappy/dissatisfied)

(e) Likelihood of throwing a six: "How likely do you think you are to throw a six on the dice?" Responses were indicated on a 10cm visual analogue scale, anchored at 0% (Impossible to do this) and 100% (Certain to do this).

Figure 3.6

Expected values of gamble options used in scenarios for Experiment 2

Jackpot	Gamble choice	Expected utilities	Decision quality
£1 million	Reject the gamble	100% x £1000 = 1000	'Worst' choice
	Accept the gamble	16.67% x £1 million = 166700	'Best' choice
£15000	Reject the gamble	100% x £1000 = 1000	'Worst' choice
	Accept the gamble	16.67% x £15000 = 2500.50	'Best' choice
£5000	Reject the gamble	100% x £1000 = 1000	'Best' choice
	Accept the gamble	16.67% x £5000 = 833.50	'Worst' choice

Once they had completed the rating scales, participants were asked to turn over the page of the questionnaire booklet. Here they were asked to imagine themselves in the second part of the scenario, which described the outcome of the dice throw and stated the prize money they would take away. The content of the second part of the scenario appears below. There were four possible outcomes - (1) throwing a six after accepting the gamble and thus winning the jackpot; (2) not throwing a six after accepting the gamble and thus leaving with just £100, having lost £900 of the quiz money; (3) throwing a six after rejecting the gamble and thus leaving with £1000, but discovering the jackpot could have been won 'if only' the gamble had been accepted; and (4) not throwing a six after rejecting the gamble and thus leaving with £1000, but knowing £900 of the quiz money could have been lost had the gamble been accepted.

TV quiz gamble (Part 2)

Imagine that this is the outcome of the dice throw …

('Accept/Six' versions) … You roll the dice and throw a six. Because you accepted the gamble, the jackpot is yours, as well as the cash you won in the quiz. You leave the television studio with … [£1 million, £15000 or £5000] … OR

('Accept/Not Six' versions) … You roll the dice but do not throw a six. Because you accepted the gamble, you have to give back to the game show host £900 of the cash you accumulated in the quiz. You leave the show with just £100, which covers your travel expenses to the studio … OR

('Reject/Six' versions) … You roll the dice and throw a six. However, because you rejected the gamble, you cannot claim the jackpot. Therefore, you leave the show with the £1000 you accumulated in the quiz … OR

('Reject/Not Six' versions) … You roll the dice but do not throw a six. However, because you rejected the gamble, you do not lose any of the cash you accumulated in the quiz. Therefore, you leave the studio with £1000.

After reading the second part of the scenario, participants were asked to complete a further series of rating scales:

(a) Decision justifiability: "How justifiable do you think your decision to [accept/reject] the gamble was?" (1 = Not at all justifiable; 7 = Totally justifiable)

(b) Decision-regret: "To what extent do you think you would now be feeling any regret about your decision to [accept/reject] the gamble?" (1 = Not at all regretful; 7 = Extremely regretful)

(c) Decision quality evaluation: "To what extent do you think you made a good or bad decision in opting to [accept/reject] the gamble?" (1 = Extremely good decision; 7 = Extremely bad decision)

(d) Happiness: "How happy or satisfied are you now about your decision to [accept/reject] the gamble?" (1 = Very happy/satisfied; 7 = Very unhappy/dissatisfied)

(e) Outcome-regret: "To what extent do you think you would now be feeling any regret about the outcome - that you leave with [£100 /£1000 /£5000 /£15000 /£1 million]?" (1 = Not at all regretful; 7 = Extremely regretful)

(f) Outcome seriousness: "How serious do you think the outcome is?" (1 = Not at all serious; 7 = Extremely serious)

(g) Likelihood of throwing a six: "How likely do you think you were to throw a six on the dice?" Response indicated on a 10cm visual analogue scale, anchored at 0% (Impossible to do this) and 100% (Certain to do this).

Results

To aid interpretation of the data, two of the rating scales were reverse-scored – decision evaluation (1 = Extremely bad decision; 7 = Extremely good decision) and overall happiness (1 = Very unhappy/dissatisfied; 7 = Very happy/satisfied). High scores on

items relating to the decision process therefore indicate a strongly justifiable decision, a high quality decision, high levels of regret and high levels of happiness.

Participants' mean pre-gamble ratings of decision justifiability, decision quality, decision-regret and happiness/satisfaction are shown in Table 3.9 as a function of gamble choice and jackpot level, across all experimental conditions. Table 3.10 shows the mean pre-gamble ratings by experimental condition (gamble choice/outcome of dice throw) and jackpot level. Participants' mean post-gamble ratings of decision justifiability, decision quality, decision-regret, happiness/satisfaction and outcome-regret are shown in Table 3.11 as a function of gamble choice and jackpot level, across all experimental conditions. Table 3.12 shows the mean post-gamble ratings by experimental condition and jackpot level.

Examination of mean estimates of the likelihood of throwing a six on the dice before the outcome was known suggest that overall participants recognised there was smaller chance of winning the gamble than losing the gamble, had they accepted it (M = 28.24%, SD = 18.835, Mode = 16%).

The identification of a comparatively small probability of winning the gamble appears to have been reflected in participants' pre-gamble ratings of the decision quality. Generally speaking, participants rated rejecting the gamble as the best choice (t (114) = -3.698, $p < .001$), the one that was most justifiable (t (114) = -4.522, $p < .001$) and least likely to be regretted (t (114) = 2.713, $p = .008$) compared to accepting the gamble (see Table 3.9). When looking at participants' ratings of the two options for each of the different jackpot levels, accepting the gamble and rejecting the gamble for a £1 million jackpot were perceived as equivalent in terms of decision justifiability (t (40) = -0.482, p

Table 3.9

Mean pre-gamble ratings of the decision process by gamble choice and jackpot level (Experiment 2)

Gamble choice (by jackpot level)	Decision justifiability	Decision evaluation*	Anticipated decision-regret	Happiness/ satisfaction*
Accept (£1 million)	4.68 (1.529)	4.16 (1.537)	4.89 (1.410)	4.21 (1.475)
Reject (£1 million)	4.91 (1.535)	4.39 (1.438)	4.26 (1.287)	4.30 (1.396)
Accept (£15000)	4.33 (1.680)	4.06 (1.305)	4.78 (1.437)	3.78 (1.262)
Reject (£15000)	5.45 (1.224)	4.95 (1.397)	3.59 (1.403)	3.45 (1.65)
Accept (£5000)	3.60 (1.454)	3.47 (1.060)	4.27 (1.751)	3.73 (1.100)
Reject (£5000)	6.21 (0.855)	5.42 (1.387)	4.00 (1.291)	5.16 (1.463)
Accept (all jackpots)	4.25 (1.595)	3.92 (1.340)	4.67 (1.517)	3.92 (1.296)
Reject (all jackpots)	5.48 (1.345)	4.89 (1.449)	3.95 (1.338)	4.61 (1.529)

Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret and greater happiness/satisfaction about the decision. Standard deviations appear in parentheses.

Table 3.10

Mean pre-gamble ratings of the decision process by experimental condition and jackpot level (Experiment 2)

Jackpot level and experimental condition (choice/outcome)	Decision justifiability	Decision evaluation*	Decision Regret	Happiness/ satisfaction*
£1 million jackpot				
Accept/Six (n = 9)	4.44 (1.014)	3.89 (1.764)	5.33 (1.225)	4.00 (1.414)
Reject/Not Six (n = 12)	4.83 (1.337)	4.33 (1.155)	4.42 (1.240)	4.25 (1.215)
Reject/Six (n = 12)	5.08 (1.730)	4.42 (1.676)	4.17 (1.337)	4.33 (1.557)
Accept/Not Six (n = 9)	4.78 (1.986)	4.44 (1.424)	4.44 (1.590)	4.44 (1.667)
£15000 jackpot				
Accept/Six (n = 10)	4.10 (1.792)	4.00 (1.414)	4.50 (1.509)	3.50 (1.434)
Reject/Not Six (n = 12)	5.42 (1.240)	4.92 (1.311)	3.33 (1.557)	4.67 (1.497)
Reject/Six (n = 10)	5.50 (1.269)	5.00 (1.563)	3.90 (1.200)	4.20 (1.874)
Accept/Not Six (n = 8)	4.63 (1.598)	4.12 (1.246)	5.13 (1.356)	4.12 (0.991)
£5000 jackpot				
Accept/Six (n = 8)	3.50 (1.414)	3.37 (1.061)	4.63 (1.685)	3.75 (0.886)
Reject/Not Six (n = 11)	6.00 (1.000)	5.54 (1.214)	3.82 (1.401)	5.54 (1.128)
Reject/Six (n = 8)	6.50 (0.535)	5.25 (1.669)	4.25 (1.165)	4.62 (1.767)
Accept/Not Six (n = 7)	3.71 (1.604)	3.57 (1.134)	3.86 (1.864)	3.71 (1.380)
All jackpot levels				
Accept/Six (n =27)	4.04 (1.454)	3.78 (1.423)	4.81 (1.469)	3.74 (1.259)
Reject/Not Six (n = 35)	5.40 (1.265)	4.91 (1.292)	3.86 (1.438)	4.80 (1.368)
Reject/Six (n = 30)	5.60 (1.429)	4.83 (1.621)	4.10 (1.213)	4.37 (1.671)
Accept/Not Six (n = 24)	4.42 (1.742)	4.08 (1.282)	4.50 (1.615)	4.12 (1.361)

Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret and greater happiness/satisfaction about the decision. Standard deviations appear in parentheses.

Table 3.11

Mean post-gamble ratings of the decision process by gamble choice and jackpot level (Experiment 2)

Gamble choice (by jackpot level)	Decision justifiability	Decision evaluation*	Decision regret	Happiness/ satisfaction*	Outcome regret
Accept (£1 million)	4.79 (1.903)	4.79 (2.371)	3.26 (2.446)	4.74 (2.513)	3.42 (2.411)
Reject (£1 million)	4.87 (1.660)	4.78 (1.506)	3.87 (2.528)	4.48 (2.313)	3.26 (1.764)
Accept (£15000)	4.94 (1.626)	4.61 (1.944)	3.39 (2.429)	4.56 (2.479)	3.28 (2.421)
Reject (£15000)	5.41 (1.593)	5.27 (2.004)	3.09 (2.448)	5.50 (2.064)	2.95 (1.939)
Accept (£5000)	4.33 (1.633)	4.53 (1.959)	3.00 (2.507)	4.60 (2.444)	2.93 (2.187)
Reject (£5000)	6.16 (1.500)	5.63 (1.461)	3.32 (2.647)	5.00 (2.380)	2.63 (2.087)
Accept (all jackpots)	4.71 (1.719)	4.65 (2.076)	3.23 (2.414)	4.63 (2.434)	3.23 (2.315)
Reject (all jackpots)	5.44 (1.651)	5.20 (1.692)	3.44 (2.519)	4.98 (2.257)	2.97 (1.910)

Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret, greater outcome-regret and greater happiness/satisfaction about the decision. Standard deviations appear in parentheses.

Table 3.12

Mean post-gamble ratings by experimental condition and jackpot level (Experiment 2)

Jackpot level and experimental condition (choice/outcome)	Decision justifiability	Decision evaluation*	Decision regret	Happiness/ satisfaction*	Outcome regret
£1 million jackpot					
Accept/Six	5.44 (1.944)	6.56 (1.014)	1.11 (0.333)	6.56 (1.014)	1.78 (1.986)
Reject/Not Six	5.92 (0.793)	5.92 (0.996)	1.75 (1.288)	6.42 (0.900)	2.00 (1.206)
Reject/Six	3.92 (1.676)	3.75 (1.055)	5.75 (1.765)	2.75 (1.764)	4.50 (1.168)
Accept/Not Six	4.00 (1.732)	2.89 (1.965)	5.67 (1.000)	2.67 (2.000)	5.11 (1.691)
£15000 jackpot					
Accept/Six	5.20 (1.619)	5.60 (1.646)	1.70 (1.059)	6.00 (1.633)	2.10 (1.912)
Reject/Not Six	6.08 (0.900)	6.58 (0.669)	1.25 (0.452)	6.83 (0.389)	1.75 (1.215)
Reject/Six	4.60 (1.897)	3.70 (1.946)	5.30 (1.947)	3.90 (2.132)	4.40 (1.647)
Accept/Not Six	4.63 (1.685)	3.37 (1.598)	5.50 (1.927)	2.75 (2.187)	4.75 (2.252)
£5000 jackpot					
Accept/Six	4.63 (1.768)	5.75 (1.282)	1.75 (2.121)	5.75 (2.188)	1.25 (0.707)
Reject/Not Six	6.55 (0.934)	6.73 (0.467)	1.27 (0.905)	6.82 (0.404)	1.18 (0.405)
Reject/Six	5.63 (1.996)	4.12 (0.834)	6.13 (1.126)	2.50 (1.414)	4.63 (1.768)
Accept/Not Six	4.00 (1.528)	3.14 (1.676)	4.43 (2.225)	3.29 (2.138)	4.86 (1.574)
All jackpot levels					
Accept/Six	5.11 (1.739)	5.96 (1.372)	1.52 (1.312)	6.11 (1.625)	1.74 (1.655)
Reject/Not Six	6.17 (0.891)	6.40 (0.812)	1.43 (0.948)	6.69 (0.812)	1.66 (1.056)
Reject/Six	4.60 (1.905)	3.83 (1.341)	5.70 (1.664)	3.07 (1.856)	4.50 (1.456)
Accept/Not Six	4.21 (1.615)	3.12 (1.702)	5.25 (1.751)	2.87 (2.028)	4.92 (1.792)

Ratings marked * have been reverse-scored to aid interpretation: higher ratings therefore denote a more justifiable decision, a better choice, greater decision-regret, greater outcome regret and greater happiness/satisfaction about the decision. Standard deviations appear in parentheses.

= .633), quality of decision (t (40) = -0.508, p = .615), anticipated decision regret (t (40) = 1.522, p = .136) and overall happiness (t (40) = -0.211, p = .834). However, for a £15000 jackpot, participants rated rejecting the gamble as being significantly more justifiable (t (38) = -2.440, p = .019), a better quality decision (t (38) = -2.086, p = .044) and less likely to be regretted (t (38) = 2.633, p = .012). There was however no significant difference between their ratings of their happiness about each choice (t (38) = -1.427, p = .162). For the smaller £5000 jackpot, there were again significant differences between participants' ratings of the choices to accept or reject the gamble – rejecting the gamble was perceived as being more justifiable (t (32) = -6.163, p < .001), a better quality decision (t (32) = -4.510, p < .001) and a choice with which they were happier (t (32) = -3.133, p = .004). However, they saw no difference between each option in terms of how much regret they anticipated (t (32) = 0.511, p = .613).

The pattern of ratings suggests that our participants thought that rejecting the gamble was the most reasonable choice, regardless of the jackpot at stake, apparently focusing only on the relatively low probability of throwing a six on the dice and ignoring information about the size of the jackpot at stake – or perhaps valuing the £1000 accrued in the quiz prior to the gamble sufficiently enough not to risk losing it in the gamble.

Between-group comparisons of pre-outcome and post-outcome ratings of the decision

Participants' pre-outcome ratings of the decision process were compared for the pairs of scenarios where the content of the first half of the scenario was matched (i.e. Accept/Six with Accept/Not Six conditions; Reject/Six with Reject/Not Six conditions) to determine that there were no differences in judgments of the decision process prior to

obtaining outcome information. Mean pre-outcome ratings are shown in Table 3.10 (all jackpot levels). Post-outcome judgments of the decision process were then compared between matched groups to establish whether the valence of the outcome information had differentially affected perceptions of the decision process. Participants' mean post-outcome ratings are shown in Table 3.12 (all jackpot levels).

For scenarios where the gamble was accepted, there were no significant differences between Accept/Six and Accept/Not Six participants in their pre-outcome ratings of decision justifiability (t (49) = -0.848, p = .401), anticipated decision regret (t (49) = 0.729, p = .469), decision evaluation (t (49) = -0.801, p = .427) or happiness (t (49) = -1.047, p = .300). Similarly, for scenarios where the gamble was rejected, there were no significant differences between Reject/Six and Reject/Not Six condition participants in their pre-outcome ratings of decision justifiability (t (63) = 0.599, p = .552), anticipated decision regret (t (63) = 0.729, p = .469), decision evaluation (t (63) = -0.224, p = .823) or happiness (t (63) = -0.154, p = .878).

However, after receiving information about the outcome, the groups did show significant differences in their ratings of the decision process. For scenarios where the contestant accepted the gamble, participants who read the Accept/Six version (where there was a positive outcome) rated the decision as more justifiable (t (49) =1.913, p = .062), less regretful (t (49) = -8.673, p < .001) and a better decision (t (49) = 6.319, p < .001) than did participants who read the Accept/Not Six version (where there was a negative outcome). Similar patterns were found for participants who read versions of the scenario where the contestant rejected the gamble. After discovering the outcome of the dice throw, participants who read the Reject/Not Six version (good outcome) rated the decision as more justifiable (t (63) = -4.147, p < .001), less regretful (t (63) =

12.435, $p < .001$) and of better quality ($t(63) = -9.144$, $p < .001$) than did participants who read the Reject/Six version (bad outcome). Thus, while the contestant's decision was rated in an equivalent manner before the outcome was known, after the outcome was discovered participants appear to have changed their view of the decision process depending on the outcome they had read about in the second half of the scenario. Outcome information appears to have affected participants' post-outcome judgments of the decision.

As might be expected, there were also significant differences between outcome regret ratings of participants who read the Accept/Six and Accept/Not Six scenarios ($t(49) = -6.581$, $p < .001$), with greater outcome regret reported where the gamble was lost (Accept/Not Six). Similarly, the outcome regret ratings of participants who read the Reject/Six and Reject/Not Six scenarios were significantly different ($t(63) = 8.878$, $p < .001$), with outcome regret being greater for participants in the Reject/Six condition. Since both 'Reject' scenarios stated that the contestant left the studio with the same amount of money (£1000) which was less than the available jackpot, the fact that Reject/Six scenario evoked more outcome regret suggests that participants had considered counterfactual outcomes when they judged their outcome regret, rather than simply the amount of money the contestant won – for participants in the Reject/Six condition, the contestant could have won the jackpot if they had chosen the other option to accept the gamble; the contestant in the Reject/Not Six could never have won the jackpot – although if they had chosen differently, they could have lost a further £900. This suggests that, rather than being purely regret about the outcome itself in an absolute sense, outcome regret also includes an element of regret about the choice that was made, derived from referring to what the participant imagined might have happened if the contestant had chosen differently.

Within-group analyses of the effect of outcome information on ratings of the decision

To further examine whether information about the outcome of the gamble had changed participants' perceptions of the decision, a mixed ANOVA was initially performed, collapsing across all jackpot levels, with 'Time' and 'Measure' as within-groups factors and 'Condition' as a between-groups factor. A second mixed ANOVA was then carried out, with 'Time' and 'Measure' as within-groups factors and 'Condition' and 'Jackpot level' as between-groups factors. Mean pre- and post-gamble ratings appear in Tables 3.9 to 3.12.

Analysis across all jackpot levels. The results of the ANOVA appear in Table 3.13. There were significant main effects of 'Measure' and 'Condition'. In addition, there were significant 2-way 'Time x Condition', 'Measure x Condition' and 'Time x Measure' interactions. These were all qualified by a significant 3-way 'Time x Measure x Condition' interaction, whereby the degree and direction of change in participants' ratings over time (pre- vs. post-gamble) varied according to experimental condition and the decision-focused measure used (see Figure 3.7).

In the 'Accept/Six' condition, participants had imagined they were a contestant who accepted the gamble and proceeded to throw a six on the dice, enabling them to take home the jackpot prize. This scenario therefore represented the best possible outcome of the four in terms of monetary gain – one likely to be associated with high levels of rejoicing, since the gambler had made a choice which meant they could claim the maximum prize. After discovering that they had won the jackpot, participants rated their decision to accept the gamble as significantly more justifiable (t (26) = -3.268, p =

Table 3.13

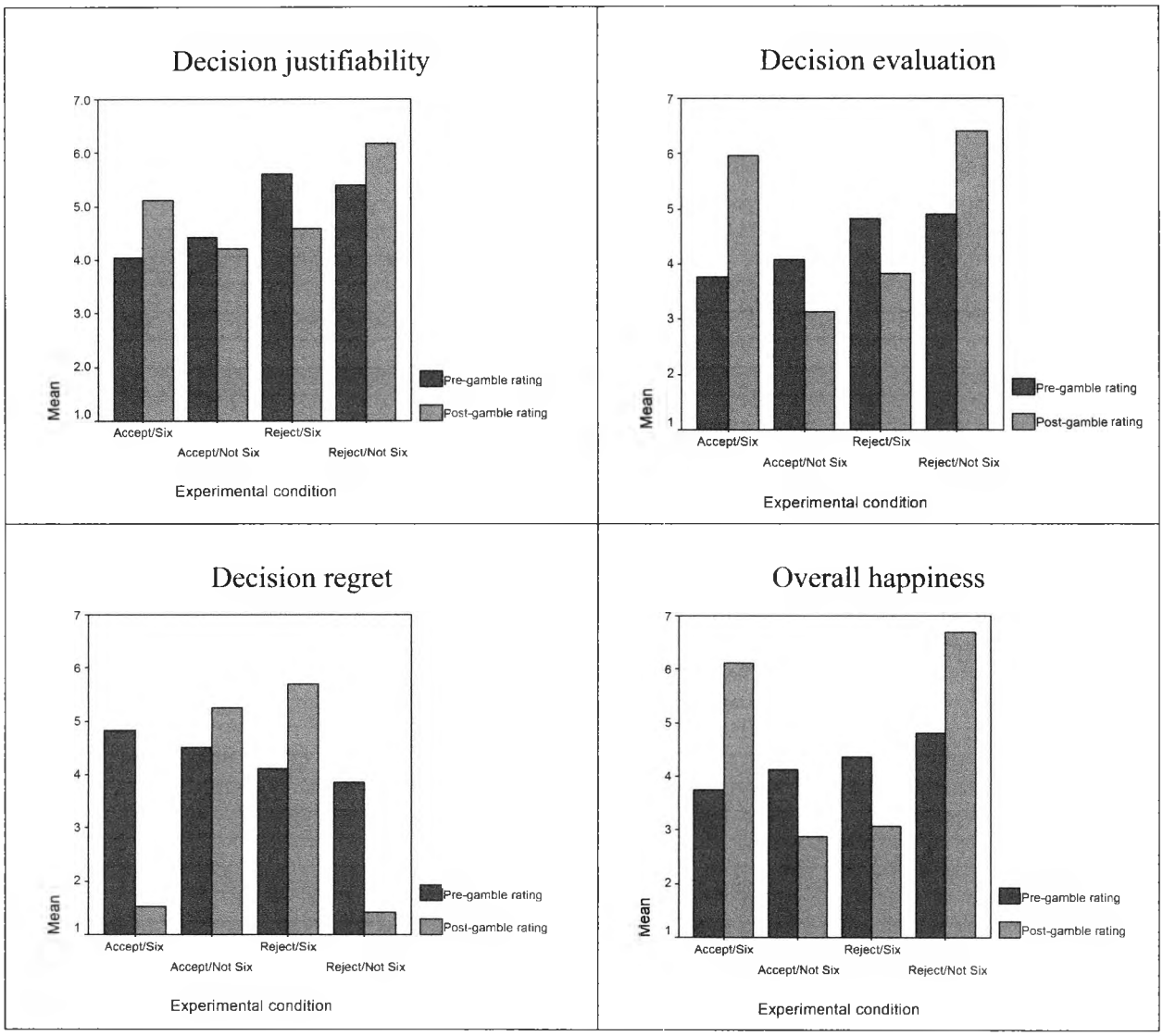
Mixed ANOVA results – across all jackpot levels (Experiment 2)

Main effect or interaction	F statistic and significance
'Time'	F (1, 112) = 0.405, MSE = 1.019, p = .526
'Measure'	F (3, 336) = 17.813, MSE = 2.444, p < .001
'Condition'	F (3, 112) = 7.821, MSE = 4.085, p < .001
'Time x Condition'	F (3, 112) = 16.131, MSE = 1.019, p < .001
'Measure x Condition'	F (9, 336) = 25.316, MSE = 2.444, p < .001
'Time x Measure'	F (3, 336) = 14.241, MSE = 1,458, p < .001
'Time x Measure x Condition'	F (9, 336) = 39.298, MSE = 1.458, p < .001

Note: Emboldened effects or interactions were statistically significant (ps < .05, 2-tailed)

Figure 3.7

Changes in decision-related ratings (pre- and post-gamble) by experimental condition (Experiment 2)



.003), of better quality (t (26) = -5.569, p < .001), less regretful (t (26) = 8.266, p < .001) and rated themselves as feeling happier/more satisfied (t (26) = -5.679, p < .001) than they had done before they knew the outcome of the dice throw (all 2-tailed tests).

In the 'Reject/Not Six' condition, participants had imagined they were a contestant who rejected the gamble and subsequently did not throw a six on the dice. Because they had chosen to reject the gamble, they took home all of the £1000 quiz prize money. This was also a condition likely to be associated with some rejoicing, since they would be aware that they could have lost £900 of the quiz money, had they chosen to accept the gamble. As things had turned out, they made a wise choice. After discovering the outcome, participants rated their decision to reject the gamble as significantly more justifiable (t (34) = -5.413, p < .001), of better quality (t (34) = -6.804, p < .001), less regretful (t (34) = 9.220, p < .001) and rated themselves as feeling happier/more satisfied (t (34) = -8.282, p < .001) than they had done before they knew the outcome of the dice throw (all 2-tailed tests).

In the 'Reject/Six' condition, participants had imagined themselves as a contestant who had rejected the gamble but had then thrown a six on the dice. Because they rejected the gamble, they still went home with £1000 from the quiz and avoided losing any money, but they also would be aware that they could have won the jackpot, had they chosen to accept the gamble. Therefore, in contrast to the previous two conditions, this scenario was likely to be associated with some degree of decision regret. After discovering the outcome, participants rated their choice to reject the gamble as significantly less justifiable (t (29) = 3.631, p = .001), of poorer quality (t (29) = 3.383, p = .002), more regrettable (t (29) = -4.837, p < .001) and rated themselves as being less happy/satisfied

with the choice (t (29) = 3.284, p = .003) than they had done before they knew the outcome (all 2-tailed tests).

In the 'Accept/Not Six' condition, participants had imagined themselves as a contestant who had accepted the gamble but had not thrown a six. In so doing, they had not only missed out on taking home the jackpot, but also lost £900 of their quiz money – in addition, they would be realising that they could have taken home £1000 instead of £100, had they not accepted the gamble. This was the worst possible outcome in monetary terms of all the four scenarios and therefore likely to be associated with high levels of regret. After discovering the outcome, participants did rate their choice to accept the gamble as being less justifiable than they had before they knew the outcome, although this change in ratings did not reach statistical significance (t (23) = 1.225, p = .233). However, they did perceive the decision as of significantly worse quality (t (23) = 3.922, p = .001), more regretful (t (23) = -2.069, p = .050) and rated themselves as feeling less happy/satisfied (t (23) = 3.498, p = .002) than they had done before the outcome was known (all 2-tailed tests).

Overall, it appeared that participants' post-gamble perceptions of the quality of the gambling choice were influenced by the valence of the outcome of the gamble they read about. Bad outcomes were associated with post-gamble perceptions of a poorer quality decision process, while good outcomes were associated with post-gamble perceptions of a better quality decision process.

Analysis by jackpot level. The mixed ANOVA incorporating 'Jackpot' as a between-groups factor revealed no significant main effect of 'Jackpot' (F (2, 104) = 0.051, MSE = 3.925, p = .950) and none of the interactions including 'Jackpot' were

statistically significant (ps > .05). The results of the ANOVA were otherwise similar to the 'across jackpot levels' analysis. There were significant main effects of 'Measure' ($F(3, 312) = 18.253$, $MSE = 2.463$, $p < .001$) and 'Condition' ($F(3, 104) = 8.604$, $MSE = 3.925$, $p < .001$), together with significant 2-way 'Time x Condition' ($F(3, 104) = 15.532$, $MSE = 1.017$, $p < .001$), 'Measure x Condition' ($F(9, 312) = 24.927$, $MSE = 2.463$, $p < .001$), 'Time x Measure' ($F(3, 312) = 14.024$, $MSE = 1.482$, $p < .001$) interactions. These were again all qualified by a significant 3-way 'Time x Measure x Condition' interaction ($F(9, 312) = 38.088$, $MSE = 1.482$, $p < .001$), whereby the degree and direction of change in participants' ratings over time (pre- vs. post-gamble) varied according to experimental condition and the measure of decision quality used.

Effect of outcome information on perceptions of the decision for participants' with different pre-gamble views of the justifiability of accepting the quiz gamble

In the experiment, participants had imagined themselves in a randomly-assigned scenario where they either accepted or rejected the gamble. Had they been given the option to make their own choice about such a gamble, it is possible they might have chosen differently to the person in the scenario that they read and this may have affected the extent to which they adjusted their ratings of the decision after the outcome was known. Therefore, a further mixed ANOVA was carried out, with 'Time' and 'Measure' as within-groups factors and 'Condition x Choice Justifiability group' as a between-group factor. 'Choice Justifiability' groupings were determined by participants' pre-gamble ratings of decision justifiability, based on how justifiable they indicated accepting the gamble was. This grouping was straightforward for participants who had read a scenario where the gamble was accepted but, for participants who had read a scenario where the choice made was to reject the gamble, if they rated this choice

as somewhat unjustifiable, then it was assumed that they would perceive accepting the gamble as somewhat justifiable. Participants were divided into two 'Choice Justifiability' groups – either 'Willing Gamblers' (justifiable to accept) or 'Reluctant Gamblers' (unjustifiable to accept), based on their response to the pre-gamble justifiability item. Mean pre-outcome and post-outcome ratings for each group in each of the four conditions appear in Table 3.14.

There was a significant 3-way 'Time x Measure x Group' interaction (F (21, 324) = 18.404, MSE = 2.056, $p < .001$). Post-hoc (related-t) tests revealed that not all groups changed their judgments of the decision process after reading about the outcome of the gamble.

For participants who read the Accept/Six scenario, 'Reluctant Gamblers' significantly changed their ratings of decision justifiability, decision quality, decision regret and overall happiness – seeing the decision as more justifiable (t (15) = -3.571, $p = .003$), of better quality (t (15) = -5.044, $p < .001$) and less regrettable (t (15) = 7.786, $p < .001$) and feeling happier about the situation (t (15) = - 4.855, $p < .001$) after discovering the positive outcome than they had done beforehand. A similar pattern was present for 'Willing Gamblers' who changed their ratings of decision quality (t (10) = 4.157, p = .002), decision regret (t (10) = -2.695, $p = .022$) and happiness (t (10) = -3.029, p = .013) but did not significantly adjust their perceptions of decision justifiability (t (10) = -0.841, $p = .420$).

There were also differences in the effect of outcome information in the Accept/Not Six condition depending on participants' original view of the gambling choice. Neither 'Willing Gamblers' (t (11) = 1.449, $p = .175$) nor 'Reluctant Gamblers' (t (11) = 0.000,

Table 3.14

Pre-outcome and post-outcome ratings by condition and choice justifiability grouping (Experiment 2)

	Decision justifiability		Decision evaluation		Decision regret		Happiness/ satisfaction		Outcome regret
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Post
'Willing Gamblers'									
Accept/Six	5.36	5.73	4.64	6.27	5.09	1.82	4.36	6.18	1.64
(n = 11)	(0.674)	(1.555)	(1.433)	(1.272)	(1.514)	(1.834)	(1.433)	(1.401)	(0.924)
Accept/Not Six	5.92	5.50	4.83	4.08	3.75	4.50	4.83	3.92	4.25
(n = 12)	(0.900)	(1.087)	(1.403)	(1.730)	(1.815)	(2.153)	(1.467)	(2.392)	(1.960)
Reject/Six	3.80	3.40	4.30	3.70	4.20	4.70	3.70	3.80	4.40
(n = 10)	(0.789)	(1.174)	(1.494)	(1.636)	(1.229)	(2.111)	(1.703)	(1.874)	(1.265)
Reject/Not Six	4.20	5.53	4.27	6.00	4.40	2.00	4.13	6.33	1.87
(n = 15)	(0.941)	(0.915)	(1.223)	(1.000)	(1.242)	(1.254)	(1.302)	(0.816)	(1.125)
'Reluctant Gamblers'									
Accept/Six	3.13	4.69	3.19	5.75	4.63	1.31	3.31	6.06	1.81
(n = 16)	(1.088)	(1.778)	(1.109)	(1.438)	(1.455)	(0.793)	(0.946)	(1.806)	(2.040)
Accept/Not Six	2.92	2.92	3.33	2.17	5.25	6.00	3.42	1.83	5.58
(n = 12)	(0.793)	(0.793)	(0.492)	(1.030)	(0.965)	(0.739)	(0.793)	(0.718)	(1.379)
Reject/Six	6.50	5.20	5.10	3.90	4.05	6.20	4.70	2.70	4.55
(n = 20)	(0.513)	(1.936)	(1.651)	(1.210)	(1.234)	(1.152)	(1.593)	(1.780)	(1.572)
Reject/Not Six	6.30	6.65	5.40	6.70	3.45	1.00	5.30	6.95	1.50
(n = 20)	(0.470)	(0.489)	(1.142)	(0.470)	(1.468)	(0.000)	(1.218)	(0.224)	(1.000)

Note. Standard deviations appear in parentheses.

$p = 1.000$) significantly adjusted their perceptions of decision justifiability. However, 'Reluctant Gamblers' did adjust all other decision-related judgments – rating the decision as being of poorer quality ($t\ (11) = 4.311$, $p < .001$) and feeling more regret about the choice ($t\ (11) = -2.691$, $p = .021$) and generally less happy ($t\ (11) = 4.423$, $p = .001$) after discovering the outcome. In contrast, 'Willing Gamblers' did not significantly adjust their ratings of decision quality ($t\ (11) = 1.827$, $p = .095$), decision regret ($t\ (11) = -1.092$, $p = .298$) or happiness ($t\ (11) = 1.476$, $p = .168$) – all 2-tailed tests. It appears that 'Willing Gamblers' were more motivated to protect their original relatively positive view of the decision to accept the gamble, even when the gamble turned out badly.

The same motivation to protect one's original view of the decision despite a disappointing outcome was not evident for 'Reluctant Gamblers' who read the Reject/Six version of the scenario. Rather than standing by their original judgment, these participants significantly adjusted all of their ratings after discovering what the outcome of the dice throw was – seeing the decision not to gamble as less justifiable ($t\ (19) = 3.380$, $p = .003$), of poorer quality ($t\ (19) = 2.854$, $p = .010$) and more regrettable ($t\ (19) = -7.844$, $p < .001$) than they had prior to knowing the outcome and feeling less happy overall ($t\ (19) = 5.033$, $p < .001$). Even though the decision taken by the contestant in the scenario was the opposite to what they thought was justifiable and turned out badly, 'Willing Gamblers' did not significantly adjust their ratings of decision justifiability ($t\ (9) = 1.809$, $p = .104$), decision regret ($t\ (9) = -0.681$, $p = .513$) or happiness ($t\ (9) = -0.139$, $p = .893$). They did however see the decision as being worse than they had done originally ($t\ (9) = 2.250$, $p = .051$).

Finally, for the Reject/Not Six scenario, both 'Reluctant Gamblers' and 'Willing

Gamblers' significantly adjusted their perceptions of the decision on learning that the contestant had not thrown a six. 'Willing Gamblers' saw the decision not to gamble as more justifiable (t (14) = 5.739, $p < .001$), of better quality (t (14) = -4.670, $p < .001$) and less regrettable (t (14) = 5.392, $p < .001$) than they had originally, and they were more happy about the situation overall (t (14) = -5.436, $p < .001$). Similarly, 'Reluctant Gamblers' rated the contestant's choice as more justifiable (t (19) = -3.199, $p = .005$), a better decision (t (19) = -4.951, $p < .001$) and less regrettable (t (19) = 7.463, $p < .001$), and felt happier (t (19) = -6.492, $p < .001$) than they had before the outcome was known.

Overall, the pattern of results suggests that 'Willing Gamblers' were less likely than 'Reluctant Gamblers' to adjust their perceptions of the decision process when a choice to accept or reject the gamble turned out worse than the foregone option. However, when the choice turned out better than the foregone option, both groups were more or less equally likely to adjust their views of the decision process in the predicted directions.

Post-gamble ratings of decision-regret and outcome-regret

Table 3.15 shows participants' mean post-gamble ratings of decision regret and outcome regret by experimental condition and jackpot level. A one-way ANOVA showed that there were significant differences between conditions in participants' post-gamble ratings of decision regret (F (3, 112) = 77.947, MSE = 2.019, $p < .001$) and in their ratings of outcome regret (F (3, 112) = 39.828, MSE = 2.182, $p < .001$). Post-hoc (Tukey HSD) tests revealed that 'Accept/Not Six' condition participants regretted their decision significantly more than 'Accept/Six' ($p < .001$) and 'Reject/Not Six' ($p < .001$) condition participants. Similarly, 'Reject/Six' condition participants regretted their

Table 3.15

Mean ratings of post-gamble decision regret and outcome regret by condition and jackpot level (Experiment 2)

	Experimental condition (choice/outcome)			
	Accept/Six	Accept/Not Six	Reject/Six	Reject/Not Six
£1 million jackpot				
Decision regret	1.11 (0.333)	5.67 (1.000)	5.75 (1.765)	1.75 (1.288)
Outcome regret	1.78 (1.986)	5.11 (1.691)	4.50 (1.168)	2.00 (1.206)
£15000 jackpot				
Decision regret	1.70 (1.059)	5.50 (1.927)	5.30 (1.947)	1.25 (0.452)
Outcome regret	2.10 (1.912)	4.75 (2.252)	4.40 (1.647)	1.75 (1.215)
£5000 jackpot				
Decision regret	1.75 (2.121)	4.43 (2.225)	6.13 (1.126)	1.27 (0.905)
Outcome regret	1.25 (0.707)	4.86 (1.574)	4.63 (1.768)	1.18 (0.405)
All jackpots				
Decision regret	1.52 (1.312)	5.25 (1.751)	5.70 (1.664)	1.43 (0.948)
Outcome regret	1.74 (1.655)	4.92 (1.792)	4.50 (1.456)	1.66 (1.056)

Note: Standard deviations appear in parentheses.

decision significantly more than did 'Accept/Six' participants ($p < .001$) and 'Reject/Not Six' participants ($p < .001$). However, there was no significant difference between ratings of decision regret for 'Accept/Six' and 'Reject/Not Six' participants ($p = .995$) or between ratings of decision regret for 'Accept/Not Six' and 'Reject/Six' participants ($p = .655$). Post-hoc (Tukey HSD) tests revealed that 'Accept/Not Six' condition participants also regretted their outcome significantly more than 'Accept/Six' ($p < .001$) and 'Reject/Not Six' ($p < .001$) condition participants. Similarly, 'Reject/Six' condition participants also regretted their outcome significantly more than did 'Accept/Six' participants ($p < .001$) and 'Reject/Not Six' participants ($p < .001$). However, there was no significant difference between ratings of outcome regret for 'Accept/Six' and 'Reject/Not Six' participants ($p = .996$) or between ratings of outcome regret for 'Accept/Not Six' and 'Reject/Six' participants ($p = .732$).

To explore the effect of gamble choice and gamble outcome on within-group differences between post-gamble ratings of decision-regret and outcome-regret, a mixed ANOVA was carried out, with 'Regret type' as a within-groups factor and 'Condition' and 'Jackpot' as between-groups factors. The results are presented in Table 3.16. There was a marginally significant main effect of 'Regret type' (F (1, 104) = 3.312, MSE = 1.284, $p = .072$) and a significant main effect of 'Condition' (F (3, 104) = 77.713, MSE = 3.028, $p < .001$), but these were qualified by a significant 'Regret type x Condition' interaction (F (3, 104) = 5.213, MSE = 1.284, $p = .002$). For two conditions, the mean regret ratings (see Table 3.15) suggested that decision regret was greater than outcome regret – for 'Accept/Not Six' and for 'Reject/Six' – and the level of both types of regret was moderate to high (in both cases, the person in the scenario had made the 'wrong' choice in terms of how the dice throw turned out). For the other two conditions, the mean ratings suggested that outcome regret was slightly greater than decision regret –

Table 3.16

Effect of condition and jackpot on the difference between decision-regret and outcome-regret (Experiment 2)

Main effect or interaction	F statistic and significance
'Regret type'	F (1, 104) = 3.312, MSE = 1.284, p = .072
'Condition'	**F (3, 104) = 77.713, MSE = 3.028, p < .001**
'Jackpot'	F (2, 104) = 0.449, MSE = 3.028, p = .640
'Regret type x Condition'	**F (3, 104) = 5.213, MSE = 1.284, p = .002**
'Regret type x Jackpot'	F (2, 104) = 0.206, MSE = 1.284, p = .814
'Jackpot x Condition'	F (6, 104) = 0.608, MSE = 3.028, p = .724
'Regret type x Jackpot x Condition'	F (6, 104) = 0.909, MSE = 1.284, p = .909

Note: Emboldened effects or interactions were statistically significant (ps < .05, 2-tailed)

for 'Accept/Six' and 'Reject/Not Six' – although the level of both types of regret was very low (in both cases, the person in the scenario had made the 'right' choice in terms of how the dice throw turned out). Post-hoc (related t) tests revealed that the difference between decision regret and outcome regret was significant only for participants in the 'Reject/Six' condition ($t(29) = 3.561$, $p = .001$), who imagined experiencing significantly more decision regret than outcome regret.

For the other conditions, the differences between decision regret and outcome regret ratings were not statistically significant – 'Accept/Six' ($t(26) = -0.618$, $p = .542$), 'Accept/Not Six' ($t(23) = 1.190$, $p = .246$) and 'Reject/Not Six' ($t(34) = -1.113$, $p = .273$). This pattern of results (see Figure 3.8) did not appear to vary greatly between the different jackpot levels insofar as there was no significant 'Regret type x Jackpot x Condition' interaction ($F(6, 104) = 0.909$, MSE = 1.284, $p = .909$).

