2014-05-06

More Intense Affective Experiences, Less Intense Affective Forecasts: Affective Forecasters Overestimate the Influence of Outcome Specifications

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By

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A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

May 2014

UNIVERSITY OF MIAMI

A dissertation submitted in partial fulfillment of
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More Intense Affective Experiences, Less Intense Affective Forecasts: (May 2014)
Affective Forecasters Overestimate the Influence of Outcome Specifications

Abstract of a dissertation at the University of Miami.

Dissertation supervised by Professor Jiao Zhang and Professor Carey K. Morewedge.
No. of pages in text. (109)

It is generally assumed that the hedonic response to an outcome is a joint function of the desirability of the outcome and the likelihood of its occurrence. Losses are almost never pleasurable, but people believe that losses hurt less when they are small and/or expected than when they are large and/or unexpected. Conversely, gains are almost always pleasurable, but are more so when they are large and/or unexpected than when they are small and/or expected. When consumers decide which potential losses to avoid and which potential gains to pursue, their decisions depend on predictions of their hedonic responses to those potential future gains and losses. Thus, an important question is whether affective forecasters are able to accurately predict the extent to which their hedonic responses to an outcome are influenced by the magnitude of the outcome and the probability of its occurrence.

This dissertation proposes that affective forecasters overestimate the extent to which their happiness with an outcome depends on its magnitude and its probability of occurrence because of differences in affective intensity between affective forecasters and experiencers. The hedonic experience of an outcome is typically more affectively intense than the simulation of that outcome upon which the affective forecasts for it are based.

Intense experiences capture attentional resources required to consider and incorporate outcome specifications into judgment. Consequently, hedonic experiences are less influenced by outcome specifications than are affective forecasts of those experiences.

The present research establishes that affective forecasters are more sensitive to the magnitude of an outcome and its probability of occurrence than experiencers. It provides support for the theorized account that the asymmetry in affective intensity evoked by the act of making affective forecasts and having the corresponding hedonic experiences leads to different attention and sensitivity to these outcome specifications. The difference in sensitivity to outcome specifications between forecasters and experiencers can lead to under-and overestimation of emotional response: High magnitude and low probability beget overestimation of future emotional response, whereas low magnitude and high probability beget underestimation of future emotional responses.

To my mother
Susan D. Weymouth

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude and appreciation to my two brilliant advisors, Carey Morewedge and Jiao Zhang, for their excellent guidance, care, and patience while supervising my dissertation.

I wish to thank my Committee Members Bob Meyer, Juliano Laran, and Claudia Townsend for their time serving on my dissertation committee, their encouragement, and their valuable feedback related to my dissertation work.

I thank Joachim Vosgerau for his contributions to the reported research and the resulting publication.

In addition to the above-mentioned individuals, I would also like to thank Jonah Berger, Arnd Florack, Chris Janiszewski, Jeff Inman, Cait Lamberton and Annamarie Vogt for their guidance, training, and support at various stages of my academic pursuits.

I would like to acknowledge the financial and academic support of the Marketing Department at the University of Miami. I also thank the Ph.D. students and research assistants at the University of Miami and Carnegie Mellon University for their assistance in data collection.

Last but not least, I thank my family and friends for their love and support during these important years. A special thank you goes to my mother, Susan D. Weymouth. Thank you for being such a wonderful role model and mother.

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CHAPTER 1: INTRODUCTION

People believe that the hedonic response to an outcome not only depends on the desirability of the outcome, but also on the probability of its occurrence (e.g., Loewenstein & Lerner, 2003; Mellers, Schwartz, Ho, & Ritov, 1997). Losses are almost never pleasurable, but people believe losses hurt less when they are small and/or expected than when they are large and/or unexpected. Conversely, gains are almost always pleasurable, but are more so when they are greater and/or unexpected than when they are small and/or expected. When people decide which potential losses to avoid and which potential gains to pursue, their decisions depend on predictions of their hedonic responses to those potential future gains and losses. Thus, an important question is whether affective forecasters are able to accurately predict the extent to which their hedonic responses to an outcome are influenced by the magnitude of the outcome and by the probability of its occurrence.

A variety of cognitive and motivational biases give rise to systematic errors in affective forecasting (e.g., Eastwick, Finkel, Krishnamurti, & Loewenstein, 2007; Hsee & Zhang, 2004; Morewedge & Buechel, 2013; Morewedge, Gilbert, & Wilson, 2005; Nelson & Meyvis, 2008; Sieff, Dawes, & Loewenstein, 1999; Wilson, Whitley, Meyers, Gilbert, & Axom, 2000; Wilson & Gilbert, 2003; 2005). Most experiments in this existing literature have examined the accuracy of forecasts for uncertain outcomes, but have not systematically measured or manipulated the specifications that are associated with the event. For example, this literature has not examined outcomes with precisely defined probabilities, nor has it precisely manipulated the probability of the forecasted outcomes. To illustrate, Gilbert and colleagues (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998), asked assistant professors to forecast how happy would feel if they received or were denied tenure. Obtaining tenure is an uncertain outcome for most professors, but the probability of receiving tenure presumably varies among different universities and for different professors. Given that the probability of receiving tenure was not measured or manipulated, it is unclear whether and how the probability of receiving tenure influenced forecasts and experiences, or how the probability influenced forecasting errors.

The desirability of an outcome (i.e., the magnitude or the significance) has received some attention in recent research on affective forecasting (Dunn & Ashton-James, 2008; Gilbert, Lieberman, Morewedge, & Wilson, 2004; Hsee & Zhang, 2004; Morewedge, Gilbert, Keysar, Berkovits, & Wilson, 2007). Nevertheless, given the extent to which outcomes vary in desirability and the extent to which variations determine people's happiness with the outcome (Kahneman & Tversky, 1979), it is necessary to gain a more precise understanding of when and why magnitude specifications influence affective forecasts and experiences.

The present dissertation addresses this important topic in consumer and decision making research. It directly compares the sensitivity of affective forecasts and experiences to both magnitude and probability specifications of outcomes, and develops a theory to understand whether and when affective forecasters can accurately predict to what extent their hedonic responses are influenced by outcome specifications. The central premise of the theory is that there is a difference in the affective intensity of the outcome when making an affective forecast for that outcome and when experiencing it. Hedonic experiences are typically more affectively intense than mental simulations of those experiences. Because of this difference, experiencers devote a larger share of their limited attentional resources to the outcome (e.g., receiving tenure) and a smaller share to its outcome specifications (e.g., the importance or the likelihood of receiving tenure) than do affective forecasters. Thus, outcome specifications receive less weight and have less impact on experienced hedonic responses to an outcome than on affective forecasts for that outcome. As a result, experiencers generally exhibit less sensitivity to the specifications of an outcome than do affective forecasters, leading to errors in affective forecasting.

The dissertation makes several contributions to the existing literature. First, it contributes to the understanding of predicted and experienced utility. Specifically, it establishes that affective forecasters are more sensitive to two central outcome specifications – the probability and the magnitude of an outcome – than experiencers, leading to errors in affective forecasting. Importantly, these errors in affective forecasting can occur in two qualitatively different directions, namely the over- or underestimation of affective responses. The dissertation specifies when each is more likely to occur. Furthermore, it aims to provide evidence that the difference in sensitivity to outcome specifications between forecasters and experiencers arises due to differences in affective intensity of the outcome, which in turn leads to differences in attention to outcome specifications. Identifying the differences in affective intensity between forecasted and experienced events as a source of errors in affective forecasting contributes to the list of other sources that have been identified in the literature, such as the tendency to underestimate adaptation, the tendency to focus too much on the event itself when making affective forecasts, and the difference in evaluation mode that is frequent between forecasters and experiencers.

Second, by providing insight into how the affect influences attention and sensitivity to outcome specifications, the present research aims to further the understanding of when and why consumers are more or less likely to be sensitive to probability and magnitude specifications in general.

The rest of the dissertation is organized as follows: Chapter 2 outlines the theoretical background and the theoretical framework of the present investigation. Chapter 3 focuses on the difference in sensitivity to probability specifications exhibited by affective forecasters and experiencers. Six experiments test affective forecasters' and experiencers' differential sensitivity to probability specifications, as well as the proposed process that underlies their difference in sensitivity. Chapter 4 generalizes differences in affective forecasters' and experiencers' sensitivity to outcome specifications from probability specifications to magnitude specifications. Two experiments test affective forecasters' and experiencers' differential sensitivity to magnitude specifications. Chapter 5 examines how simultaneous variations in probability specifications and magnitude specifications differently influence affective forecasters and experiencers. Specifically, it tests whether differences in the sensitivity to these outcome specifications determine the direction of the forecasting errors. Chapter 6 concludes with a discussion of how the present research contributes and relates to previous findings in relevant research streams and outlines its implications for consumers and marketers.

CHAPTER 2: THEORETICAL BACKGROUND AND FRAMEWORK

Theories of expected value (e.g. prospect theory) suggest that the utility of an outcome that may occur in the future (i.e., a prospect) should be positively correlated with both the desirability of the outcome and the probability of its occurrence (Kahneman & Tversky, 1979; Laplace, 1814/1951). It is better to have a chance to win $100 than $1, for example, and to have a 99% chance of winning either amount than a 1% chance of winning either amount.

In contrast, hedonic responses to an outcome that one is experiencing are believed to be positively correlated with the desirability of the outcome and inversely related to the probability of obtaining it (Kahneman & Miller, 1986, Mellers et al., 1997). It is more pleasurable to win $100 than $1, but it is presumably more pleasurable to have won either amount if one had a 1% chance of winning than if one had a 99% chance of winning.

More generally, hedonic responses toward an outcome depend on the utility of the outcome itself, comparisons between it and counterfactual alternatives, and the likelihood of its occurrence (Mellers et al., 1997). Winning $5 is more pleasurable when the alternative is winning $3 than when the alternative is $7 (Kassam, Morewedge, Gilbert, & Wilson, 2011), and receiving nothing is better when the alternative was losing $50 than when the alternative was winning $50 (Mellers et al., 1997). Furthermore, the less likely the actual outcome and the more likely a prominent counterfactual alternative is, the more surprising is the outcome and the more intense is a person's emotional reaction. For instance, when an outcome (e.g., winning $100) is better than its counterfactual alternative (e.g., winning $0), the larger the probability of its counterfactual alternative is, the more elated one will feel if one experiences the outcome. Conversely, when an outcome (e.g., winning $100) is worse than its counterfactual alternative (e.g., winning $200), the larger the probability of its counterfactual alternative is, the more disappointed one will feel if one experiences it (Brandstaetter, Kuehberger, & Schneider, 2002; Kahneman & Miller, 1986; Mellers et al., 1997).

Value and Probability Sensitivity

The impact that counterfactuals have on hedonic evaluations demonstrates the lability of these judgments. The utility derived from a given outcome is not related to its magnitude and absolute manner. Instead, the utility from an outcome is evaluated in relation to a reference point to which an outcome is compared. The reference dependence of value is one of the central insights of Prospect Theory (Kahneman & Tversky, 1979). More generally, the Prospect Theory value function is defined by deviations from a reference point and is normally concave for gains and convex for losses. Two important characteristics of the value function are (1) *loss aversion*, the observation that the slope of the utility function is generally steeper for losses than for gains and (2) *diminishing marginal utility*, the observation that while two cookies are better than one, the utility derived from eating the first cookie is usually greater than the utility derived from eating the second cookie. In other words, as the magnitude increases, the sensitivity toward variations in magnitude decreases.

Importantly, sensitivity to magnitude variations (i.e., how steep the value function is) depends on many other factors. An important factor determining sensitivity is the "evaluability" of the outcome (Hsee & Zhang, 2010). The utility derived from a given value is easier to evaluate for some outcomes than for others. Outcomes for which humans have an innate psychological scale are easiest to evaluate (Hsee & Zhang, 2010). Examples of such inherently evaluable outcomes are temperature or pain. Stubbing a toe does not require any external information to feel bad and painful. Even so, *how* painful it feels might depend on whether one compares it to a broken bone or a paper cut (Hsee, Loewenstein, Blount & Bazerman, 1999). Evaluation becomes more difficult for outcomes that are not inherently evaluable. An example for such an outcome is money. Despite often being used as a proxy for utility, money is a second-order reinforcer that is measured on an artificial scale. Making judgments about the utility it yields requires the mapping of this artificial scale onto psychological utility scales (Stevens, 1975). The complicated nature of this mapping process leaves money relatively “inevaluable” (Buechel & Morewedge, in press; Hsee, Yang, Li, & Shen, 2009; Yang, Hsee & Zheng, 2011). Evaluability is enhanced when an external comparison standard is present because the judge can use it as a reference point, putting the judge in joint evaluation mode (Hsee et al., 1999; Hsee & Zhang, 2004; 2010). Sophia would likely be more sensitive to the value of a $20 gift card received for Christmas if she had a sibling who received $30 than if she were a single child having no comparison standard to judge the generosity of the gift.

Familiarity with a good allows for retrieval of comparison standards from memory when no external standards are present (Buechel & Morewedge, in press; Hsee & Zhang, 2010), thus also aiding evaluability. A student receiving a B on an exam can quickly retrieve the grading scale from memory and assess the happiness with the grade, for example. Similarly, after receiving Christmas gift cards for many years, Sophia will learn to better evaluate the generosity of the gift giver. When no such standards are present or when they cannot be retrieved from memory, value sensitivity is decreased.

Important for the present research, sensitivity is also decreased when the outcomes for which judgment are made evoke intense emotions – when they are “affect-rich”. Affect-rich judgments and decisions have been shown to be less sensitive to outcome magnitude specifications than affect-poor judgments (Diener, Kahneman, Tov & Arora, 2010; Hsee & Rottenstreich, 2004; Kahneman & Deaton, 2010). Hsee and Rottenstreich found that the difference of participants’ willingness to pay to save four pandas versus one panda was greater when the pandas were represented as dots (affect-poor) than when the pandas were represented with cute pictures of a panda (affect-rich). Similarly, well-being has been shown to be more highly correlated with the more abstract (and more affect-poor) measure of “life-satisfaction” and evaluation of life, but less correlated with the more emotional (affect-rich) happiness measures and emotional well-being (Diener, et al, 2010; Kahneman & Deaton, 2010).

How sensitive hedonic responses are to probability specifications of experienced outcomes has received relatively little attention in the literature. However, considerable research has examined how sensitive people are to the probability specifications of risky prospects when making judgments and decisions about their expected value. Research in this domain has shown that people do not incorporate probability information in a linear fashion when evaluating the desirability of risky prospects (Kahneman & Tversky, 1979). With the exception of probability specifications making outcomes certain as opposed to uncertain (e.g., medical treatments with a 0% versus a 1% mortality rate), variations in the probability of prospects are typically underweighted. Again, and important for this investigation, the insensitivity toward probability variations when making utility judgments and decisions about risky prospects is particularly exacerbated when those prospects evoke intense emotions and are “affect-rich” (Arkes, Herren, & Isen, 1988; Rottenstreich & Hsee, 2001; Slovic, Finucane, Peters, & MacGregor, 2004; Suter, Pachur, & Hertwig, 2012; Sunstein, 2002). Rottenstreich and Hsee (2001), for example, found that the difference in the monetary amount participants demanded to opt out of a gamble in which they had a 1% or 99% chance of winning was smaller when the prize was a $500 trip to Europe (i.e., an affect-rich outcome) than when the prize was a $500 tuition remission (i.e., an affect-poor outcome). In other words, when determining the value of the gamble, participants were less sensitive to the probability of the gamble when the prize was affect-rich than when it was affect-poor.

Similarly, the risk-as-feelings hypothesis posits that decisions relating to risky options are insensitive to probability variations when the outcome is emotionally powerful enough to place people in an affect-rich state (Loewenstein, Weber, Hsee, & Welch, 2001). Indeed, the influence of affect-richness on probability sensitivity is so strong that in some cases it can be modeled as complete probability neglect. Suter and colleagues (2012) showed that lottery choices were predicted by distorted weighting of their probabilities when the options were affect-poor, whereas their choices were predicted by complete neglect of their probabilities when the options were affect-rich. This suggests that, at least in the domain of risky prospects, affect-richness seems to influence probability sensitivity in a way that can be described as leading to the partial and sometimes total neglect of probability information.

Affective Forecasting

Research on affective forecasting has demonstrated that people have difficulty predicting the intensity and the duration of affect evoked by future outcomes (Gilbert & Wilson, 2007). Affective forecasters exhibit an impact bias, a tendency to overestimate the intensity and duration of their emotional reactions to a diverse array of future events, including winning money, receiving an HIV-positive test result, being denied tenure, the dissolution of a romantic relationship, the outcome of political elections, narrowly missing a train, and their team winning or losing a sporting event (Eastwick et al., 2007; Gilbert et al., 1998; Gilbert, Morewedge, Risen, & Wilson, 2004; Meyvis, Ratner, & Levav, 2010; Sieff et al., 1999; Wilson et al., 2000).

The impact bias has been examined by assessing the accuracy with which affective forecasters can predict the intensity and duration of their hedonic responses to specific future events (Andrade & Van Boven, 2010; Gilbert & Wilson, 2007) and the cognitive and dispositional factors that underlie their errors (e.g., Meyvis et al. 2010; Morewedge, Gilbert, & Wilson, 2005; Nelson & Meyvis, 2008; Quoidbach & Dunn, 2010; Wilson et al., 2000).

Given that future events vary with regard to their outcome specifications, such as their magnitude or probability of occurrence, it is similarly important to understand whether and when affective forecasters can accurately predict the influence of such outcome specifications on their hedonic responses to the events.

Initial evidence suggests that affective forecasters and experiencers differ in their sensitivity to one kind of outcome specifications, namely magnitude specifications. Hsee and Zhang (2004), for example, found that people often predict that they will be more sensitive to the magnitude of outcomes than they actually are because predictions are often made in a joint evaluation mode (i.e., considering two or more outcomes simultaneously), whereas experiences occur in a single evaluation mode (i.e., realizing and experiencing a single outcome), the latter making differences in magnitude less salient. Morewedge et al. (2007) examined affective forecasters' beliefs about the utility function for gains at small magnitudes in a single evaluation mode and found that affective forecasters underestimate the size of a gain necessary to change their hedonic experience. Dunn and Ashton-James (2008) found that people exhibit a greater impact bias for larger than for smaller death toll tragedies. Similarly, Gilbert, Lieberman, et al. (2004) showed that affective forecasters falsely predict that a less significant aversive event would cause a shorter duration of pain than a more significant aversive event because they failed to consider that significant aversive events trigger psychological processes to attenuate them. Finally, Gilbert, Morewedge et al. (2004) demonstrated that affective forecasters overestimate the amount of regret they would experience if they missed an outcome by a small margin as opposed to a large margin.

These findings demonstrate isolated cases in which affective forecasters and experiencers exhibit different sensitivity to the magnitude of future events (e.g., the amount of money won or number of lives lost). Given the extent to which outcomes vary with regards to specifications such as magnitude and probability, a more precise understanding of when and why outcome specifications differently influence affective forecasts and experiences is important and missing. For example, only one study has directly compared affective forecasts and the intensity of immediate reactions to different magnitude specifications (Dunn &Ashton-James, 2008), whereby the forecasted event was a specific and hypothetical negative event (i.e., reading about different death tolls of a tragedy). Furthermore, no research to date has explored whether affective forecasts and experiences are differently impacted by probability specifications. Mellers and colleagues (1997) and Brandstaetter and colleagues (2002) found that probability specifications influence participants' predicted and reported emotional responses, but the accuracy of predictions was not tested.

Theoretical Model

This dissertation proposes a general theory of why and when affective forecasters and experiencers differ in their sensitivity to outcome specifications. The objective of the present research is to investigate whether affective forecasters are accurate in predicting how much magnitude and probability specifications will impact hedonic responses to an outcome. The theory posits that affective forecasters will overestimate how sensitive hedonic responses to an outcome will be to its magnitude and the probability of its occurrence.

First, the theory proposes that there is a difference in the affective intensity of an outcome when making an affective forecast for that outcome and when actually experiencing it. The experience of an outcome is vivid, concrete, and replete with emotional responses, including physiological reactions, arousal, facial expressions, and the cognitive appraisals of the experience (Myers, 2004). An affective forecast of an outcome, in contrast, is an imagined or a simulated reaction toward an abstract and hypothetical event. Although affective forecasters often overestimate the hedonic response that the outcome will evoke (Wilson & Gilbert, 2003), the affective intensity of that outcome while simulating or "pre-feeling" it is usually lesser than the affective intensity of that outcome while experiencing it (Gilbert & Wilson, 2007; Loewenstein, 1996). Thus, the forecasted experience of an outcome is typically less affectively intense during judgment than its actual corresponding experience (Loewenstein, Prelec, & Shatto, 1998). When imagining how one would feel while skydiving, for example, one may overestimate how exciting it would be to skydive (as the impact bias suggests), but the mere simulation of that experience is not as affectively intense as is the actual experience of skydiving. In other words, when imagining skydiving, one might anticipate intense feelings of fear and an increased heart rate at the moment that one is jumping out of a plane, possibly triggering a fluttery feeling in the moment (Gilbert & Wilson, 2007), but one is less likely to experience the same intensity of fear and increase in heart rate at the moment of imagination than at the moment when one is actually jumping out of that plane.

Second, the theory proposes that this difference in the affective intensity of forecasts for an outcome and the corresponding experience leads to differences in attention to outcome specifications, such as magnitude and probability. People tend to pay more attention to affectively intense stimuli (Bradley, 2009; Bradley, Houbova, Miccoli, Costa & Lang, 2011) than to neutral stimuli, and affectively intense experiences such as pain and consumption draw attention to the experience itself (Eccleston & Crombez, 1999; Morewedge, Gilbert, Myrseth, Kassam, & Wilson, 2010; Walker 1971). Because attentional resources are limited (Broadbent, 1958; Deutsch &Deutsch, 1963), if more attention is devoted to the experienced outcome itself, then less attention is devoted to more peripheral and abstract specifications associated with the outcome (Bradley, Keil,

& Lang, 2012). Consequently, experiencers should typically devote less attention to the outcome specifications of an outcome than affective forecasters.

Finally, the theory suggests that this difference in the allocation of attention between affective forecasters and experiencers leads to differential sensitivity to outcome specifications, such as outcome magnitude and probability. For magnitude and probability specifications to influence a person's affective forecast or hedonic response to an experience, they have to be attended to, appraised, and incorporated into judgment (Lazarus, 1991; Bhatia, 2013). Because experiencers attend less to magnitude and probability specifications, such outcome specifications are predicted to typically have less influence on hedonic responses to outcomes than on affective forecasts for those outcomes.

As tentative support for this theory, research in the domain of risky gambles reviewed earlier has shown that vivid or affect-rich outcomes, which elicit more intense affect in the judge, reduce sensitivity to probability and magnitude specifications (Arkes et al., 1988; Hsee & Rottenstreich, 2004; Loewenstein et al., 2001; Rottenstreich & Hsee, 2001; Slovic et al., 2004; Sunstein, 2002), such that outcome specifications seem to be largely neglected (Suter et al., 2012).

It is important to note that the theory also predicts when forecasters and experiencers should be similarly sensitive to outcome specifications. Forecasters should be similarly insensitive to outcome specification as experiencers if their attention is diverted away from outcome specifications to another task and if the forecasted outcome is sufficiently affectively intense while forecasting their response to it. The theory also predicts that experiencers should be sensitive to outcome specifications of an outcome if their attention is drawn toward its outcome specifications.

The general theory is tested in the following two chapters. Chapter 3 examines whether affective forecasters are more sensitive to probability specifications than experiencers, and whether differences in the affective intensity of forecasts and experiences underlie the attention paid to and influence of probability specifications. Chapter 4 examines the generalizability of the finding by testing whether the difference in sensitivity between forecasters and experiencers extends to magnitude specifications. Finally, Chapter 5 investigates how probability and magnitude jointly influence affective forecasts and experiences. If forecasters are more sensitive to outcome specifications, then the magnitude and the probability of an outcome will likely determine whether forecasters overestimate or underestimate their emotional response to that outcome. High magnitude and low probability are theorized to beget overestimation of future emotional response, whereas low magnitude and high probability are theorized to beget underestimation of future emotional responses.

CHAPTER 3: FORECASTERS' AND EXPERIENCERS' SENSITIVITY TO PROBABILITY SPECIFICATIONS

The research in the present chapter predicts that the asymmetry in the affective intensity of an outcome when making an affective forecast for that outcome and when actually experiencing it leads to different attention to probability specifications and therefore to different sensitivity to those specifications. As a result, affective forecasters should be more sensitive to probability specifications than are experiencers, and therefore overestimate the extent to which probability specifications will influence hedonic experiences. In other words, there should be a greater difference between forecasted happiness for a high probability event versus a low probability event than there is between experienced happiness for the same high probability event versus low probability event.

Six experiments test affective forecasters' and experiencers' differential sensitivity to probability specifications, as well as the proposed process that underlies their difference in sensitivity. Experiment 1 and Experiment 2 tested the main prediction that affective forecasters are more sensitive than experiencers to probability specifications for both positive and negative outcomes. Experiment 3 and Experiment 4 tested whether differences in the allocation of attention underlie this difference in sensitivity. Experiment 3 tested whether diverting the attention of forecasters away from probability specifications reduces their sensitivity to those specifications. Experiment 4 tested whether drawing attention to probability specifications increases the sensitivity of experiencers to those specifications. Experiment 5 and Experiment 6 tested the core theory that differences in the affective intensity of forecasts and experiences underlie the attention paid to and influence of probability specifications. Each tested whether differences in sensitivity to probability specifications between forecasters and experiencers were diminished when the forecasted outcome was made more affectively intense.

3.1. DIFFERENTIAL SENSITIVITY TO PROBABILITY SPECIFICATIONS FOR GAINS AND LOSSES

Experiment 1

Experiment 1 tested the hypothesis that affective forecasters overestimate the extent to which probability specifications of a positive outcome will influence their hedonic response to that outcome. Forecasters predicted how happy they would be if they won $1, given either a 10% or a 90% probability of winning. Experiencers won $1, given either a 10% or a 90% probability of winning, and reported how happy they were. Forecasters were expected to be more sensitive to the probability of winning $1 than experiencers.

Method

Participants and Design

Sixty-one pedestrians on the University of Miami campus (38 females and 23 males; M_{age} = 36.02 years, *SD* = 12.70) participated in the experiment. Participants were randomly assigned to one of four conditions in a 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) between-subjects design.

Procedure

Participants played a game of chance in which they drew a ball from an opaque bag containing 10 balls of the same shape and size. A drawstring at the top of the bag enabled the experimenter to close the opening, making the contents of the bag non-visible to the participants. Participants were told that they would win $1 if they drew a ball marked with an "X", and that they would not win anything ($0) if they drew a ball not marked with an "X". Half of the participants were told that one of the 10 balls (i.e., 10%) was marked with an "X". The other half were told that nine of the 10 balls (i.e., 90%) were marked with an "X". In fact, all balls were marked with an "X", so that all participants drew a winning ball and won $1.

Before drawing a ball, forecasters predicted how happy they would be if they drew a ball with an "X" and won $1 on a 13-point scale with endpoints, *Very Unhappy* (1) and *Very Happy* (13). They then drew a ball with an "X" and were given $1. Experiencers reported their happiness on the same scale after drawing a ball with an "X" and receiving $1. Finally, as a manipulation check, participants assessed their subjective likelihood of winning on an 11-point scale with endpoints, *Very Low* (1) and *Very High* (11).

Results

Manipulation Check

A 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA on subjective likelihood estimates revealed a significant main effect of probability of winning, such that participants in the 10% conditions reported a lower subjective likelihood of winning (M = 5.82, SD = 3.03) than did participants in the 90% conditions (M = 7.70, SD = 3.84), $F(1, 57) = 4.57$, $p = .04$, $\eta^2 = .07$. No other effects were significant, Fs < 1.

Forecasted and Experienced Happiness

Happiness ratings were submitted to a 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA. The analysis revealed a main effect of role, $F(1, 57) = 8.35$, $p = .005$, $\eta^2 = .13$. There was no main effect of probability of winning, $F(1, 57) = 1.52$, $p = .22$. More important, there was a significant role x probability of winning interaction, $F(1, 57) = 4.74$, $p = .03$, $\eta^2 = .08$. As predicted, forecasters were more sensitive to the probability specifications than were experiencers (*Figure 1*). Forecasters predicted that they would be happier winning $1 when their probability of winning was 10% (M = 9.53, SD = 2.07) than when it was 90% (M = 7.27, SD = 2.65), $F(1, 57) = 5.27$, $p = .03$, $\eta^2 =.09$. In contrast, experiencers were similarly happy having won $1, whether their probability of winning was 10% (M = 10.00 SD = 2.67) or 90% (M = 10.63 SD = 2.78), $F < 1$.

Discussion

Affective forecasters were more sensitive to probability specifications than were experiencers. Thus, forecasters overestimated the extent to which the probability specifications would influence the hedonic responses of experiencers to that outcome. Forecasters predicted that winning $1 given a 10% probability of winning would yield greater happiness than winning $1 given a 90% probability of winning. Experiencers, however, were startlingly insensitive to the probability specifications of the outcome. Experiencers were equally happy whether they won $1 in a gamble given a 10% or a 90% probability of winning. [1]

It is important to note that, within the low and high probability conditions, forecasters and experiencers in this and the following experiments did not differ with respect to the perceived likelihood of obtaining the outcome. Consequently, their different sensitivity to probability specifications cannot be attributed to differences in perceived likelihood of winning.

Experiment 2

Experiment 2 examined whether the different sensitivity to probability specifications between forecasters and experiencers that was found in Experiment 1 generalizes to situations involving negative outcomes and less extreme probability

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[1] The results of Experiment 1 were replicated with a non-monetary outcome (a box of chocolates). The results of this experiment are not reported because Experiment 3 also replicates forecasters' and experiencers' difference in sensitivity to probability specifications with a non-monetary outcome as part of a larger design in which cognitive load is manipulated (i.e., results are replicate in the low cognitive load conditions).

specifications. Forecasters predicted how happy they would be if they won or did not win $3, given a 20% or an 80% probability of winning. Experiencers reported how happy they were after winning or not winning $3, given a 20% or an 80% probability of winning. Forecasters were expected to be more sensitive to probability specifications than experiencers for both positive and negative outcomes.

Additionally, this experiment began to explore why affective forecasters are more sensitive to probability specifications than are experiencers. A key assumption of the proposed theory is that affective forecasters are more likely to attend to probability specifications than are experiencers and that forecasters therefore are more likely to be influenced by these specifications than are experiencers. For a preliminary test of the proposed theory, an open-ended question asking participants to spontaneously report any information influencing their reports was included. If the proposed theory is true, then affective forecasters should be more likely to spontaneously mention probability specifications (i.e., their likelihood of winning) than experiencers.

Method

Participants and Design

Three hundred and seventy-two University of Miami students (143 females and 229 males; M_{age} = 20.15 years, *SD* = 3.30) participated in the experiment as part of a one-hour laboratory session in exchange for course credit. Participants were randomly assigned to one of eight conditions of a 2 (role: forecaster, experiencer) x 2 (probability of winning: 20%, 80%) x 2 (outcome: winning, losing) between-subjects design.

Procedure

Participants played a game of chance in which they picked one of 10 identical opaque envelopes. They were told that they would win $3 if they picked an envelope containing a ticket displaying a dollar sign and that they would not win anything ($0) if they picked an envelope containing a blank ticket. Half of the participants were told that two of the 10 envelopes (i.e., 20%) contained a winning ticket. The other half were told that eight of the 10 envelopes (i.e., 80%) contained a winning ticket. In fact, five of the 10 envelopes contained a winning ticket in all conditions, making the objective probability of winning 50% for all participants.

Before drawing an envelope, half of the forecasters predicted how happy they would be if they drew an envelope containing a winning ticket and won $3. The other half predicted how happy they would be if they drew an envelope containing a blank ticket and did not win anything ($0). All forecasts were made on analog scales with endpoints, *Very Unhappy* (-100) and *Very Happy* (100). The slider was initially positioned at the midpoint (0). After making their predictions, forecasters were asked to write down any thoughts that had occurred to them while making their predictions in an open-ended response text box. They then drew an envelope and received $3 if it contained a winning ticket and $0 if it contained a blank ticket. Experiencers drew a ticket, noted the outcome, and reported their happiness on the same scale as did forecasters. Subsequently, experiencers wrote down any thoughts that had occurred to them while reporting their happiness. Finally, as a manipulation check, all participants reported their subjective likelihood of winning on an analog scale with the endpoints, *Very Unlikely* (1) and *Very Likely* (100).

Results

Manipulation Checks

A 2 (role: forecaster, experiencer) x 2 (probability of winning: 20%, 80%) x 2 (outcome: winning, losing) between-subjects ANOVA on subjective likelihood estimates revealed a significant main effect of probability of winning, such that participants in the 20% probability of winning conditions reported a lower subjective likelihood of winning ($M = 42.18$, $SD = 24.87$) than did participants in the 80% probability of winning conditions ($M = 61.15$, $SD = 26.23$), $F(1, 363) = 53.95$, $p < .001$, $\eta^2 = .13$. There was also a significant main effect of outcome, such that participants in the winning conditions reported higher subjective likelihood of winning ($M = 55.27$, $SD = 26.83$) than did participants in the losing conditions ($M = 46.91$, $SD = 27.05$), $F(1, 363) = 11.22$, $p = .001$, $\eta^2 = .03$. No other effects were significant, *F*s < 1.

Forecasted and Experienced Happiness

Happiness ratings were submitted to a 2 (role: forecaster, experiencer) x 2 (probability of winning: 20%, 80%) x 2 (outcome: winning, losing) between-subjects ANOVA. The analysis revealed a main effect of outcome, $F(1, 364) = 386.66$, $p < .001$, $\eta^2 = .52$, a marginally significant main effect of role, $F(1, 364) = 3.42$, $p = .07$, $\eta^2 = .01$, and a marginally significant probability of winning x outcome interaction, $F(1, 364) = 3.40$, $p = .07$, $\eta^2 = .01$. More important, these effects were qualified by a significant role x probability of winning x outcome interaction, $F(1, 364) = 6.79$, $p = .01$, $\eta^2 = .02$. As predicted, forecasters were more sensitive to probability specifications than were experiencers for both winning and losing (*Figure 2*). No other effects were significant, *F*s < 1. For the purpose of clarity, the results are presented split by outcome.

Winning Conditions. In the winning conditions, there was a marginally significant role x probability of winning interaction, $F(1, 198) = 3.30$, $p = .07$, $\eta^2 = .02$. Forecasters predicted that they would be happier winning the gamble (and winning $3) when their probability of winning was 20% ($M = 61.15$, $SD = 25.08$) than when it was 80% ($M = 45.78$, $SD = 27.86$), $F(1, 198) = 6.08$, $p = .02$, $\eta^2 = .03$. In contrast, experiencers were similarly happy having won the gamble (and winning $3), whether their probability of winning was 20% ($M = 60.50$, $SD = 32.22$) or 80% ($M = 60.64$, $SD = 34.07$), $F < 1$.

Losing Conditions. In the losing conditions, there was a marginally significant role x probability of winning interaction, $F(1, 166) = 3.38$, $p = .07$, $\eta^2 = .02$. As predicted, forecasters predicted that they would be unhappier about losing the gamble (and not winning $3) when their probability of winning was 80% (i.e., 20% probability of losing; $M = -27.21$, $SD = 43.14$) than when it was 20% (i.e., 80% probability of losing; $M = -9.85$, $SD = 41.35$), $F(1, 166) = 3.78$, $p = .05$, $\eta^2 = .02$. In contrast, experiencers were similarly unhappy having lost the gamble (and not winning $3), whether their probability of winning was 80% ($M = -9.30$ $SD = 39.87$) or 20% ($M = -14.75$, $SD = 37.47$), $F < 1$.

Thought Listing

Spontaneous thought listings were coded by two research assistants who were blind to the hypotheses. The coders noted whether participants mentioned thoughts related to the probability specifications (i.e., probability, percentage, likelihood, chance, certainty, odds, expectation, number of winning envelopes; *No* [0], *Yes* [1]). The coders agreed in over 99% of all cases. Two cases of disagreement were resolved through discussion. A logistic regression using the dummy coded factors and their interactions tested how the manipulations influenced the mention of probability specifications in the open-ended responses. The analyses revealed that forecasters mentioned probability specifications more often than did experiencers, b = -1.65, SE = .82, χ^2 (1, N = 371) = 4.02, p = .05. No other effects were significant, $\chi^2 s$ (1, N = 371) < 1.50, ps > .20.

Discussion

Affective forecasters were more sensitive to the probability specifications of positive and negative events than were experiencers. Consequently, affective forecasters overestimated the extent to which the probability specifications of an outcome would influence hedonic responses to that outcome. Forecasters predicted that winning $3 given a 20% probability of winning would yield greater happiness than winning $3 given an 80% probability, and that losing the gamble given a 20% probability of losing would yield greater unhappiness than losing given an 80% probability of losing. In contrast, experiencers were similarly happy having won $3 given either probability of winning, and were similarly unhappy about losing given either probability of losing. These results replicate those of Experiment 1 and generalize its findings to include negative outcomes. Affective forecasters also mentioned probability specifications more often in their spontaneous thought listings than did experiencers. This result is initial tentative evidence suggesting that affective forecasters may be more likely to attend to and rely on probability specifications than are experiencers, which was tested more directly in the following.