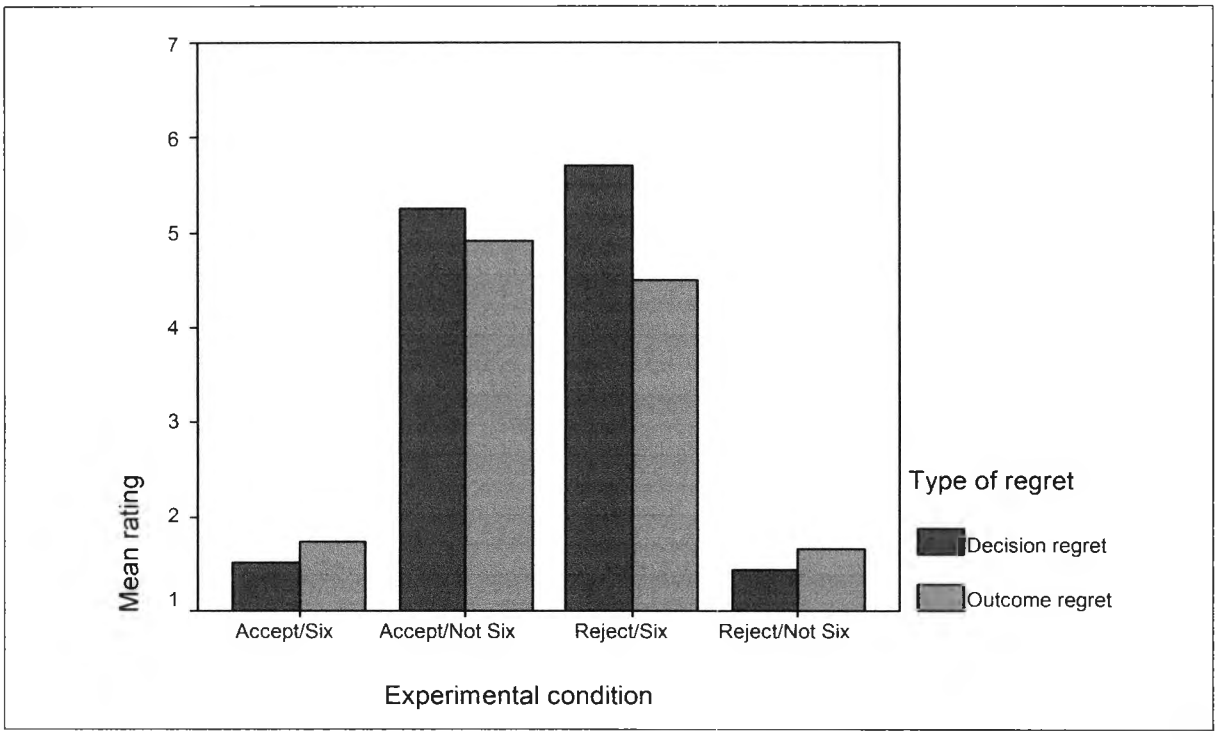
Comparisons between post-gamble ratings of decision-regret and outcome-regret taking account of participants' pre-gamble view of the justifiability of accepting the quiz gamble

A further mixed ANOVA was carried out, with 'Regret Type' as a within-groups factor and 'Condition' and 'Choice Justifiability' as between-group factors. As discussed above, participants were divided into two 'Choice Justifiability' groups – either 'Willing Gamblers' (justifiable to accept) or 'Reluctant Gamblers' (unjustifiable to accept), based on their response to the pre-gamble justifiability item. Mean ratings of decision regret and outcome regret for each group in each of the four conditions appear in Table 3.14.

The ANOVA revealed a marginally significant 'Regret type x Condition x Choice

Figure 3.8

Differences between decision-regret and outcome-regret by experimental condition (Experiment 2)

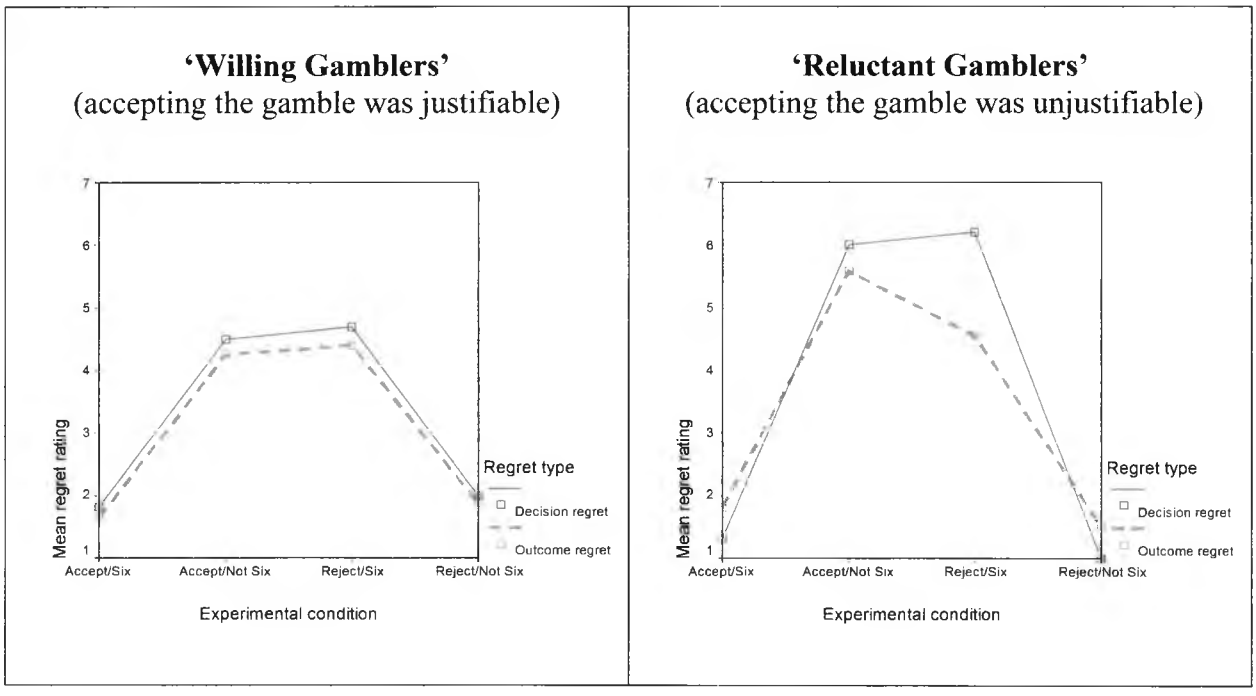


Justifiability' interaction (F (3, 108) = 2.560, MSE = 1.223, p = .059) – see Figure 3.9. Post-hoc (related t) tests revealed that the difference between decision regret and outcome regret ratings was significant for 'Reluctant Gamblers' in two of the experimental conditions – Reject/Six and Reject/Not Six. Where they had read a version of the scenario where the contestant had rejected the gamble (apparently the participants' preferred choice also) but then thrown a six and so could have won the jackpot had they chosen to accept the gamble, participants' decision regret (M = 6.20, SD = 1.152) was significantly greater than their outcome regret (M = 4.55, SD = 1.572) – t (19) = 4.437, p < .001. For Reluctant Gamblers who read a version of the scenario where the contestant rejected the gamble and then failed to throw a six, the opposite pattern was found: their outcome regret (M = 1.50, SD = 1.000) was significantly greater than their decision regret (M = 1.00, SD = 0.000) – t (19) = -2.236, p = .038.

The computed mean difference between decision and outcome regret ratings for 'Reluctant Gamblers' (M = 1.65, SD = 1.663) was greater than that for 'Willing Gamblers' (M = 0.30, SD = 1.946) – t (28) = -1.981, p = .057. Interestingly, the greater margin between decision regret and outcome regret for 'Reluctant Gamblers' who read the 'Reject/Six' scenario (compared to 'Willing Gamblers') can be accounted for by a higher level of decision regret for the 'Reluctant Gamblers' (t (28) = -2.097, p = .058), since both groups rated their outcome regret at the same level (t (28) = -0.262, p = .796). Even though the 'Reluctant Gamblers' had originally indicated that rejecting the gamble was a reasonable choice, when the choice turned out badly, this relative justifiability did not appear to protect them against regret about the decision. As discussed earlier, they appear to have adjusted their perception of the wisdom of rejecting the gamble after they learned about the outcome.

Figure 3.9

Difference between post-gamble decision regret and outcome regret ratings as a function of experimental condition and how justifiable participants thought accepting the gamble was (Experiment 2)



A similar pattern does not appear to exist for 'Willing Gamblers' who learned that their preferred choice (to accept the gamble) turned out badly (Accept/Not Six scenario). Here, they rated their decision regret (M = 4.50, SD = 2.153) no differently from their outcome regret (M = 4.25, SD = 1.960) – t (11) = 0.540, p = .600. In fact, 'Willing Gamblers' rated their decision regret as significantly less than did 'Reluctant Gamblers' in the same experimental condition (M = 6.00, SD = 0.739) – t (22) = 2.283, p = .039. As discussed, earlier, 'Willing Gamblers' did not alter their perceptions of the choice to accept the gamble (on any of the four measures) even when they learned the outcome was the worst possible. This may reflect an attempt to protect oneself from blame – regardless of how it turned out, they still felt they were right to take the risky option.

Correlations between ratings and regression models

Post-gamble ratings of decision justifiability correlated most strongly with pre-gamble decision justifiability ratings (r = 0.584, p < .001) and post-gamble decision evaluation ratings (r = 0.599, p < .001). As suggested by DJT, post-gamble decision justifiability ratings were correlated negatively with decision regret (r = -0.448, p < .001). Post-gamble decision justifiability ratings also correlated negatively with ratings of outcome regret (r = -0.397, p < .001) and positively with overall happiness (r = 0.492, p < .001). A multiple regression model (Stepwise method) showed that participants' pre-gamble rating of decision justifiability was the best predictor of their post-gamble rating of decision justifiability (Beta = 0.538, t = 8.285, p < .001). However, overall happiness after the gamble outcome was also a significant predictor (Beta = 0.435, t = 6.702, p < .001) of post-gamble decision justifiability. Together, this model accounted for 53% of the variance in post-gamble decision justifiability ratings (R Square = 0.528, F (2, 115) = 63.320, p < .001).

Post-gamble decision evaluation ratings correlated relatively weakly with pre-gamble decision evaluation ratings ($r = 0.244$, $p < .001$). Decision evaluation ratings correlated positively with decision justifiability ($r = 0.599$, $p < .001$) and with happiness ($r = 0.822$, $p < .001$). Post-decision decision evaluation ratings also correlated negatively with both post-gamble decision regret ($r = -0.783$, $p < .001$) and with outcome regret ($r = -0.738$, $p < .001$). A multiple regression model (Stepwise method) suggested that participants' post-gamble rating of their overall happiness was the best predictor of their post-gamble rating of decision quality (Beta = 0.581, $t = 8.020$, $p < .001$). Outcome regret was also a significant predictor (Beta = -0.305, $t = -4.254$, $p < .001$) of post-gamble decision quality. Post-gamble ratings of decision quality were only relatively weakly predicted by pre-gamble ratings of decision quality (Beta = 0.111, $t = 2.228$, $p = .028$). Together, this model accounted for 73% of the variance in post-gamble decision quality ratings (R Square = 0.730, $F (3, 115) = 100.880$, $p < .001$).

There was no significant correlation between pre-gamble (anticipated) decision regret and post-gamble decision regret ratings ($r = 0.111$, $p = .235$). Post-gamble decision regret correlated strongly and positively with outcome regret ($r = 0.740$, $p < .001$) and strongly and negatively with post-gamble happiness ($r = -0.826$, $p < .001$). A multiple regression model (Stepwise method) suggested that participants' post-gamble rating of their overall happiness was the best predictor of their post-gamble decision regret (Beta = 0.610, $t = -8.456$, $p < .001$). Outcome regret was also a significant predictor (Beta = -0.296, $t = 4.106$, $p < .001$) of post-gamble decision regret. Pre-gamble ratings of anticipated decision regret did not significantly predict post-gamble ratings of decision regret (Beta in = 0.036, $t = 0.724$, $p = .470$, Tolerance = .992). Together, this model accounted for 72% of the variance in post-gamble decision regret ratings (R Square = 0.723, $F (2, 115) = 147.503$, $p < .001$).

Effect of outcome information on perceived likelihood of throwing a six on the dice

After discovering the outcome of the dice throw in the gamble scenario, participants adjusted their mean estimate of the chances of winning the gamble (M = 26.22%, SD = 17.656) compared to their estimate prior to the gamble (M = 28.24%, SD = 18.835) when considering the sample as a whole. This post-outcome reduction in perceived likelihood ratings was statistically significant (t (114) = 2.404, p = .018).

Previous research (Tykocinski, 2001) has suggested that, in response to disappointing outcomes, individuals are motivated to change their view of the chances that they could have achieved a better outcome. This adjustment is hypothesised to occur as a means of protecting the individual from negative emotional consequences or self-blame – they console themselves with the fact that, no matter what they had done, they never had a chance of succeeding. Therefore, further analyses of participants' adjustments in the perceived chance of winning the gamble were carried out, to determine whether the different scenarios (which had varied in terms of choice and outcome) had different effects on change in likelihood ratings. In addition, we explored whether these effects were different for participants whose pre-gamble ratings indicated that they thought accepting the gamble was justifiable ('Willing Gamblers') and those who had indicated it was not justifiable to gamble ('Reluctant Gamblers'). Table 3.17 shows the pre-outcome and post-outcome likelihood ratings for the sample as a whole and broken down for Willing Gamblers and Reluctant Gamblers by scenario version.

A 2 (time: pre-outcome and post-outcome rating) x 4 (condition: accept/six, accept/not six, reject/six, reject/not six) x 2 (justifiability grouping: willing gamblers, reluctant gamblers) mixed ANOVA was conducted, with the likelihood rating as the dependent

Table 3.17

Mean pre- and post-outcome ratings of the likelihood of throwing a six on the dice (%) – Experiment 2

	All participants		'Willing Gamblers'		'Reluctant Gamblers'	
Scenario	Pre	Post	Pre	Post	Pre	Post
Accept/Six	26.59	23.00	31.64	23.64	23.13	22.56
	(16.644)	(14.770)	(21.186)	(15.876)	(12.225)	(14.477)
Accept/Not Six	30.87	28.33	37.00	36.75	24.18	20.27
	(20.534)	(18.607)	(23.958)	(20.614)	(14.211)	(12.539)
Reject/Six	27.60	25.77	28.90	22.00	26.95	27.65
	(19.967)	(17.467)	(21.372)	(14.575)	(19.768)	(18.810)
Reject/Not Six	28.34	27.63	33.93	33.67	24.15	23.10
	(18.910)	(19.480)	(23.575)	(25.402)	(13.682)	(12.380)
All scenarios	28.24	26.22	33.12	29.71	24.75	23.75
	(18.835)	(17.656)	(22.163)	(20.613)	(15.272)	(14.902)

Note. 'Willing Gamblers' denote participants who thought it was justifiable to accept the gamble pre-outcome; 'Reluctant Gamblers' denote participants who thought it was not justifiable to accept the gamble pre-outcome (median split groupings)

variable – 'Time' was a within-groups factor, while 'Condition' and 'Justifiability grouping' were between-groups factors. This model revealed a significant main effect of 'Time' (F (1, 107) = 7.275, MSE = 47.365, p = .008) with pre-outcome likelihood ratings being higher than post-outcome likelihood ratings, as previously discussed. This was qualified by a near-significant 3-way 'Time x Condition x Justifiability grouping' interaction (F (3, 107) = 2.260, MSE = 47.365, p = .086). Post-hoc (related-t) tests showed that the change in likelihood ratings was statistically significant only for 'Willing Gamblers' who had read the Accept/Six scenario (t (10) = 2.708, p = .022), who reduced the likelihood of throwing a six by 8% after they read that the contestant had thrown a six. For all other groups, the changes in likelihood ratings were not significant $ps > .05$). There was therefore no evidence to suggest that participants adjusted their perceptions of the likelihood of throwing a six as a way of dealing with a disappointing outcome. However, the fact that 'Willing Gamblers' reduced the likelihood of the contestant throwing a six after they read about the most positive outcome, could perhaps reflect an attempt to make the outcome all the more enjoyable by emphasising how surprising it was (Mellers, 2000).

Discussion and Conclusions

As was suggested by the results of Experiment 1, participants appear to have changed their view of the quality of the decision process after the outcome was discovered. When gamble choices turned out badly or worse than hoped, ('Accept/Not Six' or 'Reject/Six' scenarios) the general pattern was for participants to rate the decision as being less justifiable and of poorer quality than they did before they knew the outcome. In support of Baron & Hershey (1988)'s findings, our participants' perceptions of the quality of the decision appear to have been altered by how things turned out, even

though the experiments had a repeated measures design which one might expect would make participants more aware of the outcome bias. Losing the gamble was always the most likely outcome in purely probabilistic terms (5/6 chance) – regardless of the amount of the jackpot at stake (£5000, £15000 or £1 million), participants identified accepting the gamble as the least justifiable choice. Yet, when a choice to accept the gamble turned out well and the unlikely happened in terms of the dice throw ('Accept/Six' scenario), they tended to change their view of the decision, rating it as being more justifiable/of better quality than they had done before the dice throw. A similar effect was seen even when what was generally perceived to be the most justifiable choice was taken in the scenario and the events turned out favourably ('Reject/Not Six' scenario). The decision to reject the gamble was judged to be even more justifiable once the outcome was known than it had earlier been. Seemingly the outcome bolstered the justifiability of the decision – participants perhaps realised that, had the person chosen to accept the gamble instead of reject it, they would have lost most of the quiz prize money by not throwing a six on the dice. Knowing that the outcome was comparatively good (a negative outcome had been avoided) seems to have made participants believe the decision was not only good, but better than originally thought.

The observed adjustments in ratings of decision quality occurred even though at both rating points participants were provided with information by which they could judge the decision quality independently of the outcome. Thus, if judgments about decisions and judgments about outcomes can be regarded as being totally independent, one would expect that the decision-related ratings should have been more stable over time, with only outcome-related ratings varying according to the valence of the outcome – in the interim period, nothing about the decision process had changed. The fact that

participants' decision-related ratings varied (pre- vs. post-outcome) suggests that the two components of regret must be somewhat inter-related: the nature of an outcome (which is hypothesised to influence outcome regret) has an effect on an individual's evaluation of the decision process, which is hypothesised to influence decision (self-blame) regret.

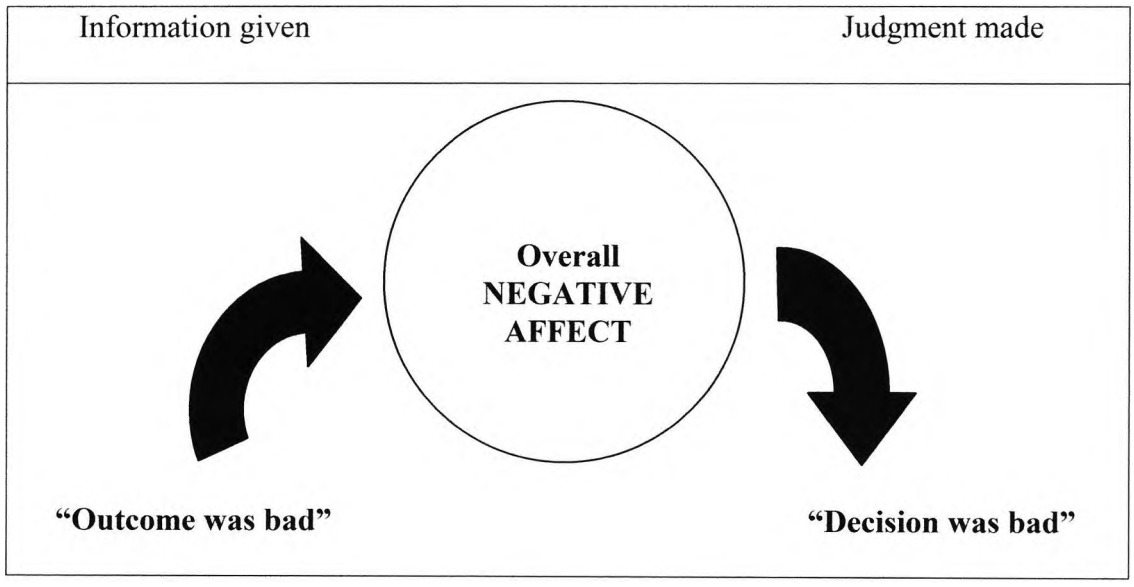
Baron & Hershey (1988) suggested that good outcomes make arguments in favour of the decision more salient, while bad outcomes make arguments against the decision more salient in the mind of the judge. In the case of the gamble in Experiment 2, where participants read a version of the scenario where the gamble was accepted, two important factors may have come to mind when they originally judged the quality of the choice – the chances of winning (in this case throwing a six on a dice) and the amount of money one might stand to win (the jackpot). Taken alone, one factor (the chances of winning) may bring the quality of the decision into question – the chances of throwing a six on the dice are slim, so perhaps one should quit whilst ahead, take the £1000 and reject the gamble. However, the other factor may make the choice to accept the gamble seem more justifiable: the size of the jackpot one might win is significantly larger than the money already won in the quiz and the contestant began the day with no prize money at all – so why not try to maximise the amount they take away? When they later discovered that the choice to gamble turned out well (Accept/Six), the argument in favour of accepting the gamble (the jackpot available) may have become more salient to participants than the argument against (the slim odds) when they re-rated the quality of the decision. In contrast, when participants discovered that the choice to gamble turned out badly (Accept/Not Six), they may have become more conscious of the argument against accepting the gamble than of the argument for it when they rated the quality of the decision.

Recent literature in the field of judgment and decision-making might also help to explain these findings. Finucane, Alhakami, Slovic & Johnson (2000) have suggested that people use an 'affect heuristic' when making judgments about risk and benefits associated with hazards. The results of Finucane et al.'s research suggest that individuals use their overall affective reaction to the hazard or item to evaluate it. When participants were presented with negative information about an item (e.g. "the risks are high"), this influenced their judgments of the benefits – they inferred that the benefits were low. Conversely, when participants were presented with positive information about the same item (e.g. the risk is low"), they rated the benefits as high. Finucane et al. argue that presentation of negative information affected participants overall feelings about/towards the item and this coloured their subsequent judgments about it. When they received positive information, they had a generally positive feeling about the item and so rated other aspects of the item favourably. Thus, participants tended to make use of how they felt about the item rather than how they thought about it. Slovic (2001) argues that they may have been unconscious of the process and believed that they were making a rationally-based judgment. These findings support the views of Zajonc (1980) that affect may precede cognition and have a direct influence on judgment and information processing.

An 'affect heuristic' explanation might be applied to the findings of the current experiments (see Figure 3.10). Presenting participants with information that the outcome was good may have evoked an overall positive affective reaction to the gamble situation and this may have influenced participants' post-gamble ratings of the decision process – they judge the decision to have been good, based on their positive 'affective pool'. Conversely, presenting participants with information that the outcome was bad may have evoked an overall negative affective reaction to the gamble situation. Based

Figure 3.10

'Affect Heuristic' explanation of the observed effects



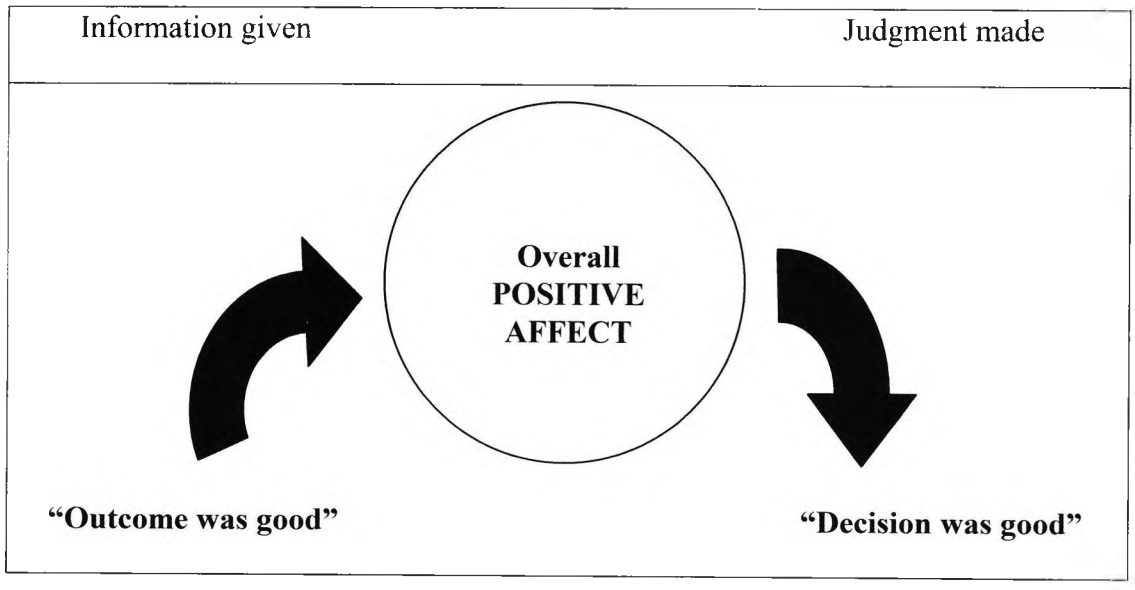


Figure adapted from Finucane, Alhakami, Slovic & Johnson (2000).

on their negative 'affective pool' associated with the gamble, participants judged the decision process to have been bad. Data from Experiment 2 showed that participants' ratings of their overall happiness were strongly associated with and significant predictors of their post-outcome ratings of the decision process.

Another possible explanation for the findings of the current experiments is that participants are showing the phenomenon of 'hindsight bias' – the tendency for knowledge about the actual outcome of an event to make that outcome appear to have been almost inevitable even before it happened. As a consequence, people believe they should have been able to anticipate that the outcome would happen (Fischhoff, 1975; Fischhoff, 1982; Hawkins & Hastie, 1990) – that it should have been obvious that there was never really any chance of another outcome occurring (Tykocinski, 2001). Literature in this area suggests that this posterior adjustment of estimates of probability is almost inescapable and typically occurs without the individual's awareness (Tykocinski, 2001), it being caused by the relatively higher accessibility of outcome-related information. Evidence that supports the occurrence of the true outcome dominates the individual's representation of events and reduces the accessibility of evidence that supports the occurrence of the other possible outcomes. Thus, the actual outcome appears in retrospect to have been much more predictable than it would have been without any knowledge of the outcome (Hawkins & Hastie, 1990). In our experiments, after participants were given information about the outcome of the scenario, they may have perceived that the person in the scenario should have been able to predict that this outcome would happen when they were making their choice. This bias in thinking may influence evaluations of the choice – if the person should have been able to anticipate the outcome that occurred, participants may judge that the individual should have chosen differently. Thus the choice that was made would, in

retrospect, seem less justifiable and of poorer quality than it actually appeared before any information about the outcome was introduced into the equation. However, in Experiment 2, participants were asked to rate the likelihood that they would throw a six on the dice both before and after they knew what the outcome was. There was a tendency for participants to rate the probability of throwing a six as slightly smaller post-outcome than they had pre-outcome, but this difference only represented an overall reduction in probability of 2% for the sample as a whole. More detailed analyses found this change in likelihood ratings was only statistically significant for 'Willing Gamblers' who had read the 'Accept/Six' scenario – a reduction in rated likelihood of 8%. No measurement of perceived likelihood of specific outcomes was taken in Experiment 1 where probabilistic information was not available to participants in the scenarios – a situation perhaps more representative of everyday life decisions under uncertainty. Our task was not exactly the same as the typical hindsight bias paradigm in that participants made their pre-outcome judgments before they learned about the outcome (i.e. when there was no chance of being biased by knowledge about the outcome) and then were asked to repeat their judgments only a short period of time later. In the usual hindsight bias paradigm, participants are given outcome information before they make any judgments and are furthermore asked to make their judgments "as if they did not know" the outcome. Previous research has indicated that hindsight bias is reduced when the original estimate is memorable (see Hawkins & Hastie, 1990). In Experiment 2, this may well have been the case: even if participants could not recall exactly where they had originally marked the visual analogue scale, most are likely to know (if not be able to calculate or know automatically the odds) that a dice normally has six sides, only one of which can land face upwards at any given time – this prior knowledge of readily quantifiable odds could guide their indication of both the pre-outcome and post-outcome ratings of likelihood on the visual analogue scale, making their probability judgments

less biased by outcome information.

Tykocinski (2001) suggests that, in order to get motivated to pursue an objective, individuals may initially over-inflate their chances of success in the pre-action stage – if an outcome seems impossible, there would be little motivation to follow that goal. However, having pursued the goal and been unsuccessful, the individual adjusts the likelihood of outcomes after the event to repair their mood and self-perception. By changing the odds that the desired outcome would have occurred, the individual can protect themself from the bitterness of disappointment by convincing themselves that they never stood a chance, no matter how hard they tried. According to Tykocinski (2001), the greater the disappointment, the larger the adjustment in likelihood of success will be. It appears, however, that our results cannot be completely explained by this type of cognitive dissonance or psychological immune system account (Festinger, 1957; Gilbert, Pinel, Wilson, Blumberg & Wheatley, 1998). When the individual is fortunate and a risky choice turns out much better than it might have done, the individual may be motivated to construe their decision-making process as being better than it may actually have been. By doing so, they can take the credit for being a competent decision-maker, shielding themselves from any creeping doubts that they may have taken a rather reckless gamble. However, if a similarly-motivated process occurs when a choice turns out badly, one would expect to see the individual trying to bolster their mood and self-esteem by again working to justify their choice and laying the blame for the disappointing outcome on more random events beyond their control. However, our data suggests that they may in fact do the opposite – having discovered that the contestant's choice to accept or reject the gamble was followed by a negative outcome, participants changed their view of the decision and rated it as less justifiable and of poorer quality than they originally had done. This pattern of adjustment does not seem congruent with

a cognitive dissonance account, although it may be argued that our participants were imagining themselves in predetermined scenarios where choices were being made that may not have matched their own choice in the same situation; as a result, they were not having to judge their own decision-making or experiencing the actual consequences and therefore had no need to attempt to protect their own mood or self-perception – it may be easier to blame a third party for making a poor decision than it is to blame oneself for making a poor decision. Future research might wish to explore therefore whether the pattern of adjustment of perceptions of the decision process observed in the current experiments still occurs when participants actually make their own choices and experience the outcomes first-hand.

Nonetheless, this issue was explored to some extent in our existing data, by considering separately participants who originally appeared to think accepting the gamble was justified ('Willing Gamblers') and those who originally appeared to think it was not ('Reluctant Gamblers'). There was evidence to suggest that 'Willing Gamblers' were less likely than 'Reluctant Gamblers' to adjust their views of the contestant's choice to accept or reject the gamble when the outcome was worse than the foregone option. The views of 'Willing Gamblers' about the choices in these circumstances seemed more resistant to influence by outcome information, particularly where the contestant had accepted the gamble (Accept/Not Six scenario) – in this case, none of the four measures showed significant change, even though participants had read about the worst possible outcome. If outcome information were to affect ratings of decision quality, one would have expected it to occur in the worst case scenario where not only was the jackpot missed but most of the quiz prize money was lost too. It seems however that the fact that participants had previously indicated that they felt it was reasonable to accept the gamble may have motivated them to defend their view of the decision, even though it

had turned out badly – this may have been the choice they would have made themselves in the same situation. The mirror pattern of results was not observed for 'Reluctant Gamblers' when their (presumably) preferred choice turned out worse than the foregone choice (Reject/Six scenario). These participants did not seem so motivated to defend their original view of the choice, even though it might have been their own in the same situation. Perhaps admitting one might have made the 'wrong choice' is somewhat easier when one has the consolation of knowing that you still can take home all of the £1000 you won in the quiz prior to the gamble.

In complex decisions that are made under uncertainty, it may be difficult to judge the quality of decision-making processes in a purely rational-analytical way, because of the demands of the task (weighing probabilities and expected utility values for each available option) and possibly a lack of necessary components of information required for such a computation. This was particularly true for the scenarios used in Experiment 1, where no probabilistic information was provided and only brief information about the decision context was available. It may also have been true for the gambling scenario used in Experiment 2 – participants may not have known how to make use of the information about probability and money at stake, or may not have been sufficiently motivated to compute and compare expected utility values for each option. When evaluating decisions in the absence of information about the outcome, one may have to make somewhat intuitive judgments and these pre-outcome judgments may serve as an 'anchor' for post-outcome judgments, with some adjustment made to take account of the fact that it is now known that the outcome was good or bad. In such cases, it may be reasonable to use outcome information as a heuristic by which to judge decision quality, based on an assumption that <u>on average</u> bad decisions are likely to go awry and be followed by bad outcomes while good decisions are likely to be followed by good

outcomes. Whilst this may not always be true for every instance (Baron & Hershey, 1988), over a lifetime of decision-making and learning from experience, the individual should be able to get a sense of what constitutes a good or a bad decision over a range of situations.

In Experiment 2, we found no effect of jackpot size in any of our analyses. Even when participants could gamble for a jackpot as large as £1 million, they still seemed somewhat reluctant to accept the gamble and, after the outcome was known, still adjusted their perceptions of the quality of the decision. This was somewhat unexpected. One would imagine that, even with a 1:6 chance of winning, it would be worth risking £1000 to win £1 million; regardless of the outcome, it would seem a justifiable choice to accept the gamble and try to secure a life-changing amount of money. When dividing the sample into experimental conditions and jackpot levels, the sample sizes may have been too small to detect any effects of jackpot size, but it may also have been the case that, for student participants, £1000 was too great a sum of money to risk, even for the chance of increasing this to £1 million. Future experiments might therefore explore whether the same pattern of results are found when participants have a smaller amount of money to gamble away (e.g. when only £100 has been won in the quiz), when the jackpot is even larger than £1 million (e.g. £5 million), and/or the chances of winning the jackpot are greater (e.g. rolling a dice and throwing a five or a six to win).

In terms of developing Decision Justification Theory, there was some (albeit limited) evidence in both experiments to support the proposal that decision justifiability has an influence on the decision (self-blame) regret component. There were some instances where, when there was a strong justification for the choice described in the scenario,

participants did appear to distinguish between the two types of regret and rated their outcome regret as greater than their decision regret. In both experiments, however, this was only the case where negative outcomes were concerned. For positive outcomes, both components of regret were rated equally, regardless of decision justifiability. It appears therefore that when a choice turns out well, the individual is not motivated to consider post-hoc whether or not their decision was unjustifiable and thus regretful – if the outcome is not regrettable, perhaps there is no need to dwell further on the quality of the decision that lead up to it or how one feels about the decision in isolation from the outcome.

To date, DJT has not specified whether the two components of regret should be viewed as independent or inter-related. Previous research (Wright et al., 2004) suggested that the two components appear to be somewhat inter-related in terms of their antecedents, rather than being totally independent. The results of the current experiments offer further support for this view, since the valence of the outcome appeared to influence participants' perceptions of decision quality – a factor identified by DJT as contributing to decision (self-blame) regret. Thus it would appear that, even when one could judge the decision process independently of its consequences, information about the outcome affects both components of regret, particularly where there is a negative outcome – one regrets the outcome itself but may also reconsider the quality of the decision process in the light of the obtained outcome and this may impact on one's feelings of decision-related regret. People may therefore blame themselves for making a bad decision (even though it may have been perfectly justifiable in the circumstances), simply based on the observation that it turned out badly.

Although in general it may be a reasonable strategy to judge decisions by their outcomes, in cases where individuals have made the best decision they could but events still turned out badly, employing this type of heuristic could mean that in future they may change the choice they make because their judgment of the earlier decision has been tainted by the way it turned out on that occasion. Conversely, where a somewhat unjustifiable decision has fortuitously turned out well, the individual may not reflect on the quality of the decision they made and thus may repeat a 'bad' decision in the future simply because their experience shows that it turned out well. This may help to explain (at least in part) while some individuals continue to repeat decisions that might be regarded as bad in principle (e.g. smoking cigarettes) – in their experience, their choice has never resulted in a regrettable outcome and so the decision still appears good/justifiable, since to date they have derived more pleasure than pain from their choice.

Future research might therefore wish to investigate the effects of experienced outcome regret and decision (self-blame) regret on subsequent behavioural choice to determine whether it is specifically regret about a bad outcome or regret about a bad decision (or simply an overall feeling of regret) that drives 'switching' behaviour (Zeelenberg & Pieters, 1999) in terms of subsequent choices.

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Chapter 4

What do people identify as their biggest regrets: Bad decisions or bad outcomes?

What do people identify as their biggest regrets: bad decisions or bad outcomes?

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Abstract

Decision researchers and social psychologists have tended to distinguish between the two emotions, regret and disappointment. More recently Decision Justification Theory (DJT) has identified two core components of regret – regret about bad decisions and regret about bad outcomes. Previous scenario-based research found that individuals rated their imagined outcome-related regret as higher than their imagined decision-related regret. The current study investigates what people report their real-life biggest regrets are. Two independent raters coded quotes from newspaper articles that referred to individuals' biggest or greatest regrets. The results showed that, overall, individuals more frequently identified regrets about bad outcomes than they did regrets about their decisions. However, they seemed to use the term 'regret' to include what researchers would define as 'disappointment'. When coding items so as to separate outcome regrets and disappointments, the most commonly reported 'biggest regrets' were actually disappointments, with no difference in the frequency of 'decision regret' and 'outcome regret'. Implications for decision research and the development of DJT are discussed.

Keywords: Regret, choice, Decision Justification Theory, outcome, decision, disappointment

Introduction

Social psychology has proposed that there are two routes by which humans might process information. Dual process theories (e.g. Petty, Cacioppo & Goldman, 1981; Chaiken, 1980; Epstein, Pacini, Denes-Raj & Heier, 1996) argue that one route is primarily analytic/rational, making use of logic and reason, while the other is more experiential/intuitive, using affective and associationistic connections. Whilst an analytic approach may be important in many decision situations, it is also demanding of both cognitive resources and time. In contrast, "relying on affect and emotions is a quicker, easier, and more efficient way to navigate in a complex, uncertain, and sometimes dangerous world" (Slovic, 2001, p.99). Research by neurologist Antonio Damasio suggests that the ability to access emotional information from one's experience is essential to effective decision-making (Damasio, 1994).

Recently decision researchers have begun to explore the effects that emotions have on individuals' choices (Schwarz, 2000). Much of this body of research has focused on two specific emotions – regret and disappointment. Whilst the two emotions have common characteristics (both are common negative emotions that result from a cognitive process that is evoked by an unfavourable event), researchers have tended to distinguish between them because of observed differences in how people appraise and report their experiences of the two emotions (van Dijk & Zeelenberg, 2002a; Zeelenberg, van Dijk, Manstead & van der Pligt, 1998; Zeelenberg, van Dijk, van der Pligt, Manstead, van Empelen & Reinderman, 1998; Roseman, Wiest & Swartz, 1994; Frijda, Kuipers & ter Schure, 1989). In addition, it has been argued that regret and disappointment are experienced under different conditions and have different effects on

subsequent decision-making (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998) and behaviour (Zeelenberg & Pieters, 1999).

Regret is proposed to be experienced when a person realises that their current situation might have been better if they had acted differently (Zeelenberg, 1999a). The emotion is often felt when a decision turns out badly and is the result of a mental comparison of the obtained outcome with an alternative outcome that the person imagines or knows would have occurred if they had chosen differently (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998). This cognitive process, whereby reality is compared to what might have been, is known as 'counterfactual thinking' (Kahneman & Miller, 1986; Boninger, Gleicher & Strathman, 1994). In the literature, regret has been particularly associated with situations where the person has some control over the events (by having a choice) and they may therefore feel responsible to some extent for the negative outcome they obtained (van Dijk & Zeelenberg, 2002a; Frijda et al., 1989) or blame themselves for making a bad decision (Zeelenberg, van Dijk, Manstead & van der Pligt, 2000). The individual concludes that the negative outcome might have been avoided 'if only' they had made a different choice. This realisation is reported to be associated with a characteristic 'sinking feeling' and thought patterns whereby the individual concludes they should have known better, have made a mistake or lost out on an opportunity. As a result, they want to undo the events and have another opportunity to correct their mistake or improve their performance by doing something differently (Roseman et al., 1994; Zeelenberg, van Dijk, Manstead & van der Pligt, 1998). Thus, the experience of regret involves a kind of mental 'post-mortem' where the individual examines what happened, particularly focusing on their own contribution to the events leading up to the negative outcome, and considers how their behaviour might have been changed (van Dijk & Zeelenberg, 2002a). According to Zeelenberg (1999b), whilst experiencing

regret may be unpleasant, it may also be adaptive, since it gives the individual the opportunity to learn from their mistake and apply that experience in their future decision-making. Studies conducted by Zeelenberg & Pieters (1999) have, for example, suggested that the experience of regret over a choice of service provider promotes a desire to switch to an alternative service provider in future (i.e. customers are motivated to change their choice).

Disappointment is a frequently experienced emotion that typically occurs when an outcome does not match up to expectations or when a desired outcome is not achieved (Bell, 1985; Zeelenberg, van Dijk, Manstead & van der Pligt, 2000). Like regret, disappointment also involves counterfactual thinking (comparing 'what is' with 'what might have been') but, rather than undoing one's choice or behaviour in the situation, the counterfactual thoughts typically undo the outcome by changing something about the situation or the state of the world – that is, the person concludes that the unwanted outcome was caused by external factors that were beyond their own control – they were not responsible (Zeelenberg, van Dijk, van der Pligt et al, 1998; Frijda et al., 1989). Compared to regret, research suggests that the experience of disappointment is qualitatively different and the emotion appears to have its own characteristic effects on thinking and behaviour (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998; Zeelenberg & Pieters, 1999). Zeelenberg, van Dijk, Manstead & van der Pligt (1998) found that, when asked to recall occasions when they had felt disappointment, participants' responses indicated that the emotion was associated with a feeling of powerlessness and a desire to turn away from the situation, rather than trying to go over the events to see if there was something they could do about it. In contrast to regret, which promotes a desire to try again, the experience of regret appears to be "more paralysing" (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998). The results of

consumer behaviour studies conducted by Zeelenberg & Pieters (1999) suggest that the experience of disappointment over service delivery promotes 'word-of-mouth' behaviour, whereby a dissatisfied consumer is motivated to tell members of their social network about the bad experience, rather than change their choice of service provider.

Not only do experienced emotions influence future behaviour, it has also been argued in Regret Theory (Bell, 1982; Loomes & Sugden, 1982) and Disappointment Theory (Bell, 1985; Loomes & Sugden, 1986) that individuals can anticipate disappointment and regret associated with different outcomes and take these anticipated emotions into account when choices are made, opting for courses of action that are associated with the least negative affect. A body of research appears to support this view (Zeelenberg, 1999a; Zeelenberg & Pieters, 2003).

More recently, researchers have begun to distinguish between different types of disappointment and regret and the processes that precede these. For example, van Dijk & Zeelenberg (2002b) have argued there are two variants of disappointment, both related to disconfirmed expectancies – one that occurs when another person lets you down or fails to meet your expectations (person-related disappointment) and another that occurs when an outcome is not as pleasurable as one hoped and thus falls below expectations (outcome-related disappointment). According to van Dijk & Zeelenberg (2002b), there is a need to be specific about which variant of disappointment one is talking about, since the two types of disappointment do overlap in some respects, yet are also associated with distinct appraisal patterns and responses and tend to occur in different situations.

In relation to regret, Decision Justification Theory (DJT) has recently proposed that there are two "core components" of regret in decision-making (Connolly & Zeelenberg, 2002). One component involves the evaluation of the outcome of a choice, typically comparing the obtained outcome with some kind of 'standard', which may be the outcome of a foregone option or an expected or imagined outcome. The comparison reveals that the obtained outcome is relatively worse than the standard – thus this component of regret relates to a 'bad outcome' (outcome-related regret). The second component of regret proposed by DJT involves an evaluation of the decision process. In retrospect, the individual may feel their choice was unjustified or in some other way of poor quality and, because they made this 'bad decision', they are in some way to blame for the events. According to DJT, the two components contribute to an overall feeling of regret but need not necessarily co-occur. For example, an unjustifiable choice may turn out relatively well and thus the decision-maker would feel little or no 'outcome-related regret' but may still feel regret about making a bad decision. In another situation, they may feel they made a perfectly justifiable decision even though the outcome was bad and thus the decision-maker would feel regret about the outcome but little or no regret about the decision that preceded it. Alternatively, they may experience both types of regret – when the outcome is bad and the decision somewhat weakly justified.

A series of experiments offers some support for these ideas. In scenario-based tasks, Wright, Ayton & Djemal (2004) found that, in general, participants tended to rate their (imagined) outcome-related regret as slightly more intense than their (imagined) decision-related regret – the fact that the two types of regret were rated differently suggest they are somewhat distinct. For some, but not all, scenarios there was evidence that decision-related (self-blame) regret was reduced when participants felt that

decisions were strongly justified, as hypothesised by DJT. The fact that outcome regret tended overall to be greater than decision regret may reflect the effects of cognitive dissonance (Festinger, 1957) or the "psychological immune system" proposed by Gilbert, Pinel, Wilson, Blumberg & Wheatley (1998), whereby people are (perhaps subconsciously) motivated to distort information about events so as to protect their self-concept and repair their mood or psychological well-being.

It is important to note, however, that the results reported by Wright et al. (2004) – like a large proportion of the research in the area – were derived from scenario-based studies, in which people imagined themselves in situations where they had made a choice that turned out badly. Imagined emotional experiences that follow imaginary choices may be qualitatively different to those really experienced. For example, research suggests that when anticipating future affect or imagining themselves in hypothetical situations, individuals tend to mispredict the duration and intensity of their own and others' emotions (Ayton, Naseem & Pott, 2002; van Boven, White & Kruger, 2002; Gilbert & Wilson, 2000; Gilbert et al., 1998; Brickman, Coates & Janoff-Bulman, 1978). In addition, Damasio (2003) reports that some neurological patients who were unable to make sound choices and decisions (and in some cases any decision at all) in real life, were nonetheless able to make good decisions when presented with hypothetical social scenarios.

It would therefore seem important to determine whether people can and do distinguish between regret about bad decisions and regret about bad outcomes in their real-life decision-making – and, if they do, whether they tend to report more outcome-related regret than decision-related regret in the way that Wright et al.'s (2004) scenario studies have suggested. It would also be of interest to explore whether individuals distinguish

between specific emotions in the way that researchers do. Disappointment and outcome-related regret would seem to share a common focus – a 'bad' outcome that falls below expectations. As yet, DJT has not clearly specified whether or how the two emotions might differ, particularly as the component described as decision-related regret appears to encompass the sense of self-blame over having made a bad choice and thus being somewhat responsible for the events. Dictionary definitions of regret in terms of the word's common usage in the English language suggest that regret incorporates an element of disappointment. For example, The Concise Oxford Dictionary of Current English (8th Edition: Allen, 1991) defines the noun, 'regret' as "a feeling of sorrow, repentance, disappointment, etc." or "an … expression of disappointment or sorrow at an occurrence, inability to comply, etc.". Indeed, Zeelenberg and his colleagues seem to have acknowledged this possibility when they stated,

> "*In order to experience regret, we suggest, one not only has to perceive the outcome as negative, but one also has to realise that the unwanted outcome resulted from (or could have been prevented by) one's own behaviour. This suggests that disappointment is the more general emotion and that regret is experienced in cases where the disappointing outcome is attributed to the self*".
>
> (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998, pp. 228-229)

In the series of papers addressing the issue of the relationship between regret and responsibility, Connolly & Ordonez (2000) and Zeelenberg, van Dijk & Manstead (2000) also consider the possibility that people in their everyday language may use the terms, 'regret' and 'disappointment' in different ways to researchers and accept that 'regret' may be used in American English to include events that one would like to have avoided but for which the individual cannot be held personally responsible.

Gilovich & Medvec (1994) categorised what individuals reported as their biggest regrets

in terms of whether they discussed actions or inactions but did not distinguish between regrettable choices and regrettable outcomes. The current study therefore aimed to explore two issues. Firstly, whether people tend to naturally distinguish between the hypothesised components of regret and more frequently mention bad outcomes than bad decisions when they reflect on their own 'biggest regrets' or 'greatest regrets'.

One might expect, based on Wright et al.'s (2004) scenario studies that, if outcome regret tends to be more intense than decision regret, interviewees would mention more bad outcomes than bad decisions. Secondly, the study explores whether, when talking about their own regrets, people also mention outcomes that are beyond their control and unrelated to their own decisions – which researchers would perhaps prefer to define as 'disappointments'. Both of these issues would seem to be of interest in terms of the further development of Decision Justification Theory and in terms of how confident researchers can be when they ask participants in experiments about their own experiences of regret and disappointment that the two parties are 'speaking the same language'.

Method

Procedure and materials

Stimuli were downloaded from the InfoTrac Custom Newspaper database and the Guardian Unlimited database. The two databases cover a large number of the major national daily newspapers and Sunday newspapers published in the United Kingdom (The Daily Mail, The Guardian, The Independent, The Mirror, The Observer, The Times, The Independent Sunday, The Mail on Sunday, Sunday Mirror and Sunday

Times). The databases were searched for articles that had appeared in these newspapers from 1990 onwards (neither database includes full-text extracts before this date). An initial search on the word 'regret' generated a total of 19128 articles. The search was therefore refined and the databases were searched using the terms, 'biggest regret' and 'greatest regret'. These searches generated a total of 387 articles.

In some cases, the same regret statement had been published in more than one newspaper source - in such cases, only one copy of the stimulus was included for coding. Articles were also excluded from the analysis if the regret statement was referring to an 'imagined' or 'hypothetical' regret of a third party (eg. "Y must surely be X's greatest regret"), if the statement was clearly 'tongue in cheek' or made as a joke and if the interviewee responded that they had "no regrets".

A copy of the article was retrieved from the database and the phrase which included the words 'biggest regret' or 'greatest regret' was identified. The relevant section of the feature was then extracted and copied onto a stimulus sheet (see Appendix 1). Each stimulus sheet contained information about one article, including:

(a) the title of the article or feature

(b) the source of the item (newspaper name and author, if known)

(c) the date the article was published

(d) a summary of the content of the whole article - to give raters an idea of the context of the 'regret extract'

(e) a verbatim quote of the 'biggest regret' or 'greatest regret'

(f) a series of tick-boxes by which raters could indicate their coding of the stimulus (see below).

Two researchers - who were familiar with the 'core components' of regret proposed by Decision Justification Theory (Connolly & Zeelenberg, 2002) - independently coded the stimuli that had been extracted from the database. Their task was to read the stimulus sheet and code the 'regret item', selecting from the following four possible categories the one which they thought was most applicable:

(1) Regret the decision or choice

(2) Regret the outcome that followed their own choice

(3) Regret the outcome that was beyond their own control or choice

(4) Don't know/can't determine

The coding categories were defined in detail before the raters began the task. These definitions were based on the research literature and are reproduced in Appendix 2. A fourth option was included on the stimulus sheet ("Don't know") for use in cases where the raters were unable to categorise the regret quote, either because there was not enough information in the article or extract, or because they could not easily distinguish which category it best fitted. In addition to categorising the 'regret item', the two coders also independently rated each stimulus on the following two scales:

(a) Ease of categorisation - "How easy was it to determine which type of regret the article is referring to?" (1 = Very easy to determine; 7 = Very difficult to determine).

(b) Confidence in categorisation - "How confident are you that you have ticked the right box?" (0% = Not at all confident; 100% = Totally confident) on the right hand side of the scale.

The category assigned to each 'regret item' by each of the raters was recorded in an SPSS spreadsheet, together with the relevant 'ease of categorisation' and 'confidence in categorisation ratings. Information was also recorded in the spreadsheet about the year of publication and source of the item, the gender of the 'regretter' and their occupation, where it was possible to determine this from the article.

The two raters' codings were compared; initially they agreed on 73% of codings. Where there was disagreement about the categorisation of the regret item, these differences of opinion were resolved in a meeting between the raters, where they discussed the reasoning behind their choice of category. Where agreement could still not be reached, the items were coded as "Don't know" and excluded from the main analyses. The coding agreed for each of the regret items was added to the SPSS database.

Results

The two raters reached agreement on the coding for a total of 358 (92.5%) regret items and these were included in the analysis. For twenty-nine cases, the raters could not reach agreement, or agreed on a 'Don't know' coding; these regret items were excluded from the analysis.

Table 4.1 and Figure 4.1 show the frequencies of items coded as relating to regret about a decision and items coded as relating to regret about an outcome (whether relating to their own choice or not). Regrets about outcomes (84%) were more frequently mentioned in the articles than regrets about decisions (16%). A Binomial test confirmed

Table 4.1

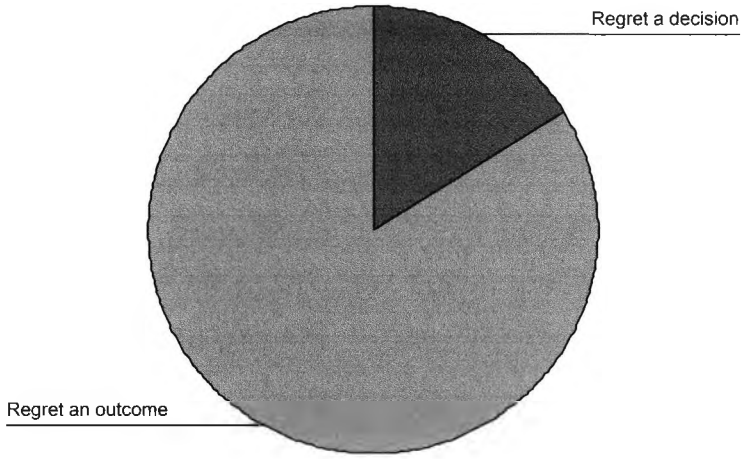
Percentages and frequencies of regret items coded as referring to regrets about decisions and regrets about outcomes*

	Regrets about bad decisions	Regrets about bad outcomes*	Totals
Observed percentage of cases	16%	84%	100%
Expected percentage of cases	50%	50%	100%
Observed frequency	58	300	358
Expected frequency	179	179	358

Note: * In this analysis, 'outcome regrets' refer to those that were related or unrelated to the person's own choice

Figure 4.1

Relative frequencies of items when coded as 'regrets about a decision' and 'regrets about an outcome'



that this preference for interviewees to identify regrets about an outcome (rather than a decision) was statistically significant – $p < .001$.

Table 4.2 and Figure 4.2 show the frequencies of items coded as relating to regret about a choice or decision (categorised as 'decision-regret'), regret about an outcome that followed an individual's own choice (categorised as 'outcome-regret'), and regret about an outcome beyond the individual's control or choice (categorised as 'disappointment'). The most frequent category assigned to the regret items was 'disappointment' (57%). Outcome-regrets (27%) were slightly more frequently mentioned than decision-regrets (16%) as interviewees' biggest or greatest regret. A Chi-Square goodness-of-fit test confirmed that the discrepancies between observed and expected values (assuming equal distribution of items across the three categories) were significant, χ^2 (2, N = 358) = 96.156, $p < .001$. There was a tendency for people to mention outcomes that were beyond their control (i.e. unrelated to their own choices) more frequently when they were speaking about their biggest or greatest regrets – even though emotion researchers might label these as 'disappointments' rather than 'regrets'.

Figures 4.3(a) to 4.3(c) give examples of regret items that were categorised as 'decision regrets', 'outcome regrets' (regret about an outcome related to the person's own choice) and 'disappointments' (regret about an outcome that appeared to be unrelated to the person's own choice).

Raters' averaged confidence in categorisation and ease of categorising the items

An averaged (%) confidence rating was computed for all items where the two independent raters had initially agreed on the categorisation of the regret item (n = 281

Table 4.2

Percentages and frequencies of regret items coded as referring to decision-regret, outcome-regret and disappointment

	Decision regret	Outcome regret	Disappointment	Totals
Observed % of cases	16%	27%	57%	100%
Observed frequency	58	96	204	358
Expected frequency	119.3	119.3	119.3	358
Residuals	-61.3	-23.3	84.7	---

Figure 4.2

Relative frequencies of items when coded as 'decision regrets', 'outcome regrets' and 'disappointments'

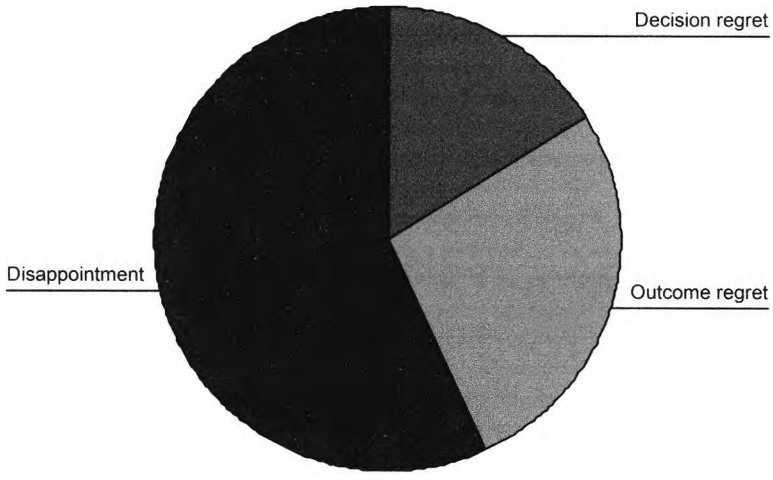


Figure 4.3(a)

Examples of regret items falling into the 'decision regret' category

Decision regrets

'For two years, starting in 1996, he had a recurring part as Lisa Kudrow's suitably kooky half brother in 'Friends'. As Frank Jnr, he persuaded Phoebe to become a surrogate mother for him. Despite the exposure, Ribisi regretted the decision. "It's one of the biggest regrets I've had because it becomes embarrassing for me. I don't want to be controlled or manipulated for fear that my career is going to go into the toilet if I don't take a role".

Actor, Giovanni Ribisi

'Noel raced saloon cars as a semi-professional in the Seventies. "It's the biggest regret of my life that I didn't carry on motor racing", he says. "But my TV career was moving on so I went with that. I have had a go at driving recently with champion driver Derek Bell. He even said he thought I could have made a professional. Now I don't have the time to commit myself to it. And I think I'm probably past it anyway".

Noel Edmonds, Former DJ and TV presenter

'Not long after ... [the failure of her marriage to musician Nick Walker] ... Georgie found herself pregnant with Best's child and decided to have an abortion. "I had one child already and knew I couldn't look after another. George wasn't around and I hung on for 16 weeks before I went through with it, hoping he would contact me, but he didn't. He rang me two weeks later. I told him what I had done. I was in a terrible state about it for years. In fact, I've never forgiven myself for getting rid of his baby. It's my biggest regret"'.

Georgie Ellis, former lover of footballer George Best

'It was the greatest regret of his later years that he gave up the Chair of BBC's Question Time in 1989 after a decade of prompting flustered politicians into unwilling disclosures'.

Tribute to broadcaster, Sir Robin Day

'Aitken reserves his greatest regret for involving his wife and family, who signed witness statements for the 1997 libel trial against The Guardian and Granada Television, supporting Aitken's disingenuous claims over payment of a bill at the Paris Ritz. "To my eternal shame, I even got my wife and daughter to back me up with witness statements supporting my lie", he adds'.

Former Tory cabinet minister, Jonathan Aitken

Figure 4.3(b)

Examples of regret items falling into the 'outcome regret' category

Outcome regrets (related to individual choice)

'In 1984, Elton stunned pals by suddenly marrying German sound engineer, Renate Blauel in Sydney, Australia on St. Valentine's Day. The pain he put her through during their four year marriage is still his biggest regret. They haven't seen each other for 11 years. He said recently, "It was basically dishonest. I was so unhappy. She's the only person I've not made up with. I hope one day we can be friends, but she doesn't want it".

Gay rock star, Sir Elton John

'Ince, who began life as a trainee at the club, has always insisted his biggest regret in football was quitting the Hammers under a cloud of controversy after being pictured in a Manchester United shirt in a national newspaper months before his move to Old Trafford. Despite running a gauntlet of hate every time he returns to Upton Park, Ince has always declared his love for the club, even taking the unprecedented action of asking fans for forgiveness through the local fanzine'.

Feature on professional footballer, Paul Ince

'Lyon said after the hearing, "I am relieved this is all over ... I don't think I should have been treated as I was by the police and I have no confidence in the law and order system". He said he would "do it again if my life was in danger. It is my biggest regret that I now have a stain on my character".

Retired soldier, Ben Lyon, who shot and wounded thieves at his allotment and was arrested and found guilty of unlawful wounding after an armed police operation

'The programme highlights how wives and girlfriends have been infected ... [with HIV] ... One woman was infected by her lover who decided not to tell her he had the virus. "The biggest regret is that I actually passed the virus on to somebody else", her lover says. "I have taken her life".

Feature on World in Action documentary on the HIV epidemic in Scottish prisons

'Her biggest regret is that her addiction has blighted her daughter's childhood. "I've missed a whole chunk of her life that I can never bring back. I didn't do with her the things that other mothers do with their children. I didn't take her to the zoo, I didn't take her on holiday"'.

'Anne', one of an increasing number of respectable suburban housewives who are addicted to cocaine, seen as the 'fashionable' drug that celebrities use

Figure 4.3(c)

Examples of regret items falling into the 'disappointment' category

Disappointments ('regrettable' outcomes unrelated to individual choice)

'Dr Fejk said the zoo had saved most of its animals including tigers, panthers, jaguars and rhinoceroses, but more could have survived ... [the Prague floods] ... if it [the zoo] had been warned earlier. He said that the biggest regret was the loss of Pong, a six year old gorilla that probably drowned. "I went through that pavilion", Dr Fejk said. "I walked in chest-high water and if he were still alive I would have found him".

'What's your biggest regret? "Losing my Mum. She was only 52 years old when she died 16 years ago. I wish she could have lived to see all her grandchildren. If I could change anything about my life, that'd be it".

Actor, Ray Winstone

'In the past, he has always ducked questions about his childlessness. But now he admits the biggest regret of his life is not an unmet polar challenge but the fact that he and his wife never had children. They tried but were unable to conceive'.

Feature on explorer, Sir Ranulph Fiennes

'A musical about the group, A Need For Heroes, was staged on Merseyside in 1987. It encouraged Johnny Guitar to reform The Hurricanes and his forceful playing was heard at functions for the Merseycats Charity. When he succumbed to motor neurone disease, his biggest regret was that he could not play the guitar any more'.

Obituary for guitarist John Byrne (Johnny Guitar)

"My biggest regret is that my father and my mother divorced in the first place – I'd have loved him to be around".

Karen Briggs, daughter of TV actor, Johnny Briggs

"My biggest regret is that my mother, Adriana, did not live long enough to see me get to the top. She died shortly before I made the breakthrough into the England team, but she was in my thoughts when I walked out at Wembley for the first time. I said, "This is for you, Mum" ... " I know she would have been so thrilled if she had still been alive".

Les Ferdinand, England International and Premiership footballer

items). Similarly, an averaged ease of categorising rating was computed from the two coders' original ratings; to aid interpretation, ease of categorisation ratings were reverse-scored, so that higher ratings represented a perception of the item being easy to categorise.

Ease of categorisation ratings were compared for items coded as 'decision regret', 'outcome regret' and 'disappointment'. The results of a one-way ANOVA revealed that the coders had found it significantly more easy to categorise 'disappointments' ($M = 6.08$, $SD = 0.787$) than they had to categorise 'decision regrets' ($M = 5.23$, $SD = 0.992$) or 'outcome regrets' ($M = 5.16$, $SD = 0.977$) – $F(2, 278) = 34.313$, $MSE = 0.752$, $p < .001$. Decision regrets and outcome regrets were equally easy to categorise (Tukey HSD, $p = .915$), while disappointments were easier to categorise than decision regrets and outcome regrets (Tukey HSD, $ps < .001$). Similarly, coders were more confident that they had categorised 'disappointment' items correctly ($M = 86.31$, $SD = 10.146$) compared to 'decision regret' ($M = 77.41$, $SD = 10.048$) or 'outcome regret' ($M = 76.27$, $SD = 11.158$) items – $F(2, 278) = 28.075$, $MSE = 106.769$, $p < .001$. There was no difference in coders' average confidence in categorising decision regrets and outcome regrets (Tukey HSD, $p = .838$). However, coders had been significantly more confident in their categorisation of disappointments than in their categorisation of decision regrets and outcome regrets (Tukey HSD, $ps < .001$).

Thus it appears that the raters found it easier to identify items that referred to disappointments (outcomes unrelated to the individual's choice) compared to items that referred to decision regrets and outcome regrets, and they were more confident about their categorisation of instances of disappointment. This may have reflected a difficulty in disentangling regret about poor quality decisions from regret about bad outcomes that

follow decisions, although this interpretation cannot be confirmed, since raters were not asked to give any qualitative information about what made categorisation easy or difficult.

Comparisons of the categorisation of biggest regrets according to the gender of the regretter

To determine whether gender had an influence on the nature of the 'biggest' or 'greatest' regrets that individuals reported, the percentage of 'regret' recollections falling into each category was compared between males and females. There were more male regretters (n = 249) than female regretters (n = 100) in the sample; the remaining regret items had been reported by couples (n = 9) and therefore were excluded from this analysis.

There was no significant association between the regretter's gender and the categorisation assigned to the regret item, χ^2 (2, N = 349) = 0.731, p = .694. Both genders had most frequently mentioned 'disappointments' (male regretters: 58% items; female regretters: 53% items). Regrets about outcomes that followed their own decisions (male regretters: 26% items; female regretters: 30% items) were slightly more frequently mentioned than regrets about bad decisions (male regretters: 16% items; female regretters: 17% items).

Comparisons of the categorisation of biggest regrets according to the occupation of the regretter

One might expect individuals from certain walks of life (e.g. politicians, company

directors) to avoid reporting that they regret a decision that they took, since doing so may provoke a loss of confidence in the individual amongst the public (e.g. voters or shareholders). Since their professional reputation relies on being perceived as a 'good decision maker', they might be more inclined to report regrets about bad outcomes, particularly those beyond their own control.

To explore whether the regretter's occupation did have such an influence of the type of biggest regret they reported, the percentage of 'regret' recollections falling into each category was compared across five occupation groups – politicians (n = 27), sportsmen (n = 97), company directors/chairmen (n = 27), creative/performing arts (n = 57) and media/journalism (n = 47). Regretters falling into other categories (n = 43) were excluded from the analysis since there were too few individuals in the sample having that particular occupation and they could not be subsumed into any of the other occupational groups. In other cases, the article had not mentioned the regretters occupation (n = 60). The categorisation of regret items by occupational group are shown in Table 4.3 and Figure 4.4.

There was no significant association between the regretter's occupation and the categorisation assigned to the regret item, χ^2 (8, N = 255) = 6.225, p = .622. All occupations had most frequently mentioned 'disappointments' when they spoke about their 'biggest regrets' or 'greatest regrets' (all occupations: 58% items). Overall, regrets about outcomes that followed their own decisions (all occupations: 26% items) tended to be mentioned more frequently than regrets about bad decisions (all occupations: 16% items). Therefore it appears that all individuals, regardless of their occupation, are more inclined to talk about disappointing outcomes that are somewhat beyond their own control when they identify their 'biggest regrets' or 'greatest regrets' in life.

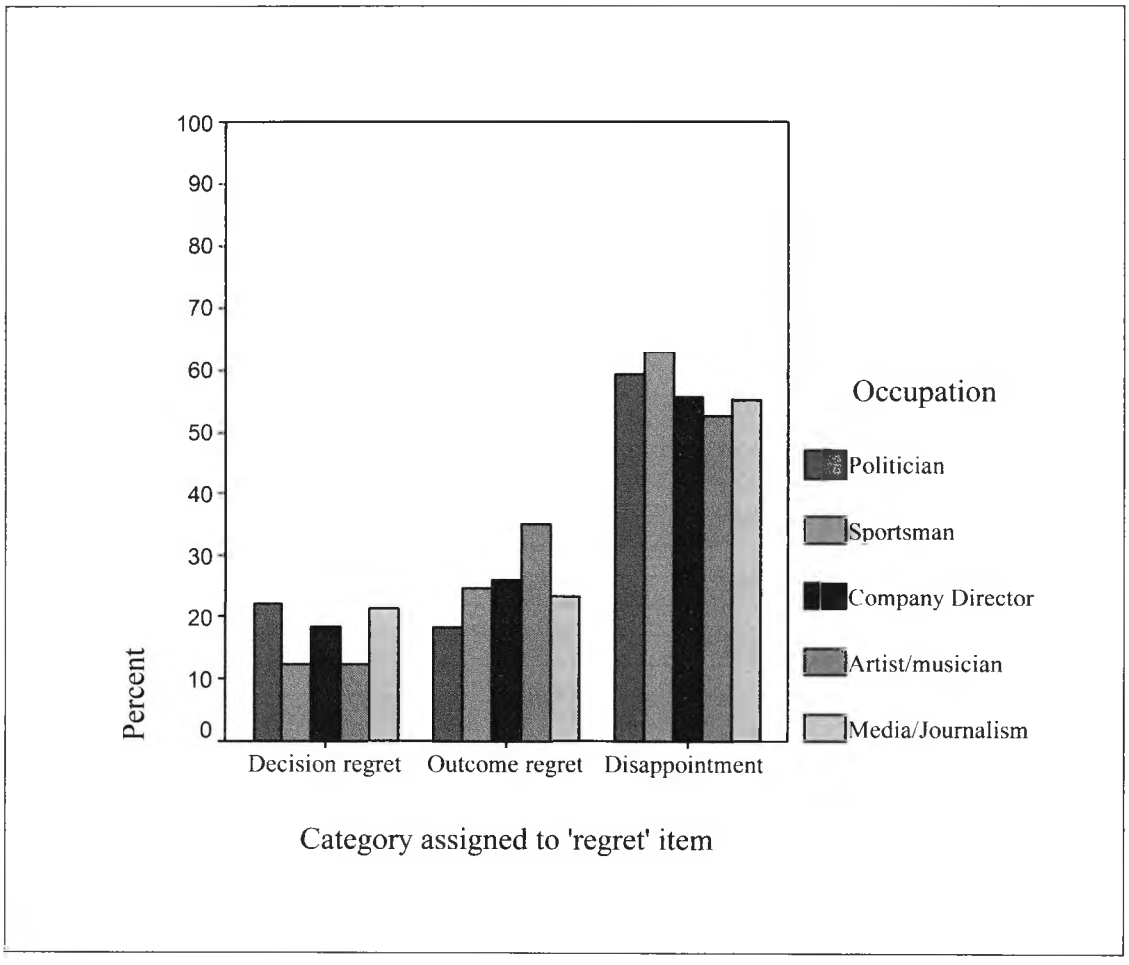
Table 4.3

Percentage of regret items falling into each category by occupation of the regretter

	Category assigned to regret item by coders		
Occupation of regretter	Decision regrets	Outcome regrets	Disappointments
Politicians	22%	18%	59%
Sportsmen/sportswomen	12%	25%	63%
Company directors/Chairmen	18%	26%	56%
Creative/Performing Arts	12%	35%	53%
Media/Journalism	21%	23%	55%
All occupations	16%	26%	58%

Figure 4.4

Relative frequencies of items coded as decision regrets, outcome regrets and disappointments as a function of occupation of the regretter



Comparisons of the categorisation of biggest regrets according to the date the article was published

The newspaper search had identified significantly more articles mentioning 'biggest regret' or 'greatest regret' that were published after the year 2000 (62% stimuli) than were published in the 1990s (34% stimuli – χ^2 (1, N = 358) = 21.631, $p < .001$. This may simply reflect the fact that a greater number of more recent articles were included in the database, or it may be that in recent years there has been a bigger focus on emotional experiences, such as regret, in the media. Gilovich & Medvec (1994) have argued that modern culture is likely to maximise the potential to experience regret because of the increasing volume of choices now available to individuals. Despite an apparent increase in the incidence of regret items over time, there was no significant association between decade of publication of the article and the categorisation of the 'regret' item – χ^2 (2, N = 358) = 2.763, $p = .251$. In both publishing decades, individuals were more likely to have mentioned disappointing outcomes as their 'biggest regrets' or 'greatest regrets' (1990s: 57% items; 2000s: 57% items) than they were to mention regrets about outcomes of their choices (1990s: 30% items; 2000s: 25% items) or regrets about making bad decisions (1990s: 13% items, 2000s: 18% items).

Discussion

The review of newspaper articles showed that, when talking about their biggest regrets or greatest regrets, people tended overwhelmingly to mention bad outcomes rather than bad decisions. Only a small proportion of interviewees specifically mentioned that they regretted a poor decision they made. This observation may reflect a self-presentation bias, whereby people are motivated to avoid presenting themselves as someone who is

unable to make sound decisions. This may not be a conscious attempt to deceive readers about their ability to make decisions. Rather, it may be the result of a range of sub-conscious cognitive processes – described as a 'psychological immune system' – hypothesised to protect the individual's mood and self-esteem (Gilbert et al., 1998). This may involve the reconstrual of events to minimise one's part in the regrettable events and attempts to justify their action, which would – according to DJT – have the effect of reducing the salience of self-blame or decision-related regret.

The review also revealed that common usage of the word 'regret' is somewhat different to definitions of regret used by decision and emotion researchers. As discussed earlier, English dictionary definitions of 'regret' also incorporate the experience of disappointment. In line with this definition, a high proportion of the biggest regrets or greatest regrets mentioned in the articles referred to outcomes that seemed to be beyond the individual's personal control, in that it was not obviously an outcome which followed a choice they made. Decision and emotion researchers would probably label these types of emotional experiences, 'disappointments'. This raises the methodological question of whether, when asked about 'regret' or 'disappointment', research participants make the same distinction between the different emotions that experimenters do – whether the two parties are actually talking about the same things. As already discussed, this idea is not necessarily new.

From a theoretical perspective, another question arises. Decision Justification Theory has identified two core components to regret in decision making – regret about making a poor quality decision (self-blame) and regret about a bad outcome. It is not immediately clear how 'outcome regret' differs from 'disappointment'. Both seem to relate to bad outcomes. Past literature has defined 'disappointment' as the negative feeling that

arises when an outcome that is beyond the individual's control is worse than expected or hoped for – had a 'different state of the world existed'. That is, the bad outcome is the result of external factors, unrelated to any choice made by the individual. In contrast, 'regret' has been defined as the negative emotion that arises when the individual compares the outcome of their choice with other outcomes that might have occurred had they chosen differently. That is, they had control in the situation – they could have changed the outcome by changing their choice. One might argue that 'decision regret' or self-blame regret encompasses this aspect – the individual regrets making the wrong (a bad) decision and now wishes they had done something differently. Presumably what has been labelled 'outcome regret' in DJT is related to the realisation that the outcome is worse than it might have been and is thus a negative outcome. However, if 'decision regret' already accounts for the self-blame aspect (the outcome resulted from the individual's own choice), it is not clear how the negative feeling about a bad outcome differs from disappointment.

In describing DJT, Connolly & Zeelenberg (2002) have argued that the theory can explain some of the findings of existing research, including that exploring the relationship between regret and responsibility. In a series of studies (Connolly, Ordóñez & Coughlan, 1997; Zeelenberg, van Dijk & Manstead, 1998; Ordóñez & Connolly, 2000; Zeelenberg, van Dijk & Manstead, 2000), participants rated the regret experienced by students who had moved from one course option to another. For some students, the move was the result of their own choice (responsible), but for other students the move had been randomly decided by computer (non-responsible). In the scenario, one of the students ends up on a better course than the one they originally selected; one student ends up on the same course; another student ends up on a worse course than they were originally signed up for. In the case where the student ends up on

the worse course, participants typically rated the regret of the 'responsible' student (who ended up on the worse course as a result of their own choice) as greater than the regret of the 'non-responsible' student (who ended up on the same worse course as a result of random computer allocation). This finding has been explained by the suggestion that having responsibility in a situation accentuates regret. However, the series of papers also observed that participants still rated the regret of non-choosing students as moderately high. Connolly & Zeelenberg (2002) argue that DJT can explain this otherwise puzzling finding – students who chose to move to the worse course experience both decision regret (self-blame) and outcome regret, whereas students whose move was decided by the computer experience only outcome regret. However, given that the student in the latter case did not make a choice in the situation, decision theorists would surely argue that what participants attribute to this student must be disappointment rather than regret, since they did not choose. Had another state of the world existed (the computer had allocated them to another course, or they had not had to move courses at all), they would have been on a better course.

If there are two core components that contribute to the overall feeling of regret as Connolly & Zeelenberg (2002) propose in their description of DJT, perhaps these components would be better labelled as decision (self-blame) regret and disappointment about the outcome (in that it falls short of the outcome that was hoped for or expected), somewhat in line with the way regret is defined in English dictionaries, i.e.,

Regret = disappointment (bad outcome) + self-blame (bad decision).

This proposed reformulation appears to be in line with Zeelenberg, van Dijk, Manstead & van der Pligt's (1998) comment that, "... regret is experienced in cases where the

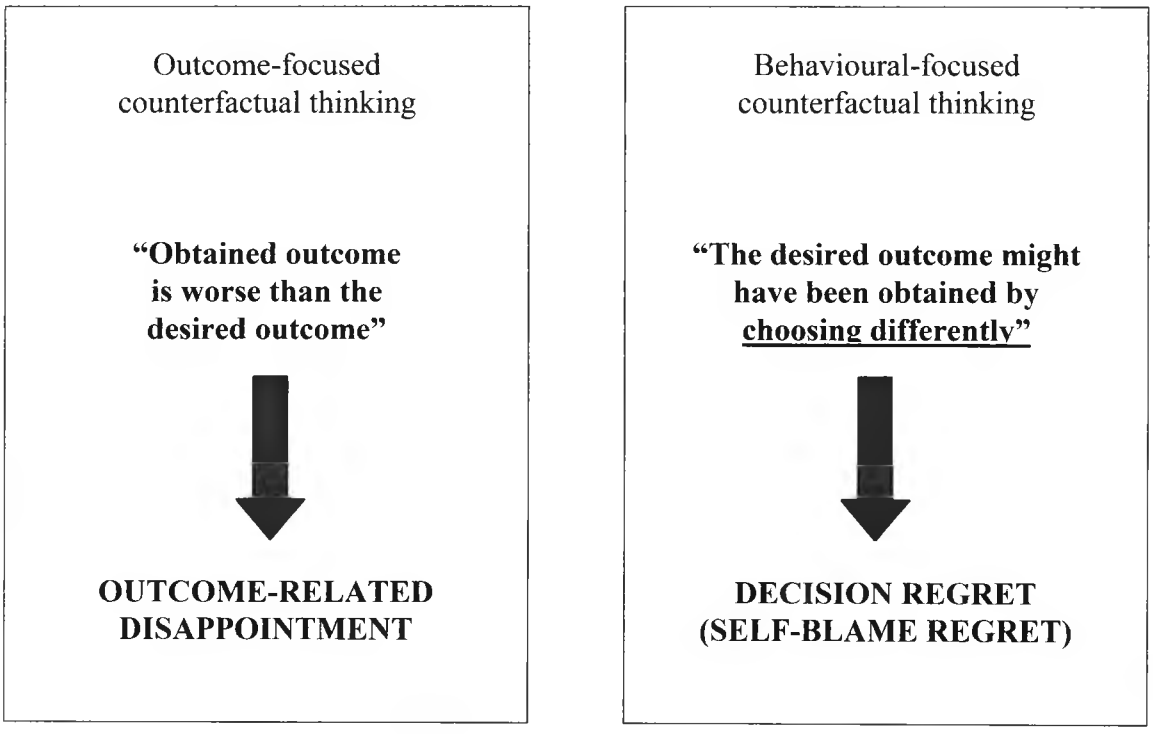
disappointing outcome is attributed to the self" (p. 229). Figure 4.5 suggests the processes that might be involved. Where a person has no responsibility (had no choice in the situation), they will experience only disappointment as a result of comparing the obtained outcome with what they had expected – with no element of self-blame. However, where the individual did make a choice in the situation, they may experience both disappointment and an element of self-blame (regret about making the wrong/bad decision), depending on how justifiable the decision now seems – the combination of these two experiences is commonly labelled as 'regret'.

This appears to be the case in the content analysis of the biggest regrets reported in the newspaper articles in the current study. When talking about their biggest or greatest regrets, the majority of interviewees identified bad outcomes, some of which appeared to have followed their own choices and some of which (a significantly larger proportion) appeared to be unrelated to a choice they made and somewhat beyond their control (e.g. "My biggest regret is that my father did not live long enough to see my success"). All might be described as outcomes that were worse than the individual had hoped for (a disappointment aspect of regret). The remainder of interviewees (a comparatively smaller proportion) mentioned feeling bad about having made a bad choice (self-blame aspect of regret).

Future research might wish to explore this issue further, perhaps using a wider search on regret items – (e.g. to include the search terms, 'most regret', 'most regrettable', etc.) – or survey people about these experiences, rather than look at reports of people in the news (newsworthy regrets may be somewhat different to more routine ones). It might also look at 'biggest disappointments' and 'greatest disappointments' and other related negative emotions (anger and sadness – van Dijk & Zeelenberg, 2002a) to determine if

Figure 4.5

Counterfactual thinking processes/evaluations that contribute to the experience of regret



there is a similar interchangeability of terms in common language – e.g. do people talk about 'disappointing choices'? A survey of recalled emotional experiences might also explore the effects of these on subsequent behaviour to determine, in relation to the experience of regret, whether it is the self-blame (decision-related) element of regret that drives the hypothesised subsequent changes in choice, or whether it is disappointment over the negative outcome.

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Appendix 4.1: Example of regret article stimulus sheet

News article [number]

Title of article
Author
Source
Date, pages

Overview of article (context)
[Summary of article]

"Regret" paragraph

[Direct quote from article]

Having read the paragraph, please tick which category you think the 'biggest regret' expressed in this article falls into:

	Regret the decision	They say they regret that they made a bad or poor quality decision - they could have chosen better or wouldn't make the same choice again in future
	Regret the outcome of their own decision or choice	They say they regret that the outcome itself was bad. The outcome followed a decision or choice they made themself.
	Regret an outcome that was beyond their own control	They say they regret that the outcome itself was bad. The outcome was *not* related to a decision or choice they made themself.
	Don't know	Can't decide which of the three above categories it falls into

Appendix 4.2: Definitions of the types of regret used for the categorisation task

Decision regret
"This is where the regret is related to the choice or decision the individual made. They may express a view that they have made a poor quality decision or an unjustifiable decision, and thus report some self-blame or reproachment about the events. The regret stems from the belief that they should have made a different decision or that they chose badly - "I should have chosen X instead of Y" or "It would have been better to choose X instead of Y". The regret is related to the fact the person thinks they made a bad decision, irrespective of how it turned out."

Outcome regret
For the purposes of this analysis, there may be two types of 'outcome-related regret' that are mentioned in the articles:

(a) Outcome of own choice/decision
"In this case, the regret is related specifically to the outcome that followed the individual's choice or decision. The regret is focused on a 'bad outcome' that has occurred, rather than on the choice itself. The person may express regret that the outcome is negative or was worse than they had anticipated or expected, or worse than what they know or imagine would have happened if they had chosen differently. The regret is related to the fact that the outcome is perceived as bad or severe, but not specifically to the choice or decision the individual made".

(b) Outcome beyond own control (disappointment)
"In this case, the regret is about a bad outcome but the outcome is not directly or specifically related to a choice or decision the individual made. Rather, the regrettable outcome was beyond their control and caused perhaps by chance or by external events or perhaps the actions of others. The outcome is negative or worse than they might have hoped for and so they feel disappointed about the way things happened to turn out. They might have expected 'a different state of the world' but there is nothing they could have done to change that and they don't feel any responsibility for the outcome".

Don't know
"If you really can't decide which of the above three categories the regret paragraph falls into, please choose this option".

Chapter 5

"Better safe than sorry": Can regret-based interventions promote health-conscious thinking and choices about sunbathing?

"Better safe than sorry": Can regret-based interventions promote health-conscious thinking and choices about sunbathing?

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Abstract

The current studies investigated whether focusing individuals on the future emotional consequences of choosing not to protect one's skin from the sun had an influence on their future sunbathing behaviour. Participants completed measures of their skin cancer risk perceptions and sunbathing behaviour at three timepoints – baseline, intervention and follow-up phases. In Experiment 1, comparisons between participants' baseline and immediate post-intervention ratings showed there was an increase in the perceived risks of sunbathing after the regret intervention. Participants also reported an intention to move towards more health-conscious behaviour in future but there was no evidence of actual behavioural change at follow-up. The failure to manipulate the levels of regret anticipated by two groups of participants in the intervention phase of Experiment 1 limited the conclusions that could be drawn about the specific effects of regret. This methodological problem was addressed in Experiment 2, which piloted four revised sunbathing scenarios – by varying the levels of outcome seriousness and responsibility they described, two scenarios were identified which evoked significantly different ratings of regret. Experiment 3 replicated the design of Experiment 1, using the new materials developed in Experiment 2, and again demonstrated some immediate effects on participants' behavioural intentions. There were also longer-term effects on participants' actual behaviour in the sun in relation to their use of sunscreen. However, most of the changes in sunscreen use were observed for both intervention and control group participants, suggesting that the effects may not have been specifically related to the anticipation of regret.

Key words: Anticipated regret, risk behaviour, intervention, sunbathing, skin cancer

Introduction

Stroebe (2000) argues that, with the decline in infectious diseases as a cause of mortality, many deaths in modern Western society could be seen to be self-inflicted to some extent. Some deaths might have been delayed if the individual had chosen to adopt a healthier lifestyle or had avoided health-impairing behaviours. Despite improved understanding of disease processes and the increasing availability of health information, significant numbers of people still apparently choose to behave in ways that may put themselves (e.g. by smoking cigarettes) and others (e.g. by combining alcohol and driving) at risk. Providing facts and figures about known health risks clearly is not sufficient to persuade some people to adopt behaviours that are associated with better health.

Most people would support the view that individuals have the right to choose their own lifestyle. An important objective for public health policy is therefore to ensure that the choices individuals make are well-informed – that they understand the impact their chosen lifestyle may have on their health and well-being (Stroebe, 2000). For organisations that are interested in persuading people to behave in ways that limit the likelihood of future negative outcomes, it is important to understand how individuals interpret risk information and use it to make choices and decisions. Research and theory from the field of judgment and decision-making is one source such bodies might wish to refer to when developing new strategies for persuasion. For example, there is evidence that people - even 'experts' - do not always understand risk information when it is presented in terms of probabilities but that they can more accurately interpret risk information when it is presented in frequency formats (Gigerenzer, 2002). People also tend to show unrealistic optimism - they underestimate their own risk of experiencing

negative outcomes, believing that negative things happen to other people but not to themselves, perhaps because of an illusion of control over such events (Weinstein, 1980; McKenna, 1993). Research has also demonstrated that people generally show a positive time preference in choice and decision-making, which favours taking immediate benefits over longer-term ones (Chapman, 2000; Loewenstein & Thaler, 1997), perhaps because they believe that immediate gains will be followed by additional gains in the future (Berndsen & van der Pligt, 2001). The tendency to consider distant versus immediate future consequences appears to vary between individuals (Strathman, Gleicher, Boninger, & Edwards, 1994). Successful persuasion strategies need to be able to overcome such biases in human cognition and preferences.

Dual-process theories argue that there are two routes of thinking and persuasion (Petty, Cacioppo, & Goldman, 1981; Chaiken, 1980; Epstein, Pacini, Denes-Raj, & Heier, 1996). While the various theories have given different labels to the two different modes of processing information, essentially they describe similar concepts. One route is analytic and reason-based, encoding reality in 'abstract symbols, words and numbers' and using logical connections (Epstein et al, 1996). However, because of its reliance on conscious and intentional appraisal of events, the system is effortful and processing tends to be slower. On the other hand, the second route is more experiential and emotion-based, encoding reality in 'concrete images, metaphors and narratives' and using associationistic connections (Epstein et al, 1996). Via this system, behaviour is determined by cues from past events and information processing is less cognitively demanding and much faster.

Research in social psychology, looking at the structure of attitudes, has also suggested that there are three different components of an attitude – those which are cognitive

(based on beliefs about the properties, benefits and rewards of the attitude object), those which are affective (based on feelings, sensory reactions and values associated with the object) and those which are more behaviourally based (Breckler, 1984). In order to persuade an individual to change their attitude and behavioural intentions, it has been argued that a persuasive message should stress aspects of the attitude object which match the primary basis of the attitude that is being targeted. For example, if a person holds a predominantly affectively-based attitude, then a persuasive message should be affectively-based (focusing on the feelings associated with the attitude object), rather than cognitively-based (Edwards, 1990; Fabrigar & Petty, 1999).