3.2. THE ROLE OF ATTENTION IN SENSITIVITY TO PROBABILITY SPECIFICATIONS

Affective forecasters in the foregoing experiments were more influenced by probability specifications than were experiencers. The proposed theory suggest that this difference arises because the experience of an outcome is typically more affectively intense than are affective forecasts for that outcome, which leads experiencers to allocate more attention to the outcome itself and less to its probability specifications than do affective forecasters. In line with this attentional account, analysis of open-ended responses revealed that affective forecasters were more likely to mention that probability specifications influenced their judgment than were experiencers.

Experiments 3 and 4 more directly tested the proposed attentional account. Experiment 3 examined whether diverting the attention of forecasters away from probability specifications would decrease their sensitivity to probability specifications, rendering them as insensitive as experiencers. Experiment 4 examined whether drawing the attention of experiencers to the probability specifications of the experienced outcome would increase their sensitivity to its probability specifications.

Experiment 3

Experiment 3 directly tested the attentional account by manipulating the attentional resources available to affective forecasters and experiencers. According to the theory, the overestimation of probability sensitivity in Experiments 1 and 2 should disappear if both affective forecasters and experiencers devote a similar amount of attentional resources to probability specifications during judgment. If the attention of affective forecasters is diverted from the probability specifications of the outcome to a cognitive load task, their forecasts should exhibit a decrease in sensitivity to its probability specifications. In contrast, because experiences capture attention and experiencers already devote less attentional resources to probability specifications, the cognitive load task should have little effect on their sensitivity to the probability specifications of the outcome.

Forecasters under high or low cognitive load predicted how happy they would be if they won a cookie, given a 10% or a 90% probability of winning. Experiencers under high or low cognitive load won a cookie, given a 10% or a 90% probability of winning, and reported how happy they were. Forecasters were expected to be more sensitive than experiencers to probability specifications in the low cognitive load conditions, but forecasters were expected to be no more sensitive to probability specifications than experiencers in the high cognitive load conditions.

Method

Participants and Design

One hundred and eighty-five University of Miami students (80 females and 105 males; M_{age} = 19.25 years, *SD* = 1.90) participated in the experiment as part of a one-hour laboratory session in exchange for course credit. Participants were randomly assigned to one of eight conditions in a 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (cognitive load: low, high) between-subjects design.

Procedure

Participants played a game of chance in which they picked one of 10 identical opaque envelopes. They were told that they would win a cookie (shown in its original opaque wrapper) if they picked an envelope containing a ticket with a winning sticker and that they would not win anything if they picked an envelope containing a blank ticket. Half of the participants were told that one of the 10 envelopes (i.e., 10%) contained a winning ticket. The other half were told that nine of the 10 envelopes (i.e., 90%) contained a winning ticket. In fact, all envelopes contained winning tickets, so that all participants won a cookie.

After receiving these instructions, participants were given eight seconds to encode a sequence of numbers that they would have to recall later in the experiment. Participants in the low cognitive load condition were given a two-digit sequence to encode. Participants in the high cognitive load condition were given an eight-digit sequence to encode (Macrae, Hewstone, & Griffiths, 1993).

While under low or high cognitive load, forecasters predicted how happy they would be if they drew an envelope with a winning ticket and won the cookie on an analog scale with endpoints, *Very Unhappy* (-100) and *Very Happy* (100). The slider was initially positioned at the midpoint (0). Forecasters also rated the affective intensity evoked by the forecasted outcome (i.e., its emotionality) on an analog scale with endpoints, *Not at all Emotional* (-100) and *Very Emotional* (100). They then drew an envelope, won, and received a cookie. Experiencers, while under low or high cognitive load, drew an envelope, received a cookie, and rated their happiness and the affective intensity evoked by the experienced outcome on the same scales.

As a manipulation check, participants reported their subjective likelihood of winning on an analog scale with endpoints, *Very Unlikely* (1) and *Very Likely* (100). Participants[2] then recalled the sequence of digits they had been asked to remember. Participants also rated how difficult it was to remember the number sequence on an analog scale with endpoints, *Very Easy* (0) and *Very Difficult* (100), and rated the perceived cognitive resources required to memorize the sequence on an analog scale with endpoints, *Not much at all* (0) and *A lot* (100).

Results

Manipulation Checks

Subjective Likelihood Estimates. A 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (cognitive load: low, high) between-subjects ANOVA on subjective likelihood estimates revealed a significant main effect of probability of winning, such that participants in the 10% conditions reported a lower subjective likelihood of winning ($M = 33.39$, $SD = 30.83$) than did participants in the 90% conditions ($M = 86.40$, $SD = 15.29$), $F(1, 177) = 210.75$, $p < .001$, $\eta^2 = .55$. No other effects were significant, Fs < 1.

Perceived Cognitive Load. A 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (cognitive load: low, high) between-subjects MANOVA on perceived difficulty and cognitive resources required for memorizing the number sequence revealed two main effects of cognitive load, such that participants in the high-load conditions reported experiencing more difficulty remembering the number sequence

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[2] Due to a programming error, the load manipulation check questions were not displayed to the participants on the first day of data collection.

(*M* = 71.22, *SD* = 23.90) and requiring more cognitive resources to memorize it (*M* = 65.62, *SD* = 24.13) than did participants in the low-load conditions (*M* = 13.35, *SD* = 20.07 and *M* = 22.27, *SD* = 24.59, respectively), $F(1, 89) = 144.89$, $p < .001$, $\eta^2 = .62$ and $F(1, 89) = 67.10$, $p < .001$, $\eta^2 = .43$, respectively. No other effects were significant, Fs(1, 89) < 2.11, *p*s > .15.

Affective Intensity. A 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (cognitive load: low, high) between-subjects ANOVA on affective intensity revealed a significant main effect of role. The outcome evoked lower affective intensity for forecasters (*M* = -10.11, *SD* = 43.37) than for experiencers (*M* = 6.14 *SD* = 45.12), $F(1, 177) = 7.18$, $p = .01$, $\eta^2 = .04$. There was also a significant main effect of probability of winning, such that participants in the 10% conditions reported higher affective intensity (*M* = 8.42, *SD* = 41.77) than did participants in the 90% conditions (*M* = -11.33, *SD* = 45.73), $F(1, 177) = 9.42$, $p = .002$, $\eta^2 = .05$. No other effects were significant, *Fs* < 1.

Forecasted and Experienced Happiness

Happiness ratings were submitted to a 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (cognitive load: low, high) between-subjects ANOVA. The analysis revealed a marginally significant main effect of load, $F(1, 177) = 3.00$, $p = .09$, $\eta^2 = .02$. More important, the analysis revealed the predicted three-way role x probability of winning x cognitive load interaction, $F(1, 177) = 4.65$, $p = .03$, $\eta^2 = .02$ (*Figure 3*). No other effects were significant, Fs(1, 177) < 2.25, *ps* >.13. For purposes of clarity, the results are presented split by low and high cognitive load.

Low-Load Conditions. In the low-load conditions, there was a significant role x probability of winning interaction, $F(1, 87) = 4.52$, $p = .04$, $\eta^2 = .05$. As predicted, forecasters were more sensitive to probability specifications than were experiencers. Forecasters predicted that they would be happier winning the cookie when the probability of winning was 10% ($M = 64.22$, $SD = 30.53$) than when it was 90% ($M = 46.62$, $SD = 29.61$), $F(1, 87) = 3.73$, $p = .06$, $\eta^2 = .04$. Experiencers, in contrast, were similarly happy having won the cookie, whether the probability of winning was 10% ($M = 50.60$, $SD = 25.46$) or 90% ($M = 60.94$, $SD = 32.27$), $F(1, 87) = 1.20$, $p = .28$. These results replicate the findings of Experiments 1 and 2 with a non-monetary reward.

High-Load Conditions. In the high-load conditions, there was no role x probability of winning interaction, $F < 1$. As predicted, forecasters were no more sensitive to probability specifications than were experiencers. Forecasters predicted that they would be similarly happy winning the cookie, whether the probability of winning was 10% ($M = 60.20$, $SD = 32.77$) or 90% ($M = 60.17$, $SD = 27.13$), $F < 1$. Likewise, experiencers were similarly happy having won the cookie, whether the probability of winning was 10% ($M = 71.72$, $SD = 27.28$) or 90% ($M = 61.55$, $SD = 32.09$), $F(90) = 1.30$, $p = .26$.

Discussion

Changing the allocation of attentional resources by diverting attention away from probability specifications decreased the sensitivity of affective forecasters to probability specifications of a non-monetary reward (winning a cookie), but did not influence the sensitivity of experiencers to its probability specifications. Forecasters were sensitive to probability specifications under low cognitive load, but insensitive to probability specifications under high cognitive load. Experiencers, in contrast, were insensitive to probability specifications, whether they were under low or high cognitive load.

Additionally, the manipulation check revealed that the forecasted outcome was less affectively intense than the experienced outcome. The results are consistent with the proposition that the affective intensity of a forecasted outcome is less intense than the experience of that outcome, and that consequently, forecasters devote less attention to the outcome and more attention to its probability specifications than do experiencers.

Experiment 4

Experiment 4 further tested the attentional account by manipulating the salience of probability specifications among experiencers. The theory assumes that experiencers attend less to probability specifications because the greater affective intensity of experiences draws a larger proportion of attentional resources to the experienced outcome itself and away from its probability specifications.

Alternatively, it is possible that experiencers are not sensitive to probability specifications while reporting feelings because they choose to neglect this information, perhaps because they deem it as irrelevant, or because intense experiences reduce their ability to appraise and incorporate probability specifications into judgment. If experiencers are insensitive to probability specifications because they do not attend to them, as the proposed theory predicts, then directing their attention toward probability specifications should increase their sensitivity to probability specifications. If experiencers deem probability specifications to be irrelevant or are unable to process those specifications, then drawing their attention to probability specifications should not influence their sensitivity to those specifications.

Experiencers in Experiment 4 won $1, given a 10% or a 90% probability of winning, and then either reported how happy they were, or first recalled their probability of winning and then reported how happy they were. Immediately afterward, all participants were shown two probabilities and asked to identify their probability of winning the gamble. Their reaction time to identify the correct probability was recorded and served as a measure of attention to probability specifications. Experiencers who were explicitly asked to recall the probability specifications of their outcome were expected to devote more attention to those specifications (measured as a decrease in reaction time) and therefore be more sensitive to its probability specifications and be faster to identify their probability of winning.

Method

Participants and Design

Seventy-five pedestrians in Pittsburgh, PA who were recruited into a nearby behavioral laboratory (37 females and 38 males; M_{age} = 28.87 years, *SD* = 13.89) correctly[3] completed the experiment in exchange for a beverage and candy. Participants

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[3] Correct completion was contingent on the passing of the Instructional Manipulation Test (Oppenheimer, Meyvis & Davidenko, 2009), which was determined prior to the analysis of the data. The IMT is widely used to assess participants' reading of instructions. It was administered in Experiments 4 and 6 due to poor identification of the stated probability information in Experiments 1, 2, 3 and 5, which were collected prior to Experiments 4 and 6 (i.e., the experiments are not presented in chronological order).
The failure rate in Experiment 4 was 48%, which is slightly higher than the failure rate reported by the developers of the IMT; this could be due to differences in the quality of the participant sample. The analysis of the full sample is described in a separate footnote. The statistical significance in Experiment 4 and 6 increased with the exclusion of the participants who failed the IMT, suggesting that the quality of responses increased the effect size. Exclusions based on the IMT likely would have increased effect sizes in Experiments 1, 2, 3 and 5 as well, had it been administered.

were randomly assigned to one of four conditions of a 2 (probability specification salience: low, high) x 2 (probability of winning: 10%, 90%) between-subjects design.

Procedure

Participants first performed a simple task designed to familiarize them with a paradigm with which the time needed to identify their probability of winning was later measured. Participants placed their fingers on the letter keys E and I. They were then shown two numbers (one even and one uneven) displayed under the two letters. In each of 30 trials, participants identified which of the two numbers was the even or odd number by pressing the corresponding letter key. Instructions at the top of the screen indicated whether they should identify the even or odd number.

Participants then played a game of chance in which they picked one of 10 identical nutshells displayed on a computer screen. They were told that they would win $1 if they picked a nutshell containing a pearl, and that they would not win anything ($0) if they picked a nutshell that was empty. Half of the participants were told that one of the 10 nutshells (i.e., 10%) contained a winning pearl. The other half were told that nine of the 10 nutshells (i.e., 90%) contained a winning pearl. In fact, the computer was programmed so that all nutshells would reveal a pearl, so that all participants won $1.

All participants selected a nutshell and won $1. Participants in the high salience condition first recalled their probability of winning the gamble and stated it in an open-ended answer format (i.e., as a percent chance or odds). They then reported how happy they were that they had won $1 in the gamble on a 13-point scale with endpoints, *Very Unhappy* (1) and *Very Happy* (13). Participants in the low salience condition did not recall their probability of winning. Rather, they simply reported how happy they were that they had won $1 in the gamble on the same 13-point scale after a five second delay.

As a manipulation check of the salience of probability specifications, the response time to identify the probability of winning the gamble was measured immediately after participants made their happiness ratings. Specifically, participants were first told to prepare for a reaction time task similar to the task that they had performed at the beginning of the experiment. After clicking a space bar to proceed to the task, they saw an instruction at the top of the screen asking them to identify their probability of winning as quickly as possible by pressing either the E or I key on their keyboard, with each of those keys associated with either 10% or 90%.

As a manipulation check of probability of winning, participants rated their subjective likelihood of winning on a 9-point scale with endpoints, *Very Unlikely* (1) and *Very Likely* (9). Then an instructional manipulation test (IMT; Oppenheimer, Meyvis & Davidenko, 2009) was administered to assess whether or not participants had paid attention to the instructions of the experiment. Only participants who passed the test were deemed to have correctly completed the experiment and were included in the subsequent analyses.

Results

Manipulation Checks

Subjective Likelihood Estimates. A 2 (salience: low, high) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA on subjective likelihood estimates revealed a significant main effect of probability of winning, such that participants in the 10% conditions reported a lower subjective likelihood of winning (M = 2.71, SD = 2.75) than did participants in the 90% conditions (*M* = 7.20, *SD* = 2.47), $F(1, 71) = 55.45$, $p < .001$, $\eta^2 = .44$. There was also a significant salience x probability of winning interaction, $F(1, 71) = 6.28$, $p = .01$, $\eta^2 = .09$, indicating that participants who recalled the probability of winning made more extreme judgments of their perceived probability of winning. There was no main effect of salience, $F < 1$.

Probability Salience. A 2 (probability specification salience: low, high) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA on the log transformed reaction time to identify the probability of winning revealed a main effect of salience, such that participants in the high salience condition were quicker to identify the probability of winning the gamble (*M* = 1.09s, *SD* = 1.17) than were participants in the low salience condition (*M* = 1.54s, *SD* = .61), $F(1, 71) = 4.15$, $p = .04$, $\eta^2 = .06$. No other effects were significant, *Fs* < 1.

Reported Happiness

Happiness ratings were submitted to a 2 (salience: low, high) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA[4]. The analysis revealed a main effect of probability of winning, $F(1,71) = 7.23$, $p = .01$, $\eta^2 = .09$. There was no main effect of salience. More important, there was a significant salience x probability of winning interaction, $F(1,71) = 9.06$, $p = .004$, $\eta^2 = .11$ (*Figure 4*). Replicating the findings of Experiments 1-3, experiencers in the low salience condition were equally happy having won $1, whether the probability of winning was 10% (*M* = 11.31, *SD* = 1.85) or 90% (*M* = 11.44, *SD* = 1.98), $F < 1$. In contrast, experiencers in the high salience condition were

[4] A 2 (salience: low, high) x 2 (probability of winning: 10%, 90%) ANOVA including the participants who failed the IMT attention check revealed a significant interaction, $F(1,140) = 3.94$, $p = .05$, $\eta^2 = .03$, suggesting that the pattern holds for the full sample. Furthermore, a 2 (salience: low, high) x 2 (probability of winning: 10%, 90%) x 2 (IMT Attention Check: pass, fail) ANOVA revealed a significant three-way interaction, $F(1,136) = 4.86$, $p = .03$, $\eta^2 = .03$, suggesting that the predicted interaction salience x probability was stronger among participants who passed the IMT than among those who failed it.

happier having won $1 when the probability of winning was 10% (*M* = 12.84, *SD* = .375) than when it was 90% (*M* = 10.50, *SD* = 2.19), $F(1, 71) = 17.89$, $p < .001$, $\eta^2 = .20$.

Ancillary Experiment

To examine if the salience manipulation would equally influence the sensitivity of affective forecasts, an ancillary experiment was conducted with a larger number of participants (*N* = 176) from the same population. Only the 108 participants who passed the same IMT attention check as that used in Experiment 4 were included in the subsequent analyses. All participants in this ancillary experiment were affective forecasters. Because forecasted outcomes are less affectively intense than are the corresponding experiences, and forecasters are thus already more likely to pay attention to probability specifications, drawing their attention to probability specifications should have a smaller effect on their sensitivity to probability specifications than it had on experiencers in Experiment 4. Forecasters were expected to be equally sensitive to probability specifications, whether their attention was drawn to those specifications or not.

The procedure and stimuli were identical to that of the Experiment 4, except that participants predicted how happy they would be if they selected a winning nutshell and won $1. Participants in the high salience condition made this forecast after the same salience manipulation (i.e., recalling their probability of winning the gamble). Participants in the low salience condition simply made their forecast after a 5-second delay. A 2 (salience: low, high) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA revealed a main effect of probability of winning, $F(1,105) = 5.24$, $p =$

.01, $\eta^2 = .05$. There was no main effect of salience, and more important, there was no significant salience x probability of winning interaction, Fs < 1.

Discussion

Drawing attention to probability specifications increased the sensitivity of experiencers to those specifications. Experiencers were insensitive to probability specifications when their attention was not explicitly drawn to those specifications, but were sensitive to probability specifications when their attention was explicitly drawn to those specifications. An ancillary experiment revealed that drawing attention to probability specifications did not have the same effect on affective forecasters, who presumably were already attending to probability specifications during judgment. These findings, together with those of Experiment 3, provide further evidence for the proposition that differences in the allocation of attention underlie differences in sensitivity to probability specifications between affective forecasters and experiencers.

The results also rule out two possible alternative accounts of the difference in sensitivity to probability specifications between affective forecasters and experiencers. One alternative interpretation of the findings of Experiments 1- 3 is that experiencers (as well as forecasters under high load) attend to probability specifications, but they do not have the ability to process such specifications. In other words, their attentional capacity is constrained to the extent that they cannot appraise and incorporate probability specifications into their evaluations. Contrary to this account, the results showed that when attention was drawn to probability specifications, experiencers were able to incorporate probability specifications into their hedonic evaluations.

Second, the results rule out the alternative explanation that experiencers simply choose to ignore probability specifications when evaluating their hedonic response to an outcome because they deem its probability specifications to be irrelevant (e.g., because they believe they should rely on their feelings to inform their judgment; Schwarz & Clore, 1983). Contrary to this alternative account, experiencers did incorporate probability specifications into their hedonic evaluations when their attention was drawn to probability specifications.