Contrary to traditional views that they disrupt human thought processes, recent research and theory suggests that emotions might actually be indispensable for good decision-making. Neurologist, Antonio Damasio has observed that patients who have sustained damage to brain regions associated with emotional experience are unable to make sound decisions - and in some cases unable to make any decision at all - even though they show no deterioration in IQ or cognitive function (Damasio, 2003). In his 'Somatic-Marker Hypothesis', Damasio argues that normal decision-making uses two "complementary paths", which can operate alongside each other. One path involves reasoning strategies which operate on information about the situation (including options for action, anticipation of future outcomes). The second path activates information about the individual's prior emotional experiences in similar situations ('somatic markers'), including details of the previous situation, action taken and the emotional consequences that followed. According to the hypothesis, this path may influence the individual's decision-making directly (acting on 'gut' reactions) or indirectly by influencing the type of information that is focused on and utilised in the reasoning process (Damasio, 1994; Damasio, 2003).

Given that people find it difficult to accurately interpret risk information and have to operate within limited time constraints and cognitive capacity, it seems unlikely that they make each and every choice or decision via the slower, more analytic route. Indeed, Damasio's research suggests that they would be ill-advised to do this. As well as providing factual and statistical risk information (suitable for the 'rational system'), persuasive communication might also focus on the 'alternative route' - one based on emotions (suitable for the affect-based or 'experiential system').

Research supports the view that in certain decision contexts, people use 'affective tags' as a cue to make judgments and evaluations, particularly under time pressure (Finucane, Alhakami, Slovic & Johnson, 2000). There was evidence to suggest that participants in these studies might have used how they felt about an item (e.g. nuclear power) to judge its risks and benefits. When they felt generally positive about an item, people tended to perceive it as having large benefits and few risks. Conversely, when they felt generally negative about an item, they perceived it as having large risks and few benefits. Finucane et al. (2000) also demonstrated that providing positive information about an item (e.g. that the benefits are high) impacted on individuals' perceptions of risk; participants appeared to infer by reference to their generally positive 'affective pool' associated with the item that the risks associated with the item were low. Similarly, provision of negative information about the item (e.g. that the risks are high) impacted on risk perceptions, in that participants appeared to infer by reference to their generally negative 'affective pool' associated with the item that the benefits were low.

Other psychological research and theory has also acknowledged that emotions influence human judgment and choice. One specific focus of this idea has been on regret which,

anecdotally, is a frequent emotional experience in relation to decision-making (Shimanoff, 1984).

Regret has been defined as "a negative, cognitively-based emotion that we experience when realising or imagining that our present situation would have been better had we decided differently" (Zeelenberg, 1999a, p. 94). Thus the specific emotional experience of regret occurs when a decision turns out badly and results from a mental comparison of the outcome obtained with an alternative outcome that the decision maker knows (or imagines) would have occurred had they chosen a different option. This type of thinking (comparing reality to what might have been) is known as counterfactual thinking (Kahneman & Miller, 1986; Boninger, Gleicher & Strathman, 1994). Observing that the obtained outcome is worse than might otherwise have been achieved, the individual begins to have the sinking feeling that they have made a mistake or lost out on a good opportunity (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998). What is allegedly unique about regret in comparison to other negative emotions is that it focuses the decision maker on their own role in the events that lead up to the sub-optimal outcome. They begin to think about how they might have avoided the outcome or perhaps how they could prevent such an outcome occurring in the future. The regretful individual is motivated to do something differently so as to improve their performance, should they find themselves in a similar situation in the future. Therefore, while the experience of regret may be negative in the short-term, it does appear that it might offer some benefits to the individual – if they take the opportunity of learning from the experience (Zeelenberg, 1999b).

Regret Theory (Loomes & Sugden, 1982; Bell, 1982) argues that decision-makers experience emotions as a consequence of choices. When choices turn out well, they

experience positive emotions, such as elation or rejoicing; when they turn out badly, they experience negative emotions, such as regret or disappointment. As well as experiencing emotions as a consequence of decision making, Regret Theory also proposes that decision-makers can anticipate the affective consequences associated with various outcomes that might follow their choices and that they take these anticipated emotions into account when choosing between available courses of action. Since they are regret-averse, striving to experience positive rather than negative emotions, it is argued that decision-makers will opt for the choice they expect will cause them the least regret.

A body of research offers support for the view that anticipating (or experiencing) regret can influence decision making, both in gambling experiments, scenario-based studies and in interpersonal decision-making tasks, such as the ultimatum game (Zeelenberg, 1999a). It might be argued that gambling paradigms, role-playing and scenario-based tasks are qualitatively different from real-life decision-making. More recent research has therefore sought to address this criticism and has explored the influence of anticipated regret in real life choices. For example, studies focusing on consumer decision-making have demonstrated that, when customers experience regret about their choices between service providers or products, they have a tendency to switch to a different service provider or product in the future – that is they may make a different choice after experiencing regret over an earlier decision (Zeelenberg & Pieters, 1999). The results of a further study suggest that the anticipation of future regret does influence decisions to play in the Dutch Postcode Lottery (Zeelenberg & Pieters, 2004). As the name suggests, winners in this particular lottery are selected according to their postcode – all people living in the winning postcode area who have bought a lottery ticket share the prize. Therefore living in the winning postcode area but not having purchased a

ticket would evoke regret for non-players, since they would be faced with the knowledge that their neighbours have shared a prize and that they could have done too, 'if only' they had chosen to play. In order to avoid the potential experience of regret over making the wrong choice, it appears that individuals are motivated to participate in the lottery.

Another body of research has demonstrated that incorporating anticipated affect as a factor in models based on the Theory of Planned Behaviour (TPB) improves the prediction of safer sexual behaviour (Richard, van der Pligt & de Vries, 1995; Buunk, Bakker, Siero, van den Eijnden & Yzer, 1998), eating junk food, using soft drugs and alcohol bingeing (Richard, van der Pligt & de Vries, 1996a), engaging in exercise (Abraham & Sheeran, in press) and changing to a lower fat diet (Steptoe, Doherty, Kerry, Rink & Hilton, 2000). In these studies, it was found that anticipated affect predicted an independent and significant proportion of the variance in behavioural expectations and/or actual behaviour over and above that predicted by TPB alone. Steptoe et al. (2000) conclude that "anticipated negative affect may provide an important stimulus to initiate behaviour change".

A small number of studies have investigated whether focusing individuals on their future regret might be an effective means of encouraging them to make different (less risky) choices. All of the studies to date have explored risky choices in relation to health and safety issues. Three studies have shown promising effects, one changing drivers' attitudes towards exceeding the speed limit (Parker, Stradling & Manstead, 1996), one changing students' intended and actual 'safer sex' behaviour (Richard, van der Pligt & de Vries, 1996b) and another strengthening the relationship between intentions to exercise and actual exercising behaviour (Abraham & Sheeran, 2003). One

further study has, however, found no positive effects of a regret-based intervention in relation to risky single-occasion drinking or binge drinking (Murgraff, McDermott, White & Phillips, 1999). To the author's knowledge, no further research has been published exploring this approach as a means of persuasion.

Parker et al. (1996) compared a regret-based video with three other videos which each featured one of the main components of the Theory of Planned Behaviour (normative beliefs, behavioural beliefs and perceived behavioural control). The experiment measured the effect of watching one of the video stimuli on drivers' beliefs about and attitudes towards breaking the speed limit and on their behavioural intentions in relation to speeding in future. The results suggested that two of the videos brought about positive changes in beliefs and attitudes about breaking the speed limit in a 30 mph zone – the video that featured messages about normative beliefs and the video that focused drivers on their future regret. However, none of the videos was successful in changing participants' intentions about speeding in the following 12 months. Parker et al. (1996) observe that "lasting attitude change is notoriously difficult to achieve" in general (p. 15), but particularly in relation to speeding where previous research has demonstrated that relatively permissive views exist and that drivers frequently violate this aspect of safe driving. Nonetheless, they argue that such interventions may bring about a shift in thinking in participants from a view that their behaviour is not problematic (and therefore does not need to be changed) to a view where they are willing to acknowledge that there may be a problem (and that they should consider doing something to change their behaviour). To use the terminology of the five-stage transtheoretical model of behaviour change, this shift represents a move from the "precontemplation stage" to the "contemplation stage", this being hypothesised to be the first step towards behaviour change (Prochaska & DiClemente, 1982).

The studies by Richard et al. (1996b) used a scenario-based intervention. Participants were presented with two contrasting scenarios in which to imagine themselves, each describing a situation where they have sexual intercourse with a person they have just met. In one version of the scenario, the couple use a condom but, in the other scenario, they do not use a condom but some other form of contraceptive. Half of the participants were then asked to focus on the feelings they imagined they would have after having had sex, while the other half of participants were asked to consider their feelings about having sex in each of the two scenarios. In Study 1, participants who had focused on their feelings after the sexual encounter anticipated more negative affect (and less positive affect) for the scenario where a condom was not used than participants who had focused on their feelings about the same sexual encounter. While both groups expressed strong intentions to use condoms in their future casual sexual encounters, the 'feelings after' group of participants were significantly more likely to do so than were participants in the 'feelings about' condition.

In Study 2 of Richard et al.'s (1996b) research, a similar intervention was employed, this time using a longitudinal design where participants completed three questionnaires over a 5-month period. The questionnaires asked not only about behavioural expectations for future sexual encounters but also required students to report their actual 'casual' sexual behaviour, indicating whether they had used a condom in these encounters or not. The results replicated those found in Study 1 with respect to affective reactions and behavioural intentions. In addition, participants who had focused on their feelings after a sexual encounter reported at follow-up that they had actually used condoms more frequently in their actual sexual encounters than those who had considered their feelings about a sexual encounter. Richard et al. (1996b) argue that increasing participants' awareness that a behavioural choice might have negative

affective consequences in the future was an important factor in producing changes in their subsequent behaviour. Because risky behavioural choices can evoke negative emotions (e.g. anxiety, regret) in the immediate short-term, these post-decisional consequences may be a more powerful persuasive tool and less likely to be discounted than the more distant potential consequences (e.g. contracting a sexually-transmitted infection). In contrast, when people think about taking a certain course of action, different affective reactions (perhaps including more positive feelings) and cognitions may be more salient.

A recent study by Abraham & Sheeran (2003) demonstrated that focusing students on the regret they would feel if they did not exercise before they reported their intentions to exercise in the following two weeks increased the likelihood that the students would translate their good intentions into actual behaviour. In this experiment, participants in the experimental condition (n=86) were asked to rate their anticipated regret about not exercising before they indicated their intentions about exercising in the forthcoming two weeks (number of times planned to exercise). Participants in the control condition (n=80) indicated their intentions about exercising before they rated their anticipated regret. When the students were followed-up two weeks later, the experimental group reported exercising more often and were more likely to have exercised at least once compared to control group participants – although the between-groups differences in reported behaviour were not statistically significant, they approached significance. Further analyses revealed that the intention-behaviour relationship was moderated by experimental condition. Intentions were significant predictors of exercise behaviour for both groups, but intentions were a significantly better predictor of behaviour for the experimental group than for the control group. Abraham & Sheeran (2003) concluded that "anticipated regret is a potentially powerful antecedent of the enactment of exercise

intentions".

In the light of Richard et al.'s promising results in relation to promoting safer sexual behaviour, Murgraff et al. (1999) applied a similar methodology to the problem of risky single-occasion drinking (RSOD), a behaviour where perceived risk tends to be low. As was the case for sexual activity, it was argued that there is a clear difference between feelings about drinking large quantities of alcohol (e.g. relaxation, positive mood, social disinhibition) and the affective reactions one might expect to experience after indulging in the behaviour. Therefore an intervention which emphasises post-decisional affect might make drinkers more risk-averse and change their RSOD intentions and behaviour (Murgraff et al., 1999). Although the study replicated Richard et al.'s (1996b) findings that participants in the 'feelings after' condition anticipated more negative feelings than participants in the 'feelings about' condition, Murgraff et al. (1999) did not find any effect on behavioural intentions after the intervention or on actual behaviour in relation to RSOD at follow-up.

Murgraff et al. (1999) attribute the absence of any effects of anticipating regret in their study on the lower perceived risk and lower levels of fear associated with RSOD compared to HIV infection. According to Murgraff et al.'s explanation, if people do not perceive the potential consequences of their behaviour to be serious or permanent (irreversible), then there would be little reason to anticipate any regret over engaging in the behaviour afterwards and therefore there would be nothing to be gained by using a regret-based intervention to attempt to change their risky behaviour.

The experiments reported in the current paper focus on the risks of developing skin cancer as a result of sunbathing without adequately protecting one's skin from the sun's

ultraviolet (UV) rays. There has been a recent, worrying increase in the number of cases of skin cancer diagnosed worldwide, particularly among the white adult population – despite large-scale health promotion programmes (Buchanan, 2002).

In the United Kingdom, over 65,000 new cases of skin cancer are diagnosed each year and approximately 5,500 of these are the more dangerous malignant melanoma form of the disease (Cancer Research UK, 2004). About 2,000 people die from skin cancer in the United Kingdom every year (Cancer Research UK, 2004) and this mortality rate is high for both males and females, when compared to incidence (Buchanan, 2001). Melanoma is the least common form of the disease, but accounts for about 75% of all deaths from skin cancer. The more common forms of skin cancer do not carry as high a mortality risk, but they can nonetheless be "disfiguring and difficult to treat if extensive" (Buchanan, 2001). It is estimated that, if people were to follow health recommendations for protecting their skin from the sun, four out of every five cases of skin cancer could be prevented (Department of Health, 1996). These recommendations include reducing the time spent in the sun, taking care not to burn, covering up, seeking shade around the mid-day hours, applying a sunscreen and protecting children from the sun's rays (Department of Health, 2004; Cancer Research UK, 2004).

However, in many Northern hemisphere countries, people still actively seek out the sun rather than shield themselves from it. Research also suggests that younger adults are less likely to take the necessary precautions to protect their skin than older adults and that a concern with personal appearance is associated with greater exposure to the sun, particularly for women (Leary & Jones, 1993). One study suggests that young women are more aware than young men of the risks of melanoma and are more likely to use protection against the sun by applying sunscreen correctly and regularly. However,

young women are also more likely to sunbathe to get a tan, perceiving this to enhance their attractiveness (Langford, Marris & O'Riordan, 1999). It appears that people can hold a mixture of attitudes towards sunbathing - they are drawn to the pleasures and benefits of sunbathing, even though they see the behaviour as being potentially dangerous (Eiser, Eiser & Pauwels, 1993).

Jackson & Aiken (2003) emphasise the need to highlight the risks of skin cancer in health promotion messages and to undermine the perceived advantages of sunbathing. It has also been argued that the rise in incidence of skin cancers necessitates that we "attempt to increase our arsenal of effective messages for convincing individuals to protect themselves ..." (Mahler, Fitzpatrick, Parker & Lapin, 1997). Reminding people about the possible affective outcomes of excessive sun exposure (e.g. regret), as well as providing information about the physical health outcomes, might provide a means of achieving this.

Experiment 1 served as a pilot test to investigate the effectiveness of a scenario-based regret intervention, using a longitudinal design where participants' responses to items about their sunbathing behaviour and attitudes towards sunbathing were measured and compared at three timepoints. The immediate short-term effects of the intervention were explored by contrasting baseline and post-intervention ratings, while the longer-term effects were explored by contrasting baseline and follow-up ratings (8 months later). In the light of the results of Experiment 1, the materials used in the regret-based intervention were further developed (Experiment 2) and employed in a second longitudinal study (Experiment 3) which also incorporated further modifications to the research design (e.g. the inclusion of control groups) and recruited a larger number of participants.

Experiment 1

Method

Design

The experiment had a 3 (Time: baseline, intervention, follow-up) x 2 (Condition: high regret or low regret) mixed factorial design, with 'Time' as a within-subjects factor and 'Condition' manipulated as a between-subjects factor. The experiment took place between February and October 2002 and used a longitudinal design, whereby participants completed questionnaires at three separate timepoints during the eight-month period. The items included in the questionnaire measured participants' risk perceptions and behaviour in relation to sunbathing.

Participants

Participants were recruited from first year Social Sciences undergraduates at City University, London. They participated for course credits (baseline and intervention phases) or a cash payment of £3 (follow-up phase). Seventy-four students completed the baseline questionnaire. The cohort was predominantly female (a group more like to sunbathe to get a tan) and 60% had fair/white skin (a group at higher risk of developing skin cancer). A high proportion (80%) of the sample reported that their skin had burned in the sun to some degree in the previous year (one in three said they 'always burn'). Very few reported knowing anyone who had been diagnosed with skin cancer. Thirty-five of the original cohort (47% participants) completed the intervention phase. At this point, participants were randomly assigned to either the High Regret (n=17) or Low

Regret (n=18) conditions. Thirty-seven students (50% cohort) completed the follow-up questionnaire. Twenty of these had participated in both the baseline and the intervention phases; the remaining students, who had completed the baseline questionnaire but did not take part in the intervention phase, formed a control group (n=17).

Procedure and materials

At baseline, participants completed a series of rating scales that measured their risk perceptions in relation to sunbathing and skin cancer and measured their behaviour in the sun during the previous year. One week later, the group was approached again and asked to complete a second questionnaire-based task. This comprised a scenario-based 'intervention' and immediate re-measure of their risk perceptions and intended sunbathing behaviour over the next eight months. Eight months later, participants were invited to complete a follow-up questionnaire that re-measured their risk perceptions and their actual sunbathing behaviour since the intervention phase.

Risk perception and behavioural measures. The risk perception measures used appear in Figure 5.1 and were adapted from previous research (e.g. Eiser et al, 1993; Leary & Jones, 1993; Wichstrom, 1994; Weinstein, 2001). Unless otherwise indicated, the measures were worded in the same way at all three timepoints (baseline, intervention and follow-up). The behavioural measures used appear in Figure 5.2 and were adapted from previous research on sunbathing behaviour (Eiser et al, 1993; Leary & Jones, 1993; Wichstrom, 1994; Jackson & Aiken, 2000). These included items to determine how much time participants spent sunbathing, how often they applied sunscreen to protect their skin, which level of sun protection factor (SPF) they used, and how often

Figure 5.1

Risk perception measures (Experiment 1)

Verbal risk perception scale

"In general, how risky do you think it is to sunbathe without protecting your skin, in terms of developing skin cancer?" (1 = 'Very risky' to 4 = 'Not at all risky').

Comparative risk perception scale

"Compared to other people your age and sex, how likely do you think it is that you will get skin cancer at some time in the future?" (1 = 'Much more likely' to 5 = 'Much less likely').

Conditional risk perception scale

"If you regularly sunbathed without protecting your skin, how likely do you think it is that you would develop skin cancer in the future?" Response indicated on a 10cm visual analogue scale, anchored at 0% ('No chance of this happening') and 100% ('It is certain to happen').

Agreement with risk statement

"To what extent do you agree that sunbathing without using a sunscreen increases a person's chances of getting skin cancer?" (1 = 'Strongly agree' to 5 = 'Strongly disagree').

Extent of thinking about the risks of sunbathing

(Baseline and follow-up phases): "Over the last ... months, to what extent have you thought about how sunbathing without protecting your skin might affect your health?" (1 = 'Very much so' to 5 = 'Not at all').

(Intervention phase): "Over the next 8 months, how much do you expect you will think about how sunbathing without protecting your skin might affect your health?" (1 = 'Very much so' to 5 = 'Not at all').

Figure 5.2

Behavioural measures (Experiment 1)

Frequency of sunbathing

"On how many days did you lay out in the sun?" (1 = 'None'; 2 = '1-4 days'; 3 = '5-15 days'; 4 = '16-30 days'; 5 = 'More than 31 days').

Duration of average sunbathing session

"How long, on average, were you laying out in the sun on each occasion?" (1 = 'Less than 1 hour'; 2 = '1-2 hours'; 3 = '2-4 hours'; 4 = '4-6 hours'; 5 = 'More than 6 hours').

Consistency of sunscreen use

"Generally speaking, how often do you use a sunscreen when you are out in the summer sun or when you are abroad in the sun?" (1 = 'Always' to 6 = 'Never').

Number of applications of sunscreen per day

"On average, how many times a day did you apply your sunscreen?" (" ____ times a day").

SPF rating of sunscreen used

"What was the SPF rating of the sunscreen that you usually used?" (1 = 'Factor 20 or higher'; 2 = 'Factor 15 to 19'; 3 = 'Factor 10 to 14'; 4 = 'Factor 5 to 9'; 5 = 'Factor 0 to 4'; 6 = 'Don't know/can't recall').

Sunbed use

"How many times have you used a sunbed to get a tan or to maintain a tanned appearance?" (1 = 'Never'; 2 = '1 to 5 sessions'; 3 = '5 to 10 sessions'; 4 = '11 to 15 sessions'; 5 = '16 to 20 sessions'; 6 = 'More than 20 sessions').

they used a sunbed. At baseline, the items referred to past behaviour (during the previous year). At the intervention phase, the wording of the measures was adapted to refer to intended behaviour over the forthcoming eight months. At follow-up, behavioural measures referred specifically to behaviour during the eight months since the intervention.

The anticipated regret intervention. At the intervention phase, participants were asked to imagine themselves in a scenario, which described in some detail an individual's behaviour in the sun and the consequences of that behaviour. There were two versions of the scenario, designed to evoke different levels of anticipated regret by manipulating within the scenario how responsible the individual was for the outcome. Research has indicated that perceptions of responsibility can influence regret ratings (Connolly, Ordóñez & Coughlan, 1997; Zeelenberg, van Dijk & Manstead, 1998; Ordóñez & Connolly, 2000; Zeelenberg, van Dijk & Manstead, 2000). The High Regret scenario described a person who sunbathed at every possible opportunity, often in tropical locations. They were fully aware of the risks to their health, but chose not to follow recommended guidelines for protecting their skin, because they wanted to get the best possible tan. The person therefore had high responsibility for the subsequent outcome. The Low Regret scenario described a person who worked as a marine biologist, often in tropical locations. They were fully aware of the risks to their health and chose to protect their skin as recommended, but various factors in the environment and their work routine prevented them from doing so consistently. The person therefore had lower responsibility for the subsequent outcome. Both versions of the scenario described exactly the same negative outcome - a diagnosis of malignant melanoma. The person was described as facing surgery and possible chemotherapy, with uncertainty

about their prognosis. Full versions of the two scenarios are included in Appendices 1 and 2 to this paper.

Immediately after reading the scenario, participants rated the extent to which they expected they would be feeling a range of different emotions if they were in the situation described in the scenario. The list contained both positive and negative emotional terms, adapted from the Positive Affect Negative Affect Schedule (PANAS) (Watson, Clark & Tellegen, 1988) and emotion measures used in previous research (Richard, et al., 1995; Richard et al., 1996b), including the term 'regret'. Five-point rating scales were used, anchored at each end (1 = 'Not at all like this' and 5 = 'Very much like this'). A total negative affect score was computed by summing the ratings given to the 10 negative emotional terms (possible range of scores: 10-50). As a manipulation check, participants rated their responsibility in the situation (1 = 'Very much like this' to 5 = 'Not at all like this') and the seriousness of the outcome (1 = 'Very serious' to 4 = 'Not at all serious'). They also indicated how easy they had found it to imagine themselves in the scenario, and imagine their emotional response and thoughts in the situation (three scales, ranging from 1 = 'Very easy' to 5 = 'Very difficult'). A total imageability score was computed by summing the ratings for each of the three items (possible range of scores: 3-15). Participants then completed a series of rating scales that remeasured their risk perceptions and behavioural intentions (see above).

Additional measures. The baseline questionnaire also asked participants to indicate their age and gender, their skin type ('White', 'Brown'; or 'Black'), their skin's typical reaction to the sun (extent to which their skin burns and extent to which their skin tans). One further item asked about their own or close others' experience of skin

cancer (6-point scale ranging from 1 = 'It has happened to me' to 6 = 'It has not happened to anyone I know').

Since the experience of regret is assumed to initiate information-seeking about the decision problem (Zeelenberg, van Dijk, Manstead & van der Pligt, 2000), participants were invited (at the intervention phase) to detach the final sheet of the questionnaire booklet if they were interested in finding out more about the health risks of sunbathing and how they could protect their skin from damage in the sun. The sheet suggested a number of sources of information, including websites dedicated to the particular health issue. The number of participants who detached the sheet was used as an indicator of interest in information seeking. At the follow-up phase, participants were asked to indicate whether they had sought information about skin cancer and/or skin protection during the previous eight months.

Results

Baseline data (N = 35)

Very few of the participants had any experience of skin cancer, either in terms of being diagnosed with the condition themselves or knowing someone who had been diagnosed with it. 80% participants reported that they did not know anyone who had had skin cancer.

Participants' responses to the risk perception items suggested that they did recognise there was some risk in sunbathing without protecting one's skin from the sun. The group's mean ratings on these measures indicated that participants had given the matter

a fair amount of thought in the past (M = 3.17, SD = 1.294), that they agreed quite strongly that sunbathing without using sunscreen increased the risk of developing skin cancer (M = 1.57, SD = 0.655) and was a risky thing to do (M = 1.60, SD = 0.847) and that they perceived one was more likely than not to develop skin cancer if one did not apply sunscreen (M = 59.19%, SD = 25.257). However, on average, the sample tended to believe they were themselves slightly less at risk of developing the condition than their peers (M = 3.51, SD = 0.853).

This acknowledgement of the health risks of sunbathing appears to have been reflected in most participants' past behaviour in the sun, as reported at baseline. Overall, the sample reported they had spent on average between one and two weeks in the sun (M = 3.09, SD = 1.652). The duration of a typical sunbathing session in the previous year had been approximately 2 hours (M = 2.40, SD = 1.311). During this time, they had applied sunscreen to their skin an average of two times (M = 1.83, SD = 1.339), typically using a Factor 10-14 sunscreen (M = 3.37, SD = 2.170). They reported that they were fairly consistent about applying sunscreen whenever they went out in the sun (M = 3.09, SD = 1.652). In the previous year, participants had rarely, if ever, used a sunbed (M = 1.46, SD = 1.221).

Intervention phase

Manipulation checks. As expected, there was no significant difference between the experimental groups' ratings of the seriousness of the outcome (Mann Whitney U = 143.00, p = .757). Both High Regret (M = 1.29, SD = 0.59) and Low Regret (M = 1.22, SD = 0.55) participants rated the outcome as very serious. However, the manipulation of responsibility was not successful. There were no significant differences between

participants' ratings of perceived responsibility (Mann Whitney U = 127.00, p = .405). Both the High Regret (M = 3.76, SD = 1.09) and the Low Regret (M = 3.39, SD = 1.19) experimental groups rated responsibility for the situation as moderately high. Ratings of imageability of the scenario also indicated that the High Regret scenario (M = 10.59, SD = 2.81) had been easier for participants to imagine than the Low Regret scenario (M = 7.94, SD = 1.89). This difference was statistically significant (Mann Whitney U = 64.50, p = .003).

Ratings of anticipated regret and total negative affect. Mean regret ratings and total negative affect scores for the High Regret and Low Regret groups are shown in Table 5.1. There was no significant difference between the experimental groups in terms of their ratings of anticipated regret (Mann Whitney U = 148.00, p = .883) or in their total negative emotion score (Mann Whitney U = 129.50, p = .443). Both groups anticipated moderate levels of regret and other negative affect.

Because the manipulation of responsibility appeared to have failed and there was no difference in anticipated regret ratings between the experimental groups, participants were treated in subsequent analyses as a single regret intervention group (N = 35). Repeated measures analyses were used to assess the short-term effect of the regret-based intervention on risk perceptions and behavioural intentions, comparing participants' baseline ratings to those they made immediately post-intervention.

Short-term effects of the regret-based intervention. When comparing baseline and post-intervention ratings, significant changes were found on five measures. Mean pre- and post-intervention ratings on these scales appear in Table 5.2.

Table 5.1

Mean ratings of anticipated regret and negative affect (Experiment 1)

Experimental group	Anticipated regret rating	Total negative affect score
High Regret (n = 17)	3.65 (1.37)	34.88 (9.94)
Low Regret (n = 18)	3.83 (0.98)	33.00 (8.87)

Note: Standard deviations are in parentheses.

Table 5.2

Mean baseline and immediate post-intervention ratings (Experiment 1)

	Timepoint	
Measure	Baseline (N = 35)	Post-intervention (N = 35)
Conditional risk perception (%)	59.19 (25.26)	70.51 (19.80)
Duration of sunbathing sessions*	2.40 (1.31)	2.03 (1.27)
Consistency of sunscreen use *	3.09 (1.65)	2.34 (1.26)
SPF rating of sunscreen *	3.37 (2.17)	2.83 (1.72)
Number of sunscreen applications per day	1.83 (1.34)	2.77 (1.68)

Note. Standard deviations are in parentheses. For items marked *, higher ratings reflect more risky behaviour.

Ratings on one risk perception item (conditional risk) increased significantly after the intervention ($t = 2.386$, $p = .023$). Immediately after the intervention, participants estimated a greater chance (M = 70%) of developing skin cancer if they sunbathed without protecting their skin than they had at baseline (M = 59%).

There were also significant changes on four of the behavioural items after the intervention. All of these changes reflected an intention to move towards more health-protective behaviour in the future. Immediately after exposure to the regret-based intervention, participants intended to reduce the amount of time they spent sunbathing on any one day (Wilcoxon $Z = -1.949$, $p = .05$), to use sunscreen more consistently (Wilcoxon $Z = -3.085$, $p = .002$), apply it more frequently during any one day in the sun ($t = -4.605$, $p < .001$) and increase the SPF rating of the sunscreen they used (Wilcoxon $Z = -1.944$, $p = .05$). On average, they intended to spend only 1-2 hours sunbathing on any one day, to use sunscreen "very often", apply it about 3 times per day and use a sunscreen with an SPF rating of Factor 10-14.

Although the manipulation of responsibility/regret had failed, the participants who had been in the High Regret condition were more likely to indicate an interest in information seeking than Low Regret group participants (χ^2 (1, N = 35) = 4.833. Fisher's exact probability test $p = .041$, 2-sided). In the High Regret group (n = 17), 6 people had detached the information sheet from the questionnaire booklet at the intervention phase. In the Low Regret group (n = 18), only one person had done this. Whilst the two scenarios did not evoke different levels of anticipated regret, the High Regret scenario had been rated as being easier to imagine. Therefore, it might have seemed that this scenario was more personally relevant to the participants than the Low Regret scenario, which focused on the story of a marine biologist.

Were the observed effects due to anticipated regret? Because of the lack of a control group at the intervention phase, it was not possible to determine whether the changes in participants' ratings on the risk perception and behavioural measures could be attributed specifically to having been focused on their future regret about an imagined scenario. In an attempt to address this issue, participants were divided into two groups, according to their actual ratings of anticipated regret, regardless of the scenario version they had originally been exposed to. Participants who had rated their level of regret as "Very much like this" or "Quite a bit like this" formed the 'Higher Regretters' group (n = 22), while participants who had rated their level of regret as "A little like this" or "Not at all like this" formed the 'Lower Regretters' group (n = 13). If the observed changes in ratings were related to anticipation of regret, it was expected that the effect would be stronger for 'Higher Regretters' than for 'Lower Regretters'.

There was no significant change from baseline to post-intervention in participants' responses on the SPF rating, duration of sunbathing sessions and conditional risk perception measures for either High Regretters or Low Regretters (ps > .05). However, there were some changes in participants' ratings on items relating to the consistency of applying sunscreen and number of sunscreen applications per day. Mean pre- and post-intervention ratings on these two measures for the two groups appear in Table 5.3.

In terms of consistency of applying sunscreen, there was a significant difference between baseline and immediate post-intervention ratings for 'Higher Regretters' (Wilcoxon Z = -2.801, p = .005) but not for 'Lower Regretters' (Wilcoxon Z = -1.265, p = .206). After the intervention, 'Higher Regretters' intended to apply their sunscreen more consistently when they were out in the sun than they had done previously. This intended change in behaviour was not apparent for the 'Lower Regretters'.

Table 5.3

Mean pre- and post-intervention ratings for High and Low Regretters (Experiment 1)

	Consistency of applying sunscreen*		Number of sunscreen applications per day (count)	
	High Regretters (n = 22)	Low Regretters (n = 13)	High Regretters (n = 22)	Low Regretters (n = 13)
Baseline	3.41 (1.68)	2.54 (1.51)	1.73 (1.49)	2.00 (1.08)
Post-intervention	2.41 (1.18)	2.23 (1.42)	2.82 (1.79)	2.69 (1.55)

Note: Standard deviations are in parentheses. For items marked *, higher ratings reflect more risky behaviour.

When considering the number of times they would apply their sunscreen during any given day in the sun, there was a significant difference between baseline and immediate post-intervention ratings for both groups, although the effect was slightly stronger for 'Higher Regretters' ($t = -3.626$, $p = .002$) than for 'Lower Regretters' ($t = -3.323$, $p = .006$). Both groups intended to apply sunscreen more frequently throughout the day than they had done previously.

The fact that, for one measure (consistency of sunscreen), significant change from baseline to intended behaviour was found only for 'High Regretters' and, for a second measure (number of sunscreen applications), the effect was stronger for 'High Regretters' than for 'Low Regretters', suggests that - at least in part - the observed changes in baseline to intended sunbathing behaviour may have been related to a greater tendency to anticipate regret in response to a negative situation.

Follow-up phase

The cohort was followed up eight months after the intervention to determine whether exposure to the regret-based intervention had any long-term effect on risk perceptions and actual sunbathing behaviour. Of the 35 who had taken part at the intervention phase, 15 were lost to follow-up. Twenty participants had therefore completed questionnaires at all three timepoints. Other participants, who had completed only the baseline and the follow-up questionnaire, served as a 'no intervention' control group ($n = 17$). Separate repeated measures comparisons of baseline and follow-up ratings were made for the 'intervention group' and for the 'control group'. Mean ratings on all measures for the two groups at both timepoints appear in Table 5.4. Because of the drop-out rate in the intervention group, the comparisons between baseline and

immediate post-intervention ratings were repeated, to confirm whether the previously observed intended move towards more health-protective thought and behaviour was present in the smaller sample who had completed all timepoints. Mean ratings on all items at the intervention phase appear in Table 5.4 for this group.

Intervention group analyses. When comparing baseline and immediate post-intervention ratings on the smaller sample (n = 20), three of the behavioural measures still showed significant change, all in the previously-observed direction. Immediately after the intervention, participants had intended to use sunscreen more consistently (Wilcoxon Z = -2.435, p = .015), apply it more times during their sunbathing day (t = -3.679, p = .002) and increase the SPF rating of their sunscreen (Wilcoxon Z = -1.902, p = .057).

However, none of these promising intentions to move towards greater skin protection progressed to changes in actual sunbathing behaviour as reported at 8-month follow-up. On all three of the dependent variables that had shown change immediately post-intervention, participants appear to have continued their sunbathing behaviour almost exactly as they had done in the previous year (ps > .05). Since there was some suggestion that individuals who anticipated higher regret were more likely to show change in their intended behaviour after the intervention, additional repeated measures analyses explored whether there had been any change from baseline to follow-up in actual sunbathing behaviour reported by 'High Regretters' (n = 12) and by 'Low Regretters' (n = 8). However, there were no significant differences for either group between participants' responses at baseline and their responses at follow up on any of the measures (ps > .05). The intervention therefore appears to have had no long-term effect on actual sunbathing behaviour.

Table 5.4

Mean ratings on risk perception and behavioural measures for intervention and control groups across all timepoints (Experiment 1)

	Intervention Group (n=20)			Control Group* (n=17)	
Risk perceptions	Baseline	Intervention	Follow-up	Baseline	Follow-up
Verbal risk	1.80 (1.01)	1.65 (0.74)	1.85 (0.75)	1.94 (0.75)	1.76 (0.83)
Comparative risk	3.50 (0.95)	3.50 (0.95)	3.63 (1.06)	3.29 (0.85)	3.65 (0.70)
Conditional risk	60.06 (24.61)	68.10 (20.63)	66.72 (15.51)	61.35 (20.63)	62.29 (24.82)
Agreement with risk statement	1.55 (0.60)	1.55 (0.51)	2.00 (1.12)	1.88 (0.78)	1.65 (0.61)
Thinking about risks	3.55 (1.19)	3.00 (1.30)	3.85 (1.14)	3.82 (0.95)	4.06 (1.03)
Behavioural Measures	Baseline	Intervention	Follow-up	Baseline	Follow-up
Frequency of sunbathing	3.00 (1.03)	2.90 (1.29)	2.75 (1.21)	2.41 (1.37)	2.59 (1.50)
Duration of sunbathing	2.45 (1.28)	2.25 (1.25)	2.10 (1.25)	1.71 (1.49)	2.00 (1.62)
Consistency of sunscreen use	3.25 (1.74)	2.55 (1.54)	3.90 (1.77)	3.47 (1.70)	3.29 (1.99)
Number of applications/day	1.58 (1.50)	2.55 (1.79)	1.37 (1.30)	1.53 (1.46)	2.00 (1.70)
SPF rating of sunscreen	3.80 (2.37)	2.90 (1.74)	3.79 (1.78)	3.18 (2.35)	3.24 (1.92)
Sunbed use	1.30 (1.13)	1.20 (0.41)	1.32 (0.67)	1.59 (1.23)	1.12 (0.33)

Notes: * No intervention phase data was collected for control group participants. Standard deviations are in parentheses.

Control group analyses. Within-group comparisons of baseline and follow-up ratings were also carried out for control group participants. None of mean ratings on the behavioural measures differed significantly from baseline to follow-up (ps > .05). Control group participants appeared to have continued their sunbathing behaviour in the same way they had done the previous summer. Only one risk perception measure showed significant change. At follow-up, control participants agreed less strongly than they had at baseline with the statement that sunbathing without using a sunscreen increased the risk of getting skin cancer (Wilcoxon $Z = -2.000$, $p = .046$).

Between-group comparisons. A 'change score' was calculated for all participants on each of the dependent variables, by subtracting their follow-up rating from their baseline rating. Between-group analyses were then carried out on the 'change scores', contrasting intervention group and control group participants. While there were differences in the direction of change between the control and intervention groups on seven of the dependent variables (three in the predicted direction, but four in the opposite direction), none of these between-group comparisons reached statistical significance.

Discussion

In line with the previous regret research focusing on driving and sexual risk-taking (Parker et al., 1996; Richard et al., 1996b), there was evidence to suggest that the regret-based intervention had a significant immediate impact on participants' risk perceptions and behavioural intentions in relation to sunbathing. There was also evidence that some of the observed effects were stronger for participants who had anticipated greater levels

of regret when imagining themselves in a situation where their behavioural choice in the sun had resulted in a serious health problem.

However, in contrast to the study by Richard et al. (1996b), these changes were not sustained at 8-month follow-up in relation to either the risk perceptions or actual sunbathing behaviour. Ratings on the risk perception and behavioural measures, which had shown promising changes immediately after the intervention, returned to their baseline level at follow-up.

There were, however, a number of limitations in the design of the experiment. The lack of a comparison group at the intervention phase made it difficult to determine whether the observed immediate effects on risk perceptions and behavioural intentions were really due to the anticipation of regret or some other factor in the task. It may be the case that simply being asked on repeated occasions to reflect on your attitudes towards an issue and your previous behaviour in itself has an impact on participants' responses. Although participants were instructed to answer in a way that was true for themselves, some participants might have felt they 'ought' to adjust their responses, particularly about behavioural intentions, because they did not wish to appear to be planning to act against what the scenario had suggested was 'sensible' or recommended behaviour. According to Festinger (1957), individuals will adjust their attitudes when they experience a 'cognitive dissonance' between what they think or do and what they know they should think and do, or what a 'rational' person would think or do in the circumstances. If there had been a control group at the intervention phase that completed the rating scales but did not read a scenario or rate their anticipated regret, it would have been possible to explore whether changes in risk perceptions and behavioural intentions still occur in the absence of the regret-based intervention.

Because of the longitudinal design and extended follow-up period, there was a sizeable drop-out rate of participants from the study. This resulted in a rather small sample for which data was available at all three timepoints and the associated reduction in power might account for the apparent absence of an effect on actual sunbathing behaviour in the longer-term. The follow-up period was also perhaps longer than would have been ideal, although this was largely dictated by the difficulties in obtaining access to the student participants during the summer months. The follow-up questionnaire was completed in October and it is possible that participants did not accurately recall their sunbathing behaviour during the typical UK summer months from June to August. In addition, participants were exposed to the regret-based intervention on only one occasion, during February, some four months before the start of British summer weather. Hence, the promising short-term effects of the intervention may have faded before participants had the opportunity to engage in any sunbathing. When they did have the opportunity to sunbathe in the summer, the benefits (including possible anticipated positive affect) related to sunbathing may have loomed larger.

There were also problems with the scenarios used in the experiment. Firstly, the 'High Regret' scenario had been rated as significantly easier for participants to imagine themselves in and this may explain why 'High Regret' participants were more likely to indicate an interest in seeking further information after the intervention - because the scenario was more personally relevant to them. In addition, when manipulating levels of responsibility and holding the seriousness of the outcome constant across both versions, the 'High Regret' version of the scenario did not evoke more regret than the 'Low Regret' version. Therefore, to examine the effects of varying levels of regret on participants' risk perceptions and behavioural intentions, it was necessary to divide groups into 'Higher Regretters' and 'Lower Regretters', according to their actual regret

ratings, using median splits. This meant that some participants within the same 'Regretter' grouping may have read subtly different versions of the scenario and there was no longer random assignment to conditions, rendering it problematic to make inferences about the influence of the independent variable. Experiment 2 was conducted to address this problem with the intervention materials.

Experiment 2

Before attempting to repeat the longitudinal study piloted in Experiment 1, it was necessary to develop materials that could reliably evoke significantly different levels of anticipated regret and were not confounded by other factors, such as perceived personal relevance or imageability of the scenario.

There has been some debate in the literature as to whether regret is necessarily associated with responsibility, or whether other factors (e.g. severity of the outcome) have a stronger impact on the experience of regret (Connolly, Ordóñez & Coughlan, 1997; Zeelenberg, van Dijk & Manstead, 1998; Ordóñez & Connolly, 2000; Zeelenberg, van Dijk & Manstead, 2000). The conclusions of this series of papers are that whilst responsibility can influence regret, it is not a necessary precondition for it. Therefore, Experiment 2 piloted four new scenarios, which varied in both responsibility (high or low) and in outcome seriousness (high or low) and measured the impact of these variables on participants' regret ratings. Because the emotional experience of regret is believed to result from a comparison of actual events with counterfactual ones (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998), the experiment also tested whether being asked to generate counterfactual outcomes (how things might have been) increased or decreased anticipated regret ratings.

Method

Design

The experiment used a 2 (Responsibility: high or low) x 2 (Outcome: high or low seriousness) x 2 (Counterfactual generation: present or absent) between-subjects factorial design. The effect of these variables on participants' ratings of anticipated regret was measured.

Participants

Participants were recruited from JISC-MAIL mail bases (Decision, Health Psychology and Psychological Methods), from a research student mail base administered at City University and from a convenience sample of the first author's friends, family and colleagues. Most participants took part via electronic mail. An advertisement, which gave brief information about the study, was posted to the mail base or e-mailed direct to individuals. Those interested in taking part replied, requesting a copy of the questionnaire. One hundred and fifty-seven individuals initially responded and were then randomly assigned to receive one of the eight versions of the questionnaire. Reminders were sent by e-mail to individuals who did not return the questionnaire within four weeks. In total, one hundred and thirty completed questionnaires were returned (83% of those distributed).