3.3. THE ROLE OF AFFECTIVE INTENSITY IN SENSITIVITY TO PROBABILITY SPECIFICATIONS

In the foregoing experiments, affective forecasters were more sensitive to probability specifications than were experiencers. The results of Experiments 3 and 4 suggest that the difference in their sensitivity is due to an asymmetry in attention devoted to probability specifications, whereby affective forecasters are more likely to attend to and therefore be sensitive to probability specifications than are experiencers.

The theory posits that this difference in attention to probability specifications is the result of a difference in the affective intensity of an outcome when making an affective forecast for that outcome and when actually experiencing it. Outcomes are typically more affectively intense when experiencing those outcomes than when forecasting those outcomes, which leads experiencers to devote a larger share of their attentional resources to those outcomes than do affective forecasters. Consequently, probability specifications are less attended to and receive less weight in experiencer reports than in affective forecasts.

Experiments 5 and 6 directly tested the core assumptions of the theory. Experiment 5 examined whether increasing the affect-richness of a reward (i.e., the stimulus), and thus the affective intensity of the outcome, would decrease the sensitivity of affective forecasters to its probability specifications, rendering them as insensitive to probability specifications as experiencers. Experiment 6 held the reward constant and tested whether increasing the affective intensity of the outcome while participants made their affective forecasts would decrease the sensitivity of affective forecasters to its probability specifications and render them as insensitive to those specifications as experiencers.

Experiment 5

Experiment 5 manipulated the affective intensity of the forecasted outcome (winning a cookie) by presenting the reward – a chocolate-chip cookie – either in its opaque wrapper (affect-poor stimulus) or unwrapped (affect-rich stimulus; Hsee & Rottenstreich, 2004). This manipulation was based on the assumption that affect-rich stimuli would evoke greater affect intensity than affect-poor stimuli (Hoch & Loewenstein, 1991; Mischel, 1974) and would have a greater impact on affective forecasters (for whom the forecasted outcome is usually not intense) than on experiencers (for whom the experienced outcome is normally more intense).

Forecasters predicted how happy they would be if they won a wrapped or unwrapped cookie, given a 10% or a 90% probability of winning. Experiencers won a wrapped or an unwrapped cookie, given a 10% or a 90% probability of winning and reported how happy they were. Increasing the affect-richness of the reward was expected to decrease the sensitivity of forecasters to probability specifications, but not the sensitivity of experiencers.

Method

Pretest

To ensure that the manipulation of affect-richness was effective, pretest participants ($N = 44$) were randomly assigned to evaluate either a wrapped chocolate-chip cookie (presented in its original opaque wrapper) or an unwrapped chocolate-chip cookie (presented on top of its original wrapper) placed before them on a desk in a private cubicle. Participants first estimated the value of the cookie on an analog scale with endpoints, *$1* and *$3*. Then, they rated how much they liked the cookie type (i.e. chocolate-chip cookie) on a 5-point scale with endpoints, *Dislike Extremely* (1) and *Like Extremely* (5). Finally, participants evaluated the appeal of the cookie, its vividness, its affect-richness, its desirability, how tempting it was, how much emotion it elicited, and how easy it was to imagine eating it on analog scales with endpoints, *Not at all* (1) and *Very* (100).

A factor analysis of all these measures (using extraction criterion of Eigenvalue > 1) yielded two factors. One factor included the dimensions related to affect-richness (i.e., appeal, vividness, affect-richness, desirability, how tempting it was, how much emotion it elicited, ease of imagining eating it), whereas the second factor included the two remaining dimensions (i.e., the value estimate and liking of cookie type). Because the correlation between the value estimate and the liking of cookie type was low (r = -.10, p = .51), these measures were not treated as a factor, but treated as separate constructs, leaving affect-richness as the only factor. The affect-richness items were averaged to an index of affect-richness (α = .91). The affect-richness index, the value estimate, and the liking of cookie type were submitted to a 2 (wrapping: wrapped, unwrapped) x 3 (within-subject measures: affect-richness, value, liking) mixed-ANOVA. The analysis revealed a significant main effect of the within-subject measures, $F(2, 84) = 68.11$, $p < .001$, $\eta^2 = .60$, a significant between-subject effect of wrapping, $F(1, 42) = 10.59$, $p = .002$, $\eta^2 = .21$, and a significant interaction, $F(2, 84) = 10.87$, $p < .001$, $\eta^2 = .21$. Simple effects revealed that the affect-richness index was higher when the cookie was unwrapped (M = 54.69, SD = 25.60) than when the cookie was wrapped (M = 24.79, SD = 34.16), $F(1, 42) = 10.79$, $p = .002$, $\eta^2 = .20$. The wrapping manipulation did not influence the value estimate or the reported liking of the cookie type, Fs < 1 (*Figure 5*). The results of the pretest suggested that the unwrapped cookie was indeed perceived to be more affect-rich and evoked greater affective intensity than did the wrapped cookie, but the wrapping manipulation did not influence value estimates or how much participants liked the cookie.

Participants and Design

Three hundred and forty-three students and pedestrians in Pittsburgh, PA (175 females and 168 males, M_{age} = 27.12 years, SD = 12.88) participated in the experiment in either a stationary or mobile research laboratory in exchange for a soft drink or course credit. Participants were randomly assigned to one of eight conditions of a 2 (role:

forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (affect-richness: affect-poor, affect-rich) between-subjects design.

Procedure

Participants were seated in a private cubicle with a chocolate-chip cookie placed on a napkin on a desk in front of them. In the affect-poor condition, the cookie was presented in its original (opaque) wrapper. In the affect-rich condition, the cookie was unwrapped and placed on top of its original wrapper.

Participants then played a game of chance in which they picked one of 10 identical opaque envelopes. They were told that they would win the cookie in their cubicle if they picked an envelope containing a ticket with a winning sticker and that they would not win the cookie if they picked an envelope containing a blank ticket. Half of the participants were told that one of the 10 envelopes (i.e., 10%) contained a winning ticket. The other half were told that nine of the 10 envelopes (i.e., 90%) contained a winning ticket. In fact, all envelopes contained a winning ticket, so that all participants won a cookie.

Before drawing an envelope, forecasters predicted how happy they would be if they drew an envelope with a winning ticket and won the cookie on an analog scale with endpoints, *Very Unhappy* (-100) and *Very Happy* (100). They then drew an envelope and won the cookie in their cubicle. Experiencers drew an envelope, won the cookie, and rated their happiness on the same scale. As a manipulation check of probability of winning, all participants rated their subjective likelihood of winning on an analog scale with endpoints, *Very Unlikely* (1) and *Very Likely* (100).

Results

Manipulation check

A 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (affect-richness: affect-poor, affect-rich) between-subjects ANOVA on subjective likelihood estimates revealed a significant main effect of probability of winning, such that participants in the 10% conditions reported a lower subjective likelihood of winning ($M = 44.69$, $SD = 31.21$) than did participants in the 90% conditions ($M = 75.11$, $SD = 24.47$), $F(1, 335) = 96.98$, $p < .001$, $\eta^2 = .23$. No other effects were significant, *F*s < 1.

Forecasted and Experienced Happiness

Happiness ratings were submitted to a 2 (role: forecaster, experiencer) x 2 (probability of winning: 10%, 90%) x 2 (affect-richness: affect-poor, affect-rich) between-subjects ANOVA, which revealed a marginally significant probability of winning x affect-richness interaction, $F(1, 335) = 2.98$, $p = .09$, $\eta^2 = .01$. More important, the analysis revealed the predicted three-way role x probability of winning x affective-richness interaction, $F(1, 335) = 4.11$, $p = .04$, $\eta^2 = .01$ (*Figure 6*). No other effects were significant, $Fs(1, 335) < 1.60$, $ps > .20$. For the purpose of clarity, the results of the three-way interaction are presented split by affect-richness.

Affect-Poor Conditions. There was a main effect of probability of winning, $F(1, 156) = 4.16$, $p = .04$, $\eta^2 = .03$. More important, there was a significant role x probability of winning interaction, $F(1, 156) = 4.38$, $p = .04$, $\eta^2 = .03$. As predicted, forecasters were more sensitive to probability specifications than were experiencers. Forecasters predicted that they would be happier winning the cookie when the probability of winning was 10%

(*M* = 56.81, *SD* = 32.79) than when it was 90% (*M* = 33.66, *SD* = 39.13), $F(1, 156) = 9.11$, $p = .003$, $\eta^2 = .06$. Experiencers, in contrast, were similarly happy having won the cookie, whether the probability of winning was 10% (*M* = 41.38, *SD* = 36.63) or 90% (*M* = 41.69, *SD* = 30.10), $F < 1$.

Affect-Rich Conditions. There was no role x probability of winning interaction, $F < 1$. Forecasters predicted that they would be similarly happy winning the cookie, whether the probability of winning was 10% (*M* = 38.85, *SD* = 33.13) or 90% (*M* = 44.36, *SD* = 37.67), $F < 1$. Likewise, experiencers were similarly happy having won the cookie, whether the probability of winning was 10% (*M* = 46.11, *SD* = 29.88) or 90% (*M* = 44.11, *SD* = 35.71), $F < 1$.

Discussion

Increasing the affective intensity of the outcome by increasing the affect-richness of the reward decreased the sensitivity of affective forecasters to probability specifications, but did not influence the sensitivity of experiencers. Forecasters were sensitive to probability specifications when the reward was affect-poor, but insensitive to probability specifications when the reward was affect-rich. Experiencers were insensitive to probability specifications regardless of the affect-richness of the reward. The results provide direct support for the proposition that differences in the affective intensity of the forecasted and experienced outcome underlie the difference in sensitivity to probability specifications between affective forecasters and experiencers.

The present findings dovetail with the risk-as-feelings hypothesis (Loewenstein et al., 2001), which posits that behavior and decisions under uncertainty – such as the purchase of insurance policies – are insensitive toward probability variations when the behavior is driven by the feeling evoked by an outcome (see also Rottenstreich & Hsee, 2001; Sunstein, 2002). In line with this hypothesis, increasing the intensity of affect by making an outcome more affect-rich decreased the sensitivity to probability specifications in hedonic evaluations.

Importantly, the results of Experiment 5 rule out three potential alternative interpretations that could account for different sensitivity of affective forecasters and experiencers to probability specifications in the previous studies. First, the results rule out the alternative account that forecasters are more likely to be influenced by lay beliefs about how probability influences happiness with an outcome than are experiencers. Erroneous lay beliefs have been shown to underlie some affective forecasting errors (e.g., Novemsky & Ratner, 2003; Ratner, Khan, & Kahneman, 1999). A key difference between this alternative account and the present theory is that this theory predicts that affect-richness would influence the sensitivity of affective forecasters to probability specifications, as found in Experiment 5, whereas the erroneous-lay-belief account does not make such a prediction.

Second, given that forecasters in both the affect-rich and affect-poor conditions made the same evaluative judgment, but exhibited different sensitivity to probability specifications, the results also rule out the possibility that the differences in sensitivity result from differences in information processing used to make forecasts and report experiences (e.g., that affective forecasts involve more comparative judgment or a more deliberate processing style than the reporting of an experience; Kahneman, 2011).

Third, given that both groups of forecasters were asked the same question, the differences observed between the forecasters in the affect-rich and affect-poor conditions also rule out the interpretation that differences in sensitivity result from different conversational norms (e.g., that forecasters in previous studies were more likely to think that they were supposed to rely on and incorporate probability specifications in their judgment than experiencers; Grice, 1975).

A fourth possible alternative explanation is that experiencers (and forecasters in the affect-rich conditions) in previous experiments had more information to make their judgments than forecasters. For example, experiencers in Experiments 1 and 2 had information about how winning feels, whereas affective forecasters did not. Similarly, forecasters in the affect-rich condition in Experiment 5 saw the cookie without its wrapper, which might have provided them with more information about how it would taste than was provided to forecasters who saw the wrapped cookie. The availability of additional information might have made the experiencers (vs. the forecasters) in Experiments 1-2 and the forecasters in the affect-rich condition (vs. the affect-poor condition) in Experiment 5 ascribe less weight to probability specifications. Experiment 6 directly addresses this possibility.

Experiment 6

Experiment 6 manipulated the intensity of affect experienced during judgment, while controlling for information about the experienced and forecasted outcome. All participants won $1, given either a 10% or a 90% probability of winning. They then either reported their experienced happiness or forecasted how happy they would be if they won the same gamble again one week later. Forecasters in an immediate forecaster condition made their predictions immediately after winning the gamble (while the forecasted outcome was still affectively intense); forecasters in a delayed forecaster condition made their predictions after watching a 3-minute neutral video (while the forecasted outcome was no longer affectively intense). Both experiencers and forecasters who made their predictions immediately after winning the gamble were expected to be less sensitive to probability specifications than forecasters who made predictions after watching the video.

Method

Pretest

A pretest (N = 61) was run to ensure that watching a neutral 3-minute video (images of the universe) after winning the gamble would effectively reduce the affective intensity of the outcome. Pretest participants first won $1 with either a 10% or a 90% probability of winning. They then reported the intensity of affect evoked by the outcome on a 13-point scale with endpoints, *None at all* (1) and *Very Intense* (13), either immediately after learning the outcome or after watching the video.

A 2 (timing: immediate, delayed) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA on the affect intensity ratings revealed a significant main effect of timing, such that affective intensity was greater when measured immediately after winning $1 ($M$ = 6.07, SD = 2.65) than when it was measured after the 3-minute video (M = 4.23, SD = 2.69), $F(1, 57) = 6.83$, $p = .01$, $\eta^2 = .10$. No other effects were significant, Fs < 1. The results of the pretest confirmed that the video delay manipulation successfully reduced the affective intensity of the outcome, independent of its probability specifications.

Participants and Design

One hundred and thirty-three University of Miami students (73 females and 60 males, M_{age} = 21.11 years, *SD* = 5.41) correctly[5] completed the experiment as part of a one-hour laboratory session in exchange for course credit. Participants were randomly assigned to one of six conditions of a 3 (role: experiencer, immediate forecaster, delayed forecaster) x 2 (probability of winning: 10%, 90%) between-subjects design.

Procedure

Participants played a game of chance in which they picked one of 10 identical nutshells displayed on a computer screen. They were told that they would win $1 if they picked a nutshell containing a pearl and that they would not win anything if they picked a nutshell that was empty. Half of the participants were told that one of the 10 shells (i.e., 10%) contained a winning pearl. The other half were told that nine of the 10 shells (i.e., 90%) contained a winning pearl. In fact, the computer was programmed so that all nutshells would reveal a winning pearl, so that all participants won $1.

All participants selected a nutshell and won $1. Those in the experiencer condition reported their happiness about winning $1 in the gamble on a 13-point scale with endpoints, *Very Unhappy* (1) and *Very Happy* (13), immediately after learning the outcome. Participants in the two forecaster conditions were asked to imagine playing the same gamble again one week later. They then predicted how happy they would be about winning $1 in that gamble on the same scale used by experiencers. The crucial difference between the two forecaster conditions was that half of the forecasters made their forecast

[5] As in Experiment 4, correct completion was contingent on the passing of the Instructional Manipulation Test (Oppenheimer et al., 2009), which was determined prior to the analysis of the data. The failure rate was 38%, which is consistent with the exclusion rate reported by the developers of the test. The analysis of the full sample is described in a separate footnote.

immediately after winning $1, while the forecasted outcome was still affectively intense. The other half made their forecast after watching the pretested neutral 3-minute video, when the forecasted outcome was no longer affectively intense. To ensure that any differences between the delayed-forecaster condition and the other two conditions cannot be attributed to the difference in exposure to the video, both experiencers and immediate-forecasters watched the video before playing the gamble.

As a manipulation check, all participants then rated their subjective likelihood of winning on a 7-point scale with endpoints, *Very Unlikely* (1) and *Very Likely* (7). In addition, participants completed the instructional manipulation test (IMT; Oppenheimer et al., 2009) that assessed whether participants attended to the instructions. Only participants who correctly completed the IMT were included in the subsequent analyses.

Results

Manipulation Check

A 3 (role: experiencer, immediate forecaster, delayed forecaster) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA on subjective likelihood estimates revealed a significant main effect of probability of winning, such that participants in the 10% conditions reported a lower perceived likelihood of winning ($M = 2.55$, $SD = 2.21$) than did participants in the 90% conditions ($M = 5.10$, $SD = 1.71$), $F(1, 127) = 48.75$, $p < .001$, $\eta^2 = .28$. No other effects were significant, $Fs < 1$.

Reported and Forecasted Happiness

Happiness ratings were submitted to a 3 (role: experiencer, immediate forecaster, delayed forecaster) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA[6]. The analysis revealed the predicted role x probability of winning interaction, $F(2,127) = 3.47$, $p = .03$, $\eta^2 = .05$ (*Figure 7*). No other effects were significant, *F*s(2, 127) < 2.27, *ps* > .1. Replicating the findings of the previous experiments, experiencers were equally happy having won $1, whether their probability of winning was 10% ($M = 9.00$, $SD = 2.33$) or 90% ($M = 9.43$, $SD = 1.80$), $F < 1$. Similarly, immediate-forecasters predicted that they would be equally happy winning an identical gamble one week later, whether their probability of winning was 10% ($M = 9.45$, $SD = 1.84$) or 90% ($M = 10.43$, $SD = 1.91$), $F(1, 127) = 2.50$, $p = .12$. In contrast, delayed-forecasters predicted that they would be happier winning an identical gamble one week later when their probability of winning was 10% ($M = 10.74$, $SD = 2.26$) than when it was 90% ($M = 9.48$, $SD = 1.94$), $F(1, 127) = 3.99$, $p = .05$, $\eta^2 = .03$.

Discussion

The results of Experiment 6 provide compelling evidence that differences in the affective intensity of forecasted and experienced outcomes underlie the difference in sensitivity to probability specifications between affective forecasters and experiencers. Delayed forecasters, who made their forecast when the affective intensity of the outcome

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[6] A 3 (role: experiencer, immediate forecaster, delayed forecaster) x 2 (probability of winning: 10%, 90%) ANOVA including the participants who failed the IMT attention check did not reveal a significant interaction effect, $F(1,211) = 1.64$, $p = .19$, $\eta^2 = .02$. However, a 3 (role: experiencer, immediate forecaster, delayed forecaster x 2 (probability of winning: 10%, 90%) x 2 (attention check: pass, fail) ANOVA revealed a marginally significant three-way interaction, $F(2,205) = 2.65$, $p = .07$, $\eta^2 = .025$, suggesting that the predicted role x probability of winning interaction was stronger among the participants who passed the IMT than among those who failed it.

was low, were more sensitive to its probability specifications than were experiencers, despite having had the experience that they were forecasting three minutes prior to making their forecast. Immediate forecasters, who made their forecast while the forecasted outcome was affectively intense, were as insensitive to probability specifications as were experiencers.

Importantly, the results thus rule out the alternative account that differences in available information during judgment could explain the different sensitivity of affective forecasters and experiencers to probability specifications observed in previous experiments. In this experiment, delayed forecasters and experiencers had identical information about the outcome, and yet the delayed forecasters were more sensitive to its probability specifications than were experiencers. This suggests that affective forecasters' increased sensitivity to probability specifications as compared to experiencers is not due to experiencers having more diagnostic information (i.e., knowing more about the outcome) or processing a greater amount of information, diluting the influence of probability specifications (Nisbett, Zukier, & Lemley, 1981).

Moreover, both the immediate forecasters and the delayed forecasters made forecasts for the same outcome, but exhibited different sensitivity to probability specifications. The results of Experiment 6 therefore provide further evidence against the alternative explanations that were ruled out in Experiment 5, specifically, that differences in sensitivity to probability specifications result from differences in a reliance on lay beliefs, from differences in information processing during judgment, or from differences in conversational norms between affective forecasters and experiencers.

3.4. CHAPTER SUMMARY AND EXTENSIONS

Chapter 3 suggests that affective forecasters overestimate how sensitive hedonic responses to an outcome are to the probability of its occurrence. It is theorized that differences in the affective intensity of the forecasted and experienced outcome lead to differences in attentional resources devoted to its probability specifications, which in turn lead to the observed differences in sensitivity to those specifications.

The results of six experiments provide support for the existence of the forecasting error and document the theorized underlying process. Experiments 1 and 2 demonstrated the difference in sensitivity to probability specifications between affective forecasters and experiencers, and that this difference applies to both positive and negative outcomes and different probability specifications.

Experiments 3 and 4 showed that the allocation of attention toward probability specifications influences the sensitivity of affective forecasters and experiencers to probability specifications. Experiment 3 found that diverting attention away from probability specifications reduced the sensitivity of affective forecasters to probability specifications, but did not influence the sensitivity of experiencers to these specifications. Experiment 4 revealed that drawing attention to probability specifications increased the sensitivity of experiencers to probability specifications.

Experiment 5 and 6 showed that the difference in attention allocation stems from a difference in affective intensity of the forecasted and experienced outcomes. Experiment 5 showed that increasing the affect-richness of a reward reduced the sensitivity of forecasters to its probability specifications, but had no effect on the sensitivity of experiencers. Experiment 6 revealed that affective forecasters who had previously experienced an outcome were as insensitive to probability specifications as experiencers if they made their forecasts while the forecasted outcome was still affectively intense, but were more sensitive than experiencers if they made their forecasts while the outcome was no longer affectively intense.

By manipulating the affective intensity of the forecasted and experienced outcome and holding information, type of judgment, and question wording constant, the results of Experiments 5 and 6 rule out several alternative explanations that could account for the differential sensitivity of affective forecasters and experiencers to probability specifications. Specifically, sensitivity to probability specifications cannot be explained by an asymmetry in information available to forecasters and experiencers during hedonic evaluations, from differences in information processing used to make forecasts and report experiences, or from differential reliance on erroneous lay beliefs or conversational norms.

Extensions

The results of the reported experiments suggest a discrepancy between the sensitivity of affective forecasters and experiencers to probability specifications. A caveat must be expressed in terms of the generalizability of the present findings, as the probability specifications used in the experiments were always presented in an explicit, quantitative format and thus objective and relatively easy to evaluate (Hsee, 1996). It is reasonable to assume that the present findings would generalize to less objective and explicit likelihood formats, such as the perceived likelihood of missing a train, getting a promotion, or learning the outcome of a medical test. Although the results of previous research support the intuition that the present findings should generalize to cases in which the subjective likelihood of outcomes is inferred rather than stated (e.g., Gilbert, Morewedge et al., 2004), it would be beneficial for future research to systematically test the generalizability of the present findings to different likelihood formats and explore whether other outcome characteristics, such as psychological distance and perceived control, exacerbate or mitigate the differences in sensitivity to probability specifications between affective forecasters and experiencers.

While the present chapter has focused on how different sensitivities to probability specifications lead to affective forecasting errors, the difference in sensitivity between forecasters and experiencers may generalize to other outcome specifications. Initial evidence suggests that affective forecasters overestimate their sensitivity to the number of lives lost in a natural disaster (Dunn & Ashton-James, 2008). Importantly, this finding is limited to hypothetical scenarios or a specific, negative event (death tolls of natural disasters). Chapter 4 aims to extend the sensitivity of affective forecasters and experiencers to outcome magnitude specifications more generally.

CHAPTER 4: FORECASTERS' AND EXPERIENCERS' SENSITIVITY TO MAGNITUDE SPECIFICATIONS

The aim of the present chapter is to generalize the findings of Chapter 3 from probability specifications to magnitude specifications. The asymmetry in the affective intensity of an outcome when making an affective forecast for that outcome and when actually experiencing should not only lead to differential attention probability specifications; it should also lead to differential attention to other outcome specifications, such as magnitude specifications, and therefore to different sensitivity to those specifications. As a result, affective forecasters should be more sensitive to magnitude specifications than are experiencers, and therefore overestimate the extent to which magnitude specifications will influence hedonic experiences. In other words, there should be a greater difference between forecasted happiness for a high magnitude event versus a low magnitude event than there is between experienced happiness for the same large magnitude event versus low magnitude event.

Two experiments tested affective forecasters' and experiencers' differential sensitivity to magnitude specifications. Experiment 7 tested affective forecasters' and experiencers' differential sensitivity to different monetary magnitude specifications in a monetary gamble, while holding outcome probability constant. Experiment 8 tested whether this difference in sensitivity between forecasters and experiencers extends to non-monetary magnitude specifications and whether it generalizes to sure gains where no chance component is involved.

4.1. DIFFERENTIAL SENSITIVITY TO MAGNITUDE SPECIFICATIONS FOR MONETARY AND NON-MONETARY GAINS

Experiment 7

Experiment 7 tested the hypothesis that affective forecasters overestimate how much the magnitude of a monetary gain will influence their experienced affect. Forecasters predicted how happy they would be if they won $1 or $20 (rather than $0) in a gamble with a 50% probability of winning. Experiencers reported their happiness after winning $1 or $20 (rather than $0) in a gamble with a 50% probability of winning. Affective forecasters were expected to overestimate the impact of the magnitude of the gain on experienced affect.

Method

Participants and Design

Sixty-three Carnegie Mellon University students (35 males, 28 females, M_{age} = 22.84 years, SD = 6.66) volunteered to participate in the experiment. They were randomly assigned to one of four conditions in a 2 (role: forecaster, experiencer) x 2 (magnitude: $1, $20) between-subjects design.

Procedure

Participants played a game of chance in which they rolled a 6-sided die with a dice cup. They made their die roll by flipping a dice cup upside down on a table and only lifting the cup when the experimenter instructed them to do so (i.e., when the die came to a full stop). Participants were told that if they rolled an even number, they would win $1 or $20. If they rolled an odd number, they would not win any money. Participants were made to believe that they had a 50% probability of winning. Unbeknownst to the participants, the die was loaded so that it would always land on an even number. To allay participants' suspicion, participants were run one at a time and did not see die rolls made by other participants.

Before rolling the die, forecasters predicted how happy they would be if they won the gamble and received $1 or $20 on a 13-point scale with endpoints, *Endlessly Unhappy* (1) and *Endlessly Happy* (13). They then rolled an even number and were given $1 or $20 in cash. Experiencers reported their happiness on the same scale after rolling an even number and receiving $1 or $20 in cash.

Results

Happiness ratings were submitted to a 2 (role: forecaster, experiencer) x 2 (magnitude: $1, $20) between-subjects ANOVA. The analysis revealed a directional main effect of magnitude, $F(1, 59) = 2.76$, $p = .10$, $\eta^2 = .05$, such that happiness ratings were higher in the $20 condition ($M = 10.75$, $SD = 1.58$) than in the $1 condition ($M = 9.94$, $SD = 2.08$), and a main effect of role, indicating that forecasters' happiness ratings were lower ($M = 9.86$, $SD = 1.62$) than experiencers' happiness ratings ($M = 10.93$, $SD = 2.04$), $F(1, 59) = 5.83$, $p = .02$, $\eta^2 = .09$.

More important, these main effects were qualified by a significant role x magnitude interaction, $F(1, 59) = 3.94$, $p = .05$, $\eta^2 = .06$. As predicted, forecasters were more sensitive to the magnitude of the outcome than were experiencers (*Figure 8*). Forecasters predicted they would be happier if they won $20 ($M = 10.66$, $SD = 1.23$) than if they won $1 ($M = 9.06$, $SD = 1.59$), $F(1, 59) = 7.46$, $p = .01$, $\eta^2 = .11$, but experiencers were similarly happy, whether they won $20 ($M = 10.86$, $SD = 1.99$) or $1 ($M = 11.00$, *SD* = 2.14), $F < 1$. Looked at in another way, forecasters accurately predicted the impact of winning \$20 on their happiness, $F < 1$, but underestimated the impact of winning \$1 on their happiness, $F(1, 59) = 9.55$, $p = .003$, $\eta^2 = .14$.

Discussion

Holding probability of the outcome constant, affective forecasters were more sensitive to the magnitude of an outcome than were experiencers. Thus, forecasters overestimated the extent to which magnitude specifications would influence the hedonic response to that outcome. Forecasters predicted that winning \$20 in a gamble would yield greater happiness than winning \$1. Experiencers, however, were startlingly insensitive to the magnitude specifications of the outcome. Experiencers were equally happy winning \$1 or \$20 dollars in the gamble.

Experiment 8

In Experiment 7, forecasters were more sensitive than experiencers to the magnitude of a reward in a gamble with a constant probability of winning. Experiment 8 examined whether the findings generalize to situations involving non-monetary outcomes and outcomes that do not involve a chance event.

Eliminating the chance event in Experiment 8 is important because most experiences in a consumer's everyday life do not contain a precisely defined chance event. Examples for such instances are a store purchase, receiving a paycheck, or receiving a gift. Experiment 8 seeks to speak to these types of consumption experiences.

In addition, the removal of the chance component eliminates possible confounds of Experiment 7. For example, it is possible that the perceived probability of winning differed between forecasters and experiencers. The hindsight bias describes the inclination to see an event as more predictable and probable after the event has occurred (Fischhoff, 1975). This suggests that, despite holding probability constant, experiencers' perception of their probability of winning may have been higher than that of forecasters. Relatedly, the chance event introduces a difference in determinacy between the forecaster and experiencer conditions. Whereas forecasters make predictions about their hedonic response to an undetermined outcome, experiencers report their hedonic response to an outcome that has been determined. This leads to alternative explanations that could account for the difference in magnitude sensitivity between forecasters and experiencers in Experiment 7. For forecasters, the event might have been more psychologically distant (Trope & Liberman, 2010), leading forecasters in Experiment 7 to be differently involved (and therefore differently motivated) to make an accurate judgment about the hedonic impact of the magnitude than experiencers. Another possibility is that, due to the fact that the event was not yet determined, the counterfactual of not winning might have been more salient for forecasters than experiencers. This could have placed forecasters in a joint evaluation mode - increasing sensitivity to magnitude (Hsee & Zhang, 2010) - while experiencers were in a single evaluation mode. Experiment 8 seeks to address these possible confounds.

Participants in this study were told that they would receive a token of appreciation for completing a task in the study. Forecasters predicted how happy they would be if they received a single Reese's peanut butter cup or eight Reese's peanut butter cups as a token of appreciation for participating in a task. Experiencers reported their happiness after receiving either one or eight peanut butter cups as a token of appreciation for completing a task. Affective forecasters were expected to overestimate the impact of the magnitude of the token of appreciation on experienced affect.

Method

Participants and Design

One hundred and sixty-six University of Miami students (82 males, 84 females, M_{age} = 19.89, years, *SD* = 2.74) volunteered to participate in the experiment. They were randomly assigned to one of four conditions in a 2 (role: forecaster, experiencer) x 2 (magnitude: 1 cup, 8 cups) between-subjects design.

Procedure

Participants were told that the experimenters were interested in their motor skill performance. Their task in the study was to perform a simple motor skill task for which they would receive a token of appreciation. In an instructional practice round, all participants were shown a 13 x 20 grid of squares and were asked to try to click on as many squares as possible for 30 seconds. Once they had successfully clicked on a square, a check mark appeared in the box. After completing the practice round, participants moved on to the actual motor task, in which they would again click as many squares as possible. They were instructed that this time they would perform the task for 60 seconds.

Before continuing to the task, forecasters predicted how happy they would be if they received one or eight Reese's peanut butter cups as a token of appreciation after completing the task on an analog scale with endpoints, *Very Unhappy* (-100) and *Very Happy* (100). They then were presented the 13 x 20 grid of squares, were asked to click on as many squares as possible in 60 seconds, and then received either one or eight Reese's peanut butter cups. Experiencers proceeded directly to the task and reported their happiness on the same scale after completing the task and receiving one or eight Reese's peanut butter cups as a token of appreciation.

As a manipulation check of magnitude, all participants rated their subjective magnitude of the token of appreciation on a scale with endpoints, *Tiny* (1) and *Gigantic* (7). In addition, they indicated the estimated price of the token of appreciation in dollars on an analog scale with endpoint, *$0* (0) and *$5* (5). Participants also indicated whether they received the token of appreciation *(yes, no),* reported how many cups they received in an open ended question, and rated how much they liked Reese's peanut butter cups on a scale with endpoints, *Dislike Extremely* (1) and *Like Extremely* (7).

Only those who indicated that they received the token of appreciation were deemed to have correctly completed the experiment. The18 participants who indicated that they did not receive the token of appreciation (possibly because they did not notify the experimenter or because the experimenter failed to provide the token of appreciation before they continued with the questionnaire) were therefore excluded from the subsequent analyses.

Results

Manipulation checks

A 2 (role: experiencer, forecaster) x 2 (magnitude: 1 cups, 8 cups) between-subjects ANOVA on subjective magnitude estimates revealed a significant main effect of magnitude, such that participants in eight cup conditions perceived that the token of appreciation was larger (*M* = 4.64, *SD* = 1.11) and more expensive (*M* = \$3.17, *SD* = .91) than did participants in the one cup conditions (*M* = 3.45, *SD* = 1.08; *M* = \$ .84, *SD* = .81), $F(1, 144) = 36.01$, $p < .001$, $\eta^2 = .20$ and $F(1, 144) = 230.03$, $p < .001$, $\eta^2 = .63$, respectively. No other main effects or interactions were significant, $Fs(1, 144) < 1.2$, *ps* >.19.

Forecasted and Experienced Happiness

Happiness ratings were submitted to a 2 (role: forecaster, experiencer) x 2 (magnitude: 1 cup, 8 cups) between-subjects ANOVA. The analysis revealed a directional main effect of magnitude, $F(1, 144) = 2.82$, $p = .09$, $\eta^2 = .02$, such that happiness ratings were higher in the eight cup conditions (*M* = 36.23, *SD* = 50.44) than in the one cup conditions (*M* = 21.39, *SD* = 46.69). There was no main effect of role, $F<1$.

More important, there was a significant role x magnitude interaction, $F(1, 144) = 4.12$, $p = .04$, $\eta^2 = .03$. As predicted, forecasters were more sensitive to the magnitude of the outcome than were experiencers (*Figure 9*). Forecasters predicted they would be happier if they received eight peanut butter cups (*M* = 46.79, *SD* = 51.51) than if they received one peanut butter cup (*M* = 16.60, *SD* = 46.32), $F(1, 144) = 7.18$, $p < .01$, $\eta^2 = .05$, but experiencers were similarly happy whether they received one or eight peanut butter cups (*M* = 24.17 *SD* = 47.43) or 1 (*M* = 27.13, *SD* = 46.99), $F < 1$. Looked at in another way, forecasters accurately predicted the impact of receiving one peanut butter cup on their happiness, $F(1, 144) = 1.23$, $p < .25$, but marginally overestimated the impact of receiving eight peanut butter cups on their happiness, $F(1, 144) = 2.89$, $p = .09$, $\eta^2 = .02$.

Discussion

Affective forecasters were more sensitive to the magnitude of a non-monetary outcome than were experiencers. Thus, forecasters overestimated the extent to which magnitude specifications would influence the hedonic response to that outcome. Forecasters predicted that receiving eight peanut butter cups as a token of appreciation for completing a task would yield greater happiness than receiving one peanut butter cup. Experiencers, however, were insensitive to the magnitude of the token of appreciation. Experiencers were equally happy, whether having received one or eight peanut butter cups as a token of appreciation for completing a task.

The overestimation of sensitivity was found despite the absence of a chance event, which rules out potential confounds associated with probabilistic outcomes, such as differences in perceived probability of winning, differences in involvement or motivation associated with the judgment task, or differences in the salience of a counterfactual alternative between affective forecasters and experiencers.

4.2. CHAPTER SUMMARY AND EXTENSIONS

Chapter 4 suggests that affective forecasters overestimate how sensitive hedonic responses to an outcome are to the magnitude of the outcome. It complements the findings of Chapter 3 by showing that the forecasting error documented in the previous chapter is not limited to probability specifications, but extends to magnitude specifications as well.

The chapter reports two experiments that provide support for this claim. Experiment 7 demonstrated the difference in sensitivity to magnitude specifications between affective forecasters and experiencers using a monetary gamble with a constant probability of winning. Affective forecasters overestimated the impact that the magnitude specifications of an outcome ($1 or $20) would have on experienced happiness upon winning an outcome in a game of chance. Experiment 8 demonstrated that this pattern generalizes to non-monetary magnitude specifications when no probability is involved. Affective forecasters overestimated the impact that the magnitude of a guaranteed token of appreciation (one or eight Reese's peanut butter cups) would have on experienced happiness with the token of appreciation.

At this point, it is important to note that the results of Experiment 7 and 8 do not mean to imply that the magnitude of an outcome *never* affects the hedonic response it elicits. Indeed, different magnitudes have been shown to differently impact hedonic experiences (e.g., Morewedge et al., 2007). Rather, the results suggest that affective forecasters are more sensitive to the magnitude of an outcome than are experiencers.