Procedure and materials

Questionnaires and instructions on how to complete the task were distributed via

electronic mail to individuals who responded to the advertisement. Participants were asked to imagine themselves in a scenario described in some detail on the second page of the questionnaire. Immediately after doing this, and prior to rating their emotional reactions, half of the participants were prompted to generate counterfactuals (how the outcome might have been avoided and what alternative outcomes might have been). The remaining half of participants did not generate counterfactuals, but were instructed to go straight on to rate their emotions and reactions to the scenario.

Content of the scenarios. There were four different versions of the scenario - High Seriousness/High Responsibility (HSHR), High Seriousness/Low Responsibility (HSLR), Low Seriousness/High Responsibility (LSHR) and Low Seriousness/Low Responsibility (LSLR). In the High Responsibility versions, the person sunbathed regularly without protecting their skin from the sun, fully cognisant of the risks they were taking, because they wanted to get a tan. In the Low Responsibility versions, the person took all recommended steps to protect their skin in the sun but had a genetic predisposition to skin cancer, which they were not aware of until they sought medical advice about changes in a mole. In the High Seriousness versions, the scenario described an outcome where the person was diagnosed as having a malignant melanoma and faced uncertainty over its treatability, with the possibility that the condition could prove fatal. In the Low Seriousness versions, the scenario described an outcome where the person was diagnosed as having a benign skin cancer, which was readily treatable and harmless. Full versions of the four scenarios are included in Appendices 3 to 6.

Rating scales. All participants were asked to rate their reactions to the scenario, using a series of 7-point response scales, anchored at each end by appropriate descriptors. Still imagining themselves as the person in the scenario, participants

completed three affective measures – to indicate their anticipated regret (1 = 'Not at all regretful'; 7 = 'Extremely regretful'), anticipated worry (1 = 'Not at all worried'; 7 = 'Extremely worried') and anticipated happiness (1 = 'Very unhappy'; 7 = 'Very happy'). In addition, participants completed two manipulation check items, where they rated their responsibility for the events (1 = 'Not at all responsible'; 7 = 'Completely responsible') and the seriousness of the outcome (1 = 'Not at all serious'; 7 = 'Extremely serious').

Further measures asked participants to rate how much control they thought they had over the events (1 = 'Not at all under my control'; 7 = 'Completely under my control'), to what extent they had caused the outcome themselves (1 = 'Not at all caused by me'; 7 = 'Completely caused by me'), to what extent the outcome was caused by external factors (1 = 'Not at all caused by these'; 7 = 'Completely caused by these'), how much they would blame themself for the situation (1 = 'Not at all to blame'; 7 = 'Completely to blame') and how preventable they thought the outcome had been (1 = 'Not at all preventable'; 7 = 'Completely preventable').

Finally, participants rated (from their own perspective) how similar they were to the person in the scenario (1 = 'Not at all similar'; 7 = 'Extremely similar'), how easy or difficult it was to imagine themself in the situation described (1 = 'Very difficult'; 7 = 'Very easy') and how relevant they felt the issue was to them personally (1 = 'Not at all relevant to me'; 7 = 'Extremely relevant to me').

Once completed questionnaires were returned, debrief information about the study was sent to respondents, together with website addresses where more information was available about skin cancer and skin protection.

Results

Manipulation checks

The manipulation of responsibility and seriousness in the scenarios was successful. Participants who read 'High Responsibility' versions (M = 5.56, SD = 1.177) rated their responsibility for the events as significantly greater than participants who read the 'Low Responsibility' versions (M = 3.52, SD = 1.491) of the scenario, t (128) = 8.686, p < .001. Participants who read 'High Seriousness' versions (M = 6.58, SD = 0.556) rated the outcomes as significantly more serious than participants who read 'Low Seriousness versions (M = 4.57, SD = 1.237) of the scenario, t (128) = 11.857, p < .001.

Effect of generating counterfactuals

Being explicitly prompted to generate counterfactuals had no significant effect on participants' ratings of anticipated regret. Individuals who were asked to generate counterfactuals did not rate their regret as being any greater than those who were not asked to generate counterfactuals. This was the case for all four versions of the scenario – Table 5.5 shows the mean regret ratings and relevant test statistics. Therefore, in subsequent analyses, the data was treated as though there were only four conditions in the experiment, corresponding to the version of the scenario that participants had read - HSHR (n=31) , HSLR (n=35), LSHR (n=30) or LSLR (n=34).

Effect of scenario version on ratings of anticipated regret

There were significant differences between ratings of anticipated regret evoked by the

Table 5.5

Mean regret ratings by scenario version and counterfactual generation condition

(Experiment 2)

		Counterfactual generation condition		
Scenario version*	All participants	No counterfactual generation	Counterfactual generation	Independent *t* test statistics
HSHR	6.42 (0.672)	6.56 (0.512)	6.27 (0.799)	$t(29) = 1.218$, $p = .235$
HSLR	5.20 (1.779)	4.88 (1.799)	5.50 (1.757)	$t(33) = -1.027$, $p = .312$
LSHR	5.43 (1.278)	5.31 (1.448)	5.57 (1.089)	$t(28) = -0.547$, $p = .589$
LSLR	4.09 (1.545)	4.06 (1.638)	4.12 (1.495)	$t(32) = -0.109$, $p = .914$

* Note: HSHR = High Seriousness/High Responsibility; HSLR = High Seriousness/Low Responsibility; LSHR = Low Seriousness/High Responsibility; LSLR = Low Seriousness/Low Responsibility. Standard deviations are in parentheses. Independent *t* test statistics refer to the comparison of counterfactual generation conditions.

different versions of the scenario, F (3, 126) = 15.182, p = < .001. The most regret was evoked by the HSHR scenario and the least regret was evoked by the LSLR scenario. Mean regret ratings by scenario version are shown in Table 5.5 (all participants column). Post-hoc tests (Tukey HSD) revealed significant differences between the regret ratings evoked by each of the possible pairings of the scenarios (ps < .05), except for HSLR and LSHR which both evoked similar levels of regret (p = .908). As shown in Figure 5.3, the pattern of ratings suggests an additive effect of outcome seriousness and responsibility on anticipated regret. The results of a 2 x 2 ANOVA offered support for this view. There was a significant main effect of outcome seriousness on regret ratings, F (1, 126) = 18.148, p = < .001, and a significant main effect of responsibility, F (1, 126) = 27.120, p = < .001. However, there was not a significant interaction between the two factors, F (1, 126) = 0.065, p = .799.

Ratings of perceived similarity, imageability and personal relevance

Table 5.6 shows, for each scenario version, participants' mean ratings of how similar they perceived themselves to be to the person described in the scenario, how easy or difficult it was to imagine themselves in the scenario and the personal relevance of the scenario. There were no significant between-scenario differences in ratings of personal relevance, F (3, 125) = 2.141, p = .098. All scenarios were rated as being moderately relevant to the reader. However, there were significant between-scenario differences in participants' ratings of similarity, F (3, 126) = 6.376, p < .001, and ratings of imageability, F (3, 126) = 5.497, p = .001. Post-hoc (Tukey HSD) tests revealed there was a significant difference in perceived similarity between HSHR and HSLR versions (p = .006), with participants feeling more similar to the individual in the HSLR scenario.

Figure 5.3

Mean anticipated regret ratings by scenario version (Experiment 2)

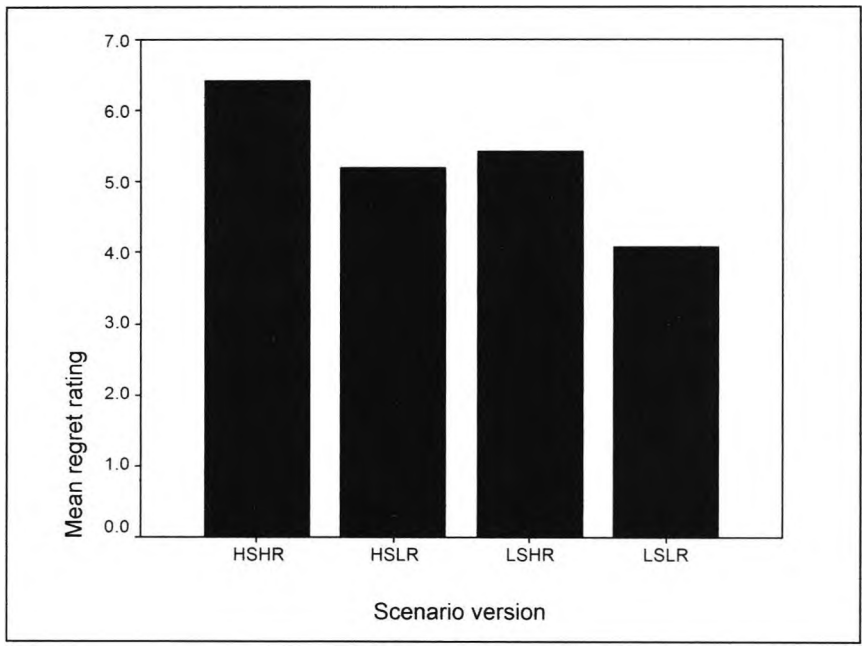

Table 5.6

Mean ratings of similarity, imageability and personal relevance (Experiment 2)

Scenario version	Mean similarity rating	Mean imageability rating	Mean personal relevance rating
HSHR	3.00 (1.571)	4.81 (1.957)	3.97 (1.853)
HSLR	4.29 (1.526)	5.69 (1.255)	4.62 (1.457)
LSHR	2.80 (1.627)	4.07 (2.033)	3.70 (1.745)
LSLR	3.74 (1.483)	5.12 (1.200)	4.41 (1.373)

Note: Standard deviations are in parentheses.

There was also a significant difference in similarity ratings between HSLR and LSHR versions ($p = .001$), with participants again feeling more similar to the individual in the HSLR scenario. There were significant differences in imageability between HSLR and LSHR ($p = .001$) – with the HSLR scenario being easier to imagine – and between LSHR and LSLR ($p = .054$) – with the LSLR scenario being easier to imagine. Ratings of imageability suggested that participants had found it moderately easy to imagine themselves in the situations described.

Effect of scenario version on anticipated worry and anticipated happiness

Mean ratings of anticipated worry and anticipated happiness appear in Table 5.7. There were significant between-scenarios differences in ratings of anticipated worry, $F (3, 125) = 15.524$, $p < .001$, and anticipated happiness, $F (3, 125) = 16.234$, $p < .001$. Post-hoc (Tukey HSD) tests showed that there were significant differences in these ratings between all versions of the scenario ($ps < .01$), except for between HSHR and HSLR, and between LSHR and LSLR ($ps > .05$).

The results of a 2 x 2 ANOVA revealed a significant effect of outcome seriousness on anticipated worry ratings, $F (1, 125) = 41.943$, $p < .001$, but no significant main effect of responsibility on anticipated worry, $F (1, 125) = 0.266$, $p = .607$. Similarly, the results of a further ANOVA showed a significant effect on anticipated happiness ratings for outcome seriousness, $F (1,125) = 48.693$, $p < .001$, but not for responsibility, $F (1,125) = 0.005$, $p = .946$. The finding that participants' worry and happiness ratings were affected only by outcome seriousness, while regret ratings were affected by both outcome seriousness and responsibility, suggests that regret is somewhat different to

Table 5.7

Mean ratings of anticipated worry and anticipated happiness (Experiment 2)

Scenario version	Mean anticipated worry	Mean anticipated happiness
HSHR	6.29 (1.270)	1.57 (1.165)
HSLR	6.56 (1.021)	1.67 (1.388)
LSHR	5.23 (1.357)	3.47 (1.697)
LSLR	4.74 (1.377)	3.38 (1.538)

Note: Standard deviations are in parentheses.

worry and more than just general unhappiness in that regret includes a sense of the self contributing to the negative event.

Discussion

Experiment 2 identified two scenarios that generated significantly different levels of anticipated regret, worry and happiness, but did not vary in terms of participants' perceptions of imageability and personal relevance. The HSHR and LSLR versions were therefore selected to be used as part of the intervention phase questionnaire in Experiment 3 to evoke anticipated regret in groups of participants. This enabled the effects of exposure to 'High Regret' (HSHR) versus 'Low Regret' (LSLR) scenarios on participants' risk perceptions and sunbathing behaviour to be explored in a new cohort, using a design similar to Experiment 1.

The results suggested that there was no significant effect on regret ratings of being specifically asked to generate upward and downward counterfactuals prior to completing the rating scales that measured participants' responses to the hypothetical scenario. There may be a number of explanations for this finding. Firstly, it may be the case that considering how events could have turned out better might have initially evoked greater levels of regret. However, participants were asked to then consider how things might have turned out worse and this may have reduced any elevated level of imagined regret back to a level one might have imagined without being cued to consider counterfactual outcomes at all. In other words, considering both upward and downward counterfactuals consecutively may 'cancel out' or neutralise any heightened or lessened regret. Secondly, it may be the case that participants in the 'no counterfactual generation' groups may still have spontaneously considered better and worse outcomes,

even though they were not specifically cued to do so by the instructions. Perhaps the estimation of one's regret automatically involves the consideration of better and worse scenarios and the mutability of events. Whatever the explanation for the observed results, given that being asked to generate counterfactuals appears to have had no significant effects on participants' regret ratings and lengthened the experimental task, we decided not to include these additional items as part of the intervention procedure in Experiment 3.

On a theoretical level, the results of the experiment also suggest that participants' regret ratings are influenced not only by responsibility but also by outcome seriousness. Since Experiments 1 and 2 were completed, a new theory of regret in decision making has been published – Decision Justification Theory (Connolly & Zeelenberg, 2002). This proposes that there are two components to regret - regret about making a poor quality decision (self-blame) and regret about a negative outcome. According to the theory, the two components can vary independently and thus influence the overall experience of regret.

The data collected in Experiment 2 would appear to support this view of two aspects of regret, albeit using different 'labels' for these aspects (outcome seriousness and responsibility). The results also support previous research which has argued that regret is qualitatively different to other emotions (Frijda, Kuipers & ter Schure, 1989; Roseman, Wiest & Swartz, 1994; Zeelenberg et al., 1998). Our data suggests that participants' anticipation of regret was affected by the severity of the outcome and also by a sense of personal responsibility in the situation, while anticipation of worry and general happiness were influenced only by the severity of the outcome.

Experiment 3

The experiment aimed to further explore whether there is a role for a regret-based intervention in persuading individuals to behave in a more health-conscious manner in the sun. The general design of Experiment 1 was repeated, but attempts were made to address some of the limitations of the earlier experiment, namely the small sample size, the absence of a control (no-intervention) group and the lack of reliability in the scenario manipulations of anticipated regret.

Method

Design

The experiment had a 3 (Time: baseline, intervention, follow-up) x 3 (Condition: high regret, low regret, no intervention) mixed factorial design, with 'Time' as a within-subjects factor and 'Condition' manipulated as a between-subjects factor. The experiment took place between October 2002 and October 2003 and used a longitudinal design, whereby participants completed questionnaires at three separate timepoints across a one-year period. The effect of experimental condition was measured on the change (if any) in participants' sunbathing attitudes, risk perceptions and behaviour from baseline to intervention (short-term impact) and from baseline to follow up (long-term impact).

Participants

Participants were recruited from first year Social Sciences undergraduates at City

University and London Metropolitan University. They participated for course credits or for a cash payment (£3 per timepoint). One hundred and ten students took part in the baseline (T1) phase of the study. Fifty-seven of the original cohort (52%) completed the intervention (T2) phase. 76 students completed the follow-up (T3) questionnaire but not all of these participants had completed a baseline questionnaire. Complete data sets were obtained for 38 participants (baseline, intervention and follow-up phases). Students who had completed baseline and follow-up questionnaires but had not taken part in the intervention phase (n = 19), formed a second control ('No T2') group.

The average age of participants in the final sample (N = 57) was 21 years (SD = 5.116, Range = 18 to 48 years). The majority of participants were female (89%) with white skin (45%) or brown skin (45%). Approximately 60% of participants reported that their skin 'sometimes' or 'always' burned in the sun, and 93% reported their skin tended to tan 'lightly' or 'deeply' in the sun.

Procedure and materials

At baseline (Autumn 2002), participants completed a series of rating scales that measured their attitudes and risk perceptions in relation to sunbathing and skin cancer, and measured their behaviour in the sun during the previous summer.

Four months later, the group was approached again and asked to complete a second questionnaire-based task, this being the intervention phase. At this point, participants were randomly assigned to either the 'High Regret' (n = 16) or 'Low Regret' (n = 22) experimental groups or a 'No Regret Intervention' control group (n = 19). For 'High Regret' and 'Low Regret' groups, the task comprised a scenario-based intervention and

immediate remeasure of their attitudes, risk perceptions and intended sunbathing behaviour over the forthcoming summer. For the 'No Regret Intervention' control group, the booklet contained a number of filler tasks unrelated to sunbathing or skin cancer, followed by the same series of sunbathing-related rating scales that were completed by the other two experimental groups.

Eight months later, participants were invited to complete a follow-up questionnaire that re-measured their attitudes, risk perceptions and their actual sunbathing behaviour since the intervention phase.

Attitude and ambivalence measures. Seven items measured participants' attitudes towards sunbathing, having a tanned appearance and using a sunscreen lotion (adapted from Leary & Jones, 1993, Wichstrom, 1994). The items used appear in Figure 5.4. For each of the three aspects, one item measured the extent to which the attitude was positive or negative, while the other item measured the extent to which the attitude was favourable or unfavourable. Ratings on the two items were summed to give a single attitude score for each of the three aspects – one towards a tanned appearance, one towards sunbathing and one towards using sunscreen. An additional item measured the extent to which the participant believed having a tan made them look more attractive. One item measured participants' ambivalence towards sunbathing (adapted from Sparks, Conner, James, Shepherd & Povey, 2001).

Risk perception measures. Eight items measured a range of participants' risk perceptions in relation to sunbathing and skin cancer. Questions about perceived risk were asked in a number of different formats, as research suggests that responses to risk

Figure 5.4

Attitude and ambivalence measures (Experiment 3)

Attitude towards sunbathing (2 items - summed)

(a) "My attitude towards sunbathing is ..." (1 = 'Extremely positive' to 7 = 'Extremely negative').

(b) "My attitude towards sunbathing is ..." (1 = 'Extremely favourable' to 7 = 'Extremely unfavourable').

Attitude towards having a tanned appearance (2 items - summed)

(a) "My attitude towards having a tanned appearance is ..." (1 = 'Extremely positive' to 7 = 'Extremely negative').

(b) "My attitude towards having a tanned appearance is ..." (1 = 'Extremely favourable' to 7 = 'Extremely unfavourable').

Belief about effect of a tanned appearance on attractiveness (1 item)

"How much do you think that having a tan makes you look more attractive?" (1 = 'Not at all' to 7 = 'Extremely').

Attitude towards using a sunscreen lotion (2 items - summed)

(a) "My attitude towards using a sunscreen lotion is ..." (1 = 'Extremely positive' to 7 = 'Extremely negative').

(b) "My attitude towards using a sunscreen lotion is ..." (1 = 'Extremely favourable' to 7 = 'Extremely unfavourable').

Ambivalence measure (1 item)

(a) "Would you say that you are strongly in favour of, or strongly against sunbathing, or would you say that your feelings are mixed?" (1 = 'Strongly against'; 2 = 'Mixed feelings'; 3 = 'Strongly in favour').

items vary according to how the question is worded or what response scale is used (van der Pligt, 1998; Weinstein, 2001). The items used appear in Figure 5.5 and were adapted from previous research (Eiser et al, 1993; Leary & Jones, 1993; Wichstrom, 1994; Slovic, 2000; Weinstein, 2001; Gigerenzer, 2002).

Behavioural measures. Six items measured participants' behaviour in the sun. The items used appear in Figure 5.6 and were adapted from previous research on sunbathing (Eiser et al, 1993; Leary & Jones, 1993; Wichstrom, 1994; Jackson & Aiken, 2000). The wording of these items was altered slightly for the intervention phase questionnaire to focus on participants' behavioural intentions. For example, "On how many days do you expect you will lay or sit out in the sun during the next 8 months?" (duration of average sunbathing session item).

Additional measures. At baseline, information about participants' age and gender was collected. In addition, three items asked about their skin type ('White/Fair', 'Brown' or 'Black') and their skin's typical reaction on exposure to the summer sun in terms of burning ('Always burn', 'Sometimes burn' or 'Never burn') and tanning ('Tans deeply', 'Tans lightly' or 'Never tans'). One item asked about participants' closest experience with skin cancer ("To what extent have you ever had any experience of skin cancer?") whereby participants were asked to indicate whether they knew anyone who had had the condition ("It has happened to me"; "It has happened to a partner of mine"; "It has happened to a member of my family"; "It has happened to a friend of mine"; "It has happened to an acquaintance of mine"; "It has not happened to anyone I know").

Since one hypothesised effect of experiencing regret is to initiate information seeking about the decision problem (Zeelenberg, van Dijk, Manstead & van der Pligt, 2000), the

Figure 5.5

Risk perception measures (Experiment 3)

Verbal risk perception scale

"In general, how risky do you think it is to sunbathe without protecting your skin, in terms of developing skin cancer?" (1 = 'Extremely risky' to 6 = 'Not at all risky').

Frequency risk perception scale

"Imagine 100 people who sunbathe regularly without protecting their skin from the sun's UV rays. How many of these 100 people do you think will develop skin cancer at some point in the future?" (_____ people out of 100).

Comparative risk perception scale

"Compared to other people your age and sex, how likely do you think it is that you will get skin cancer at some time in the future?" (1 = 'Much more likely' to 6 = 'Much less likely').

Conditional risk perception scale

"If you regularly sunbathed without protecting your skin, how likely do you think it is that you would develop skin cancer in the future?" Response indicated on a 10cm visual analogue scale, anchored at 0% ('No chance of this happening') and 100% ('It is certain to happen').

Agreement with risk statement

"To what extent do you agree that sunbathing without using a sunscreen increases a person's chances of getting skin cancer?" (1 = 'Strongly agree' to 6 = 'Strongly disagree').

Single exposure risk perception

"How harmful do you think it is, on any single occasion, for your skin to get burned in the sun?" (1 = 'Extremely harmful' to 6 = 'Not at all harmful').

Repeated exposure risk perception

"How harmful do you think it is, in the long term, for your skin to get burned in the sun on a regular basis?" (1 = 'Extremely harmful' to 6 = 'Not at all harmful').

Extent of thinking about the risks of sunbathing

"How much have you thought about how sunbathing might affect your health?" (1 = 'Very much so' to 6 = 'Not at all').

Figure 5.6

Behavioural measures (Experiment 3)

Frequency of sunbathing

"On how many days did you lay out in the sun?" (1 = 'None'; 2 = '1-5 days'; 3 = '6-10 days'; 4 = '11-15 days'; 5 = '16-20 days'; 6 = '21-25 days'; 7 = '26-30 days'; 8 = 'More than 30 days').

Duration of average sunbathing session

"For how long did you usually lay or sit out in the sun on each occasion?" (1 = 'Less than 1 hour'; 2 = '1 hour'; 3 = '2 hours'; 4 = '3 hours'; 5 = '4 hours'; 6 = '5 hours'; 7 = '6 hours'; 8 = 'More than 6 hours').

Consistency of sunscreen use

"Generally speaking, how consistently did you use a sunscreen when you are out in the summer sun or when you are abroad in the sun?" (1 = 'Always used sunscreen' to 6 = 'Never used sunscreen').

Number of applications of sunscreen per day

"On average, how many times a day did you apply your sunscreen?" (" ____ times a day").

SPF rating of sunscreen used

"What was the SPF rating of the sunscreen that you usually used?" (0 = 'Don't know/can't recall'; 1 ='Factor 20 or higher'; 2 = 'Factor 15 to 19'; 3 = 'Factor 10 to 14'; 4 = 'Factor 5 to 9'; 5 = 'Factor 0 to 4'; 6 = 'Did not use a sunscreen').

Sunbed use

"How many times have you used a sunbed to get a tan or to maintain a tanned appearance?" (1 = 'Never'; 2 = '1 to 5 sessions'; 3 = '6 to 10 sessions'; 4 = '11 to 15 sessions'; 5 = '16 to 20 sessions'; 6 = 'More than 20 sessions').

intervention phase and follow-up questionnaires included a detachable sheet that gave sources of information (e.g. websites) that participants could consult if they wanted more information about skin cancer and/or skin protection. The number of participants in each condition who detached the sheet was used as an indicator of interest in information seeking. At follow-up, two further items asked whether participants had obtained information during the previous eight months about skin cancer ('Yes' or 'No') and about protecting their skin from the sun ('Yes' or 'No').

The anticipated regret intervention. At the intervention phase, participants who had been randomly assigned to an intervention group (High Regret or Low Regret conditions) were asked to imagine themselves in a scenario, which described in some detail an individual's behaviour in the sun and the consequences that followed that behavioural choice. There were two scenarios, identical to the HSHR and LSLR versions developed in Experiment 2 (see Appendices 3 and 6), which were designed to evoke different levels of anticipated regret by manipulating the levels of responsibility and outcome seriousness in the scenarios. The 'High Regret' scenario described a person who sunbathed at every possible opportunity without protecting their skin from the sun. They were described as being fully aware of the risks to their health but did not follow recommendations for protecting their skin because they wanted to get a tan. The person therefore had high responsibility for the subsequent outcome - development of a malignant melanoma. At the end of the scenario, they were facing surgery and possible chemotherapy, with uncertainty about their prognosis. In contrast, the 'Low Regret' scenario described a person who took all possible steps to protect their skin in the sun, because they were aware of the risks to their health. However, they were unaware that they had a genetic predisposition to develop skin cancer. They therefore had low responsibility for the subsequent outcome. At the end of the scenario, they were

diagnosed with a benign skin cancer, which was readily treatable with minor surgery and posed no threat to their life.

Immediately after reading the scenario, participants completed a series of 7-point rating scales, which measured their reactions to the scenario, as used in Experiment 2. The rating scales were anchored at each end by appropriate descriptors (e.g. 1 = 'Not at all regretful'; 7 = 'Extremely regretful'). Still imagining themselves as the person described in the scenario, participants completed three affective measures - anticipated regret, anticipated worry and anticipated happiness. In addition, they rated their responsibility for the events and the seriousness of the outcome (manipulation checks). Participants also indicated how much control they thought they had over the events, the extent to which they had caused the outcome, how much they would be blaming themselves for the situation and how preventable the outcome had been. Finally, they rated (from their own perspective) how similar they were to the person in the scenario, how easy or difficult it had been to imagine themself in the situation described and how relevant they felt the issue was to them personally.

Results

Baseline attitudes, risk perceptions and sunbathing behaviour

At baseline, most students (72%) had not known anyone who had been diagnosed with skin cancer. Of the remaining 28% who had known someone who had been diagnosed with skin cancer, only three participants (5%) had experience of the condition themselves.

The majority of participants reported having mixed feelings about sunbathing (78%), with relatively few being either strongly against (11%) or strongly in favour of it (11%). Responses to the general attitude items suggested that the sample as a whole held fairly neutral attitudes towards sunbathing (M = 8.25, SD = 2.834). Participants reported fairly positive attitudes towards having a tan (M = 6.30, SD = 3.254) and agreed slightly that a tanned appearance made them look more attractive (M = 4.61, SD = 1.834). They also reported moderately positive attitudes towards using sunscreen (M = 5.00, SD = 3.635).

Participants' responses to the risk perception items suggested that they did recognise the potential dangers of sunbathing without protecting one's skin from the sun. They reported they had given the matter a fair amount of thought in the past (M = 3.46, SD = 1.637), agreed quite strongly that sunbathing without using sunscreen increased the risk of developing skin cancer (M = 1.63, SD = 0.709) and was a high risk behaviour (verbal risk perception item: M = 2.21, SD = 1.279). They appeared more concerned about the cumulative risk of sunbathing without protecting one's skin (M = 1.61, SD = 0.994) than the risk associated with a single exposure to the sun (M = 3.04, SD = 1.371). When asked about the frequency of skin cancer diagnosis, they estimated that approximately 40% of people who did not protect their skin in the sun would develop skin cancer in the future (M = 38.22, SD = 29.964). When asked how likely it was that someone would develop skin cancer if they did not protect their skin, participants estimated a 64% chance of developing skin cancer (conditional risk perception item: M = 64.29, SD = 23.019), although they tended to believe they were themselves less at risk of developing the condition than their peers (comparative risk perception item: M = 4.54, SD = 1.160).

Overall, the sample reported they had spent on average between 10 to 15 days in the sun in the previous year (M = 3.79, SD = 2.340). The duration of a typical sunbathing session had been approximately 2 hours (M = 3.08, SD = 1.922), during which time they had applied sunscreen to their skin an average of two times (M = 1.89, SD = 1.566). On average, they applied a Factor 10-14 (SPF rating) sunscreen (M = 3.21, SD = 2.087) and reported that they were moderately consistent about applying sunscreen whenever they went out in the sun (M = 3.25, SD = 1.960). In the previous year, participants had rarely, if ever, used a sunbed (M = 1.24, SD = 0.746).

Differences were observed between white-skinned and non-white skinned participants in some of their baseline ratings. At baseline, white participants had spent more days in the sun (t (72) = -2.355, p = .021) in the previous year than non-white participants and had stayed out in the sun longer on each occasion (t (72) = -2.409, p = .019); in spite of this greater tendency to expose their skin to the sun, there were no significant differences between the two groups in the consistency of their sunscreen use (t (72) = 1.702, p = .093), the number of times they applied their sunscreen (t (72) = -0.667, p = .507), or the SPF rating of the sunscreen they used (t (72) = 0.419, p = .677). White-skinned participants also reported using sunbeds slightly more often than non-white skinned participants, this difference approaching statistical significance (t (72) = -1.914, p = .063, 2-tailed test).

White-skinned participants' increased exposure to the sun was not associated with any increased perception of their own vulnerability to developing skin cancer compared to others in the population (t (72) = 0.781, p = .437). Two other risk perception measures also suggested that white-skinned respondents saw sunbathing without sunscreen as less risky than their non-white skinned peers did. White participants estimated a

significantly smaller proportion of people who sunbathed without protecting their skin would develop skin cancer in the future (t (72) = 2.170, p = .033). In addition, non-white participants saw a single exposure to the sun without skin protection as being more risky than did white participants (t (72) = -2.097, p = .040). However, white-skinned participants did agree more strongly with the statement that sunbathing without protecting one's skin increased the risk of developing skin cancer (t (72) = 1.948, p = .055). There were also differences in the groups' attitudes towards sunbathing (t (72) = 2.680, p = .009) and having a tanned appearance (t = 1.994, p = .050) – white-skinned participants had more positive attitudes towards sunbathing and having a tan than did non-white participants. They also agreed more strongly that having a tan made them look more attractive (t (72) = -2.137, p = .036). However, both groups had equally positive attitudes towards the use of sunscreen (t (71) = 1.551, p = .125).

Intervention phase – manipulation checks.

Table 5.8 shows the mean ratings of the intervention group participants in response to imagining the regret scenario at the intervention phase. The manipulation of regret was successful; the 'High Regret' scenario evoked significantly more anticipated regret than the 'Low Regret' scenario (see Table 5.8 for statistical test results). In addition, participants who imagined the 'High Regret' scenario anticipated significantly less happiness than those who imagined the 'Low Regret' scenario. The two scenarios were rated differently on a number of other dimensions – perceived self-blame, self-caused and responsibility. Participants who imagined the 'High Regret' scenario indicated they would feel significantly more to blame, feel more that they had caused the outcome and feel more responsible for the situation than those who imagined the 'Low Regret' scenario.

Table 5.8

Mean ratings of responses to the regret scenarios (Experiment 3)

All intervention group participants (N = 38)

	'High Regret' scenario (n = 16)	**'Low Regret' scenario (n = 22)**	**Independent t test statistics**
Anticipated regret	6.06 (0.998)	4.95 (1.527)	$t(36) = 2.702$, $p = .010$
Anticipated happiness	2.19 (1.682)	3.27 (1.486)	$t(36) = -2.103$, $p = .043$
Anticipated worry	6.13 (1.500)	5.55 (1.299)	$t(36) = 1.272$, $p = .211$
Self-blame	5.19 (1.721)	3.95 (1.495)	$t(36) = 2.355$, $p = .024$
Self-caused	4.75 (1.342)	3.59 (1.436)	$t(36) = 2.524$, $p = .016$
Outcome seriousness	6.25 (1.125)	5.73 (1.386)	$t(36) = 1.239$, $p = .223$
Preventability	4.50 (1.211)	3.73 (1.486)	$t(36) = 1.707$, $p = .097$
Responsibility	4.88 (1.310)	3.91 (1.411)	$t(36) = 2.146$, $p = .039$
Perceived control	4.00 (1.897)	2.95 (1.495)	$t(36) = 1.900$, $p = .065$
Similarity to self	3.63 (2.029)	3.00 (1.155)	$t(36) = 1.109$, $p = .236$
Imageability	3.31 (1.493)	3.77 (1.478)	$t(36) = -0.944$, $p = .352$
Personal relevance	2.94 (1.389)	3.91 (1.571)	$t(36) = -1.974$, $p = .056$

Note: Standard deviations appear in parentheses.

There were two marginally significant differences between the two groups' ratings of perceived control and personal relevance: participants in the 'High Regret' condition perceived more control over the events than did participants in the 'Low Regret' condition, but participants in the 'Low Regret' condition felt the scenario they read was more personally relevant than participants in the 'High Regret' condition. There was no significant difference between the two scenarios in terms of participants' ratings of anticipated worry, the seriousness of the outcome or how preventable the situation was perceived to be. The scenarios were rated as being equivalent in terms of how similar participants felt to the person in the scenario and how easy it was to imagine being in the situation.

When comparing white-skinned and non-white skinned participants' responses to the scenarios, there were significant differences between the two groups in terms of how relevant they felt the issue was to them (t (35) = -2.085, p = .044) and how easy it was to imagine themselves in the situation (t (35) = -3.274, p = .002). White-skinned participants thought the issue had more personal relevance (M = 3.90, SD = 1.640) than did non-white skinned participants (M = 2.88, SD = 1.258); white-skinned participants also felt the scenario was easier to imagine (M = 4.24, SD = 1.446) than non-white skinned participants (M = 2.81, SD = 1.109).

In all other responses to the scenario, there was no significant difference between the two skin type groups. For non-white skinned participants only, there was no significant difference in the level of regret (t (14) = 1.240, p = .235), happiness (t (14) = 0.372, p = .715) or worry (t (14) = 0.632, p =.538) anticipated in response to the 'High Regret' and 'Low Regret' scenarios.

Short-term effects of the intervention on planned behaviour, attitudes and risk perceptions

To explore the effects of the intervention in the short term, a series of ANOVA models were carried out, with 'Time' as a within-groups factor (T1 vs. T2 ratings) and 'Condition' as a between-groups factor. Changes in ratings for the different experimental groups – i.e. 'High Regret' (n = 16), 'Low Regret' (n = 22) and 'No Regret Intervention' (n = 19) groups – were compared. In addressing the question of whether a regret-based intervention was effective in changing behaviour, risk perceptions and attitudes, while no intervention was not, the presence of a significant 'Time x Condition' interaction was of particular interest in the analysis.

Further analyses were conducted on the data, to determine whether the intervention had been more effective in the short-term for white-skinned participants than for non-white skinned participants. In these analyses, because dividing the sample into two 'skin type' groups resulted in relatively small numbers of participants in each of the four experimental conditions for each skin type, the 'High Regret' and 'Low Regret' groups were combined to form one 'Intervention group' and compared to the 'No Regret Intervention' control group. Here, the presence of significant 'Time x Condition x Skin Type' or 'Time x Skin Type' interactions was of interest.

Behavioural measures. There were significant changes after the intervention phase in participants' plans for future behaviour (compared to past behaviour reported at baseline) on five of the six behavioural measures, although not all of these changes were as predicted. Table 5.9 shows participants' mean ratings on the sunbathing behavioural items at baseline and after the intervention.

Table 5.9

Change in ratings on behavioural measures from baseline to post-intervention by experimental condition and skin type (Experiment 3)

		Intervention groups		Control groups	
Behaviour item/phase	**All participants (n = 57)**	**White skin (n = 21)**	**Non-white skin (n = 16)**	**White skin (n = 7)**	**Non-white skin (n = 11)**
Days in the sun (T1)	3.67 (2.413)	4.38 (2.312)	2.69 (1.401)	5.14 (1.952)	2.73 (2.370)
Days in the sun (T2)	4.30 (2.413)	5.14 (1.982)	3.00 (1.789)	5.57 (2.225)	3.73 (2.970)
Duration of sunbathing session (T1)	3.32 (2.089)	3.81 (1.965)	2.69 (1.621)	4.86 (1.773)	2.55 (2.622)
Duration of sunbathing session (T2)	3.11 (1.790)	3.48 (1.601)	2.06 (1.237)	4.57 (2.070)	3.09 (1.973)
Consistency of sunscreen use (T1)	3.21 (1.980)	3.00 (1.844)	3.38 (2.094)	1.86 (1.069)	4.27 (2.240)
Consistency of sunscreen use (T2)	2.46 (1.604)	2.10 (1.136)	3.00 (2.066)	1.86 (0.690)	2.82 (1.991)
Number of sunscreen applications (T1)	2.09 (1.687)	2.14 (1.352)	1.87 (1.727)	2.71 (1.799)	1.82 (2.316)
Number of sunscreen applications (T2)	2.59 (2.130)	2.57 (1.165)	2.27 (2.549)	3.57 (3.207)	2.55 (2.464)
SPF rating of sunscreen (T1)	3.28 (2.007)	3.43 (1.568)	3.13 (2.277)	2.29 (1.380)	4.27 (2.370)
SPF rating of sunscreen (T2)	2.89 (1.644)	2.43 (1.287)	3.25 (1.693)	2.29 (1.380)	3.82 (2.040)
Sunbed use (T1)	1.19 (0.515)	1.38 (0.740)	1.13 (0.342)	1.00 (0.000)	1.09 (0.302)
Sunbed use (T2)	1.49 (0.966)	1.62 (1.071)	1.19 (0.403)	2.14 (1.773)	1.27 (0.467)
Interest in information seeking (T2)	9%	9%	0%	7%	0%

There was no significant change planned in the duration of future sunbathing sessions for any of the experimental conditions or for either skin type group. Somewhat contrary to expectations, participants showed an intention to significantly increase the number of days they spent in the sun in the future compared to baseline (F (1, 54) = 9.078, p = .004). This was the case for all participants, regardless of experimental condition or skin type. In addition, participants intended to increase their use of sunbeds in future compared to baseline (F (1, 53) = 5.591, p = .022). This effect was qualified by a marginally significant 'Time x Condition' interaction (F (1, 51) = 3.292, p = .075), whereby control group participants intended to increase their sunbed use (t (18) = -1.957, p = .066) but intervention group participants did not (t (37) = -1.312, p = .198).

Participants did however report changes in relation to their intended use of sunscreen. They planned to increase the consistency of their sunscreen use in future compared to baseline (F (1, 54) = 9.999, p = .003). In addition, there was a marginally significant 'Time x Condition x Skin Type' interaction (F (1, 51) = 3.938, p = .053). White-skinned participants who had been exposed to a regret-based intervention (either the 'High Regret' or 'Low Regret' scenario) indicated an intention to apply their sunscreen more consistently when going out in the sun in future (t (20) = 2.627, p = .016). In addition, for non-white control group participants, there was an intention to apply sunscreen more consistently in future (t (10) = 2.451, p = .034) – this finding was somewhat unexpected given that the group had not been exposed to a regret-based intervention. There was no evidence of a change in intended consistency of sunscreen use for non-white skinned intervention group participants (t (15) = 0.778, p = .449) or for white-skinned control group participants (t (6) = 0.000, p = 1.000).

Participants also reported that they intended to increase the SPF rating of the sunscreen

they would use in future compared to baseline, although this planned change was only marginally significant (F (1, 54) = 3.339, p = .073). The effect was found for all experimental groups and all skin type groups. There was also an intention among participants (regardless of experimental condition and skin type) to significantly increase the number of times they would apply their sunscreen during future sunbathing sessions compared to baseline (F (1, 53) = 4.764, p = .034).

Risk perception measures. Table 5.10 shows participants' mean ratings on the risk perception items at baseline and immediately after the intervention. For all experimental groups, there was an increase in perceived personal risk relative to their peers (comparative risk) of developing skin cancer from sunbathing without sunscreen after the intervention phase compared to baseline (F (1, 52) = 5.834, p = .019). Contrary to expectations, participants intended to think less about the risks associated with sunbathing at the end of the intervention phase than they had done in the past (F (1, 54) = 9.518, p = .003). In terms of the verbal risk perception measure, there was a marginally significant 'Time x Condition x Skin Type' interaction (F (1, 50) = 3.507, p = .067). Post hoc analyses (Related t tests) showed there was no significant change in participants' verbal risk perception ratings for the white-skinned intervention group, white-skinned control group or non-white control group (ps > .05). However, non-white skinned intervention group participants rated the risk of developing skin cancer from sunbathing without sunscreen as lower after the intervention than they had done at baseline (t (15) = -2.825, p = .013). None of the other risk perception measures showed any significant change in the short term.