Extensions

The results of the reported experiments suggest a discrepancy between the sensitivity of affective forecasters and experiencers to magnitude specifications. While the present chapter focuses on magnitude specifications of an outcome or a reward, the findings may generalize to other value specifications. It is quite possible that affective forecasters would overestimate the influence of other quantitative attributes of outcomes, such as time, space, and even possibly expended effort (e.g., Kruger, Wirtz, Van Boven, & Altermatt, 2004). In addition to examining different quantitative outcome specifications, future research could examine whether the difference in sensitivity between affective forecasters and experiencers holds for less evaluable, less quantitative and explicit magnitude specifications, such as perceived magnitude, importance, or quality perceptions

Given that the size of a good and its evaluability are not only influenced by the nature of the outcome, but also by the presence of external standards, existing knowledge, and motivation to recruit standards to aid evaluability (Hsee & Zhang, 2010; Kassam et al., 2011), future research should further investigate factors that influence magnitude sensitivity. Context effects, task construal (e.g., self-relevance, psychological and temporal distance), as well as individual differences (e.g., need for cognition, thinking predispositions, numeracy) or even cross-cultural differences associated with numeracy and different processing styles could influence the sensitivity to magnitude specifications (Mukherjee, 2010; Pachur & Galesic, 2011). Future research could also examine how these factors exacerbate and mitigate the difference in magnitude sensitivity between forecasters and experiencers. In light of the proposed theory and the findings of Chapter 4, it might be of particular interest to explore factors that may interact with affect-richness to influence magnitude sensitivity. For example, one might predict that outcomes that are temporally or psychologically distant might lead to less magnitude sensitivity because they may lower motivation to attend to outcome specifications. Similarly, temporally and psychologically proximate events might lead to less sensitivity because such proximate events elicit greater immediate affective response (i.e., more affect-richness or affective intensity). This means that there might be a curvilinear relationship between temporal and psychological distance and sensitivity toward magnitude specifications. Exploring when and how affective forecasters' and experiencers' utility curves might differ in shape is an interesting avenue of future research.

CHAPTER 5: FORECASTERS' AND EXPERIENCERS' SENSITIVITY TO PROBABILITY AND MAGNITUDE SPECIFICATIONS AND THE DIRECTION OF FORECASTING ERRORS

This chapter explores how magnitude and probability specification jointly influence forecasters' and experiencers' hedonic evaluations. As reviewed in Chapter 2, hedonic evaluations of outcomes are assumed to be a function of both the probability and the magnitude of an outcome. While the magnitude of an outcome that has occurred and its hedonic impact are positively correlated, the probability of an outcome that has occurred and its hedonic impact are negatively correlated (Brandstaetter et al., 2002; Mellers et al. 1997). In other words, as the magnitude of an outcome increases and the likelihood of an outcome decreases, hedonic responses to the outcome are said to increase.

Chapters 3 and 4 have shown that the asymmetry in the affective intensity of an outcome when making an affective forecast for that outcome and when actually experiencing it leads affective forecasters to be more sensitive to both magnitude and probability specifications than experiencers when the two outcome specifications are independently manipulated. An important question is whether forecasters would show sensitivity to both outcome specifications if magnitude and probability were simultaneously manipulated.

Importantly, if forecasters attend to and show greater sensitivity to both types of outcome specifications than experiencers, then forecasted hedonic responses should show a relatively stronger correlation with the probability *and* magnitude specifications of the outcome, while experienced hedonic responses should show a relatively weaker correlation. Forecasted hedonic responses would be most extreme for unlikely high magnitude events and least extreme for likely low magnitude events. Experienced hedonic responses, on the other hand, would not vary to the same extent as a function of magnitude and probability.

An important implication of such a pattern would be that outcome magnitude and probability would likely play an important role in determining whether affective forecasters will overestimate or underestimate their hedonic response to an outcome. High magnitude and low probability would likely beget overestimation of future emotional response, whereas low magnitude and high probability would likely beget underestimation of future emotional responses. Indeed, the results of reported Experiments 1-8 are generally consistent with this proposition. Whether or not forecasters over- or underestimated their hedonic response to an outcome varied across experiments and reward stimuli. Yet, when errors in affective forecasting occurred, participants were more likely to overestimate the hedonic impact of low probability and large magnitude outcomes and underestimate the hedonic impact of high probability and low magnitude outcomes.

A single experiment tested whether affective forecasters show greater sensitivity to both magnitude and probability specifications than experiencers. In addition, it sought to provide converging evidence that the two outcome specifications interact, such that underestimation is most likely for low magnitude-high probability outcomes and overestimation is most likely for high magnitude-low probability outcomes.

5.1. DIFFERENTIAL SENSITIVITY TO PROBABILITY AND MAGNITUDE SPECIFICATIONS

Experiment 9

Experiment 9 examined the sensitivity to probability and magnitude simultaneously to test whether affective forecasters overestimate how much the magnitude of an outcome and its probability of occurrence will influence their experienced affect. In addition, Experiment 9 sought to test whether this overestimation can help explain when affective forecasters are more likely to over- and underestimate their hedonic response to an outcome. Forecasters predicted how happy they would be if they won a small or a large reward given a 10% or a 90% probability of winning. Experiencers won a small or a large reward, given a 10% or a 90% probability of winning, and reported how happy they were. Forecasters were expected to be more sensitive to magnitude and probability specifications of an outcome than experiencers. This oversensitivity was expected to lead to underestimation of affect when the reward was small and the probability of winning was large, but lead to overestimation of affect when the reward was large and the probability of winning was small.

Method

Participants and Design

One hundred and thirty-nine University of Miami students (62 females, 69 males and 8 unreported; M_{age} = 20.25 years, *SD* = 1.99) correctly completed the experiment as part of a one-hour laboratory session in exchange for course credit. Participants were randomly assigned to one of eight conditions of a 2 (role: forecaster, experiencer) x 2 (magnitude: small, large) x 2 (probability of winning: 10%, 90%) between-subjects design.

Procedure

Participants were seated in a cubicle with a paper questionnaire and either a single fun-sized M&M packet (small magnitude reward) or a large bag containing approximately 12 fun-sized M&M packets (large magnitude reward) in front of them. They played a game of chance in which they drew a ball from an opaque bag containing 10 balls of the same shape and size. A drawstring at the top of the bag enabled the experimenter to close the opening, making the contents of the bag non-visible to the participants. Participants were told that they would win the prize in front of them if they drew a ball marked with an "X", and that they would not win anything if they drew a ball not marked with an "X". Half of the participants were told that one of the 10 balls (i.e., 10%) was marked with an "X". The other half were told that nine of the 10 balls (i.e., 90%) were marked with an "X". In fact, 7 balls were marked with an "X", so that the majority of participants drew a winning ball and won the prize in the cubicle. Note that not all participants won the gamble in this experiment in order to minimize suspicion (participants were not run individually).

Before drawing a ball, forecasters predicted how happy they would be if they drew a ball with an "X" and won the prize in front of them on a 13-point scale with endpoints, *Very Unhappy* (1) and *Very Happy* (13). They then drew a ball and were able to keep the prize if they drew a ball with an X. Experiencers reported their happiness on the same scale after drawing a ball and being able to keep the prize if they drew a ball with an "X". Finally, as a manipulation check, participants assessed their subjective likelihood of winning on a 13-point scale with endpoints, *Extremely Low* (1) and *Extremely High* (13), and the subjective size of the prize they were able to win on a similar scale with endpoints, *Extremely Small* (1) and *Extremely Large* (13).To assess whether participants had read and understood the instructions, they were also asked to indicate the stated chances of winning the gamble in an open-ended question. Only participants who knew the probability of winning were deemed to have correctly completed the experiment and were included in the subsequent analyses. Experiencers who lost the gamble were also excluded from the analysis.

Results

Manipulation Checks

A 2 (role: forecaster, experiencer) x 2 (magnitude: small, large) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA on subjective likelihood estimates revealed a significant main effect of probability of winning, such that participants in the 10% conditions reported a lower subjective likelihood of winning (M = 4.34, SD = 2.57) than did participants in the 90% conditions (M = 9.87, SD = 8.66), $F(1, 124) = 32.02$, $p <$ .001, $\eta^2 = .21$. No other effects were significant, Fs < 1.

The same ANOVA on subjective magnitude estimates revealed a significant main effect of magnitude, such that participants in large pack conditions perceived the prize to be larger (M = 8.88, SD = 2.94) than did participants in the small pack conditions (M = 4.88, SD = 2.27), $F(1, 124) = 63.96$, $p < .001$, $\eta^2 = .34$. No other main effects were significant, Fs < 1.

Forecasted and Experienced Happiness

Happiness ratings were submitted to a 2 (role: forecaster, experiencer) x 2 (magnitude: small, large) x 2 (probability of winning: 10%, 90%) between-subjects ANOVA, see (*Figure 11*). The analysis revealed a main effect of probability, $F(1, 131) = 3.98$, $p = .05$, $\eta^2 = .03$ and a main effect of magnitude, $F(1, 131) = 5.04$, $p = .03$, $\eta^2 = .04$.

More important, there was a role x probability interaction, $F(1, 131) = 4.33$, $p = .04$, $\eta^2 = .03$, indicating that forecasters were overall more sensitive to probability specifications than were experiencers. Forecasters predicted that they would be happier winning the prize when the probability of winning was 10% ($M = 10.02$, $SD = 1.43$) than when it was 90% ($M = 8.82$, $SD = 1.48$), $F(1, 131) = 11.72$, $p = .001$, $\eta^2 = .08$. Experiencers, in contrast, were similarly happy having won the prize, whether the probability of winning was 10% ($M = 9.50$, $SD = 2.23$) or 90% ($M = 9.53$, $SD = 1.71$), $F < 1$.

In addition, there was a marginal role x magnitude interaction, $F(1, 132) = 3.13$, $p = .07$, $\eta^2 = .02$, indicating that forecasters were overall more sensitive to magnitude specifications than were experiencers. Forecasters predicted that they would be happier winning a large magnitude prize ($M = 10.00$, $SD = 1.52$) than a small magnitude prize ($M = 8.82$, $SD = 1.37$), $F(1, 131) = 11.37$, $p = .001$, $\eta^2 = .08$. Experiencers, in contrast, were similarly happy having won the prize, whether it was small ($M = 9.48$, $SD = 1.80$) or large ($M = 9.56$, $SD = 2.08$), $F < 1$.

The two interactions were driven by significant simple effects among forecasters, and by non-significant simple effects among experiencers. Regardless of the magnitude of the prize, forecasters predicted that they would be happier winning a the prize when the probability of winning was 10% (M_{Small} = 9.38, *SD* = 1.07; M_{Large} = 10.50, *SD* = 1.50) than when it was 90% (M_{Small} = 8.16, *SD* = 1.42; M_{large} = 9.36, *SD* = 1.32), $F(1, 131) = 5.58$, $p = .02$, $\eta^2 = .04$ and $F(1, 131) = 6.21$, $p = .014$, $\eta^2 = .05$, respectively.

Similarly, regardless of the probability of winning, forecasters predicted that they would be happier winning a large prize ($M_{10\%}$ = 10.50, *SD* = 1.50; $M_{90\%}$ = 9.36, *SD* = 1.32) than a small prize ($M_{10\%}$= 9.38, *SD* = 1.07; $M_{90\%}$ = 8.16, *SD* = 1.42), $F(1, 131) = 5.87$, $p = .017$, $\eta^2 = .04$ and $F(1, 131) = 5.54$, $p = .02$, $\eta^2 = .04$, respectively.

Experiencers, in contrast, were similarly happy having won either prize, with either probability ($M_{10\%,Small}$ = 9.30, *SD* = 2.54; $M_{10\%,Large}$ = 9.70, *SD* = 2.00; $M_{90\%,Small}$ = 9.58, *SD* = 1.27; $M_{90\%, Large}$ = 9.46, *SD* = 2.22), *Fs*< 1.

There was no magnitude x probability and no role x magnitude x probability interaction, suggesting that forecasters' sensitivity to probability (the difference between happiness ratings for a 10% versus 90% probability of winning) was similarly different from experiencers for both the small and the large magnitude prize.

Over- and Underestimation

Simple effects examined the accuracy of the affective forecasts by comparing predicted happiness ratings for a given magnitude and probability of winning to experienced happiness ratings. Forecasters predicted that they would be less happy winning the small magnitude prize with a 90% probability of winning than experiencers actually were (*M* = 8.16, *SD* = 1.42 and *M* = 9.58, *SD* = 1.27, respectively), thus underestimating their emotional response to the outcome, $F(1, 131) = 6.91$, $p = .01$, $\eta^2 = .05$. Forecasters predicted that they would be directionally happier winning a the large magnitude prize with a 10% probability of winning than experiencers actually were (*M* = 10.50, *SD* = 1.50 and *M* = 9.46, *SD* = 2.22, respectively), thus directionally overestimating their emotional response to the outcome, $F(1, 131) = 1.84$, $p = .17$, $\eta^2 = .01$. Forecasters accurately predicted their emotional reaction toward winning the small prize with a 10% probability of winning and winning the large prize with a 90% probability of winning, *F*s <1. [7]

Discussion

Affective forecasters were more sensitive to both magnitude and probability specifications than were experiencers. Thus, forecasters overestimated the extent to which magnitude and probability specifications would influence the hedonic response to that outcome. Forecasters predicted that winning a large pack of M&M's would yield greater happiness than receiving a small pack of M&M's, and they predicted that winning either prize given a 10% probability of winning would yield greater happiness than winning it given a 90% probability of winning. Experiencers, however, were insensitive to the magnitude of the prize and the probability of winning. Experiencers were equally happy, whether they won a small or a large pack of M&M's, and they were equally happy, whether they won it given a 10% or a 90% probability of winning.

Interestingly, the lack of a three-way interaction suggests that probability and magnitude have an additive effect on forecasters, while neither probability nor magnitude

[7] Planned contrasts (Rosenthal & Rosnow, 1991) with weights in parentheses yielded similar results. Forecasters (+1; *M* = 8.16, *SD* = 1.42) predicted that they would be less happy winning the small magnitude prize with a 90% probability of winning than experiencers (-1; *M* = 9.58, *SD* = 1.27) actually were, $t(131) = -2.63$, $p = .01$. Forecasters (+1; *M* = 10.50, *SD* = 1.50) predicted that they would be directionally happier winning a the large magnitude prize with a 10% probability of winning than experiencers (-1; *M* = 9.46, *SD* = 2.22), $t(131) = 1.36$, $p = .17$. Forecasters accurately predicted their emotional reaction toward winning the small prize with a 10% probability of winning, and winning the large prize with a 90% probability of winning, *t*s <1.

have an effect on experiencers. Forecasters were sensitive to probability and magnitude, but the difference in the forecasted hedonic response for the 10% probability of winning versus 90% probability of winning was no greater for the high magnitude prize than for the low magnitude prize. Experiencers did not differ as a function of magnitude or probability.

Importantly, this additive effect of magnitude and probability on forecasters' sensitivity – and the lack of effect of either outcome specification on experiencers' sensitivity – lead to qualitatively different types forecasting errors. Forecasters underestimated how happy they would be about winning the small magnitude with a 90% probability, and they directionally overestimated how happy they would be about winning the large magnitude prize with a 10% probability. This suggests that the magnitude of an event and its probability of occurrence seem to determine the direction of the forecasting error, such that high magnitude and low probability events beget overestimation of affective reactions to future events, whereas low magnitude and high probability events beget underestimation of affective reactions to future events.

5.2. CHAPTER SUMMARY AND EXTENSIONS

Chapter 5 suggests that affective forecasters simultaneously overestimate how sensitive hedonic responses to an outcome are to both the magnitude of the outcome and its probability of occurrence. Forecasters' increased sensitivity to both types of outcome specifications leads to qualitatively different types of forecasting errors, whereby forecasters are more likely to underestimate their hedonic response to small and likely events, and they are more likely to overestimate their hedonic response to large and unlikely events.

A single experiment provided support for the proposition. By varying probability and magnitude simultaneously, Experiment 9 demonstrated the difference in sensitivity to both outcome specifications between affective forecasters and experiencers. Forecasters were sensitive to both the magnitude of a prize and its probability of occurring, leading to an additive effect of both outcome specifications on affective forecasts. Experiencers, on the other hand, were insensitive to both magnitude and probability specifications. This in turn led forecasters to underestimate how happy they would be about winning a small prize with a large probability of winning and directionally overestimate how happy they would be about winning a large prize with a small probability of winning.

Experiment 9, in accordance with Experiments 1-8, seems to suggest that high magnitude and low probability beget overestimation of future emotional response, whereas low magnitude and high probability beget underestimation of future emotional responses. Yet, it is important to note that the results of these experiments also suggest that these two outcome specifications are mere predictors of affective forecast extremity. Forecasters in Experiment 1 underestimated how happy they would be about winning a monetary reward of $1 with a 90% probability of winning, whereas forecasters in Experiment 9 accurately predicted how happy they would be about winning a small pack of M&Ms (i.e., an outcome with a lower monetary value) with a 90% probability of winning. This illustrates that whether or not affective forecasters ultimately over- or underestimate their hedonic response to an outcome with a certain magnitude and probability of winning is heavily dependent on other factors, such as the nature of the reward.

Extensions

In Experiment 9, forecasters were more sensitive to both magnitude and probability specifications than experiencers, suggesting that forecasters paid more attention to both types of outcome specifications than experiencers, and that both of the outcome specifications therefore were incorporated into affective forecasters' judgment.

It is important to interpret these results in light of the model proposed by Mellers et al. (1997). Recall that in their Decision Affect Theory, the authors argue that the emotional reactions toward an outcome depend on the utility associated with the outcome itself and the surprise associated with the outcome. Specifically, the theory posits that the surprise of an outcome enhances the comparison between the actual outcome (e.g., winning an outcome X) and a prominent counterfactual outcome (e.g., not winning an outcome X) in a *multiplicative* fashion[8]. Thus, this theory implies that a) magnitude and probability information are both incorporated into judgment (both information being weighted), and b) that these two have multiplicative effects on hedonic responses (the difference in utility between a high and low probability outcome is larger when the outcome is large than when the outcome is small).

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[8] Formally, $R_a = a * [u_a + g (u_a - u_b) * (1 - s_a)] + b$ where a and b are linear coefficients in an emotion judgment function; u_a is the utility of the obtained outcome, u_b is the utility of the unobtained outcomes. g represents the disappointment function, reflecting the comparison between what occurred (e.g., obtaining an outcome) and what might have occurred in a different state of the world (e.g., obtaining nothing, or obtaining a better outcome). This function is weighted by $1 - s_a$, whereby s_a represents the subjective probability of outcome a.

While the findings among forecasters in Experiment 9 support their proposition that magnitude and probability are both incorporated into judgment to a certain extent, the effects of the two outcome specifications were additive and not multiplicative. Of course, the lack of multiplicative effect could be the result of the experimental stimuli (i.e., the low evaluability of the non-monetary stimulus may have hindered the multiplication) or low power due to an insufficiently large subject sample. Still, future research should further test the nature of the relationship between probability and magnitude. Using different monetary outcomes and different probability specifications, it should further investigate the shape of the predicted utility curves for different magnitude and probability specifications. This would more rigorously test whether forecasters' hedonic evaluations follow the theory proposed by Mellers et al., or whether it may follow an additive function.

More important, it should also investigate the circumstances under which the shape of the utility curve may change. The present research has shown that sensitivity to outcome specifications depends on the attention paid to each outcome specification during judgment. Differences in sensitivity to outcome specification between forecasters and experiencers in Experiment 9 (and across all other experiments) have demonstrated that there are conditions under which neither magnitude or probability are attended to and are thus not incorporated into judgment. Since attention is easily influenced by salience (Experiment 4) or affect intensity (Experiments 5 and 6), a number of factors likely determine the attention to different outcome specifications and the relative weight these have on forecasters' (and experiencers') hedonic evaluations. There should be circumstances for example, in which one of the outcome specifications (i.e., the outcome probability or the magnitude) receives more attention and therefore receives more weight in the judgment, while the other outcome specification is neglected and receives less weight in the judgment.