Attitude measures. Table 5.11 shows participants' mean ratings on the attitude items at baseline and immediately after the intervention. There was no significant

Table 5.10: Change in ratings on risk perception measures from baseline to post-intervention by experimental condition and skin type (Experiment 3)

		Intervention groups		Control groups	
Risk perception item/phase	**All participants (n = 56)**	**White skin (n = 21)**	**Non-white skin (n = 16)**	**White skin (n = 7)**	**Non-white skin (n = 11)**
Verbal risk item (T1)	2.11 (1.275)	2.05 (1.161)	1.50 (0.730)	2.29 (0.756)	3.20 (1.874)
Verbal risk item (T2)	2.25 (1.225)	2.29 (1.231)	2.13 (1.025)	2.57 (1.397)	2.30 (1.567)
Frequency risk item (T1)	39.73 (26.920)	37.14 (28.503)	47.94 (27.798)	22.86 (9.063)	39.30 (22.271)
Frequency risk item (T2)	38.32 (22.923)	35.10 (25.092)	49.06 (20.230)	21.71 (16.194)	36.70 (17.192)
Comparative risk item (T1)	4.44 (1.118)	4.52 (1.078)	4.20 (0.941)	4.29 (1.604)	4.80 (1.229)
Comparative risk item (T2)	4.04 (1.276)	3.67 (1.390)	4.00 (0.926)	3.86 (1.345)	4.80 (1.229)
Conditional risk item (T1)	67.41 (20.520)	63.48 (24.863)	72.40 (20.159)	69.71 (12.803)	65.27 (17.950)
Conditional risk item (T2)	63.68 (20.339)	65.48 (19.989)	61.60 (21.121)	63.57 (20.687)	61.64 (20.156)
Single exposure risk item (T1)	2.95 (1.394)	3.10 (1.546)	2.60 (1.352)	3.43 (0.976)	2.73 (1.348)
Single exposure risk item (T2)	2.88 (1.349)	2.76 (1.446)	2.47 (1.506)	3.29 (1.254)	3.27 (1.009)
Cumulative risk item (T1)	1.46 (0.808)	1.38 (0.669)	1.67 (1.113)	1.43 (0.787)	1.45 (0.688)
Cumulative risk item (T2)	1.66 (0.859)	1.57 (0.811)	1.60 (0.737)	1.29 (0.488)	2.09 (1.136)
Agreement with risk statement (T1)	1.59 (0.733)	1.52 (0.512)	1.60 (0.910)	1.43 (0.787)	1.82 (0.874)
Agreement with risk statement (T2)	1.73 (0.924)	1.52 (0.680)	2.00 (1.000)	2.00 (1.414)	1.73 (0.905)
Thinking about risk (T1)	3.40 (1.580)	3.19 (1.327)	2.69 (1.537)	3.29 (1.254)	4.64 (1.690)
Thinking about risk (T2)	4.05 (1.457)	3.57 (1.599)	3.81 (1.328)	4.43 (1.397)	4.82 (1.079)

Table 5.11

Change in ratings on attitude measures from baseline to post-intervention by experimental condition and skin type (Experiment 3)

		Intervention groups		Control groups	
Attitude item/phase	**All participants (n = 57)**	**White skin (n = 21)**	**Non-white skin (n = 16)**	**White skin (n = 7)**	**Non-white skin (n = 11)**
Mixed feelings (T1) – mode (range)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)
Mixed feelings (T2) – mode (range)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)	2.00 (2-3)	2.00 (1-3)
Attitude towards sunbathing (T1)	8.39 (2.827)	7.86 (2.535)	9.38 (2.500)	6.43 (2.299)	9.45 (3.328)
Attitude towards sunbathing (T2)	7.74 (2.453)	7.29 (2.148)	9.06 (2.175)	6.14 (1.864)	8.00 (2.966)
Attitude towards a tanned appearance (T1)	6.29 (3.218)	5.86 (3.381)	6.93 (2.915)	4.57 (3.259)	7.27 (3.409)
Attitude towards a tanned appearance (T2)	5.27 (2.453)	4.57 (2.181)	6.87 (2.503)	4.00 (2.236)	5.09 (2.212)
Attitude towards sunscreen (T1)	5.28 (3.858)	5.10 (3.923)	6.00 (3.847)	3.14 (1.574)	6.55 (4.569)
Attitude towards sunscreen (T2)	4.32 (2.898)	4.38 (2.500)	4.38 (3.181)	3.14 (1.574)	5.09 (3.961)
Attractiveness of a tanned appearance (T1)	4.63 (1.809)	5.14 (1.526)	4.44 (1.896)	4.57 (2.149)	3.91 (2.023)
Attractiveness of a tanned appearance (T2)	4.77 (1.722)	5.62 (1.431)	3.81 (1.797)	4.57 (1.813)	4.64 (1.567)

change in participants' responses to the ambivalence measure from baseline to immediately post-intervention. Most participants, regardless of experimental group or skin type) reported that they had mixed feelings about sunbathing; very few expressed feelings that were strongly in favour of or strongly against sunbathing. There was a marginally significant change in attitudes towards sunbathing (F (1, 54) = 3.534, p = .066), with both white-skinned and non-white skinned participants in all conditions holding more positive attitudes towards sunbathing after the intervention than they had at baseline. There was, however, a significant change in participants' attitudes towards sunscreen (F (1, 54) = 4.019, p = .05). After the intervention phase, all participants (regardless of experimental group or skin type) had more positive attitudes towards sunscreen than they had at baseline.

There was also a significant change in participants' attitudes to having a tanned appearance at the end of the intervention phase compared to baseline, as measured on the general attitude items (F (1, 53) = 6.161, p = .016). This change represented an increasingly positive attitude towards having a tan for all participants, regardless of experimental condition or skin type. When contrasting participants' responses on the item that asked whether they believed a tan made them more attractive, there was a significant 'Time x Condition x Skin Type' interaction (F (1, 51) = 6.263, p = .016). Again, this was not in the expected direction. For control group participants, there was no change in their ratings at baseline and post-intervention phases. However, for the intervention groups, white-skinned participants rated having a tan as making a person significantly more attractive after the intervention than they had done at baseline (t (20) = -3.627, p = .002). In contrast, non-white skinned participants rated having a tan as making a person less attractive after the intervention than they had done at baseline (t (15) = 2.179, p = .046).

Longer-term effects of the intervention on planned behaviour, attitudes and risk perceptions

To explore the effects of the intervention in the longer-term, a series of ANOVA models were carried out, with 'Time' as a within-groups factor (T1 vs. T3 ratings) and 'Condition' as a between-groups factor. Changes in ratings for 'High Regret' (n = 10) and 'Low Regret' (n = 15) intervention groups, 'No Regret Intervention' (n = 13) and 'No T2' (n = 18) control groups were compared. In addressing the question of whether a regret-based intervention was effective in changing behaviour, risk perceptions and attitudes, while no intervention was not, the presence of a significant 'Time x Condition' interaction was of particular interest in the analysis.

Further analyses were conducted on the data, to determine whether the intervention had been more effective in the longer-term for white-skinned participants than for non-white skinned participants. Since dividing the sample into two 'skin type' groups resulted in relatively small numbers of participants in each of the four experimental conditions for each skin type, the 'High Regret' and 'Low Regret' intervention groups were combined to form one single 'intervention' condition and the two control groups ('No Regret Intervention' and 'No T2') combined to form a single 'control' condition for the purposes of the analyses. In this case, the presence of significant 'Time x Condition x Skin Type' or 'Time x Skin Type' interactions was of particular interest.

Behavioural measures. Table 5.12 shows participants' ratings on the sunbathing behaviour items at baseline and follow-up. There was no significant change in the number of days participants reported spending in the sun or in the duration of their sunbathing sessions since the intervention compared with their baseline reports.

Table 5.12: Change in ratings on behavioural measures from baseline to follow-up by experimental condition and skin type (Experiment 3)

		Intervention groups		Control groups	
Behaviour item/phase	**All participants (n = 56)**	**White skin (n = 15)**	**Non-white skin (n = 9)**	**White skin (n = 10)**	**Non-white skin (n = 20)**
Days in the sun (T1)	3.73 (2.355)	4.07 (2.314)	3.33 (1.500)	3.60 (2.221)	3.70 (2.774)
Days in the sun (T3)	3.66 (2.185)	4.00 (2.171)	3.44 (1.878)	3.80 (1.874)	3.35 (2.368)
Duration of sunbathing session (T1)	2.93 (1.831)	3.53 (1.995)	3.22 (1.481)	2.40 (1.075)	2.67 (2.169)
Duration of sunbathing session (T3)	3.39 (1.927)	4.20 (2.077)	3.00 (1.732)	3.60 (1.265)	2.89 (2.111)
Consistency of sunscreen use (T1)	3.20 (1.994)	2.47 (1.807)	3.33 (2.291)	3.10 (1.853)	3.83 (2.093)
Consistency of sunscreen use (T3)	2.67 (1.727)	1.87 (1.060)	3.00 (1.658)	2.90 (2.283)	2.89 (1.711)
Number of sunscreen applications (T1)	1.80 (1.459)	2.13 (1.302)	1.78 (1.716)	1.30 (0.949)	1.72 (1.742)
Number of sunscreen applications (T3)	2.67 (2.298)	3.47 (2.416)	1.89 (1.900)	2.80 (3.120)	2.39 (1.944)
SPF rating of sunscreen (T1)	2.96 (2.154)	3.33 (1.496)	2.44 (2.351)	2.90 (2.183)	3.17 (2.572)
SPF rating of sunscreen (T3)	2.44 (1.734)	2.20 (1.082)	2.89 (1.764)	2.80 (1.989)	2.33 (2.114)
Sunbed use (T1)	1.28 (0.840)	1.47 (0.834)	1.11 (0.333)	1.70 (1.636)	1.05 (0.218)
Sunbed use (T3)	1.42 (1.101)	1.40 (1.056)	1.00 (0.000)	1.80 (1.549)	1.48 (1.167)
Interest in information seeking (T3)	5%	5%	11%	0%	0%
Obtained information about skin cancer	28%	38%	22%	0%	24%
Obtained information about skin protection	56%	52%	67%	7%	62%

Similarly, although some participants had intended to increase their use sunbeds post-intervention, at follow-up there was no significant change in their reported actual use of sunbeds compared to baseline. However, there were some changes in participants' reported use of sunscreen since the intervention.

For all participants, regardless of experimental condition, there had been a significant increase in the number of times they had applied sunscreen compared to baseline (F (1, 50) = 6.800, p = 0.12. There was a marginally significant 'Time x Skin Type' interaction (F (1, 48) = 2.298, p = .136), with white-skinned participants reporting a significant increase in the number of sunscreenapplications at follow-up (t (24) = -2.528, p = .018). For non-white skinned participants there was no significant increase in the number of sunscreen applications (t (26) = -1.402, p = .173).

For all groups (regardless of experimental condition and skin type), there was a marginally significant improvement in reported consistency of sunscreen use since baseline (F (1, 50) = 3.605, p = .063). In addition, participants reported an increase in the SPF rating of the sunscreen they had used compared to baseline (F (1, 50) = 3.560, p = .065). This overall effect was qualified by a significant 'Time x Condition x Skin Type' interaction (F (1, 48) = 4.542, p = .038). Post-hoc analyses (Related t tests) revealed that, at follow-up, white-skinned participants who had been exposed to a regret-based intervention reported using a higher SPF rating sunscreen than they had done at baseline (t (14) = 2.377, p = .032). However, a similar increase was not evident for white-skinned controls or for non-white skinned control or intervention group participants (ps > .05). This pattern of results is consistent with the rationale for the study.

Risk perception measures. Table 5.13 shows participants' mean ratings on the risk perception items at baseline and at follow-up eight months later. At follow-up, participants reported that they had thought less about the risks of sunbathing than they had in the past (F (1, 52) = 8.118, p = .006). However, participants indicated that they saw a single exposure to the sun as more risky at follow-up than they had in the past (F (1, 52) = 6.001, p = .018). In terms of comparative risk ratings, there was a marginally significant 'Time x Condition' interaction (F (3, 53) = 2.303, p = .088). At follow-up, the 'High Regret' intervention group perceived their personal risk as being significantly greater relative to their peers (M = 3.50, SD = 1.780) than they had at baseline (M = 4.50, SD = 1.509) – t (9) = 2.535, p = .032. For all other groups, there was no change in their perceived comparative risk at follow-up, compared to baseline (ps > .05). None of the other risk perception measures showed significant change in the longer term.

Attitude measures. Table 5.14 shows participants' mean ratings on the attitude items at baseline and at follow-up. The change in attitude towards sunscreen observed immediately after the intervention was sustained at follow-up (F (1, 51) = 5.618, p = .022). Participants from all experimental conditions held more positive attitudes towards sunscreen at follow-up than they had at baseline. In particular, white-skinned participants held more positive attitudes towards sunscreen than non-white skinned participants (F (1, 49) = 6.259, p = .016). There were no significant changes in any of the other attitude measures at follow-up.

Experience of skin cancer. Comparison of baseline and follow-up reports suggested there was no significant change in participants' experience of skin cancer over the study period, in terms of their own personal experience or of knowing someone else

Table 5.13: Change in risk perception ratings from baseline to follow-up by experimental condition and skin type (Experiment 3)

		Intervention groups		Control groups	
Risk perception item/phase	**All participants (n = 57)**	**White skin (n = 15)**	**Non-white skin (n = 9)**	**White skin (n = 10)**	**Non-white skin (n = 20)**
Verbal risk item (T1)	2.26 (1.316)	1.67 (0.724)	1.78 (0.833)	2.70 (1.494)	2.76 (1.546)
Verbal risk item (T3)	2.19 (1.329)	1.73 (1.033)	2.22 (1.093)	2.80 (1.814)	2.29 (1.347)
Frequency risk item (T1)	41.32 (27.559)	39.00 (27.635)	59.67 (25.783)	22.80 (25.546)	41.90 (22.795)
Frequency risk item (T3)	38.96 (26.233)	39.67 (25.368)	47.89 (19.751)	26.40 (31.834)	39.33 (25.596)
Comparative risk item (T1)	4.51 (1.120)	4.47 (1.125)	4.00 (0.866)	4.40 (1.506)	4.86 (1.014)
Comparative risk item (T3)	4.30 (1.253)	3.93 (1.335)	3.78 (1.202)	4.20 (0.919)	4.71 (1.271)
Conditional risk item (T1)	65.21 (22.367)	71.80 (19.604)	71.11 (18.731)	55.60 (25.096)	61.45 (24.384)
Conditional risk item (T3)	63.02 (24.122)	70.47 (20.113)	61.67 (21.413)	47.60 (28.995)	63.55 (23.460)
Single exposure risk item (T1)	3.07 (1.399)	3.00 (1.648)	2.67 (1.414)	3.80 (1.398)	2.90 (1.119)
Single exposure risk item (T3)	2.64 (1.182)	2.40 (1.183)	2.67 (1.414)	3.10 (1.197)	2.50 (1.100)
Cumulative risk item (T1)	1.61 (0.985)	1.07 (0.258)	1.67 (0.707)	1.60 (0.843)	2.05 (1.317)
Cumulative risk item (T3)	1.75 (1.100)	1.20 (0.414)	1.78 (0.833)	1.90 (1.287)	2.15 (1.348)
Agreement with risk statement (T1)	1.63 (0.723)	1.33 (0.488)	1.67 (1.000)	1.40 (0.516)	1.95 (0.740)
Agreement with risk statement (T3)	1.67 (0.893)	1.67 (1.113)	1.56 (0.726)	1.90 (0.994)	1.67 (0.796)
Thinking about risk (T1)	3.57 (1.704)	2.80 (1.146)	3.00 (1.732)	3.30 (2.058)	4.40 (1.603)
Thinking about risk (T3)	4.14 (1.554)	3.20 (1.612)	3.89 (1.537)	4.60 (1.075)	4.60 (1.501)

Table 5.14

Change in ratings on attitude measures from baseline to follow-up by experimental condition and skin type (Experiment 3)

		Intervention groups		Control groups	
Attitude item/phase	**All participants (n = 56)**	**White skin (n = 15)**	**Non-white skin (n = 9)**	**White skin (n = 10)**	**Non-white skin (n = 20)**
Mixed feelings (T1) – mode (range)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)
Mixed feelings (T3) – mode (range)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)	2.00 (2-3)	2.00 (1-3)
Attitude towards sunbathing (T1)	8.13 (2.777)	7.73 (2.492)	8.00 (2.000)	7.22 (3.598)	8.95 (2.801)
Attitude towards sunbathing (T2)	7.77 (2.663)	8.13 (3.159)	7.11 (1.833)	7.44 (3.245)	7.76 (2.468)
Attitude towards a tanned appearance (T1)	6.43 (3.144)	5.47 (2.503)	7.11 (3.621)	5.33 (3.905)	7.29 (3.036)
Attitude towards a tanned appearance (T3)	5.86 (2.888)	5.47 (2.416)	7.00 (2.646)	5.67 (3.317)	5.71 (3.243)
Attitude towards sunscreen (T1)	5.16 (3.929)	4.40 (4.239)	7.33 (4.243)	3.78 (2.539)	5.70 (3.922)
Attitude towards sunscreen (T3)	3.87 (2.646)	2.93 (1.280)	4.89 (3.180)	3.89 (2.848)	4.30 (3.045)
Attractiveness of a tanned appearance (T1)	4.46 (1.890)	4.73 (1.580)	4.22 (2.167)	5.10 (2.183)	4.00 (1.897)
Attractiveness of a tanned appearance (T3)	4.60 (1.678)	5.20 (1.014)	3.78 (1.856)	5.10 (1.969)	4.38 (1.717)

who had developed skin cancer. The majority of participants did not know anyone with the condition at baseline (74%) or at follow-up (75%).

Information seeking. Tables 5.9 and 5.12 show the percentage of participants who demonstrated an interest in information seeking. Very few participants detached the information sheet from their questionnaires at either the intervention phase (9%) or at follow-up (5%). However, when asked at follow-up about their information seeking behaviour in the previous 8 months, 56% participants reported that they had obtained information about skin protection and 28% participants had obtained information about skin cancer.

For white-skinned participants, there was a significant association between whether or not they reported obtaining more information and whether or not they were exposed to a regret-based intervention. White-skinned participants who had considered their future regret if they developed skin cancer as a result of their sunbathing choices ('Intervention group') were more likely than control group participants to have obtained information about skin protection (χ^2 (1, N = 25) = 9.642, p = .004, Fisher's Exact Test, 2-sided) and about skin cancer (χ^2 (1, N = 25) = 7.843, p = .008, Fisher's Exact Test, 2-sided). This is in line with the hypothesis that the anticipation or experience of regret may motivate information seeking behaviour (Zeelenberg, van Dijk, Manstead & van der Pligt, 2000).

However, there was no significant association between experimental condition and information seeking behaviour for non-white skinned participants (ps > .05), perhaps indicating that personal relevance of the issue also has a part to play in determining whether individuals are motivated to seek further information.

Discussion

As was the case in the pilot study (Experiment 1), participants showed some change in their sunbathing intentions after the intervention phase, generally planning to make more health-protective choices insofar as their use of sunscreen was concerned. In the current experiment, there was also evidence that participants had changed their actual sunbathing behaviour during the study period, again relating to their use of sunscreen to protect their skin.

Immediately after the intervention, participants reported an intention to increase the consistency of their sunscreen use. This was particularly the case for white-skinned students who had been exposed to a regret-based intervention, but not the case for white-skinned control group participants ('No Regret intervention') or non-white skinned intervention group participants. These results would seem to offer some support for the experimental hypothesis – focusing on future regret appears to have brought about changes in the planned behaviour of participants who are allegedly most at risk of developing skin cancer in terms of their skin type and propensity to seek a tanned appearance. However, there was also a significant and somewhat unexpected change in planned consistency of sunscreen use amongst non-white skinned students who had not been exposed to the regret-based intervention. This effect is more difficult to explain. In addition, all experimental groups (including both white- and non-white skinned participants) reported an intention to increase the SPF rating of the sunscreen they used and to increase the number of times they applied this when out in the sun. Together, these results cast some doubt over whether the observed effects on behavioural intentions can be specifically attributed to the anticipation of regret. It may be that simply being asked about one's behaviour in the sun (which was the case for all

conditions) could have 'reactivated' an existing intention to improve one's health-protective choices in the future. Previous research has explored the gap between intended and actual behaviour and concluded that, whilst intentions are an important predictor of actual behaviour, they account for approximately 20% to 30% of the variance in behaviour (Abraham & Sheeran, 2003). It appears that intentions are not automatically followed by action – a study by Sheeran (2002) found that nearly half of the individuals who intended to act in a health-protective manner did not actually act on their intention. It may be the case that our participants already realised they should be acting in a more health-conscious way prior to the study but simply had not yet put these good intentions into practice (reflected in their reports of past behaviour). When asked about their intentions after the intervention, they may have stated the intention they had already formed before the study. We cannot therefore claim that taking part in the intervention changed their intentions per se.

The short-term impact on planned behaviour appears also to have been limited only to the use of sunscreen. After the intervention phase, participants indicated an intention to increase the amount of time they spent in the sun during the forthcoming summer and (for control group participants only) to increase their use of sunbeds. These results suggest that, whilst participants were willing to consider taking steps to protect their skin by using sunscreen, they still had a desire to seek a tanned appearance. This finding is in line with concerns expressed by health professionals and organisations that people may in fact be putting themselves at increased risk of skin cancer by adjusting only their use of sunscreen but not changing other aspects of their behaviour in the sun or their use of sunbeds. Nonetheless, it might be argued that the apparent planned increase in time spent in the sun may simply reflect the difference between what was actually possible last year because of external factors (e.g. disappointing summer

weather) and what the individual would like to have done or do (e.g. given a hot summer). It may be that participants feel that the aspects of their behaviour over which they have most control is their use of sunscreen; they may not perceive they have the same level of control over the number of days they can spend in the sun or the length of time they can sunbathe, given the somewhat unpredictable nature of the English weather.

In fact, the planned changes in the amount of time spent in the sun and sunbed use did not materialise, according to participants' reports of their behaviour at follow-up. Despite a hotter than average English summer (2003), participants did not spend more days in the sun or spend more hours in the sun per day than they had done the previous year. However, they did report changes in their actual use of sunscreen during the study period, somewhat in line with their intentions, and always in the direction of more health-protective behaviour. Across all participants, there was a reported improvement in the consistency of using sunscreen, an increase in the number of times sunscreen was applied during a sunbathing session and an increase in the SPF rating of sunscreen used. The reported improvement in consistency of sunscreen use was apparent for all participants, regardless of experimental group or skin type. However, there was some evidence that the increase in the number of sunscreen applications was reported by white-skinned participants (intervention and control groups). In terms of the increase in SPF rating, the effect was apparent only for white-skinned participants who had been exposed to a regret-based intervention. This group moved from under-protection at baseline (according to current health guidelines) to a more appropriate level of skin protection for their skin type at follow-up – i.e. changing to using a sun-protection factor greater than 15.

It has been argued that cognitive processes may moderate the intention-behaviour relationship, making intentions a stronger predictor of future behaviour – one such process that has been suggested is the anticipation of regret (Abraham & Sheeran, 2003). It is proposed that individuals anticipate regret about not putting their intentions into practice and this potential for experiencing negative affect motivates them to act more consistently with their intentions (Sheeran & Orbell, 1999; Abraham & Sheeran, 2003; Pieters & Zeelenberg, 2003). Abraham & Sheeran (2003) argue that anticipated regret has such an effect because it stabilises intentions over time, making them more resistant to conflicting goals.

Whilst the adjustments in participants' behaviour observed in this experiment in relation to the use of sunscreen are positive, these effects cannot reliably be attributed specifically to the anticipation of regret, since most of the changes were present for participants in control groups who had not been focused on their future feelings of regret as well as those who had. Only the increase in SPF rating was found exclusively for (white-skinned) participants who had been exposed to the intervention and not for the control group. There may be other factors – some of which may be totally unrelated to the study – that could have caused these changes. The data suggests that there was no change in participants' experience of skin cancer during the study period but there was evidence (from responses to items on information seeking in the follow-up questionnaire) that at least half of the sample had obtained information on skin protection in the previous year; there was also some evidence that, amongst white-skinned participants, this information seeking was associated with exposure to a regret-based intervention. However, for the non-white skinned sub-sample, more or less equal percentages of participants from both the control and intervention groups had also sought information on this issue. This makes it difficult to claim that it was the regret-

based intervention that prompted participants' information seeking. One cannot exclude the possibility that the observed effects were produced by other sources of risk information – e.g. national or local health promotion campaigns, media coverage of the issue during the study period. The observed effects may even reflect a self-presentation bias. It may be difficult for an individual to report engaging in behaviour that they know is not recommended. Whilst this possibility may have been present at baseline, the fact that the study focused explicitly on the dangers of sunbathing may have exacerbated this bias at later measurement points.

The results were somewhat inconsistent in relation to the effects on participants' risk perceptions. At the intervention phase, participants indicated an intention to think less about the risks of skin cancer than they had done previously. At follow-up, they also reported that they had given the issue less thought. However, at follow-up participants perceived a single exposure to the sun as being more risky than they had done at baseline. In addition, participants in the 'High Regret' condition rated their own risk of developing skin cancer through sunbathing without protection (relative to their peers' risk) as being higher than they had done at baseline. None of the other risk perception measures showed any change during the study period.

The intervention does not appear to have had any significant effects on undermining positive attitudes towards sunbathing or having a tanned appearance (Jackson & Aiken, 2003). Throughout the study, participants held somewhat mixed views about sunbathing, apparently recognising both the potential risks and the potential gains. Immediately after the intervention, the cohort reported more positive attitudes towards sunbathing and having a tanned appearance, but also reported more positive attitudes towards using sunscreen than they had at baseline. At follow-up, only the change in

attitudes towards sunscreen was sustained and there was some suggestion that this was particularly the case for white-skinned participants. That the long-term change in attitudes towards sunscreen parallels the change in the use of sunscreen is not unexpected, but the current experiment cannot support the conclusion that the anticipation of regret had its effect on behaviour by altering attitudes. Although many models of health behaviour postulate that attitudes and risk perceptions motivate behaviour, it might also be the case that individuals 'adjust' their cognitions so that they are consistent with their current behaviour (Festinger, 1957; Gerrard, Gibbons, Benthin & Hessling, 1996). Other research has demonstrated that attitudinal ambivalence (simultaneously holding positive and negative attitudes towards the same attitude object) weakens the attitude-intention relationship (Conner, Sparks, Povey, James, Shepherd & Armitage, 2002). In the current experiment, we used a rather unsophisticated measure of attitudinal ambivalence, but nonetheless the majority of participants' responses did indicate they had mixed feelings about sunbathing and their responses to the risk perception and attitude measures suggested they appear to hold somewhat conflicting views about the risks and benefits of sunbathing. The fact that both positive and negative attitudes and feelings about sunbathing co-exist might serve to destabilise intentions at the point when actual behavioural choices are being made. A 'single dose' of a regret-based intervention (some months before any opportunity to sunbathe presented itself) may not have kept the possibility of future negative affect sufficiently salient in the longer term to counter the anticipation of more immediate positive affective consequences which individuals associate with spending time in the sun or obtaining a tanned appearance (Caffray & Schneider, 2000; Goldberg, Halpern-Felsher & Millstein, 2002).

Although Experiment 3 addressed some of the limitations of Experiment 1 and previous

research (by including a control group who had not been focused on emotions at all), there were still a number of limitations to the experiment. As discussed above, the timing of the regret-intervention was not ideal. Because of practical concerns about the availability of a student cohort during the late spring/early summer months, the intervention phase took place some four or five months before participants would have had an opportunity to sunbathe in the United Kingdom. This may have resulted in a fading of any positive effects of anticipating regret, rendering the intervention group equal to the control group in terms of the salience of future negative emotions at the point in time where they made choices about their sunbathing behaviour. Attempts were made in Experiment 3 to recruit larger numbers of participants to the study so that a control group could be incorporated into the design. Whilst over one hundred students completed baseline questionnaires and monetary rewards were offered for participation, there was still a sizeable drop-out rate by the follow-up phase, so that comparisons of behavioural change in intervention groups with that in control groups could only be carried out on relatively small numbers of participants. In addition, at baseline, participants' responses about their past sunbathing behaviour suggested that many participants were already taking steps to protect their skin from damage by the sun in terms of limiting the amount of time they spent sunbathing and by applying sunscreen whenever they went out in the sun. For some of the sample, the risks of skin cancer were not perceived as particularly personally relevant.

Nonetheless, participants did demonstrate behavioural change in terms of their sunscreen use and there was some evidence to suggest that some of these changes were stronger for intervention group participants whose skin type meant they were at greater risk of skin cancer. Future studies could investigate the effectiveness of a similar regret-

based intervention in a larger sample whose behaviour in the sun does give some cause for concern, with the intervention phase scheduled closer to the sunbathing season.

General Discussion

Two longitudinal studies have explored whether an intervention based on the anticipation of future regret can change participants' cognitions and behaviour in relation to sunbathing. Experiment 1 found some promising changes immediately after the intervention in participants' behavioural intentions about the use of sunscreen and interest in information seeking. Some of these effects were stronger for participants who had rated their anticipated regret as higher. However, the absence of a comparison group who had not been focused on their emotions somewhat weakens any conclusions that the effects were related to the anticipation of future regret. Furthermore, the experiment failed to demonstrate any long-term effects on actual sunbathing behaviour as reported at the follow-up phase, eight months later. Experiment 3 did successfully manipulate different levels of anticipated regret and included a control group who were not prompted to consider their future regret should their sunbathing behaviour result in a negative outcome. Again, there were promising effects in terms of intended sunscreen use – however, most of these effects were reported by participants in the control group as well as by participants in the intervention group, suggesting that it was not necessarily the anticipation of regret that was motivating the intentions. At follow-up, participants did report changes in their use of sunscreen compared to the previous summer. Again, with the exception of one measure (SPF rating of sunscreen used) most of these changes were reported by participants in the intervention groups and by participants in the control groups. This pattern of results makes it difficult to argue that the reported changes in behaviour can be attributed solely to the anticipation of regret.

The fact that the observed changes in participants' behaviour (whether related to anticipated regret or not) were related only to the use of sunscreen seem to confirm the concerns expressed by some experts. Whilst it is encouraging that people are motivated to take steps to protect their skin from sun damage, many dermatologists are concerned about public perceptions that applying sunscreen is all one needs to do to avoid skin cancer, neglecting other protective action such as limiting one's exposure to the sun itself (Buchanan, 2002). These concerns may not be unfounded. Recent research suggests that using a high-protection sunscreen, even when it is applied regularly and generously, may not be sufficient in itself to prevent the more serious malignant melanoma (The Restoration of Appearance & Function Trust, 2003). In fact, using a sunscreen may indirectly place individuals at greater risk for developing skin cancer since it provides a false sense of security in that individuals may believe they can safely stay out in the sun for longer periods without incurring skin damage. Although some manufacturers have claimed their products can reduce the harmful effects of both UVA and UVB rays, the findings of recent research suggest that they do not afford sufficient protection against UVA rays, which are linked to the more dangerous malignant melanomas as well as to premature ageing. Until more effective sunscreens are developed, the recommended strategy is to either keep out of the sun completely or cover up in it. This may prove more difficult for the public to adopt, given the apparent shorter-term benefits of acquiring a tan and being out in the sun.

None of the previous regret intervention studies that have found effects on actual behaviour (Richard et al., 1996; Abraham & Sheeran, 2003) included a control group who had not focused on their feelings at all. Richard et al.'s participants were either assigned to conditions where they considered their future feelings or their feelings about a sexual risk-taking scenario. Abraham & Sheeran (2003) asked participants to consider

their future regret either before or after they indicated their intentions to engage in exercise. In our research, Experiment 3 did incorporate 'no-affect' control conditions (some participants completed a filler task at the intervention phase; others did not take part in the intervention phase at all) and therefore was able to establish whether change in sunbathing behaviour also occurs during the study period in the absence of an affect-based intervention. Our results suggests that it can but cannot clearly establish why this may be the case.

However, the present experiments are limited by their comparatively small sample sizes and this lack of power may account for the absence of the expected 'Time x Condition' interactions. The studies by Richard et al. (1996) and Abraham & Sheeran (2003) had much larger sample sizes and smaller drop-out rates. In addition, these studies focused on health behaviours (safer sex and engaging in exercise) which are not seasonally dependent and perhaps are perceived as having more universal personal relevance. Therefore, it might be argued that participants in the Richard et al (1996) and Abraham & Sheeran (2003) studies were more likely to have encountered situations that required them to make the targeted behavioural choices before the salience of future regret faded – they could have put their good intentions into practice sooner. As already discussed, the timing of the intervention phase in the current studies may have meant that any effects of focusing on potential future negative affect associated with health-risk behaviour had faded before participants faced real behavioural choices of their own. Future studies might wish to target different behavioural choices, including those in risk domains other than health, to determine whether the hypothesised effects of an affect-based approach can be generalised across a range of decisions.

To date, research findings offer a somewhat confusing picture of the usefulness of

regret-based persuasive communications. The predicted effects appear to have been found in relation to choices about sexual activity and exercise, but the study by Murgraff et al. (1999) failed to find similar effects in relation to risky single-occasion drinking. The current studies also found some of the hypothesised effects but could not attribute these specifically to the anticipation of regret. Murgraff et al. (1999) suggested the absence of any effect on intentions or behaviour in their study may reflect the nature of the targeted health issue itself. In particular, they argue that the risks associated with excessive alcohol intake may be perceived as being smaller than those associated with having unsafe sexual intercourse and the health issue generally may be associated with less fear insofar as the effects of overindulging in alcohol are perceived as being more short-term and reversible. This may also be true of public perceptions of sunbathing and skin cancer.

The benefits of engaging in health-protective behaviour compared to the costs may be more clear-cut for some health-related issues than for others. By exercising, one not only seeks to improve one's health now and in the future, but one can also enjoy the shorter-term benefits of improving one's physical appearance, self-esteem and mood – even though this involves effort in the immediate future, there is also a high probability of fairly immediate physical and affective gains from engaging in the behaviour. In relation to sunbathing, engaging in health-protective behaviour to avoid a longer-term risk of skin cancer (e.g. applying sunscreen, covering up or reducing time in the sun) may affect the immediate gains that are being sought (e.g. a tanned appearance) as well as involving effort. The advantages of protecting one's skin may not so clearly outweigh the disadvantages of protective behaviour for individuals in the shorter-term. Whilst participants did acknowledge there were risks involved in sunbathing without protecting one's skin, they seemed more concerned about the cumulative effects of the

sun than any immediate danger from one episode of over-exposure. With other health risks, such as unsafe sex, a single risky exposure could be enough to have a serious impact on health – in such cases, even if the protective behaviour is effortful, there are clear disadvantages to not acting in a health-conscious manner.

Future research may also address whether individual differences moderate the effectiveness of affect-based interventions. For example, there may be a personality type that is more prone to experience or anticipate regret for whom such an intervention may be more persuasive. Alternatively, it may be the case that people who do take recommended action to protect their health have already considered the regret (or other negative emotions) they would feel in the future if their lifestyle choices resulted in negative outcomes. Existing research does suggest that having a propensity to consider potential future consequences of one's actions might be associated with health-protective behaviour (Strathman, Gleicher, Boninger & Edwards, 1994).

Future researchers might also wish to explore whether it is just regret that might influence behavioural intentions and future behaviour or whether any negative emotion (or indeed positive emotion) or general unhappiness might have similar effects. The literature on regret and disappointment has argued that the two emotions are quite distinct in terms of their antecedents and their effects on cognitions, motivation and future behavioural decision-making (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998). The difference between experiences of other emotions thought to involve counterfactual thinking (e.g. guilt and shame) has also begun to be explored (Niedenthal, Tangney & Gavanski, 1994; Tangney, Miller, Flicer & Barlow, 1996). It may be worthwhile to determine whether anticipating different emotions has different or more powerful effects on behavioural intentions and actual behavioural choice. In

addition, it may be of interest to establish whether and (if so) how interventions based on the anticipation of emotions differ from the more traditional 'fear appeals' used in persuasive communication.

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Appendix 5.1: 'High Regret' scenario (Experiment 1)

"Imagine ...

You enjoy being out in the sun and frequently take holidays abroad, as well as making the most of whatever sunshine there is during the British summer. At least once or twice a year, you have a short break to a particular tropical beach location, which has become your favourite destination over the last 6 years. Here you are guaranteed hot, sunny weather in a relaxing environment, away from the stress and strain of your daily working life.

You are aware that over-exposure to the sun causes your skin to burn, and have read that this could increase the risk that you might some day develop skin cancer. Despite what you have read about the risks and the advice of your friends and family, every year you spend most of your holidays and your free time at home lying on the beach, sunbathing. You want to make the most of every opportunity to get a tan. You decide not to use a sunscreen lotion, as you believe this will slow down the development of your tan. Similarly, you don't cover up your body and face with clothes or a hat, nor do you sit in the shade to protect your skin, even in the midday sun. You are prepared to take this risk to get a tan, as you believe it makes you look more healthy, attractive and leaves you feeling good.

This year, after you got back home from your holiday, you noticed a change in a mole on your forearm – it appears to have got bigger, changed in appearance, feels sore and occasionally oozes. Eventually, you decide to go to see your doctor who refers you to a skin specialist at the local hospital.

After examining your arm, the skin specialist diagnoses that you have a malignant melanoma. She explains that this is a relatively rare but dangerous form of skin cancer, which can spread rapidly to other parts of the body. She recommends that you need to have surgery to remove the melanoma and surrounding tissue, and that, if further tests reveal that the disease has spread, you will need to undergo a course of chemotherapy or radiotherapy to halt the progress of the disease. This treatment has some unpleasant side effects, which might include the loss of your hair, fatigue, diarrhoea, nausea and vomiting. She mentions that the success of treatment depends on how far the cancer has spread. You learn that on average about 4000 people are diagnosed with malignant melanoma every year in the UK and about 1500 people die as a result of the condition each year.

Take a few minutes to consider how you might be feeling and thinking if you were currently in this situation."

Appendix 5.2: 'Low Regret' scenario (Experiment 1)

"Imagine ...

You work as a marine biologist, and have travelled to a number of tropical locations all over the world in the last 6 years to do your research. You are passionate about your job and have been involved in some very worthwhile projects, which have added greatly to our understanding of the behaviour of marine wildlife or have helped in conserving the marine environment.

You are aware that over-exposure to the sun causes your skin to burn, and that this could increase the risk that you might some day develop skin cancer. Because of this, you try to be as careful as you can to prevent sunburn by applying a sunscreen lotion, covering up your skin and face, and moving into the shade, particularly in the midday sun. However, over the years you have visited some locations where you have not always been able to protect yourself from the sun because of the environment in which you are working. You are frequently in the water or on a boat, and when something interesting is happening, you do not always have the opportunity to regularly re-apply sunscreen or cover up your skin. In some locations, it has also been suggested that the increased use of sunscreen lotions by tourists on the beaches has caused significant damage to the marine life in the area. In an attempt to protect the wildlife, you compromise by not applying sunscreen as liberally or as often as you perhaps should.

Recently, after you returned home for a break, you noticed a change in a mole on your forearm – it appears to have got bigger, changed in appearance, feels sore and occasionally oozes. Eventually, you decide to go to see your doctor who refers you to a skin specialist at the local hospital.

After examining your arm, the skin specialist diagnoses that you have a malignant melanoma. She explains that this is a relatively rare but dangerous form of skin cancer, which can spread rapidly to other parts of the body. She recommends that you need to have surgery to remove the melanoma and that, if further tests reveal that the disease has spread, you will need to undergo a course of chemotherapy or radiotherapy to halt the progress of the disease. This treatment has some unpleasant side effects, which might include the loss of your hair, fatigue, diarrhoea, nausea and vomiting. She mentions that the success of treatment depends on how far the cancer has spread. You learn that on average about 4000 people are diagnosed with malignant melanoma every year in the UK and about 1500 people die as a result of the condition each year.

Take a few minutes to consider how you might be feeling and thinking if you were currently in this situation."

Appendix 5.3: 'High seriousness/High Responsibility' (HSHR) sunbathing scenario (Experiment 2). Also used in Experiment 3 ('High Regret' condition)

"Imagine ...

For the last few years, you have been able to take a holiday abroad every year. Once or twice a year you head off to a Mediterranean or tropical beach location, where you are guaranteed hot, sunny weather. In addition, you like to spend as much time outdoors as possible during the British summer.

You are aware that over-exposure to the sun causes your skin to burn and you have read that this can increase the risk that someone might develop skin cancer, as well as causing premature ageing. Despite what you have read about the risks and the advice of your friends and family, every year you spend as much of your holidays and free time at home as possible lying out in the sun. You choose not to use a sunscreen lotion as you believe that this will slow down the development of your tan. For similar reasons, you don't cover up your body or face with clothes or a hat, nor do you sit in the shade to protect your skin, even in the midday sun.

Even though you have ended up quite badly sunburnt on occasions, you want to make the most of every opportunity to get a tan because you believe it makes you look more healthy, attractive and leaves you feeling good. You feel the real chances of you getting skin cancer are too small to worry about.

This year, you have noticed a change in a mole on the side of your face. It appears to have got bigger, changed in appearance, feels sore and occasionally oozes. At first, you ignore this, thinking it can be nothing serious, but the symptoms do not disappear with time. After some delay, you eventually decide to go to see your doctor, who refers you straight away to a specialist skin clinic at the local hospital.

After examining you, the skin specialist decides to remove the mole and some of the surrounding tissue, leaving a small scar on your face.

Subsequent tests on the tissue reveal that it is a malignant melanoma which has grown quite deeply, beyond the top layer of your skin. Your specialist explains that this is a relatively rare but dangerous form of skin cancer, which can spread rapidly to other parts of the body if not detected early. She recommends that you need to undergo some more tests, and this will include taking samples of tissue (a biopsy) from the lymph nodes in your neck. These will be examined to see whether cancer cells are present and, if so, the nodes in your neck will need to be removed completely. This operation can cause some pain and discomfort, as well as further scarring. In addition, you need to have some scans and further tests to determine if the cancer has spread to other parts of your body. You may need to undergo a course of immunotherapy, chemotherapy or radiotherapy.

The specialist mentions that the success of the treatment will depend on how far the cancer has spread. You learn that, in advanced cases, the disease can be fatal and even if the melanoma can be treated successfully on this occasion, there is still a risk that it could reoccur in future".

Appendix 5.4: 'High seriousness/Low Responsibility' (HSLR) sunbathing scenario (Experiment 2)

"Imagine ...

For the last few years, you have been able to take a holiday abroad every year. Once or twice a year you head off to a Mediterranean or tropical beach location, where you are guaranteed hot, sunny weather. In addition, you like to spend as much time outdoors as possible during the British summer.

You are aware that over-exposure to the sun causes your skin to burn and you have read that this can increase the risk that someone might develop skin cancer, as well as causing premature ageing. Because of this, you are always very careful when you are out in the sun and try to follow the recommended guidelines to protect your skin from damage. If you are out on a hot day, you don't spend long periods of time lying or sitting in the sun and you keep to the shade during the mid-day sun. In addition, you cover up your skin with clothes, wear a hat and sunglasses, and regularly apply a sunscreen with at least SPF15 protection.

It is very rare for you to get sunburnt and you almost never have a tan, even though many of your friends do as they believe it makes them look more healthy and attractive. For you, it is more important not to damage your skin and your health.

This year, you have noticed a change in a mole on the side of your face. It appears to have got bigger, changed in appearance, feels sore and occasionally oozes. At first you ignore this, thinking it can be nothing serious, but the symptoms do not disappear with time. After some delay, you eventually decide to go to see your doctor, who refers you straight away to a specialist skin clinic at the local hospital.

After examining you, the specialist tells you that you appear to have a rare genetic condition (called Familial Dysplastic Naevus Syndrome), making you more susceptible to skin cancer, particularly malignant melanomas. Neither you nor your family have been aware of this before now. Because of your increased risk for skin cancer and the suspicious appearance of the mole, the specialist decides to remove the mole and some of the surrounding tissue, leaving a small scar on your face.

Subsequent tests on the tissue reveal that it is a malignant melanoma which has grown quite deeply, beyond the top layer of your skin. Your specialist explains that this is a relatively rare but dangerous form of skin cancer, which can spread rapidly to other parts of the body if not detected early. She recommends that you need to undergo some more tests, and this will include taking samples of tissue (a biopsy) from the lymph nodes in your neck. These will be examined to see whether cancer cells are present and, if so, the nodes in your neck will need to be removed completely. This operation can cause some pain and discomfort, as well as further scarring. In addition, you need to have some scans and further tests to determine if the cancer has spread to other parts of your body. You may need to undergo a course of immunotherapy, chemotherapy or radiotherapy. The specialist mentions that the success of the treatment will depend on how far the cancer has spread. You learn that, in advanced cases, the disease can be fatal and, even if the melanoma can be treated successfully on this occasion, there is still a risk that it could reoccur in future."

Appendix 5.5: 'Low seriousness/High Responsibility' (LSHR) sunbathing scenario (Experiment 2)

"Imagine ...

For the last few years, you have been able to take a holiday abroad every year. Once or twice a year you head off to a Mediterranean or tropical beach location, where you are guaranteed hot, sunny weather. In addition, you like to spend as much time outdoors as possible during the British summer.

You are aware that over-exposure to the sun causes your skin to burn and you have read that this can increase the risk that someone might develop skin cancer, as well as causing premature ageing. Despite what you have read about the risks and the advice of your friends and family, every year you spend as much of your holidays and free time at home as possible lying out in the sun. You choose not to use a sunscreen lotion as you believe that this will slow down the development of your tan. For similar reasons, you don't cover up your body or face with clothes or a hat, nor do you sit in the shade to protect your skin, even in the midday sun.

Even though you have ended up quite badly sunburnt on occasions, you want to make the most of every opportunity to get a tan because you believe it makes you look more healthy, attractive and leaves you feeling good. You feel the real chances of you getting skin cancer are too small to worry about.

This year, you have noticed a change in a mole on the side of your face. It appears to have got bigger, changed in appearance, feels sore and occasionally oozes. At first, you ignore this, thinking it can be nothing serious, but the symptoms do not disappear with time. After some delay, you eventually decide to go to see your doctor, who refers you straight away to a specialist skin clinic at the local hospital.