Future research could investigate whether attention paid to magnitude or probability specifications during judgment differs as a function of the magnitude of the outcome, the nature of the probability specification (i.e., extreme probabilities, precise probabilities), salience, the affect-richness of the outcome and the judge's affective state. In vivo affect ratings (using subjective measures, or more objective heart- or skin response measures) could provide more precise information about how affect mediates attention to outcome specifications and therefore the impact they have on hedonic evaluations. Similarly, eye tracking would likely serve as a useful tool during these follow-up studies because this method could reveal whether probability specifications or the magnitude specifications receive more visual attention during judgment.

Further research is necessary to understand when hedonic reactions to future events are overestimated and when they are underestimated. The current Chapter 5 directly suggests that high magnitude and low probability beget overestimation of future hedonic responses, whereas low magnitude and high probability beget underestimation. While this is generally in line with the reported experiments, future research is necessary to test the validity and generalizability of this claim. It would be important, for example, to test whether magnitude and probability predict over- and underestimation independent of the outcome valence. Aside from running follow-up experiments, the validity of the prediction could be examined with a systematic review of previous experiments on affective forecasting errors. The events (e.g., positive HIV results, sporting event outcomes) used in previous experiments could be coded for their magnitude and their probability of occurring (also for other factors such as valence, affect-richness, etc.). This would allow to test whether the magnitude and probability ratings predict the magnitude and the direction of forecasting errors proposed in this chapter.

Future experiments could also examine how the accuracy of affective forecasts changes over time and how this might differ for different event valences. Gilbert, Lieberman, and colleagues (2004) found that affective forecasters falsely predict that a less significant aversive event would cause shorter duration of pain than a more significant aversive event because they failed to consider that significant aversive events trigger psychological processes to attenuate them. This suggests that the misprediction of their affective response (overestimation for significant events, underestimation for insignificant events) might become more severe the further the measurement is temporally removed from the event. In other words, affective forecasts would likely be relatively more accurate for immediate emotional responses (as measured in the reported experiments) than for forecasts/reports made for the hours or days following the event.

Lastly, and more generally, it would be interesting to compare affective forecasts with the evaluation of the experience in retrospect. Outcome specifications should not only have greater influence on affective forecasts than on experience, but should also be influential when evaluating an experience in retrospect rather than in experience, once its emotional intensity has worn off and is diminished. If forecasts resemble “backcasts”, it would open up an interesting discussion about the importance of the relatively fleeting experienced utility in decisions concerning the magnitude and the likelihood of outcomes.

CHAPTER 6: GENERAL DISCUSSION

When consumers decide which outcomes to avoid and which outcomes to pursue, their decisions depend on predictions of their hedonic responses to those potential outcomes. The present research suggests that the two central dimensions of the utility of outcomes, namely the magnitude and the likelihood of their occurrence, differently influence affective forecasters and experiencers. As a result, affective forecasters overestimate how sensitive hedonic responses to an outcome are to its magnitude and the probability of its occurrence, leading to errors in affective forecasting.

The theory presented in Chapter 2 suggests that differences in the affective intensity of the forecasted and experienced outcome lead to differences in attention devoted to its magnitude and probability specifications, which in turn lead to the observed differences in sensitivity to those specifications. Because outcomes are typically more affectively intense when experiencing those outcomes than when forecasting those outcomes, experiencers devote a larger share of their attentional resources to those outcomes than do affective forecasters. Consequently, probability and magnitude specifications are less attended to and receive less weight in experiencer reports than in affective forecasts. Chapters 3-5 tested and provided support for this proposition.

Chapter 3 revealed that affective forecasters are more sensitive to the probability specifications of events than are experiencers, which leads them to overestimate the influence of these specifications when predicting future experiences. The greater sensitivity to probability specifications exhibited by affective forecasters than by experiencers was found across a variety of outcomes and was true for positive and negative events, as well as for different probability specifications. Furthermore, the reported experiments provide evidence that the difference in affective intensity between forecasted and experienced events appears to underlie the attention to probability specifications, leading to differences in sensitivity to these specifications. Differences in sensitivity to probability specifications between forecasters and experiencers were diminished when the forecasted outcome was made more affectively intense and when forecasters' attention was diverted away from probability specifications or when experiencers' attention was drawn toward probability specification.

Chapter 4 provided evidence that affective forecasters are also more sensitive to the magnitude specifications of events than are experiencers, thus generalizing the overestimation of outcome specifications when predicting future experiences from probability to magnitude specification. An initial experiment established the difference in sensitivity to magnitude specifications between forecasters and experiencers for a monetary gain won in a gamble. A second experiment tested the generalizability of this initial demonstration to non-monetary magnitude specifications involving no chance events.

Chapter 5 showed that affective forecasters are more sensitive to both magnitude and probability specifications of events when both specifications are jointly manipulated. Importantly, an experiment demonstrated that probability and magnitude had an additive effect on forecasters, such that forecasters were sensitive to both outcome specifications, while experiencers were insensitive to both outcome specifications. This additive effect among forecasters led to two qualitatively different forecasting errors. Forecasters underestimated their hedonic response toward small magnitudes with a large probability of winning, and they directionally overestimated their hedonic response to large magnitudes with a small probability of winning.

The present research makes several contributions to our understanding of predicted and experienced utility as well as to our understanding of probability and magnitude sensitivity. First, it identifies the differences in the intensity of affective responses evoked by mental simulations and corresponding hedonic experiences – and the accompanying differences in the allocation of attentional resources – as a source of errors in affective forecasting. In doing so, it complements research that has identified other origins of affective forecasting errors, such as immune neglect (Gilbert et al., 1998), focalism (Schkade & Kahneman, 1998; Wilson et al., 2000) and joint versus separate evaluation modes (Hsee & Zhang, 2004). Additionally, it demonstrates qualitatively different forecasting errors than documented in previous research. Much of the affective forecasting research to date has focused on the accuracy of predicted emotional reactions toward a given event, such as a football game, the dissolution of a romantic relationship, or the outcome of a political election (Eastwick et al., 2007; Gilbert et al., 1998; Wilson et al., 2000). The present research examines the accuracy of predicted emotional reactions toward variations in outcome specifications associated with a given event. By showing that affective forecasters overestimate the influence of the probability specifications of an outcome on hedonic responses to that experience, the present research extends the sparse literature on the predicted and experienced utility from outcome specifications from magnitude (Hsee & Zhang, 2004; Dunn & Ashton-James, 2008) to probability specifications. Importantly, the present research shows that mispredictions of sensitivity to outcome specifications not only arise due to contextual factors, such as whether forecasts are made in a joint evaluation mode, whereas experiences take place in a single evaluation mode (Hsee & Zhang, 2004). Mispredictions can also arise because of inherent differences in affective intensity of the forecasted and experienced outcomes, which result in differences in attention to the specifications of those outcomes. Furthermore, the present research shows that this can lead to both overestimation of hedonic responses (as previous research on the impact bias has shown) and underestimation of hedonic responses (a forecasting error that has received less attention in the forecasting literature).

Second, the present research aids the explanation and interpretation of related findings in the literature. It provides a process explanation for previously demonstrated differences in magnitude and probability sensitivity for affect-rich versus affect-poor outcomes (Dunn & Ashton-James, 2008; Hsee & Rottenstreich, 2004; Loewenstein et al., 2001; Mukherjee, 2010; Rottenstreich & Hsee, 2001; Sunstein, 2002; Suter et al., 2011) as well as differences in sensitivity to other outcome characteristics between affective forecasters and experiencers (Ebert & Meyvis, 2011). The findings also further the understanding of the important role of attentional resources during hedonic evaluations. Whereas past research has shown that attentional processes influence the comparative value of an outcome (i.e., valuation and contrast effects) in affective forecasts and hedonic experiences (Kassam et al., 2011; Morewedge et al., 2010), the present research provides evidence that attentional processes also determine the influence of outcome specifications on hedonic evaluations.

Third, the present research increases our ability to specify the circumstances under which magnitude and probability specifications are likely to influence hedonic evaluations. Previous research found that probability specifications influenced predicted (Brandstaetter et al., 2002) and experienced emotional responses (Mellers et al., 1997) when participants jointly evaluated the impact of different probabilities in a within-subject design. Consistent with Brandstaetter et al. (2002), we found that people predict that winning a reward will evoke greater happiness when the probability of winning that reward is small than when it is large, thus demonstrating that this effect occurs even when the probabilities are evaluated separately in a between-subjects design. The sensitivity to probability specification in single evaluation mode disappears, however, when the forecasted outcome is affectively intense. Unlike Mellers et al. (1997), there was no influence of probability specifications on experienced happiness unless attention is explicitly directed toward those specifications, a discrepancy that is likely due to differences in sensitivity to quantitative information in joint versus separate evaluation mode (Hsee & Zhang, 2004). Whereas participants in Mellers et al. (1997) won multiple outcomes with varying probabilities in a within-subject design, making probability specifications salient, participants in the present research only evaluated the probability of a single outcome. This difference in evaluation mode and the resulting differences in the salience of probability specifications likely influenced the sensitivity of experiencers to those specifications (Hsee & Zhang, 2004, see also Rottenstreich & Kivetz, 2006). Indeed, Experiment 4 found that drawing attention to probability specifications increased the sensitivity of experiencers to probability specifications, in line with the findings of Mellers and colleagues (1997). Sensitivity to magnitude specifications has received wide attention in the literature. While previous research has found many instances in which magnitude specifications influence predicted and experienced emotional responses (Hsee

& Zhang, 2004; Gilbert, Lieberman, et al., 2004, Kahneman & Tversky, 1997; Morewedge et al., 2007), judgments about the subjective utility derived from different magnitudes of gains and losses are overall known to be surprisingly labile and largely dependent on joint evaluations with external or internal comparison standards (Buechel & Morewedge, in press; Dhar, Nowlis & Sherman, 2000; Hsee & Zhang, 2010; Kassam et al., 2011). The present research shows that magnitude specifications have greater influence on predicted emotional responses than experienced emotional responses. Taken together, magnitude and probability specifications seem to have greater influence on forecasted happiness than experienced happiness unless they are made salient, such as when judgments are made in joint evaluation mode or when probability information is highlighted during judgment.

Over- and Underestimation of Affect

The proposed theory implies that there is a stronger positive correlation between the magnitude specifications for an outcome and hedonic evaluations of that outcome for affective forecasters than for experiencers, and that there is a stronger negative correlation between the probability specifications for an outcome and hedonic evaluations of that outcome for affective forecasters than for experiencers. It thus makes predictions for when affective forecasters will be more likely to overestimate or underestimate their hedonic response to an uncertain event. Forecasters should be more likely to overestimate the hedonic impact of large magnitude and low probability outcomes and underestimate the hedonic impact of small magnitude and high probability outcomes. This pattern is generally consistent with the empirical evidence of the reported experiments and was directly tested and confirmed in the experiment reported in Chapter 5.

Importantly, the evidence that overestimation of affect is more likely for high magnitude outcomes dovetails the literature on the impact bias (Gilbert & Wilson, 2007) which has often been demonstrated with high stake events, such as the HIV test or being denied tenure (Gilbert et al., 1998; Sieff et al., 1999). More importantly, Dunn & Ashton-James (2008) found overestimation of affect across all studies, and they found a greater overestimation for higher hypothetical death tolls than for lower ones. In an unpublished study conducted by Morewedge, Buechel and Vosgerau, it was found that overestimation is more likely for events that are personally important. Hockey fans who cared more about their team's win were more likely to exhibit an impact bias than hockey fans who cared less about their team's win. Lastly, Aknin, Norton, & Dunn (2009) showed that participants underestimated the life satisfaction of low-income individuals.

The idea that forecasters overestimate their response to low probability events is also consistent with Gilbert, Morewedge, and colleagues (2004), who found that affective forecasters were more likely to overestimate how much regret they would feel when missing a train or prize by a narrow margin than by a wide margin. Narrow margin misses are likely to be perceived as more unexpected than wide margin misses because they are more mutable. In other words, because it is easier to generate a counterfactual in which one did not miss a train or prize by a narrow margin as opposed to a wide margin, narrow margin outcomes should seem more unlikely (Kahneman & Miller, 1986), leading to an overestimation of regret for narrow margin events.

In addition, the idea that forecasters overestimate their hedonic response to high probability events it is consistent with Andrade and Van Boven's (2010) finding that participants who rejected a gamble underestimated how pleased they would be upon learning that they would have lost had they chosen to play the gamble. In other words, affective forecasters in their experiment underestimated their hedonic response to learning that they had avoided a negative outcome that they were certain to avoid (given that they had rejected the gamble). Similar to participants in the reported experiments, participants in Andrade and Van Boven (2010) who did not expect to experience a negative event (i.e., lose the gamble) underestimated how happy they would be to learn that they had avoided that negative event.

Of course, probability and magnitude specifications are not the sole determinant of over- and underestimation of hedonic responses to future events. Other cognitive biases and experimental idiosyncrasies have been shown to give rise to affective forecasting errors (Gilbert & Wilson, 2007), particularly the tendency to overestimate the intensity and duration of emotional reactions to future events (i.e., impact bias). For example, affective forecasters tend to overlook their ability to rationalize outcomes (i.e., immune neglect; Gilbert et al., 1998; Gilbert, Lieberman et al., 2004) and focus too much on the hedonic impact of the event in question, while neglecting to consider the hedonic impact of other future events that will be simultaneously experienced (i.e., focalism; Wilson et al., 2000). Procedural idiosyncrasies in the reported experiments eliminating these two major sources of the impact bias may explain why participants did not consistently exhibit an impact bias across the reported experiments. Experiencers in the present studies made their reports immediately upon learning an outcome and thus did not have as much time to adapt and rationalize the events as did experiencers in other affective forecasting studies (e.g., Gilbert, Lieberman, et al., 2004). Furthermore, given the timing and the phrasing of the questions in the reported experiments, the focus of both affective forecasters and experiencers was on the outcome of the gamble. Participants did not have intervening experiences between the forecasted and reported experience that could have diluted the influence of the focal event on hedonic evaluations or changed their interpretation of what they should report (Levine, Lench, Kaplan, & Safer, 2012; Schkade & Kahneman, 1998; Wilson et al., 2000).

Although the present research did not find a consistent impact bias, it did find systematic errors in affective forecasts. Affective forecasters overestimated how sensitive experiencers would be to magnitude and probability specifications of positive and negative outcomes, suggesting that forecasting errors occur even when controlling for the errors introduced by immune neglect and focalism.

Implications for Marketers and Consumer Welfare

People strive to be happy, and happiness is often believed to lie in quantitative specifications. People are willing to spend almost twice as much for a 63-inch TV than for a 50-inch TV, for example, and grossly overpay beyond expected value to insure themselves from even the unlikeliest losses (Schade, Kunreuther, & Kaas, 2004).

When striving for the ultimate goal of happiness, consumers are ultimately affective forecasters who exert physical, cognitive, emotional, and financial resources to attain what they believe will bring them happiness and to avoid what they believe will bring unhappiness.

While mispredicitons of affective reactions toward outcome specifications might be to marketers' benefit, the present research suggests that the resources expended by consumers might be suboptimal. For marketers, the results imply that variations in magnitude specification, and perhaps other factors such as the scarcity of a product, will likely lead to differences in consumers' willingness to pay for product and services. That is, marketers could increase their revenue by enticing their buyers with product specifications, such as specifications related to magnitude. Consumers, on the other hand, might not derive much happiness from the product specifications they paid and worked for unless these specifications are made salient during consumption. Importantly, this might be especially true for affect-poor or pallid product or events. Although not a panacea for all forecasting errors (for a review, see Gilbert & Wilson, 2007), the present research suggests that affective forecasters may be more accurate when forecasting more vivid events than more pallid events, or when the act of forecasting occurs in a state of similar affective intensity as the corresponding experience.

On a final positive note, the present research suggests that even small and expected outcomes, which are generally believed to be underwhelming, can bring surprising joy. Little tokens of appreciation for a colleague or an admission letter from a safety school might turn a day around. For marketers, this means that offering consumers even relatively inexpensive incentives could increase customer-satisfaction, and as a result, encourage consumer loyalty.

BIBLIOGRAPHY

Andrade, E. B., & Van Boven, L. (2010). Feelings not forgone: Underestimating affective reactions to what does not happen. *Psychological Science, 21*(5), 706-711. doi: 10.1177/0956797610368809

Aknin, L. B., Norton, M. I., & Dunn, E. W. (2009). From wealth to well-being? Money matters, but less than people think. *The Journal of Positive Psychology*, *4*(6), 523-527.

Arkes, H. R., Herren, L. T., & Isen, A. M. (1988). The role of potential loss in the influence of affect on risk-taking behavior. *Organizational Behavior and Human Decision Processes, 42*(2), 181-193. doi: 10.1016/0749-5978(88)90011-8

Bhatia, S. (2013). Associations and the Accumulation of Preference. *Psychological Review*. Advance online publication. doi: 10.1037/a0032457

Buechel, E. C. & Morewedge, C. K. (in press). The (relative and absolute) subjective value of money. In Henk Aarts and Erik Bijleveld (Eds.), *The Psychological Science of Money,* New York, NY: Springer.

Bradley, M. M. (2009). Natural selective attention: orienting and emotion. *Psychophysiology,* 46, 1–11. doi: 10.1111/j.1469-8986.2008.00702.x

Bradley, M. M., Houbova, P., Miccoli, L., Costa, V. D., & Lang, P. J. (2011). Scan patterns when viewing natural scenes: Emotion, complexity, and repetition. P*sychophysiology*, 48(11), 1544-1553. doi: 10.1111/j.1469-8986.2011.01223.x

Bradley, M. M., Keil, A., & Lang, P. J. (2012). Orienting and emotional perception: facilitation, attenuation, and interference. *Frontiers in Psychology,* 3 (493). doi: 10.3389/fpsyg.2012.00493

Brandstaetter, E., Kuehberger, A., & Schneider, F. (2002). A cognitive-emotional account of the shape of the probability weighting function. *Journal of Behavioral Decision Making, 15*(2), 79-100. doi: 10.1002/bdm.404

Broadbent, D. E. (1958). *Perception and communication*. New York: Oxford University Press.

Deutsch, J. A., & Deutsch, D. (1963). Attention: Some theoretical considerations.*Psychological review*,*70*(1), 80-90. doi: 10.1037/h0039515

Dhar, R., Nowlis, S. M., & Sherman, S. J. (2000). Trying hard or hardly trying: An analysis of context effects in choice. *Journal of Consumer Psychology*,*9*(4), 189-200.

Diener, E., Kahneman, D., Tov, W., & Arora, R. (2010). Income's association with judgments of life versus feelings. *International differences in well-being*, 3-15.