After examining you, the skin specialist decides to remove the mole and some of the surrounding tissue, leaving a small scar on your face.

Subsequent tests on the tissue reveal that it was a type of skin cancer but not in fact the more dangerous malignant melanoma. It was a basal cell carcinoma which had not grown deeply, beyond the very top layer of your skin. Your specialist explains that this is a relatively common and easily treatable form of skin cancer, which has not spread to other parts of your body and is not life-threatening.

Now that the cancer cells have been removed from your skin, you do not need to return to the hospital for further tests, treatment or check ups. The specialist does, however, mention that you should be more careful in the sun, to avoid similar or more serious problems in future. She also suggests that you should monitor your skin regularly, reporting any changes to your doctor straight away."

Appendix 5.6: 'Low seriousness/Low Responsibility' (LSLR) sunbathing scenario (Experiment 2). Also used in Experiment 3 ('Low Regret' condition)

"Imagine ...

For the last few years, you have been able to take a holiday abroad every year. Once or twice a year you head off to a Mediterranean or tropical beach location, where you are guaranteed hot, sunny weather. In addition, you like to spend as much time outdoors as possible during the British summer.

You are aware that over-exposure to the sun causes your skin to burn and you have read that this can increase the risk that someone might develop skin cancer, as well as causing premature ageing. Because of this, you are always very careful when you are out in the sun and try to follow the recommended guidelines to protect your skin from damage. If you are out on a hot day, you don't spend long periods of time lying or sitting in the sun and you keep to the shade during the mid-day sun. In addition, you cover your skin with clothes, wear a hat and sunglasses, and regularly apply a sunscreen with at least SPF15 protection.

It is very rare for you to get sunburnt and you almost never have a tan, even though many of your friends do as they believe it makes them look more healthy and attractive. For you, it is more important not to damage your skin and your health.

This year, you have noticed a change in a mole on the side of your face. It appears to have got bigger, changed in appearance, feels sore and occasionally oozes. At first you ignore this, thinking it can be nothing serious, but the symptoms do not disappear with time. After some delay, you eventually decide to go to see your doctor, who refers you straight away to a specialist skin clinic at the local hospital.

After examining you, the specialist tells you that you appear to have a rare genetic condition (called Familial Dysplastic Naevus Syndrome), making you more susceptible to skin cancer, particularly malignant melanomas. Neither you nor your family have been aware of this before now. Because of your increased risk for skin cancer and the suspicious appearance of the mole, the specialist decides to remove the mole and some of the surrounding tissue, leaving a small scar on your face.

Subsequent tests on the tissue reveal that it was a type of skin cancer but not in fact the more dangerous malignant melanoma. It was a basal cell carcinoma which had not grown deeply, beyond the very top layer of your skin. Your specialist explains that this is a relatively common and easily treatable form of skin cancer, which has not spread to other parts of your body and is not life-threatening.

Now that the cancer cells have been removed from your skin, you do not need any further tests or treatment. However, your specialist recommends that, because of your genetic predisposition for skin cancer, you should have annual routine check-ups at her clinic. In addition, you should continue to be careful in the sun, and monitor your own skin regularly, reporting any changes to your doctor straight away."

Chapter 6

Focusing on what might happen and how it could feel: Can the anticipation of regret change students' computing-related choices?

Focusing on what might happen and how it could feel:

Can the anticipation of regret change students' computing-related choices?

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The authors acknowledge the assistance of Professor Lorenzo Strigini and Dr Andrey Povyakalo, Centre for Software Reliability, City University, London, with the technical aspects of the study materials.

Research funded by Engineering & Physical Sciences Research Council (EPSRC) Research Studentship Award Number 317441 and the Dependability Interdisciplinary Research Collaboration (DIRC) Project. Correspondence concerning this article should be addressed to Chris Wright, Department of Psychology, City University, Northampton Square, London, EC1V 0HB, United Kingdom. Telephone: +44 (0)20 7040 8526, Fax: +44 (0)20 7040 8581. Electronic mail may be sent to: C.A.Wright@city.ac.uk or P.Ayton@city.ac.uk

Abstract

A longitudinal study tested whether a regret-based intervention could persuade computer users to make more security-conscious choices in relation to backing up their work and internet security. Computing science students reported their attitudes and behaviour in relation to the two issues at three timepoints (baseline, intervention and follow-up phases) over a 12-week period. In the intervention phase, students imagined themselves in a scenario where, had they chosen to act differently, they could have avoided a negative outcome. They then considered how regretful they would feel in that situation. The results showed that, for backing up, students showed more positive attitudes and data-protective behavioural choices immediately after the intervention and at follow-up, compared to their baseline measures. The second scenario was less effective at changing participants' attitudes and behaviour in relation to disabling active scripting. Possible reasons for the difference in effectiveness of the intervention for the two targeted issues are discussed.

Keywords: Regret, choice, decision-making, computing, backing-up, internet security

Introduction

In recent years, it has been recognised that, when assessing the reliability of computer systems, rather than focusing entirely on technical issues, one should also consider human factors – that is, the people that use the system. Weirich & Sasse (2001) have argued that human behaviour plays a role in many computer security failures and that research should explore different methods of persuading system users that it is worth their while to invest the time and effort required to act in accordance with security policies. Having a security policy is not, in itself, sufficient to guarantee system security. In relation to password mechanisms, for example, there is evidence to suggest that a large number of computer system users "consistently behave in a manner that undermines the security of the systems they are using" (Weirich & Sasse, 2001, p. 137), for example by sharing passwords, writing passwords down or choosing cryptographically weak passwords. This behaviour need not necessarily result from a lack of education or awareness about the security risk or the security policy. It appears that, unless they are sufficiently motivated, system users will cut corners to avoid the extra effort that compliance with security policies requires – particularly if the recommended practices are perceived as obstacles that stop them getting on with their job. Weirich & Sasse (2001) also note that conventional fear appeals are unlikely to be effective in persuading all system users to behave in a security-conscious way, since many individuals have belief systems that render them 'immune' to this type of communication. For example, many users did not expect that they would personally suffer any negative consequences as a result of their non-compliance with password policy and viewed not sharing passwords as a sign of not being a 'team player', not trusting your colleagues or being a 'nerd'. However, interviews with system users also revealed that some individuals did make the effort to follow policies most of the time

and Weirich & Sasse (2001) suggest that the attitudes and beliefs expressed by these individuals might guide the design of effective persuasion messages. For example, some of the users who were compliant with password policy said that they did this in order to avoid personal embarrassment or being blamed by others. If there was a breach of system security, they felt it would be hard to justify behaviour that was contrary to the established security policy. It therefore seems that, at least in part, these compliant system users were considering the emotional consequences of non-compliance as part of their decision-making.

Psychological research and theory has begun to explore the ways in which emotions can influence human judgment and decision-making (Schwarz, 2000). Rather than disrupting cognitive processes as was once believed, neurologist Antonio Damasio has suggested that emotions may actually be essential for effective decision-making. Patients who have sustained damage to areas of the brain associated with emotional experience appear unable to make sound decisions – and in some cases make any decision at all – even thought they show no deterioration in IQ or cognitive function (Damasio, 2003). According to Damasio, our memory for previous experiences includes the emotions associated with the events and these 'somatic markers' may guide our future decision-making, either consciously or sub-consciously – if an event has a negative affective tag, the individual is likely to take steps to avoid similar events in the future. Options associated in our memory with negative affect are automatically excluded from the choice set. Like Damasio's 'Somatic Marker Hypothesis' (Damasio, 1994; 2003), dual-process theories (Petty, Cacioppo & Goldman, 1981; Chaiken, 1980; Epstein, Pacini, Denes-Raj & Heier, 1996) have also argued that there are two parallel routes of thinking and persuasion – one route is analytic and reason-based while the other route is more experiential and emotion-based.

Affect has been studied by social psychologists who are interested in the phenomenology of our emotional experiences and by decision-making researchers who are interested in the impact of emotions on judgment and choice. A body of literature now exists relating to two emotions which are thought to be particularly relevant to decision-making – regret and disappointment. Both are negative emotions that are experienced when decisions turn out badly. In addition, both are cognitively-based, in that they involve the mental comparison of an obtained outcome with alternative (or counterfactual) outcomes that the individual knows or imagines might otherwise have happened. It is this process of counterfactual thinking (Kahneman & Miller, 1986; Boninger, Gleicher & Strathman, 1994) that leads to the emotional experience – if the obtained outcome falls short of the alternative outcome, we feel regret or disappointment; conversely, if the alternative outcome falls short of the obtained outcome, we experience positive emotions, such as rejoicing. Despite sharing some common features, it has also been argued that regret and disappointment are qualitatively different and have distinct effects on choice and behaviour (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998; Zeelenberg & Pieters, 1999; van Dijk & Zeelenberg, 2002).

Regret is experienced when the decision-maker compares an obtained outcome with what they know would have happened (or might have happened) if they had chosen differently. Thus, the experience of regret is associated with a sense of self-blame about having made the wrong decision. The decision maker feels that, 'if only' they had chosen another option, they could have avoided the comparatively negative outcome. As such, they may feel responsible for their situation. Recent theory argues there are two "core components" of regret in decision making – regret about a poor quality or unjustifiable decision and regret about obtaining a bad outcome (Connolly &

Zeelenberg, 2002) – both of which may contribute to the overall feeling of regret experienced. In contrast, disappointment is experienced when the decision-maker compares an obtained outcome with what they know or imagine could have happened and they realise they would have been better off, had another state of the world existed. Disappointment is therefore the emotion associated with a certain lack of control over events, while regret is more closely related to individual choice.

As well as having different antecedents, research suggests that the two emotions have very different consequences (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998; Zeelenberg & Pieters, 1999). Experiencing regret appears to have a motivating effect on the decision maker. They may feel that they made a mistake and want to have a second chance to improve on their performance. Thus, after feeling (or imagining) regret, the individual is driven to improve their decision making in future, perhaps by seeking more information about the decision problem and/or choosing a different option. In contrast, disappointment tends to be associated with distancing oneself from the situation and/or avoiding similar situations in future – it therefore has a more demotivating effect.

It is not only experienced emotions that can influence decision making but also anticipated emotions. Regret Theory (Loomes & Sugden, 1982; Bell, 1982) argues that decision makers experience emotions (e.g. regret) as a consequence of their choices and that they can also anticipate the possible emotional consequences of decisions before they make them, based on an assessment of the perceived likely outcomes. According to Regret Theory, when choosing between available options, an individual takes anticipated future emotions into account, typically selecting the option they believe will be associated with the least post-decisional negative affect.

A body of research appears to support this view in relation to choices made by participants in gambling and negotiation experiments (Zeelenberg, 1999) and by lottery players in real life (Zeelenberg & Pieters, 2004). Another body of research suggests that including anticipated regret in models based on the Theory of Planned Behaviour can improve the prediction of a number of health-related self-protective behaviours (Richard, van der Pligt & de Vries, 1995; Richard, van der Pligt & de Vries, 1996a; Buunk, Bakker, Siero, van den Eijnden & Yzer, 1998; Steptoe, Doherty, Kerry, Rink & Hilton, 2000; Abraham & Sheeran, in press). Steptoe et al (2000) conclude that "anticipated negative affect may provide an important stimulus to initiate behaviour change" and Abraham & Sheeran (2003) suggest that anticipated regret may be an important factor in stabilising intentions over time, increasing the likelihood that an individual's good intentions are translated into actual behavioural change.

In the light of the above theory and research, it appears that regret could be a candidate for an emotion-based intervention aimed at improving behavioural choice. Indeed, there is already some evidence to suggest that focusing individuals on the regret they might feel in the future can influence their subsequent thoughts and actions. Research published in this area has tended to focus primarily on health or safety issues and most published studies report promising effects. For example, Parker, Stradling & Manstead (1996) found that a regret-based video changed drivers' attitudes towards exceeding the speed limit, although the intervention had no apparent effect on drivers' behavioural intentions in relation to speeding in the future. Nonetheless, focusing on future emotions did appear to bring about a shift in thinking whereby drivers acknowledged that they might need to adjust their behaviour – according to one model, this change in thinking is the first step towards behavioural change (Prochaska & DiClemente, 1982). Other studies have demonstrated that focusing individuals on the future emotional

consequences of their actions can influence what they plan to do in the future, with participants expressing intentions to move towards more health-protective behaviour in relation to safer sex (Richard, van der Pligt & de Vries, 1996b), engaging in exercise (Abraham & Sheeran, 2003) and use of sunscreen (Wright & Ayton, 2004). These studies have also found changes in participants' reported behaviour at follow up (although one study reported by Wright & Ayton (2004) also found changes in the use of sunscreen amongst their control group participants who had not considered their future regret). However, one further published study failed to find any effect of a regret-based intervention on participants' behavioural intentions or actual behaviour in relation to binge-drinking (Murgraff, McDermott, White & Phillips, 1999), calling into question whether emotion-based persuasion strategies are necessarily suitable for all risky choices.

Overview of the present study

The current experiment aims to explore whether a regret-based intervention can be used to influence risky choice in domains other than health and safety – specifically as a means of persuading computer users to behave in security-conscious ways. If a this approach to persuasion is effective, it is hypothesised that participants in the experiment will report more positive attitudes towards the targeted behavioural choices and report more security-conscious behaviour after exposure to a regret-based intervention than they did before it – and the effects should be strongest in participants who anticipate higher levels of regret when they consider the future emotional consequences of choosing not to comply with recommended practice. The experiment focused on two specific computer-related issues - backing up work and internet security (through disabling active scripting).

Method

Design

The experiment had a repeated measures design with data collected from participants at three timepoints over a 12-week period. Participants completed a baseline questionnaire to measure their pre-intervention attitudes, risk perceptions and behaviour in relation to the two targeted computing issues - backing up and disabling active scripting. Six weeks later, participants took part in the intervention phase, where (for each of the targeted issues) they imagined themselves in a scenario where their computing-related choice had lead to a negative outcome and then rated how regretful they anticipated they would feel in that situation. The intervention task was immediately followed by a remeasure of participants' attitudes, risk perceptions and behavioural intentions in relation to backing up and internet security. Participants were followed-up five weeks after the intervention phase and completed a final questionnaire, which measured their attitudes, risk perceptions and actual behaviour over the previous five weeks to determine whether the intervention had a longer-term effect on behaviour and cognition.

Participants

Participants were recruited from postgraduate students within the Computing Science Department at the University of Newcastle and from undergraduate and postgraduate students within the Computer Science Department at City University, London. Students were told that the study was "looking at how different types of information influence people's attitudes to computer security". Participation in the study was voluntary. One hundred and twelve students completed the baseline questionnaire; seventy-two students

from the original cohort (64% participants) took part in the intervention phase; sixty-nine participants completed the follow-up questionnaire. Fifty-two students completed all three phases of the experiment (46% of the original cohort). An additional four participants served as 'controls' who had not taken part in the intervention phase, but whose baseline and follow-up ratings could be compared to determine whether there was evidence of attitude and behavioural change in the absence of a regret-based intervention. The final sample (N = 56) were predominantly male (73%), postgraduate students from University of Newcastle (85%), aged between 20 and 47 years (M = 25 years, SD = 4.118). Students received a cash payment (£5 per timepoint) or a small confectionery gift for taking part. At the end of the follow-up task, participants were fully debriefed about the aims and hypotheses of the experiment.

Procedure and materials

At baseline, participants completed a questionnaire booklet, which contained a number of items about their current behaviour, beliefs and attitudes about the two computer security issues. The questionnaire took about 10 minutes to complete and was divided into two parts - one about backing up and the other about disabling active scripting. The order of presentation of the two sections was counterbalanced across participants. Participants were asked to attempt both sections in the order they were presented, answering the items as fully and honestly as possible. Each section began with a definition of the targeted behaviour. The items included in each section are listed below:

Backing up. The first three items explored participants' backing-up behaviour over the previous six-week period:

(a) Regularity of backing up - "How regularly have you made a complete back-up of all your files?" Participants were asked to indicate the number of back-ups they had made per day/per week/per month or per year, whichever was most appropriate. At this point, they were also asked to indicate if they did not know what backing up meant before they read the questionnaire.

(b) Consistency of backing up - "How consistently have you backed up all new or updated documents and records on the day you have created or updated them?" Participants indicated their response on a 7-point rating scale (1 = I never do this; 7 = I always do this).

(c) Back-up copies - "On which, if any, of the following do you store your back-up copy or copies of your work?" Participants were asked to tick the box next to the response option or options that applied to themselves ('floppy disk', 'CD-ROM', 'zip disk', 'another computer hard drive', 'network space', 'other(please list)' or 'none of these'). This item was used to assess the media that participants used for their backing up, as well as the total number of back-up copies they made.

Three items asked participants about their attitudes towards and beliefs about backing up their work:

(d) Perceived advantages - "To what extent are there advantages for you in backing up your work?" Participants indicated their response on a 7-point rating scale (1 = Not at all advantageous; 7 = Extremely advantageous).

(e) Perceived disadvantages - "To what extent are there disadvantages for you in backing up your work?" Participants indicated their response on a 7-point rating scale (1 = Not at all disadvantageous; 7 = Extremely disadvantageous).

(f) Beliefs about the best strategy - "What do you believe is the best strategy with regard to backing up your own work? As with item (a) above, participants were asked to indicate the number of back-ups they thought it was advisable to make per day/per week/per month or per year, whichever they thought was most appropriate.

Four items then measured participants' risk perceptions in relation to backing up and how much they had considered the risks of not backing up:

(g) Verbal risk perception - "In general, how risky do you think it would be for you not to follow this strategy?" Participants responded using a 7-point rating scale (1 = Not at all risky; 7 = Extremely risky).

(h) Conditional risk perception - "If you do not follow this strategy for backing up your work, how likely do you think it is that, during your course, you will lose important documents?" Participants were asked to indicate their response by drawing a short, vertical line along a 10 cm visual analogue scale, anchored at 0% (No chance of this happening) and 100% (It is certain to happen).

(i) Frequency risk perception - "Imagine 100 students who choose not to back up their work. How many of these 100 students do you think will lose important documents during their course?" Participants responded by indicating a number of students out of 100.

(j) Thinking about the risk - "In the past, how much have you thought about the risks of not backing up your work?" Participants responded on a 7-point rating scale (1 = Not at all; 7 = Very much so).

Finally participants were asked to indicate their own personal experience or other people's experience of the issue:

(k) "To what extent have you ever had any experience either of personally losing work or hearing about someone who has lost work because they had not backed up their work?" Participants were asked to tick as many boxes as applied to themselves ('It has happened to me', 'It has happened to a partner or family member', It has happened to a friend or colleague of mine', 'It has happened to an acquaintance of mine', 'I have read or heard about it in the media' or 'I have never heard of this happening'). This item was used to assess their closest experience of losing work as well as the total number of such 'experiences' they were aware of.

Internet security. One item asked about participants' previous behaviour in relation to disabling active scripting:

(a) Consistency of disabling active scripting - "How consistently have you decided before starting to use the Internet to disable active scripting?" Participants circled one of three options that best described their current behaviour (1 = I never disable active scripting; 2 = I sometimes disable active scripting; 3 = I always disable active scripting). At this point, participants were also asked to indicate if they did not know what disabling or enabling active scripting meant before they read the definition in the questionnaire.

Three items asked participants about their attitudes towards and beliefs about disabling active scripting before using the Internet (similarly worded to those used in the backing up section):

(b) Perceived advantages - "To what extent are there advantages for you in deciding to disable active scripting before you start to use the Internet?" Participants indicated their response on a 7-point rating scale (1 = Not at all advantageous; 7 = Extremely advantageous).

(c) Perceived disadvantages - "To what extent are there disadvantages for you in deciding to disable active scripting before you start to use the Internet?" Participants indicated their response on a 7-point rating scale (1 = Not at all disadvantageous; 7 = Extremely disadvantageous).

(d) Beliefs about the best strategy - "What do you believe is the best strategy with regard to Internet security and deciding whether to disable active scripting? Participants were asked to indicate their response by circling one of three options (1 = Never disable active scripting; 2 = Sometimes disable active scripting; 3 = Always disable active scripting).

Four items then explored participants' risk perceptions and how much they had considered the risks of not disabling active scripting before using the Internet:

(e) Verbal risk perception - "In general, how risky do you think it would be for you not to worry about scripting at all before using the Internet?" Participants indicated their response on a 7-point rating scale (1 = Not at all risky; 7 = Extremely risky).

(f) Conditional risk perception - "If you were to always keep active scripting enabled when using the Internet, how likely do you think it is that you would pick up an Internet worm that corrupts some files or erases the whole hard drive on your computer?" Participants indicated their response by drawing a short, vertical line along a 10 cm visual analogue scale, anchored at 0% (No chance of this happening) and 100% (It is certain to happen).

(g) Frequency risk perception - "Imagine 100 students who choose to always keep active scripting enabled when they are using the Internet. How many of these 100 students do you think will pick up an Internet worm that corrupts some files or erases the whole hard drive on their computer?" Participants responded by indicating the number of students out of 100.

(h) Thinking about the risk - "In the past, how much have you thought about the risks of always keeping active scripting enabled when you are using the Internet?" Participants responded on a 7-point rating scale (1 = Not at all; 7 = Very much so).

One final item asked participants about their own personal experience or other people's experience of the issue:

(i) "To what extent have you ever had any personal experience or heard about someone else who picked up an Internet worm that corrupted files or erased the whole of their hard drive, because they kept active scripting enabled while using the Internet?" Participants were asked to tick as many boxes as applied to themselves ('It has happened to me', 'It has happened to a partner or family member', It has happened to a friend or colleague of mine', 'It has happened to an acquaintance of mine', 'I have

read or heard about it in the media' or 'I have never heard of this happening'). This item was used to assess their closest experience of computer damage or loss of files caused by an Internet worm, as well as the total number of such 'experiences' they were aware of.

At the intervention phase (6 weeks later), participants were given a second questionnaire-based task, which took about 15-20 minutes in total to complete. The questionnaire booklet was again divided into two parts - one focusing on backing up and the other focusing on disabling active scripting. The order of presentation of the two parts was counterbalanced across participants.

Each section began by asking participants to read and imagine themselves in scenario, which described an individual who chose a certain course of action and who then experienced a negative outcome which they could have avoided, had they chosen a different course of action. The scenarios were quite detailed and about one page in length. Full versions of the scenarios used during the intervention phase appear as appendices to this paper, but are summarised below:

(1) Backing-up scenario: Participants imagined themselves as a researcher in a computer research centre who did not back up their work as regularly as their boss recommended, because of the time and effort required. They keep all information and scripts relating to their research only on their new, reliable laptop. One morning, they discover that their laptop has been stolen and, because they had not backed up recently, they have lost all the work they have done over the last 2 months. This results in a delay in being able to publish their research findings and increases the

probability that researchers in competing research centres will publish similar work first and thus reap all the rewards.

(2) Internet security scenario: Participants imagined themselves as an individual who regularly shops via the internet at websites which required active scripting to be enabled on their PC's browser. They also receive e-mail messages with live HTML content. However, the individual always keeps active scripting enabled. One day, they discover that an Internet worm has destroyed the content of their PC hard drive. This was downloaded from the Web by a JavaScript launched from the HTML content of an incoming e-mail message - it could have been prevented if active scripting had been disabled. As a result, they have lost all their software settings, recent documents and the freeware distributions they had downloaded. They will need to completely re-install all the software to their computer, which will take several days, if not weeks to complete.

After reading and imagining themselves in the scenario, participants were asked to take a moment to consider how they might be feeling and thinking if they found themselves in the situation described. They were then prompted to turn over the page and complete a series of 7-point rating scales, which measured their response to the scenario:

(a) Anticipated regret - "How much do you think you would now be regretting your decision not to … [back up your work as your boss recommended or disable active scripting when you were using the Internet] … and the way things have now turned out?" (1 = Not at all regretful; 7 = Extremely regretful).

(b) Decision justifiability - "To what extent do you think you could justify your decision not to … [back up your work as your boss recommended or disable active scripting when you were using the Internet]?" (1 = Not at all justifiable; 7 = Totally justifiable).

(c) Outcome seriousness - "How serious do you think the outcome is?" (1 = Not at all serious; 7 = Extremely serious).

(d) Self-blame - "How much do you think you are to blame for the situation you now find yourself in?" (1 = Not at all to blame; 7 = Completely to blame).

The 'regret-intervention' thus consisted of imagining oneself in a given scenario with a negative outcome and then focusing on the amount of regret one would be feeling in that situation. After completing this part of the task, participants responded to the same set of questions they had completed at baseline, which measured their attitudes, risk perceptions and behavioural intentions in relation to the specific computing issue. The behavioural items were slightly reworded from baseline so that they asked how participants planned to behave over the coming five weeks (that is, "How regularly will you make a complete back up of all your files?", "How consistently will you back up all new or updated documents and records on the day you create or update them?", "On which, if any, of the following will you store your back-up copy or copies of your work?" and "How consistently will you decide before starting to use the Internet to disable active scripting?"). For each section, the 'Thinking about the risk' item was also reworded to read "How much will you think about the risks of … [not backing up your work or always keeping active scripting enabled when you are using the Internet]?" Where appropriate, the response scales were also reworded to reflect a future intention

perspective. Participants were again asked about their experience of the two negative outcomes and also indicated whether they had sought or been given any information about each issue during the previous six weeks (Yes/No response).

At the follow-up phase (five weeks later), participants completed a questionnaire booklet similar to the one they had completed at baseline. The questionnaire was again divided into two sections - one focusing on backing up and the other focusing on Internet security. The order of presentation of the two sections was counterbalanced across participants. In each section, participants responded to items that remeasured their attitudes, risk perceptions and actual behaviour over the five weeks since the intervention. The items were worded in the same way as those used at the baseline phase. Finally, participants were asked about their experience with the negative outcomes relevant to the computing issues and also indicated whether or not they had sought or been given any information about the targeted issues in the previous five weeks, apart from in the questionnaires they had completed for the study.

At all timepoints, the questionnaires were completed anonymously. Participants were asked to complete a 'personal identifier code' which would be unique to themselves and to indicate their age and gender on each questionnaire, so that their responses at different timepoints during the experimental period could be matched up for comparison.

Results

The immediate effects of the intervention on cognitions and behavioural intentions and the longer-term effects on cognitions and actual behaviour were explored, using the data

collected from the sample of 52 students who had completed all three phases of the experiment. In addition, analyses were conducted for the 4 students who comprised a quasi 'control group' for the longer-term effects of the intervention, having taken part in the baseline and follow-up phases, but not being exposed to a regret-based intervention.

Immediate effects of the intervention on cognitions and behavioural intentions (N = 52)

Participants' responses at baseline and post-intervention were compared, to determine whether exposure to the regret-based intervention had any immediate effect on the way they thought about the two computing issues and whether they intended to adjust their backing up and internet security behaviours in the future.

Baseline behaviour and cognitions relating to backing-up. Table 6.1 shows participants' mean ratings for the backing-up items at baseline. All participants knew what backing-up meant. Prior to the experiment, they had on average made back-up copies of their files on three to four occasions per month, although the regularity of backing-up varied widely across participants (range = 0 to 90 per month). Overall, they reported moderate consistency in backing up new documents on the day they were created or updated. On average, participants backed up their work onto two separate media (range = 0 to 4). The most popular media for backing up were a second PC hard drive (63%), CD-ROM (58% participants), floppy disk (29%), network space (29%), 'other' media (13%) and Zip disk (11%).

They thought the 'best strategy' for backing-up their work would be to back-up on thirteen occasions per month (range = 0.33 to 60 per month) and they viewed not following this strategy to be moderately risky. In addition, participants indicated that, if

Table 6.1

Mean ratings on behavioural, attitude and risk perception measures at baseline, immediately post-intervention and follow-up (Intervention Group, N = 52) - Backing up scenario

	Time of measure		
Measure	Baseline	Post-intervention	Follow-up
Behaviour (T1 and T3) and Behavioural intentions (T2)			
Regularity of backing-up (number of back-ups per month)	3.59 (13.02)	7.37 (21.66)	6.37 (21.44)
Consistency of backing-up	3.81 (1.97)	4.54 (1.66)	4.40 (1.59)
Total number of back-up media used	2.04 (0.97)	2.38 (0.99)	2.04 (0.99)
Attitudes towards backing-up			
Perceived advantages	5.75 (1.41)	6.06 (0.96)	5.90 (0.89)
Perceived disadvantages	2.50 (1.64)	2.88 (1.55)	3.06 (1.60)
Best strategy item (number of back-ups per month)	13.39 (16.64)	11.00 (22.46)	14.69 (24.24)
Risk perceptions			
Verbal risk item	4.51 (1.43)	4.98 (1.15)	4.88 (1.29)
Conditional risk item	59.35 (25.38)	54.50 (24.44)	57.90 (21.64)
Frequency risk item	42.96 (29.27)	37.19 (29.20)	37.35 (27.47)
Thinking about risk	4.67 (1.59)	5.13 (1.31)	4.83 (1.41)
Experience of losing work			
Total experience of losing work	2.42 (1.33)	2.54 (1.42)	2.69 (1.42)
Closest experience of losing work	1.58 (1.05)	1.90 (1.29)	1.88 (1.21)
Information seeking (since T1)			
% who had sought information	-	56%	47%

Note: Standard deviations appear in parentheses.

they did not follow their perceived 'best strategy' for backing-up, they stood a 59% chance of losing important documents. In terms of frequency, they estimated that some 43 students out of 100 who did not back-up their work would lose important documents. Again there was quite wide variation in these two risk estimates across participants (conditional risk range = 5% to 100%; frequency risk range = 1 to 100). Participants' responses suggested they had given the risks of not backing-up a moderate amount of thought in the past.

Table 6.2 indicates the level of experience the sample had of losing work as a result of not backing up. At baseline, most participants had some personal experience of losing work (71%) or knew someone else who had lost work (29%) because they had not backed it up. On average, participants recalled two such instances (range = 0 to 5) and none of the participants said that they had never heard of this happening. Correlational analyses (N = 112) did not show any relationship between regularity of backing up and previous experience of losing work (Spearman's rho = -0.053, p = .581, 2-tailed). However, there was a significant correlation between consistency of backing up and experience of losing work (Spearman's rho = -0.185, p = .051, 2-tailed). Participants who had more personal experience of losing work that they had not backed up (1 = "It has happened to me"; 6 = "I have never heard of this happening") reported being more consistent about backing up their new or updated documents (1 = "I never do this"; 7 = "I always do this").

Participants perceived backing-up as have significantly more advantages than disadvantages at baseline (F (1, 49) = 122.967, $p < .001$). Backing up behaviour did not correlate significantly with perceived disadvantages of backing up, but there were associations between the perceived advantages of backing up and participants' regularity

Table 6.2

Participants' experience of losing work as a result of not backing-up - baseline, post-intervention and follow-up ratings (N = 52)

Level of experience of losing work	Baseline	Post-intervention	Follow-up
% experienced by self	71	60	56
% experienced by partner or family member	10	8	13
% experienced by friend or colleague	13	23	25
% experienced by acquaintance	2	4	0
% read about it in the media	4	4	4
% never heard of this happening	0	2	2

of backing up (Spearman's rho = 0.384, p < .001, 2-tailed) and consistency of backing up new files (Spearman's rho = 0.363, p < .001, 2-tailed). As one might expect, the greater the reported advantages of backing up, the more regularly and the more consistently participants reported backing up their own work. There was also a marginally significant relationship between the number of different back-up copies kept and perceived advantages of backing up (Spearman's rho = 0.158, p = .050, 1-tailed), with more back up copies being made by those respondents who perceived the advantages as greater.

Baseline behaviour and cognitions relating to Internet security. Table 6.3 shows the participants' mean ratings for the Internet security items at baseline. The majority of participants (79%) knew what disabling active scripting meant at baseline. Prior to the intervention, the most common response to the item about consistency of disabling active scripting before using the Internet was to 'sometimes' disable (38% participants); 15% of students said they 'always' did this and 25% said they 'never' did it.

When asked about the 'best strategy' for disabling active scripting, the most common response was to 'sometimes disable' before using the Internet (80% participants); 10% participants thought it best to always disable active scripting, while 8% thought you should never do this. Overall, they viewed not following this strategy to be moderately risky. Participants estimated that they stood a 53% chance of picking up an Internet worm that could damage their computer hard drive if the did not disable active scripting. In terms of the frequency of such an event, they estimated that some 38 students out of 100 who chose not to disable active scripting would pick up an Internet worm and incur damage to their computer. As was the case with the backing-up scenario, there was quite wide variation in these two risk estimates across participants (conditional risk

Table 6.3

Mean (or *modal) ratings on behavioural, attitude and risk perception measures at baseline, post-intervention and follow-up (Intervention Group, N = 52) - Internet security scenario

	Time of measure		
Measure	Baseline	Post-intervention	Follow-up
Behaviour (T1 and T3) and Behavioural intentions (T2)			
* Consistency of disabling - modal response (range)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)
Attitudes towards disabling active scripting			
Perceived advantages	3.88 (1.53)	4.35 (1.19)	4.12 (1.18)
Perceived disadvantages	3.67 (1.37)	3.77 (1.20)	3.69 (1.15)
* Best strategy item - modal response (range)	2.00 (1-3)	2.00 (1-3)	2.00 (1-3)
Risk perceptions			
Verbal risk item	4.24 (1.68)	4.31 (1.48)	4.17 (1.40)
Conditional risk item	52.67 (27.95)	45.65 (25.34)	48.38 (24.30)
Frequency risk item	37.71 (30.97)	32.37 (29.59)	32.54 (28.08)
Thinking about risk	3.41 (1.96)	3.76 (1.52)	3.67 (1.65)
Experience of damage to PC			
Total experience of damage to PC	1.92 (1.37)	1.83 (1.25)	1.87 (1.53)
Closest experience of damage to PC	2.78 (1.79)	3.10 (1.62)	3.21 (1.98)
Information seeking (since T1)			
% who had sought information	-	23%	33%

Note: Standard deviations (or * ranges) appear in parentheses.

range = 2% to 100%; frequency risk range = 1 to 99). Participants' responses suggested that they had given the risks of not disabling active scripting a moderate amount of thought in the past.

Table 6.4 shows the level of experience the sample had of picking up an Internet worm as a result of not disabling active scripting. At baseline, one-third of participants (33%) had personal experience of such an event and 38% knew someone else who had experience damage to their PC as a result of not disabling active scripting. A further 13% said that they had read about this kind of event in the media. Only 11% of the sample had never heard of it happening.

Correlational analyses (N = 109) showed a significant positive association between participants' total experience of Internet worm damage and their consistency of disabling active scripting (Spearman's rho = 0.270, p = .013, 2-tailed). The more cases of this unfortunate event they indicated (their own or others' experience), the more consistently they reported disabling active scripting themselves before using the Internet.

Although participants rated the advantages of disabling active scripting as being slightly greater than the disadvantages, the difference in participants ratings did not reach statistical significance (F (1, 50) = 0.438, p = .511). Disabling active scripting was not rated as a clearly advantageous action in the way that backing up had been.

Correlational analyses showed that the reported consistency of disabling active scripting was significantly related to participants' perceptions of the disadvantages (Spearman's

Table 6.4

Participants' experience of PC damage as a result of not disabling active scripting - baseline, post-intervention and follow-up ratings (N = 52)

Level of experience of PC damage	Baseline	Post-intervention	Follow-up
% experienced by self	33	23	33
% experienced by partner or family member	17	13	11
% experienced by friend or colleague	21	29	15
% experienced by acquaintance	0	8	0
% read about it in the media	13	19	23
% never heard of this happening	11	8	17

rho = -0.258, p = .017, 2-tailed) and advantages (Spearman's rho = 0.548, p < .001, 2-tailed) of this action. The more advantages and the less disadvantages they saw, the more likely participants were to consistently disable active scripting when using the Internet.

Responses to the scenarios at the intervention phase. Table 6.5 shows the students' mean ratings of anticipated regret, decision justifiability, outcome seriousness and self-blame for each of the two scenarios. When comparing the two scenarios, participants anticipated significantly more regret (F (1, 51) = 36.325, p < .001) and self-blame (F (1, 51) = 19.022, p < .001) about the backing-up scenario than they did for the scripting scenario. In addition, they saw the outcome as significantly more serious (F (1, 51) = 22.043, p < .001) for the backing-up scenario than they did for the scripting scenario. The decision not to back-up regularly was rated as being slightly less justifiable than the decision not to disable active scripting, but this difference was not statistically significant (F (1, 51) = 2.784, p = .101). This pattern of results was the same, regardless of the order in which the scenarios had been presented.

Changes in cognitions and intended behaviour immediately post-intervention. Table 6.6 summarises the significant changes in participants' cognitions and intended behaviour after the regret-based intervention for the backing-up scenario. In relation to backing-up, there were a number of significant changes in the intervention group's responses on behavioural, attitude and risk perception measures, when their immediate post-intervention ratings were compared to their baseline ratings (Repeated Measures ANOVA, all ps < .05, 2-tailed tests). Overall, participants intended to back-up their work more regularly in future than they had done in the past (see Figure 6.1) and to be more consistent in backing-up new or updated documents on the day they created or

Table 6.5

Mean ratings of regret, decision justifiability, outcome seriousness and self-blame in response to imagining oneself in the backing-up and internet security scenarios (Intervention Group, N = 52)

Measure	Backing-up scenario	Internet security scenario
Regret	6.04 (1.53)	5.11 (1.50)
Justifiability	3.60 (2.02)	4.11 (1.50)
Outcome seriousness	6.08 (1.24)	5.15 (1.34)
Self-blame	5.60 (1.51)	4.53 (1.54)

Note: Standard deviations appear in parentheses.

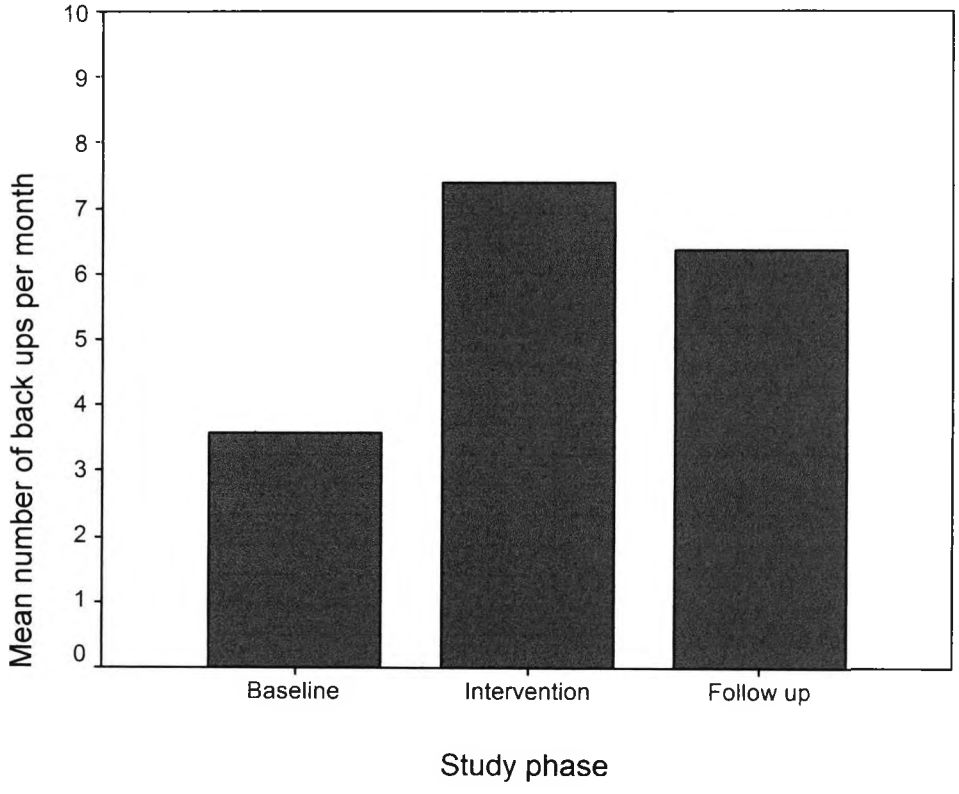
Table 6.6

Significant changes in participants' attitudes, risk perceptions and behavioural intentions from baseline to post-intervention phase - Backing up scenario (Intervention Group, N = 52)

Measure	Test statistic and significance level (1-tailed tests)	Nature of change
Regularity of backing-up	F (1, 51) = 6.156, p = .016	Increase in regularity
Consistency of backing-up	F (1, 51) = 7.445, p = .009	Increase in consistency
Total number of back-up copies	F (1, 51) = 5.910, p = .019	More back-up copies
Disadvantages of backing-up	F (1, 49) = 4.493, p = .039	More disadvantages
Verbal risk item	F (1, 51) = 4.540, p = .038	Increase in perceived risk
Thinking about risk	F (1, 51) = 4.066, p = .049	Think more about issue

Figure 6.1

Intervention group participants' reported regularity of backing up at baseline, intervention and follow-up phases*



* Note: Ratings at baseline and follow-up phases refer to reported behaviour; ratings at the intervention phase refer to intended behaviour.

updated them (see Figure 6.2). There was also a small but significant increase in the number of different back-up copies the sample intended to make.

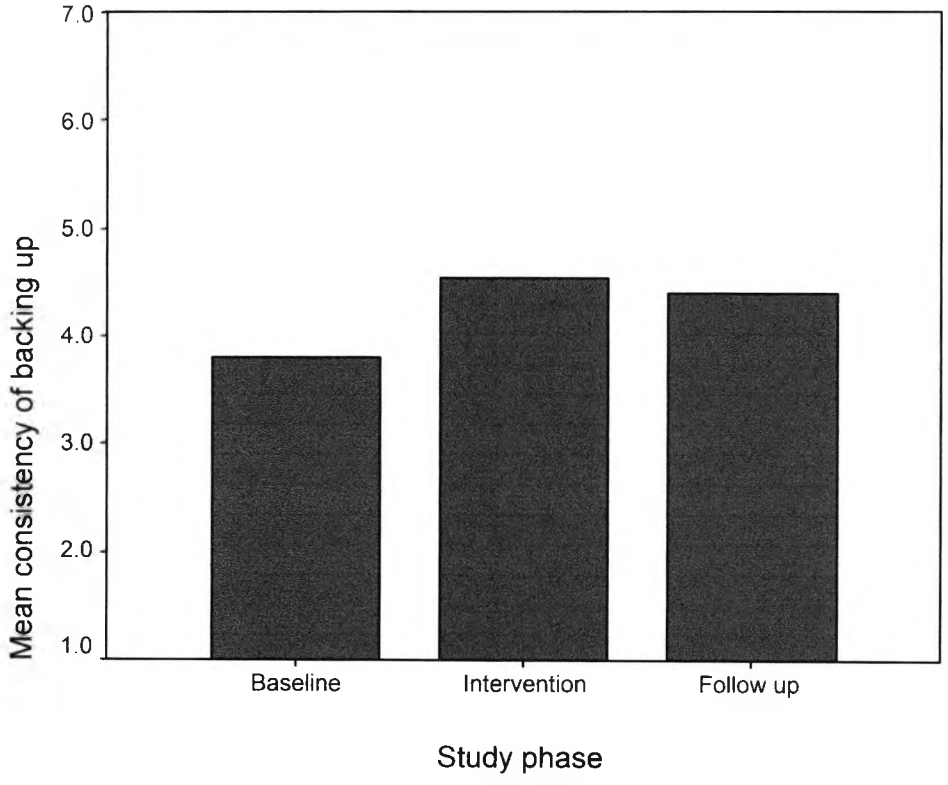
Two of the risk perception measures showed significant change after the intervention – the students saw not backing-up their work as more risky than they had done at baseline (verbal risk item) and they indicated that they would think more about the risks of not backing-up in the future. Participants also perceived the disadvantages of backing-up as significantly greater than they had done at baseline. There was a small but non-significant change in their ratings of the advantages of backing up (F (1, 50) = 2.150, p = .149). However, they still viewed backing-up their work as having significantly more advantages than disadvantages immediately after the intervention (F (1, 51) = 157.584, p < .001).

Participants reported no significant change in the amount of experience they had of losing work as a result of not backing it up - on the closest experience measure (F (1, 51) = 2.334, p .133) or on the total experience measure (F (1, 51) = 0.282, p = .598). Therefore the observed changes in cognitions and behavioural intentions could not be attributed to changes in their experience during the study period. Just over half of the students (56%) indicated that they had received information about backing up since the baseline phase. However, it was not clear from their responses whether this information had been derived from the experimental materials themselves, whether information had been specifically sought out after the baseline questionnaire or whether students had received this information during the taught modules of their course.

Table 6.7 summarises the significant changes in the intervention group participants' cognitions from baseline to post-intervention in relation to the Internet security scenario.

Figure 6.2

Intervention group participants' reported consistency of backing up at baseline, intervention and follow-up phases*



* Note: Ratings at baseline and follow-up phases refer to reported behaviour; ratings at the intervention phase refer to intended behaviour.

Table 6.7

Significant changes in participants' attitudes, risk perceptions and behavioural intentions from baseline to post-intervention phase - Internet security scenario (Intervention Group, N = 52)

Measure	Test statistic and significance level (1-tailed tests)	Nature of change
Advantages of disabling active scripting	F (1, 50) = 4.912, p = .031	More advantages
Conditional risk item	F (1, 50) = 4.529, p = .038	Decrease in perceived risk

* denotes a marginally significant difference in ratings (1-tailed test).

Immediately after imagining themselves in the scenario and considering their regret, participants perceived significantly greater advantages of disabling active scripting before using the Internet than they had done at baseline. There was no change in their ratings of the disadvantages of disabling active scripting. Immediately after the intervention, participants viewed disabling active scripting as being significantly more advantageous than it was disadvantageous (F (1, 51) = 4.996, p = .030).

One risk perception measure (conditional risk item) suggested that participants viewed not disabling active scripting as less risky than they had previously. None of the other attitude and risk perception ratings showed significant change from pre- to post-intervention. Whilst there was evidence that some participants intended to change their choice about disabling active scripting in future (with a greater proportion of students planning to 'sometimes' disable active scripting after the intervention), these changes did not reach statistical significance.

Participants reported no significant change in the level of experience of picking up an Internet worm as a result of not disabling active scripting since baseline - on either the closest experience measure (F (1, 49) = 0.881, p = .353) or on the total experience measure (F (1, 49) = 0.049, p = .826). Therefore the observed changes in ratings of perceived advantages could not be attributed to changes in the students' experience during the study period.

Approximately one-fifth (23%) of participants reported that they had sought or received information about disabling active scripting since the baseline phase, although again it was not clear from their responses whether this was derived from the experimental materials, taught courses or had been self-initiated.

Longer-term effects of the intervention on cognitions and actual behaviour

Repeated measures ANOVA tests were carried out to determine whether there was any longer-term effect of the intervention on participants' cognitions and actual computing behaviour, comparing the intervention group's mean responses at baseline and at follow-up (N = 52). A further four participants had completed questionnaires at baseline and at follow-up, without taking part in the intervention phase - they therefore formed a 'control group' against which to compare the intervention group. Repeated measures analyses were performed for this sub-sample to determine whether cognitions and behaviour could change significantly in the absence of a regret-based intervention.

Changes in cognitions and actual behaviour at follow-up. In the longer-term, there were no significant changes in the intervention group participants' attitudes, risk perceptions or behaviour in relation to Internet security and the disabling of active scripting (ANOVA, ps > .05, 2-tailed). One-third of students (33%) indicated that they had sought information about disabling active scripting since the intervention period.

Table 6.8 summarises the significant changes in the intervention group's actual backing up behaviour at follow-up (compared to their baseline behaviour). At follow-up, the intervention group reported that they had backed-up their work significantly more regularly than they had done at baseline (see Figure 6.1) and had been more consistent about backing-up new or updated documents when they had created or changed them (see Figure 6.2). Although they had indicated an intention to make back-up copies to a larger number of media immediately after the intervention, participants had not actually changed this aspect of their behaviour at follow-up (F (1, 51) = 0.000, p = 1.000). Just

Table 6.8

Significant changes in participants' attitudes, risk perceptions and actual behaviour from baseline to follow-up phase - Backing up scenario (Intervention Group, N = 52)

Measure	Test statistic and significance level (1-tailed tests)	Nature of change
Regularity of backing-up	F (1, 51) = 4.066, p = .049	Increase in regularity
Consistency of backing-up	F (1, 51) = 4.564, p = .037	Increase in consistency

under one half of the sample (47%) reported that they had sought or received additional information about backing up since the intervention.

Despite reporting at follow up that they had changed their backing up behaviour, this had not changed participants' perceptions of the advantages and disadvantages of backing up. As had been the case at baseline, they still saw backing-up their work as having significantly more advantages than disadvantages (F (1, 51) = 124.344, p < .001). There was no significant change from baseline to follow up in participants' perceptions of the risks of not backing up (ANOVA, ps > .05). Although participants had indicated immediately post-intervention that they would think more about the risks in future, their follow-up ratings suggested there had not in fact been any significant change in how much they thought about the risks of not backing up their work.

At follow-up, there was no significant change in the amount of experience participants had of losing work as a result of not backing it up – either on the closest experience measure (F (1, 51) = 2.182, p = .146) or on the total experience measure (F (1, 51) = 2.457, p = .123). Therefore the observed changes in participants' cognitions and behaviour could not be attributed to changes in their experience during the study period.

Were the changes due to the intervention or external events?

Four students had completed baseline and follow-up questionnaires but did not take part in the intervention phase and therefore were used as a 'control group'. Although the number of students in this group was much smaller than anticipated (similar studies reported higher drop-out rates from baseline to intervention phase), comparisons were made between this sub-sample's responses about their attitudes, risk perceptions and

behaviour in relation to backing-up at baseline and at follow-up. This would give some indication of whether changes in ratings still occurred in the absence of imagining oneself in the scenario and anticipating one's regret – perhaps simply as a result of becoming more aware of the targeted issues or even reflecting a self-presentation bias. Tables 6.9 and 6.10 show the control groups' mean ratings at baseline and follow up in relation to backing up and disabling active scripting, respectively. None of the comparisons reached or approached statistical significance (ps > .05). For all measures, participants' responses at follow-up more or less matched their responses at baseline. At follow-up, 25% participants in the control group indicated they had sought information about backing up and about disabling active scripting. The proportion of the control group who had sought information about the target issues was not significantly different to the proportion of the intervention group who had sought information (Chi-Square tests, ps > .05).

Given the small number of 'control group' participants who were not exposed to the scenario-based regret intervention (n = 4), the failure to find significant changes in this group's behaviour or attitudes is perhaps not surprising. As a stronger test of whether the intervention group showed changes in their ratings from baseline to follow-up while the control group did not, a series of 2 (Time: Baseline, Follow up) x 2 (Condition: Intervention, Control) mixed ANOVAs was carried out. Of particular interest in the results of these analyses was the presence of a significant 'Time x Condition' interaction. The interactions were not found to be statistically significant for any of the attitude or behavioural measures used for the backing up scenario or for the internet security scenario (ps > .05). These results suggest that, when using a statistical test that can take account of the differences in the sizes of the two groups, the intervention group participants were no more likely to change their behaviour during the study period than

Table 6.9

Mean ratings on behavioural, attitude and risk perception measures at baseline and follow-up (Control Group, N = 4) – Backing up scenario

	Time of measure	
Measure	Baseline	Follow-up
Behaviour		
Regularity of backing-up (number of back-ups per month)	14.00 (13.37)	15.50 (16.74)
Consistency of backing-up	5.75 (1.258)	6.50 (1.00)
Total number of back-up media used	3.75 (1.71)	3.00 (1.41)
Attitudes towards backing-up		
Perceived advantages	7.00 (0.00)	7.00 (0.00)
Perceived disadvantages	1.25 (0.50)	3.00 (2.71)
Best strategy item (number of back-ups per month)	20.00 (12.54)	19.00 (13.11)
Risk perceptions		
Verbal risk item	4.25 (1.50)	5.25 (1.26)
Conditional risk item	56.25 (18.80)	68.00 (32.13)
Frequency risk item	51.25 (8.54)	62.50 (27.54)
Thinking about risk	5.00 (1.63)	4.50 (2.08)
Experience of losing work		
Total experience of losing work	3.50 (1.73)	3.00 (1.41)
Closest experience of losing work	1.25 (0.50)	1.25 (0.50)
Information seeking		
% who had sought information since T1	-	25%

Note: Standard deviations appear in parentheses.

Table 6.10

Mean (or *modal) ratings on behavioural, attitude and risk perception measures at baseline and follow-up (Control Group, N = 4) - Internet security scenario

	Time of measure	
Measure	Baseline	Follow-up
Behaviour		
* Consistency of disabling - modal response (range)	2.00 (1-3)	2.00 (2-3)
Attitudes towards disabling active scripting		
Perceived advantages	4.75 (0.96)	4.50 (1.73)
Perceived disadvantages	3.25 (0.96)	3.75 (2.22)
* Best strategy item - modal response (range)	2.00 (2-3)	2.00 (2-3)
Risk perceptions		
Verbal risk item	5.25 (0.50)	4.75 (1.71)
Conditional risk item	25.00 (19.90)	45.50 (36.24)
Frequency risk item	14.67 (9.87)	34.25 (39.90)
Thinking about risk	3.00 (0.00)	4.25 (2.06)
Experience of damage to PC		
Total experience of damage to PC	2.00 (1.41)	1.50 (1.29)
Closest experience of damage to PC	2.00 (1.15)	3.50 (2.08)
Information seeking		
% who had sought information since T1	-	25%

Note: Standard deviations (or * ranges) appear in parentheses.

were the control group participants.

As previously discussed, for both of the targeted issues, there was no apparent change during the study period in the students' experience of losing work that had not been backed up. Therefore, the changes observed in participants' attitudes and behaviour in relation to backing up cannot be accounted for in terms of intervening personal experience of a negative outcome. However, there was some evidence to suggest that participants had obtained information about the issue during the study period, although it was not possible to determine precisely whether taking part in the study had provoked information seeking (one of the hypothesised effects of experiencing regret) or whether the students had received this information somewhat more 'coincidentally' as part of their taught course modules.

Did the changes in backing up behaviour result specifically from anticipating regret?

To determine whether the level of regret participants had anticipated influenced the degree to which they reported changes in their planned and actual backing up behaviour, participants were divided into two groups (using median splits; median = 6), according to their actual regret ratings at the intervention phase. Participants who had rated their regret as '7 = Extremely regretful' formed the 'High Regretters' group (n = 33), while participants who had anticipated lower levels of regret (ratings 1-5) formed the 'Low Regretters' group (n = 14). A series of mixed ANOVA tests was then conducted, comparing participants' ratings immediately after the intervention with their ratings at baseline (short-term effects) and comparing participants' follow-up ratings with their baseline ratings (longer-term effects). If anticipating regret was in some way associated with the observed changes in attitudes and behaviour, then it was hypothesised that

'High Regretters' would be more likely to show change in their self-reported ratings than 'Low Regretters' – that is, there would be a significant 'Time x Group' interaction. However, the results of the analyses showed that, on all measures for the backing up scenario, the 'Time x Group' interactions were not statistically significant (ps > .05). This was the case both for the baseline to post-intervention comparisons and for the baseline to follow up comparisons. Similarly, when comparing reported information seeking amongst 'High Regretters' (47% had sought information) and 'Low Regretters' (50% and sought information) in relation to backing up, at follow-up there was no significant difference between the groups (Chi Square (1, N = 46) = 0.038, p = .845). These findings suggest that, contrary to our hypothesis, 'High Regretters' were no more likely to show change in their attitudes and behaviour than 'Low Regretters'.

Discussion

For one of the targeted issues – backing up – participants reported after the intervention that they intended to make changes to their behaviour and, at follow up, reported that they had changed some aspects of their backing up behaviour during the study period. Immediately after imagining themselves in a scenario where they had lost a significant volume of important work because they had failed to back up their work regularly and imagining how they would feel in that situation, participants indicated that they intended to increase the frequency with which they backed up their work in future. In addition, they intended to be more consistent about backing up new and updated documents on the day they created them and intended to back up to a greater number of different media. At follow up, five weeks later, participants reported that they had increased the number of times they backed up as planned (on average nearly doubling the frequency of backing up over a month). In addition, they reported that they had been slightly more

consistent about backing up new documents, as they had intended, although they were still backing up to the same number of media as they had done before the intervention.

In addition to the apparent effects on behaviour, there was also some evidence to suggest there had been small but significant changes in the way participants thought about the issue of regular backing up, although not all of these were as expected. Immediately after the intervention, participants saw slightly more disadvantages to backing up than they had done at baseline, which may reflect the content of the scenario used or may reflect thinking more closely about the issue in general. At follow-up, there were no significant changes from baseline in the group's perceived disadvantages and advantages of backing up regularly, even though participants reported actually having increased the number of back ups performed. Therefore it appears that, although they had expected after the intervention that backing up more frequently might be associated with certain 'costs' (e.g. in terms of time and effort), participants did not report that this had actually been the case at follow up.

Immediately after the regret-based intervention, the students also saw not backing up as more risky than they had done previously (on the verbal risk perception measure only) and reported that they intended to think more about the issue in future. However, the intervention did not appear to have any lasting impact on participants' risk perceptions – when comparing baseline and follow up risk perception ratings, there were no significant differences in participants' responses. Similarly, although they thought they would think more about the risks of not backing up after the intervention, participants did not report at follow up that they had actually thought any more about the issue than they had done at baseline.

In one sense, the intervention appears to have been successful in changing students' backing up intentions and behaviour, based on comparisons of their self-reported behaviour during the study period. However, because the experimental design did not include a sizeable control group who were not exposed to a regret-based intervention, we cannot conclude with any degree of confidence that these changes were attributable specifically to the anticipation of regret. It is possible that the changes may have resulted from the mere highlighting of the issue, in that participants were asked on three occasions during a 12-week period about their thoughts and behaviour in relation to backing up. In fact, there was some indication at the intervention phase that participants had already sought or received more information about backing up since the baseline period. Similarly, at follow-up, they also indicated they had sought or received information about backing up since the intervention phase; however, our data does not allow us to say whether this information seeking was initiated by the intervention (or participation in the experiment) – being computer science students, the information may have been provided incidentally as part of their course. An alternative explanation for the reported behaviour change could be that there had been a change in participants' experience of losing work that had not been backed up. However, participants' responses at intervention and follow-up phases suggested that this was not the case, either in terms of their own personal experience or knowing someone else who had lost work through not backing up.

There was no clear evidence to suggest that the changes in behaviour were related to the anticipation of regret per se. When comparing participants who had anticipated higher levels of regret after losing work they had not backed up with participants who had anticipated lower levels of regret, there were no significant differences in the degree of change in behaviour observed between the two groups of students. 'High Regretters'

were no more likely than 'Low Regretters' to intend to increase the regularity and consistency of backing up their work immediately after the intervention, or to report actually having changed their backing up behaviour at follow-up. A small number of participants who had not taken part in the intervention phase (and thus had not considered the future emotional consequences of not backing up their work) served as a kind of comparison group, although the size of this group (N = 4) does not really allow any firm conclusions to be drawn. Nonetheless, when contrasting the changes in responses of the intervention group and the control group from baseline to follow up, there was no conclusive evidence that the intervention group participants (who had considered their future regret) were any more likely than the 'controls' to change their attitudes or behaviour during the study period.

For the second targeted issue, disabling active scripting, there were no significant changes in participants' behavioural intentions or reported behaviour during the study period. At all timepoints, participants indicated that they had or would only disable active scripting sometimes when using the Internet. Immediately after the intervention phase, there were some significant changes in the way participants appeared to think about the risks of their behaviour. On the positive side, they rated disabling active scripting as being more advantageous than they had at baseline. However, their responses on one measure indicated a decrease in the perceived risks of not backing up. Neither of these changes in cognitions persisted at follow-up. It may be important to note that, at baseline, not all participants were familiar with the issue and few had any personal experience of their computer being infected by an Internet worm in the way described in the scenario. In contrast, most participants had some experience of losing work they had not backed up at baseline. It may have been easier for our sample to

identify with the scenario in the case of backing up because they had some experience of this occurrence and as such it may have felt more personally relevant.

In addition to the relative differences in participants' awareness and experience, there were other differences between the two targeted issues in terms of our cohort's responses. At all timepoints, participants saw significantly more advantages than disadvantages in backing up their work regularly – the benefits appeared to clearly outweigh any costs. In contrast, there were no clear advantages over disadvantages of disabling active scripting for our participants, and this did not change during the study period. If an individual sees no clear benefit of taking precautionary action, then they are unlikely to make the additional effort that action requires, particularly if it requires them to change default settings on their computer that may in other ways be useful. As has been noted in other domains, 'opting in' to targeted behaviour requires effort from the individual and these additional demands can significantly affect the number of people that act in the targeted way (Johnson & Goldstein, 2003) – even if they intend to change the default setting, they simply may not remember to do it or have time to do it. In addition, our participants envisaged significantly less regret and self-blame about damage to their computer hard drive than they did about losing their work – perhaps because they felt they would not be solely responsible for the damage – a third party created the Internet worm. In addition, their ratings of the seriousness of the outcome described in the scenario suggested that they may have seen the damage to their computer described in the scenario as being relatively easy to remedy and this reversibility of the problem, in the event that it did occur, may further have affected an individual's motivation to comply with advised precautionary action (Murgraff et al., 1999). Thus, there may be a number of factors about the risk issue or the precautionary

behaviour itself that may influence how successful any persuasive communication is likely to be, including one based on regret.

Overall, the results of the current experiment suggest that a regret-based communication could prove to be a useful persuasion tool in the domain of computer security, as has tended to be the case in the risk domains of health and safety. Future research should address some of the limitations of the experimental design, particularly those that make it difficult to determine whether the changes in backing up behaviour are actually related to the anticipation of regret rather than any other aspect of the intervention or study tasks, or to factors unrelated to the experiment. The incorporation of a sizeable control group, who are not focused on the future emotional consequences of failing to comply with recommended computing behaviour at the intervention phase, would enable us to observe whether changes in attitudes and behaviour occur simply as a result of the targeted issue being highlighted on repeated occasions when participants are asked to report on their attitudes and behaviour. In addition, future experiments should attempt to more carefully measure or control for external factors that might independently influence attitudes and behaviour – for example, any information or guidelines that are given to students in their taught courses or they coincidentally come across in the media during the timescale of the research. Our participants reported that they had obtained information on the targeted issues, but it was unclear whether they had actively sought this information themselves as a result of the intervention.

The current study has demonstrated that changes in backing up behaviour are reported five weeks after the intervention. Future studies might wish to explore whether these positive effects on behaviour are sustained in the longer-term or whether individuals revert to their baseline behaviour once they believe the study period is over. A single

instance of imagining one's future regret about making a poor choice may not be sufficient to keep the negative emotional consequences salient in the individual's mind, particularly as the disadvantages of engaging in the recommended behaviour may become more evident through adopting that action. Our measures of effectiveness have relied on participants' self-reports of their behaviour and attitudes and therefore may be influenced by self-presentation biases. The use of other means of measuring behaviour change should be considered where this is possible.

In their original paper, Weirich & Sasse (2001) called for researchers to develop strategies of persuading computer users to adopt more system-protective behaviour in relation to password security in organisations. Our study focused on backing up behaviour and Internet security in a student population. Given the promising results of the current study, future research might test the effectiveness of a similar regret-based strategy in different populations on issues that are particularly relevant to organisations, including password security. In our study, we found evidence of behavioural change for one of the targeted issues (backing up), but not for the other (disabling active security). It would seem of interest to determine whether (as has been suggested by Murgraff et al, 1999 in relation to health) some risky choices lend themselves more readily to interventions than others because of their very nature – and to identify the factors that predict the success of persuasive tools.

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Appendix 6.1: Backing up scenario used in the intervention phase of the experiment

Imagine ...

"You work as a researcher in a respectable computer research centre. You have been conducting a very interesting study, analysing data on dependability and performance of a quite fashionable information system. In total, you have developed about 1000 lines of script code for a statistical package and have written nearly 100 pages of reports and notes on that problem. You are lucky - you have got really great results, which could be generalised on a broad class of systems. You plan to publish the results in the next few months. You are pretty certain that these results and publications will improve your CV quite dramatically and open up really good professional opportunities for you. You keep all the information relating to the project on your reliable and powerful new laptop. A feature of your work is that everyday you have to modify several scripts and it can be really difficult to keep track of these modifications. Your boss, whom you really respect, recommends that everyone in the research centre should routinely back up all recent documents and records they produce and also make a complete back up of all their work once a week. You know about the importance of the issue, but you also know that the total back-up takes a couple of hours and a huge amount of disk space on the server. You also find it a rather boring operation. Therefore, you decide to perform selective back-ups of the most important scripts and documents, approximately once every two months, whenever you feel inspired to do so. You think that this will be sufficient, since you have never heard of anyone else who has suffered from a hard-disk crash on a laptop like yours.

Today, you have come into the university and find that someone has broken into your office and your laptop has been stolen. Because you have not backed-up recently, you find you have lost all your scripts, notes and script modification records for the last two months. Thus, you will need at least two months to completely recover the lost work. This means that you are going to miss several very important opportunities to publish your results at some respectable conferences this year. The activity and competition in your area of research is very strong. So, it is quite likely that other researchers will report their findings, which are similar to yours, very soon. In reality, it looks like you have lost nearly one year's worth of work and effort."

Appendix 6.2: Internet security scenario used in the intervention phase of the experiment

Imagine ...

"You are a regular visitor to the websites of companies like Dixons, PC World and other such retailers. Shopping via the Internet is not something that is unusual for you. These websites require the active scripting (such as Java-scripting or Perl-scripting) to be enabled on your browser.

You also regularly receive e-mail messages with 'live' HTML content.

During your Web surfing, you never observe error messages relating to Java-scripting. This means the active scripting is likely to always be enabled on the browser on your computer.

Today, you have discovered that all the content of your hard drive has been destroyed by an Internet worm downloaded from the Web by a JavaScript launched from the HTML content of one of your incoming e-mail messages. This occurred because you did not disable active scripting before you used the Internet to access your e-mail messages.

Now, you have lost all your PC software settings (eg. favourite web links, recent entries in your e-mail address book, all software configurations). You've also lost all recent documents and all freeware distributions you have downloaded from the web (eg. LaTeX, GNU-Emacs, Java SDK, etc).

Your computer needs all software to be completely re-installed. It may take several days, if not weeks to do this."

Chapter 7

Summary and Conclusions

Summary and Conclusions

Decision making research has begun to explore the effects of emotions on choice and judgments. Whilst some of this research has focused on global measures of affect (e.g. happiness), a significant proportion of the literature has explored the effects of specific emotions – in particular, regret and disappointment. The research reported in this thesis has focused on regret, an emotion closely associated with choice. The topic has received a great deal of attention in the literature since Regret Theory (Loomes & Sugden, 1982; Bell, 1982) was first proposed as an alternative account of human decision making.

Recently, Decision Justification Theory (DJT) has been proposed in an attempt to synthesise the research findings in the field (Connolly & Zeelenberg, 2002). This new theory identifies two 'core components' that contribute to the experience of regret – regret about making a poor decision (self-blame) and regret about obtaining a bad outcome. Although in its early stages of development, DJT is intuitively plausible and can account for some of the hitherto somewhat confusing research findings. In their initial formulation of the theory, Connolly & Zeelenberg (2002) have also identified likely antecedents of each component of regret but have not yet been specific about the relationship between the two components and whether they are independent in terms of their antecedents, or somewhat inter-related. In addition, it is not yet entirely clear how the negative feeling about a worse-than-hoped-for outcome (labelled 'outcome regret') differs from another emotion that results from the comparison of an obtained outcome with one that was expected – i.e. disappointment. The research reported in Chapters 2 to 4 of this thesis has attempted to begin to explore these issues and thus help to develop DJT further.

The results of a series of scenario-based studies presented here confirm that there is support for some of the proposals of DJT. Participants tended to rate their imagined decision regret and their imagined outcome regret somewhat differently, suggesting they may be distinguishable to some extent. In addition, there was some evidence that decision justifiability (the proposed antecedent of regret about the decision) did reduce overall regret ratings and, in some instances, specifically reduced decision regret rather than outcome regret. However, the results also suggest that it can be difficult – at least in the case of hypothetical scenarios – for individuals to completely separate out what is regret about a poor decision and what is regret about a bad outcome. Correlational analyses demonstrated in three studies that participants' ratings of outcome severity correlated positively and strongly with both outcome regret and decision regret. Although decision justifiability also correlated negatively with decision regret (as one might expect if DJT is correct), this correlation was consistently weaker than the correlation between decision regret and outcome severity. In addition, outcome regret appeared to have a similar relationship as decision regret with outcome seriousness.

Two further repeated measures studies explored whether individuals change their view of the quality of the decision process after they discover how the choice turned out. The findings indicate that information about an outcome does have an influence on perceptions about the decision process. When the choice was followed by a negative outcome, participants changed their view of the decision – seeing it as less justifiable and of poorer quality than they had before they knew the outcome. Conversely, when the choice was followed by a positive outcome, they rated the decision as more justifiable and of better quality than they did before the outcome was described. It appears, therefore, that individuals may – either consciously or unconsciously – be

strongly influenced by information about outcomes when they judge the quality of decision making.

In terms of the development of DJT, the findings suggest that the two 'core components' cannot be regarded as totally independent of each other with distinct antecedents. The results of the current research suggest that outcome severity influences perceptions of decision justifiability and therefore (directly or indirectly) affects the intensity of both decision regret (self-blame) and outcome regret. Indeed, it might be difficult to conceive of regret being experienced in the absence of a negative outcome, even if the decision was unjustifiable. It appears that it is very difficult for individuals to separate out the qualities of a decision from the qualities of the associated outcome. This was the case, even when participants were provided with probabilistic information relevant to the choice (Chapter 3, Experiment 2), by which they might have judged the quality of the decision independently of the outcome.

The experiments included in this thesis were, however, all based on hypothetical scenarios, where participants imagined themselves in situations that may have been unfamiliar to them, where information about the decision process was limited, and where the actor made choices that may not have been those the participants would have made in the same circumstances. This lack of 'realism' may have influenced the results obtained. Future research might therefore explore the relationship between the core components of regret and the proposed antecedents in 'real-life' decision-making situations. A further issue that needs to be explored is whether it is specifically the experience of decision regret or the experience of outcome regret (or simply an overall feeling of regret) that influences the future choices that individuals make. The fact that participants changed their views of decision quality when the choice turned out badly

suggests that there may be occasions where a perfectly reasonable decision may become 'tarnished' – and therefore likely to be rejected in future – because it happened to turn out badly when selected in the past. If experiencing regret does influence later decisions, as earlier research suggests (e.g. Zeelenberg & Pieters, 1999), then a decision maker may adjust their behaviour in the future based on an unfortunate outcome, even if the decision they originally made was the optimal one in all other respects. This over-reliance on outcome information may mean that 'good' decisions are not repeated in the future when perhaps they should be, while 'bad' options may be selected when they perhaps should not be.

The results of a newspaper article search reported in Chapter 4 also found evidence that outcomes weigh more heavily in individuals' minds when they recall their experiences of regret. A significant majority of reported 'biggest regrets' or 'greatest regrets' referred to negative outcomes rather than poor decisions. In addition, it was apparent that many of these negative outcomes were unrelated to the individual's own choice. Decision and emotion researchers have tended to distinguish between regret and disappointment, suggesting that regret is the emotion that is experienced when a choice turns out badly while disappointment is experienced when a bad outcome is the result of circumstances beyond the individual's control. The content analysis of regrets reported in the newspaper articles therefore suggests that in common use of the English language, individuals do not necessarily distinguish between regret and disappointment in the way that researchers and theorists have tended to. This may have implications not only for the measurement of different emotions, but also for the development of DJT. As mentioned above, it is as yet unclear exactly how 'outcome regret' differs from 'disappointment' – both appear to refer to outcomes that fall below some anticipated standard. Because the second hypothesised 'core component' of regret (relating to the

making of a poor decision) appears to encompass the self-blame element associated with making an unjustifiable or bad choice, Chapter 4 has proposed that the outcome-related element of regret may simply be 'disappointment' – and therefore that the overall experience of regret might be considered as self blame (over a poor decision) combined with disappointment (over a bad outcome). Future research may wish to explore this hypothesis further.

The second part of the thesis explored further the question of whether regret can be used as a means of persuasion. Past research has suggested that anticipating regret can influence the choices individuals make and a small number of studies have investigated whether focusing participants on the future emotional consequences of their lifestyle choices can influence the way they think and behave about risks in the future. All of the published studies in this area have focused on health or safety risks. Most of these have demonstrated promising effects on cognitions and behavioural intentions in the short term but not all have tested the long-term effects on behaviour and none have included a control group of participants who were not in some way focused on their emotions. One previous study failed to find any effects at all in relation to alcohol bingeing and has suggested that a regret-based intervention may not be effective for all risky choices.

Chapter 5 continued the health risk theme but focused on the dangers of developing skin cancer from sunbathing without adequate skin protection – a relatively rare yet potentially serious and irreversible outcome, which can be avoided by choosing to take preventive action. The first longitudinal study identified short-term positive effects on participants' behavioural intentions, particularly for students who anticipated higher levels of regret if they developed a life-threatening cancer. However, the study failed to find any actual change in subsequent sunbathing behaviour as reported at follow-up. A

number of limitations were apparent in the design (particularly in relation to sample size, the lack of a control group and the reliability of materials) and attempts were made to address these in a further experiment. A second experiment developed two scenarios that reliably evoked different levels of regret. Coincidentally (the experiment was conducted in the summer of 2002), this work identified two distinct influences on regret ratings – one relating to outcome seriousness and the other to perceptions of responsibility – somewhat in line with the main assumptions of DJT later proposed by Connolly & Zeelenberg (2002).

In the repeat longitudinal sunbathing study, which incorporated control group conditions, there was again evidence for positive change in participants' behavioural intentions in relation to their future use of sunscreen. However, these changes were not exclusively found for participants in the intervention groups – there was also evidence amongst the control group that they planned to improve their use of sunscreen in the future. At follow-up, white-skinned participants (from both intervention and control groups) reported they had increased their use of sunscreen compared to the previous summer. Only for the reported increase in SPF rating of sunscreen used was the effect found solely for intervention group participants – and furthermore this was only the case for white-skinned individuals.

Whilst the sunbathing experiments found evidence of changes in sunbathing behaviour, these could not confidently be attributed to the anticipation of regret and they were limited only to the use of sunscreen. Because control group participants also demonstrated change in behaviour on some of the measures, it was not possible to rule out the influence of external factors, unrelated to the experiment, or to determine whether simply being asked about one's attitudes and behaviour on a number of

occasions might be responsible for the reported changes in choice. The studies relied entirely on self-reports of behaviour and the results may also reflect a self-presentation bias. Although attempts were made to recruit larger samples, the power of the experiment was still hampered by a disappointing drop-out rate and many of the students in the sample did not report behaviour in the sun at baseline that was particularly risky. Future research might therefore wish to focus on larger populations who do sunbathe regularly and are therefore more at risk of developing skin cancer.

It might be argued that sunbathing can be regarded as an occasional or 'seasonal' behaviour and thus any short-term effects of anticipating regret may have faded before our participants could put their promising behavioural intentions into practice. As other choices may be made on a more regular basis, the computing experiment reported in Chapter 6 enabled this limitation of the sunbathing studies to be addressed. In addition, the longitudinal study tested the effectiveness of a regret-based intervention in a new risk domain – that relating to computing choices. For one of the targeted issues (backing up), there was evidence that taking part in the study did change students behavioural intentions (as reported after the intervention) and also influenced their actual behaviour (as reported at five week follow-up). After being focused on the future consequences of not backing up regularly – and considering how this might feel – students on average doubled the number of times they backed up and reported being more consistent about backing up new documents. However, there was no clear evidence that students who anticipated higher levels of regret were any more likely to plan to change their choices immediately after the intervention or to report actual behavioural change at follow up than those who anticipated lower levels of regret. The absence of a sizeable control group also makes it difficult to draw confident conclusions about whether the apparent effectiveness of the intervention can be attributed

specifically to the anticipation of regret. As was the case with the sunbathing studies, the effects could be attributed to other influences, such as external sources of information or simply having the issues highlighted on repeated occasions.

For the second computing choice (Internet security), no changes in behaviour were reported at follow-up. The data suggested that one explanation for this absence of effect might be that the recommended behaviour was perceived as having as many disadvantages as advantages for the individual. In addition, the potential consequences were not rated as being as serious as (and less regrettable than) losing work by not backing up. The results therefore suggest that factors relating to (an individual's perceptions of) the risky choice may moderate the effectiveness of a regret-based intervention. Future research might wish to explore this issue further. As was the case in the sunbathing studies, the computing experiment used a student sample, focusing on computing issues that were thought to be most relevant to that particular group. Future research might investigate the effectiveness of a regret-based intervention in a population drawn from staff in organisations, where there may be many more competing demands that affect behavioural choice, and explore issues of particular relevance in a business context.

Whilst the regret intervention studies have shown some promising effects with one health issue and in a second risk domain (computing), they have still not yet clarified the issue of whether the anticipation of regret (in and of itself) can change behavioural choice in the longer term. Thus we cannot make any confident claims as to whether this specific approach might be a useful persuasion tool. Further research would be required to address some of the limitations of the studies reported in this thesis before we can conclude that a regret-based approach to persuasion offers benefits over and above those

of the more traditional approaches based on increasing awareness through the provision of information about risk issues.

In summary, the research reported in this thesis has explored theoretical and applied aspects of the influence of regret in decision making and has answered some of the research questions arising from a review of the existing literature. It has also identified practical issues and further questions for future researchers to consider.

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Wright, C., Ayton, P., & Djemal, C. Regret and decision-making: Does decision justifiability affect the intensity of decision- or outcome-related regret? Are the two types of regret completely independent? Poster presentation at the Biannual Conference on Subjective Probability, Utility and Decision-Making (SPUDM-19), 25-27 August 2003, Zurich, Switzerland.

Wright, C., Ayton, P. & Djemal, C. Are decision-regret and outcome-regret different? Presentation to the London Judgment and Decision-Making Group, 22 October 2003, Department of Psychology, University College London.

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Scenarios used in the research reported in Chapter 2 (Experiments 1-3) and Chapter 3 (Experiment 1)

ICY ROAD SCENARIO

As a normal everyday routine, you drive into work through a particular route. You listen to the radio everyday before you set out to hear about road closures, traffic etc. One day, you hear that following a very cold night, the roads are very icy and slippery on your normal route and so it is recommended you take an alternative route ... *[insert decision justification here]*... You are driving carefully along the road, mindful of the icy conditions ... *[insert outcome here]*.

Manipulations of decision justification

Strong justification versions
Despite the warning, you still take your normal route, as you are worried about finding traffic on another route and you do not want to be late for work, since you have an important meeting with your boss, first thing.

Weak justification versions
Despite the warning, you still take your normal route, as an acquaintance's house is on the market and you like to drive past every day to see if it has been sold yet.

No justification versions
Despite the warning, you still take your normal route.

Manipulations of outcome

High seriousness versions
Suddenly, a fox jumps out in front of you and you are forced to brake, but because of the ice, the car skids and eventually turns over. You are left with a large permanent scar on your face, a broken leg and a broken collarbone.

Low seriousness versions
Suddenly, a fox jumps out in front of you and you are forced to brake. Due to the ice the car skids and you end up hitting a tree. Luckily you only get a few bruises, and the car only has a crack in the front bumper.

Positive outcome versions
However, you still get to work safely and in time for your meeting. Others who took the alternative route suggested on the radio arrive late to work.

Notes:
1. Decision justifiability was not manipulated in Experiment 1, Chapter 2
2. Positive outcomes were used only in Experiment 1, Chapter 3.

COFFEE SHOP SCENARIO

You are looking to buy a shop to set up your own coffee bar. You come across a vacant premise on a main road, which you visit and consider buying … *[insert decision justification here]* … *[insert outcome here]*.

Manipulations of decision justification

Strong justification versions
However, you decide not to buy this shop and instead opt for a different one, as it is a bigger premise for the same amount of money. You think you may as well take this so that you can make a bigger profit.

Weak justification versions
However, you decide not to buy this shop as your friend who is a Feng Shui expert says that as the shop is situated at the top of a T-Junction, it is bound to damage the accumulation of good ch'i energy. Due to this, you opt for a different shop.

No justification versions
However, you decide not to buy this shop and instead opt for a different one.

Manipulations of outcome

High seriousness versions
A few months later you go bankrupt. The shop you bought did not generate enough customers because it is located on a side street which not many people pass. Out of curiosity you go to visit the other coffee shop you had considered buying and see that the queue reaches the door.

Low seriousness versions
A few months later your shop is not doing as well as you had hoped, but business does seem to be picking up. Out of curiosity you go to visit the other coffee shop you had considered buying and see that the queue reaches the door.

Positive outcome versions
A few months after buying the shop business is booming. The shop you bought is generating a large amount of regular customers. Out of curiosity you go to visit the other coffee shop you had considered buying and see that things are very quiet there.

Notes:
1. Decision justifiability was not manipulated in Experiment 1, Chapter 2
2. Positive outcomes were used only in Experiment 1, Chapter 3.

TV HOLIDAY PRIZE DRAW

While watching a television programme, a competition arises whereby you can win a 2-week Caribbean cruise and £1000 spending money. Your passport expired a few weeks ago, and as you didn't plan on going abroad anytime soon you put off renewing it … *[insert decision justification here]* … You win the holiday. However, as you had not renewed your passport and the flight is tomorrow morning, you are unable to go, and so you give the ticket to a friend … *[insert outcome here]*.

Manipulations of decision justification

Strong justification versions
Although you are aware that your passport expired you still enter the competition as you think the flight is in the evening of the next day and you think you'll have time to renew your passport the next morning if you do win.

Weak justification versions
Although you are aware that your passport expired, you still enter the competition for a bit of excitement, since you've got nothing else to do.

No justification versions
Although you are aware that your passport expired you still enter the competition.

Manipulations of outcome

High seriousness versions
You are also unable to keep the £1000, as the cheque has to be paid to the person whose name is on the flight tickets.

Low seriousness versions
However, you are able to keep the £1000, and you decide to spend it on a mini cruise to Spain once you have renewed your passport.

Notes:
1. Decision justifiability was not manipulated in Experiment 1, Chapter 2
2. This scenario was not used in Experiment 1, Chapter 3 – therefore there is no 'positive outcome' version

TRAFFIC JAM SCENARIO

You receive a sudden phone call from the hospital informing you that a loved one has had a serious accident and you are asked to go in as soon as possible. As you set out, you hear on the radio that there is traffic on your usual route … *[insert decision justification here]* … *[insert outcome here]*.

Manipulations of decision justification

Strong justification versions
However, you decide to still take your usual route, as the only other available route is one you have used just once before and you got lost that time. On this occasion, you don't want to get lost and you think the traffic will have time to clear before you get to that part of the route.

Weak justification versions
However, you decide to still take your usual route, as you believe this is your 'lucky' route and, if you take it, things will work out fine.

No justification versions
However, you decide to still take your usual route.

Manipulations of outcome

High seriousness versions
Halfway through your journey, you get stuck in traffic and what would have been a 20 minute journey had you have taken the other route (friends took the other route after they heard of the traffic) ended up taking you 1 hour. When you get to the hospital you are told that your loved one died 20 minutes earlier.

Low seriousness versions
Halfway through your journey, you get stuck in traffic and what would have been a 20 minute journey had you have taken the other route (friends took the other route after they heard of the traffic) ended up taking you 1 hour. When you get to the hospital you are told that your loved one went into theatre 20 minutes ago, and so you won't be able to see them for a few hours. You are however informed that they will be alright.

Positive outcome versions
You reach the hospital in the usual 20 minutes and you find your relative on the ward. Friends who took the other route don't arrive for another 40 minutes and they miss seeing your relative before they go into theatre.

Notes:
1. Decision justifiability was not manipulated in Experiment 1, Chapter 2
2. Positive outcomes were used only in Experiment 1, Chapter 3.

DRIVING INSURANCE SCENARIO

You receive a notice of motor insurance renewal 2 months before the renewal is actually due. Because you want to ring around before accepting your current insurer's renewal price, you put the letter to one side and forget about it. A few days before your insurance expires, you find the letter and remind yourself that you must start ringing around. However, your busy lifestyle takes over and again the letter is put to one side … *[insert decision justification here]* ... On the way to the supermarket, you are involved in a car accident ... *[insert outcome here]*.

Manipulations of decision justification

Strong justification versions
On the date of expiry, you remember that you are no longer insured to drive your vehicle, but you still drive down to the supermarket, as you've been trying to call the insurance company but the line is constantly engaged and your friend who works in a garage tells you he thinks it is still OK to drive for 1-2 days after expiry of the policy.

Weak justification versions
On the date of expiry, you remember that you are no longer insured to drive your vehicle, but you still drive down to the supermarket, as you want to see what the special offers are.

No justification versions
On the date of expiry, you remember that you are no longer insured to drive your vehicle, but you still drive down to the supermarket.

Manipulations of outcome

High seriousness versions
The driver of the other car is killed. In court, you are fined £3000, given 6 points on your licence for driving without insurance, and you are sentenced to two years imprisonment for manslaughter, as you were found to be driving recklessly.

Low seriousness versions
The driver of the other car is left with whiplash. In court, you are fined £200 and given 2 points on your licence for driving without insurance.

Notes:
1. Decision justifiability was not manipulated in Experiment 1, Chapter 2
2. This scenario was not used in Experiment 1, Chapter 3 – therefore there is no 'positive outcome' version

TRAVEL VACCINATION SCENARIO

You book an adventure holiday to South East Asia. While booking the holiday, the travel agent gives you information leaflets about recommended vaccinations, which you put to one side. About a week before you leave, you find the leaflets again and read them. You discover that you should have a vaccination against Japanese Encephalitis (a serious and potentially fatal tropical disease), which you can catch from being bitten by mosquitoes. However, the vaccination has flu-like side effects which can last up to 10 days after the injection ... *[insert decision justification here]* ... *[insert outcome here]*.

Manipulations of decision justification

Strong justification versions
You decide not to have the vaccination, as you have a fear of needles and do not want to risk having these side effects for the first part of your holiday.

Weak justification versions
You decide not to have the vaccination as you don't want to have a red mark on your arm for your holiday.

No justification versions
You decide not to have the vaccination.

Manipulations of outcome

High seriousness versions
During the trip many mosquitoes bite you, and towards the end of the holiday you begin to feel unwell. You eventually collapse and at hospital find out that you have caught Japanese Encephalitis and you are left with paralysis affecting one side of your body. You are told that the effects will be long-term and will have a serious impact on your life, career and general health.

Low seriousness versions
During the trip many mosquitoes bite you, and towards the end of the holiday you begin to feel unwell. You eventually collapse and at hospital find out that you have caught Japanese Encephalitis. You are told that the effects will luckily be short-term, e.g. headache, shivering, and general flu-like symptoms, which reflect the side effects you could have got from the vaccination itself.

Positive outcome versions
During the trip many mosquitoes bite you, but you remain well throughout the trip. The bites are a little itchy, but you do not catch Japanese Encephalitis. In fact, you have a wonderful time on the holiday.

Notes:
1. Decision justifiability was not manipulated in Experiment 1, Chapter 2
2. Positive outcomes were used only in Experiment 1, Chapter 3.