Dunn, E. W., & Ashton-James, C. (2008). On emotional innumeracy: Predicted and actual affective responses to grand-scale tragedies. *Journal of Experimental Social Psychology*, *44*(3), 692–698. doi: 10.1016/j.jesp.2007.04.011

Eastwick, P. W., Finkel, E. J., Krishnamurti, T., & Loewenstein, G. (2007).Mispredicting distress following romantic breakup: Revealing the time course of affective forecasting error. *Journal of Experimental Social Psychology, 44*(3), 800-807. doi: 10.1016/j.jesp.2007.07.001.

Ebert, J. E., & Meyvis, T. (2011). *Psychological distance in hedonic prediction and consumption: The surprising impact of distant events* (Working paper). Waltham, MA: Brandeis University.

Eccleston, C., & Crombez, G. (1999). Pain demands attention: A cognitive-affective model of the interruptive function of pain. *Psychological Bulletin, 125*(3), 356–366. doi: 10.1037/0033-2909.125.3.356

Fischhoff, B. (1975). Hindsight is not equal to foresight: The effect of outcome knowledge on judgment under uncertainty. *Journal of Experimental Psychology: Human Perception and Performance*, *1*(3), 288-299. doi: 10.1136/qhc.12.4.304

Gilbert, D. T., Lieberman, M. D., Morewedge, C. K., & Wilson, T. D. (2004). The peculiar longevity of things not so bad. *Psychological Science*, *15*(1), 14-19. doi: 10.1111/j.0963-7214.2004.01501003.x

Gilbert, D. T., Morewedge, C. K., Risen, J. L., & Wilson, T. D. (2004). Looking forward to looking backward: The misprediction of regret. *Psychological Science 15*(5), 346-350. doi:10.1111/j.0956-7976.2004.00681.x

Gilbert, D. T., Pinel, E. C., Wilson, T. D., Blumberg, S. J., & Wheatley, T. (1998). Immune neglect: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology, 75*(3)*,* 617-638. doi: 10.1037//0022-3514.75.3.617

Gilbert, D. T., & Wilson, T. D. (2007). Prospection: Experiencing the future. *Science, 317*(5843), 1351-1354. doi: 10.1126/science.1144161

Grice, H. P. (1975). Logic and Conversation. In P. Cole and J. L. Morgan (Eds.) *Syntax and Semantics Volume 3: Speech Acts (*pp.41-58). New York, NY:Academic Press.

Hoch, S. J., & Loewenstein, G. F. (1991). Time-inconsistent preferences and consumer self-control. *Journal of Consumer Research*, *17*(4), 492-507. doi: 10.1086/208573

Hsee, C. K. (1996). The evaluability hypothesis: An explanation for preference reversals between joint and separate evaluations of alternatives. *Organizational Behavior and Human Decision Processes, 67*(3), 247-257. doi: 10.1006/obhd.1996.0077

Hsee, C. K., Loewenstein, G. F., Blount, S. & Bazerman, M. H. (1999). Preference reversals between joint and separate evaluation of options: A review and theoretical analysis. *Psychological Bulletin*, 125(5), 576-590. doi: 10.1037/0033-2909.125.5.576

Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology: General, 126*(1), 45-53. doi: 10.1037/0096-3445.133.1.2

Hsee, C., Yang, Y., Li, N., & Shen, L. (2009). Wealth, warmth and wellbeing: Whether happiness is relative or absolute depends on whether it is about money, acquisition or consumption. *Journal of Marketing Research,* 46(3), 396-409. doi: 10.1509/jmkr.46.3.396

Hsee, C. K., & Zhang, J. (2004). Distinction bias: Misprediction and mischoice due to joint evaluation. *Journal of Personality and Social Psychology, 86*(5), 680-695. doi: 10.1037/0022-3514.86.5.680

Hsee, C. K., & Zhang, J. (2010). General evaluability theory. *Perspectives on Psychological Science*,*5*(4), 343-355. doi: 10.1177/1745691610374586

Kahneman, D. (2011).*Thinking, fast and slow*. New Yok, NY: Farrar, Straus and Giroux.

Kahneman, D., & Deaton, A. (2010). High income improves evaluation of life but not emotional well-being. *Proceedings of the National Academy of Sciences of the United States of America*. 107(38), 16489-16493.

Kahneman, D., & Miller, D. T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, *93*(2), 136-153. doi: 10.1037//0033-295X.93.2.136

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*, 263-292. doi: 10.2307/1914185

Kassam, K. S., Morewedge, C. K., Gilbert, D. T., & Wilson, T. D. (2011). Winners love winning and losers love money. *Psychological Science, 22*(5)*,* 602-606. doi: 10.1177/0956797611405681

Kruger, J., Wirtz, D., Van Boven, L., & Altermatt, T. W. (2004). The effort heuristic. *Journal of Experimental Social Psychology*, *40*(1), 91-98. doi:10.1016/S0022-1031(03)00065-9.

Laplace, P. S. (1951*). A philosophical essay on probabilities*. New York, NY: Dover. (English Translation of the 6th French Edition, 1814).

Lazarus, R. S. (1991). *Emotion and Adaptation*. Oxford, UK: Oxford University Press.

Levine, L. J., Lench, H. C., Kaplan, R. L., & Safer, M. A. (2012). Accuracy and artifact: Reexamining the intensity bias in affective forecasting. *Journal of Personality and Social Psychology*, 103(4), 584-605.doi: 10.1037/a0029544

Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational behavior and Human Decision Process, 65*, 272-292. doi: 10.1006/obhd.1996.0028

Loewenstein, G., & Lerner, J. (2003). The role of emotion in decision making. In R. J. Davidson, H. H. Goldsmith, & K. R. Scherer (Eds.), *Handbook of Affective Science* (pp. 619-642). Oxford, England: Oxford University Press.

Loewenstein, G., Prelec, D., & Shatto, C. (1998). *Hot/cold intrapersonal empathy gaps in the under-prediction of curiosity.* (Unpublished manuscript), Pittsburgh, PA: Carnegie Mellon University.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin, 127*(2), 267–286. doi: 10.1037//0033-2909.127.2.267

Macrae, C. N., Hewstone, M., & Griffiths, R. J. (1993). Processing load and memory for stereotype-based information. *European Journal of Social Psychology, 23,* 77-87.doi:10.1002/ejsp.2420230107

Mellers, B. A., Schwartz, A., Ho, K., & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science, 8*(6), 423-429. doi: 10.1111/j.1467-9280.1997.tb00455.x

Meyvis, T., Ratner, R. K., & Levav, J. (2010). Why don't we learn to accurately forecast feelings? How misremembering our predictions blinds us to past forecasting errors. *Journal of Experimental Psychology: General, 139,* 579-589. doi: 10.1037/a0020285.

Mischel, W. (1974). Processes in delay of gratification. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 7, pp. 249-292). New York, NY: Academic Press.

Morewedge, C. K., & Buechel, E. C. (2013). Motivated underpinnings of the impact bias in affective forecasts. *Emotion*, *13*(6), 1023 - 1029. doi: 10.1037/a0033797

Morewedge, C. K., Gilbert, D. T., Keysar, B., Berkovits, M. J., & Wilson, T. D. (2007). Mispredicting the hedonic benefits of segregated gains. *Journal of Experimental Psychology: General*, *136*(4), 700-709. doi: 10.1037/0096-3445.136.4.700

Morewedge, C. K., Gilbert, D. T., & Wilson, T. D. (2005). The least likely of times: How remembering the past biases forecasts of the future. *Psychological Science, 16*(8), 626-630. doi:10.1111/j.1467-9280.2005.01585.x

Morewedge, C. K., Gilbert, D. T., Myrseth, K. O. R., Kassam, K. S., & Wilson, T. D. (2010). Consuming experiences: Why affective forecasters overestimate comparative value. *Journal of Experimental Social Psychology, 46*(6), 986-992. doi: 10.1016/j.jesp.2010.07.010.

Mukherjee, K. (2010). A dual system model of preferences under risk. *Psychological Review 177*(1), 243-255. doi: 10.1037/a0017884.

Myers, D. G. (2004). Theories of emotion. *Psychology: Seventh Edition*, New York, NY: Worth Publishers.

Nelson, L., & Meyvis, T. (2008). Interrupted consumption: Disrupting adaptation to hedonic experiences. *Journal of Marketing Research, 45*(6), 654-664. doi: 10.1509/jmkr.45.6.654

Nisbett, R. E., Zukier, H., & Lemley, R. E. (1981). The dilution effect: Nondiagnostic information weakens the implications of diagnostic information. *Cognitive Psychology*, 13(2), 248-277. doi: 10.1016/0010-0285(81)90010-4

Novemsky, N., & Ratner, R. (2003). The time course and impact of consumers' erroneous beliefs about hedonic contrast effects. *Journal of Consumer Research*, *29*(4)*,* 507-516. doi: 10.1086/346246

Oppenheimer, D., Meyvis, T., & Davidenko N. (2009). Instructional manipulation checks: Detecting satisficing to increase statistical power. *Journal of Experimental Social Psychology, 45*(4), 867-872. doi:10.1016/j.jesp.2009.03.009

Quoidbach, J., & Dunn, E.W. (2010). Personality Neglect: The unforeseen impact of personal dispositions on emotional life. *Psychological Science, 21*(12), 1783–1786. doi: 10.1177/0956797610388816

Ratner, R. K., Kahn, B. E., & Kahneman, D. (1999). Choosing less-preferred experiences for the sake of variety. *Journal of Consumer Research, 26*(1), 1-15. doi: 10.1086/209547

Rosenthal, R., & Rosnow, R. (1991). *Essentials of behavioural research. Methods and data analysis*. New York, NY: McGraw-Hill.

Rottenstreich, Y., & Hsee, C. K. (2001). Money, kisses, and electric shocks: On the affective psychology of risk. *Psychological Science, 12*(3), 185-190. doi: 10.1111/1467-9280.00334

Rottenstreich, Y., & Kivetz, R. (2006). On decision making without likelihood judgment. *Organizational Behavior and Human Decision Processes, 101*(1), 74-88. 10.1016/j.obhdp.2006.06.004.

Schade, C. H., Kunreuther, H., & Kaas, K. P. (2004). Probability neglect and concern in insurance decisions with low probabilities and high stakes. *Wharton Risk Management and Decision Processes Center Working Paper*, 04-07.

Schkade, D. A., & Kahneman, D. (1998). Does living in California make people happy? A focusing illusion in judgments of life satisfaction. *Psychological Science*, *9*(5), 340-346. doi: 10.1111/1467-9280.00066

Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, *45*(3), 513-523.doi: 10.1037//0022-3514.45.3.513

Sieff, E. M., Dawes, R., & Loewenstein, G. (1999). Anticipated versus actual reaction to HIV results. *The American Journal of Psychology, 112*(2), 297-311. doi: 10.2307/1423355

Slovic, P., Finucane, M., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis, 24*(2), 1-12. doi: 10.1111/j.0272-4332.2004.00433.x

Stevens, S. S. (1975).*Psychophysics: Introduction to its perceptual, neural, and social prospects*. Transaction Publishers.

Sunstein, C. R. (2002). Probability neglect: Emotions, worst cases, and law. *The Yale Law Review*, *112*, 61-107.

Suter, R., Pachur, T., & Hertwig, R. (2012). *How to model the impact of affect on risky choice: Distorted probability weighting or probability neglect?* (Working Paper). Basel, Switzerland: University of Basel.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440-463. doi: 10.1037/a0018963

Walker, J. (1971). Pain and distraction in athletes and non-athletes. *Perceptual and Motor Skills*, 33, 1187-1190. doi: 10.2466/pms.1971.33.3f.1187

Wilson, T. D., & Gilbert, D. T. (2003). Affective forecasting. In M. Zanna (Ed.), *Advances in Experimental Social Psychology* (pp. 345-411). New York, NY: Elsevier.

Wilson, T. D., & Gilbert, D.T. (2005). Affective forecasting: Knowing what to want. *Current Directions in Psychological Science, 14*(3), 132-134. doi: 10.1111/j.0963-7214.2005.00355.x

Wilson, T. D., Wheatley, T. P., Meyers, J. M., Gilbert, D. T., & Axsom, D. (2000). Focalism: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology, 78*(5), 821-836. doi:10.1037//0022-3514.78.5.821

Yang, A. X., Hsee, C. K., & Zheng, X. (2012). The AB identification survey: Identifying absolute versus relative determinants of happiness. *Journal of Happiness Studies*,*13*(4), 729-744.

APPENDIX

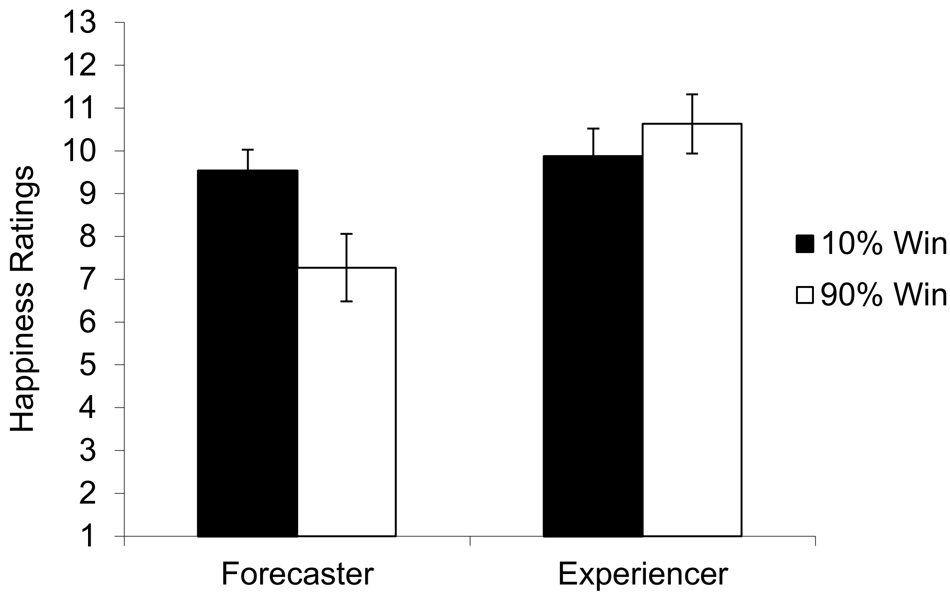

Figure 1. Affective forecasters were more sensitive to the probability of winning $1 (i.e., 10% or 90%) than were experiencers in Experiment 1. Bars represent ± *1 SEM*.

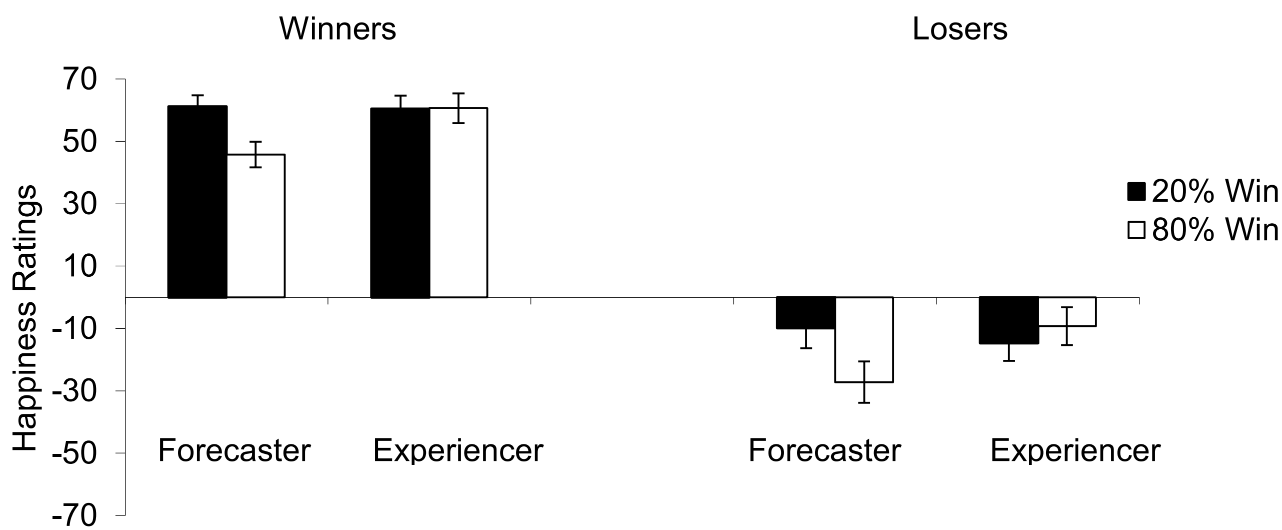

Figure 2. Affective forecasters were more sensitive to the probability of winning $3 or not winning $3 (i.e., 20% or 80%) than were experiencers in Experiment 2. Note that an 80% of winning equals a 20% of losing. Bars represent ± *1 SEM*.

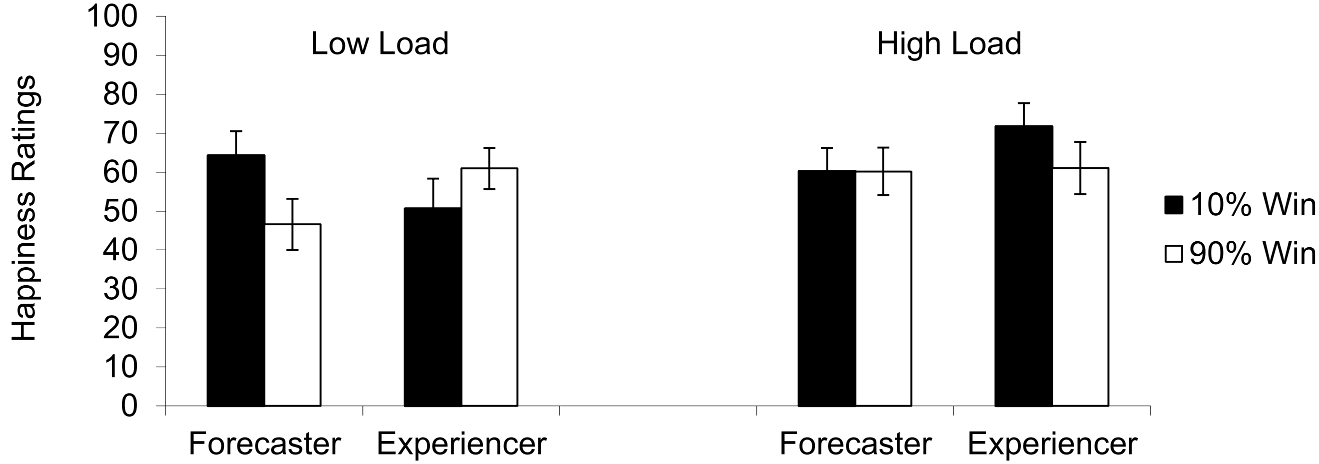

Figure 3. Affective forecasters were more sensitive to the probability of winning a cookie (i.e., 10% or 90%) than were experiencers under low cognitive load, but were no more sensitive than were experiencers under high cognitive load in Experiment 3. Bars represent ± *1 SEM*.

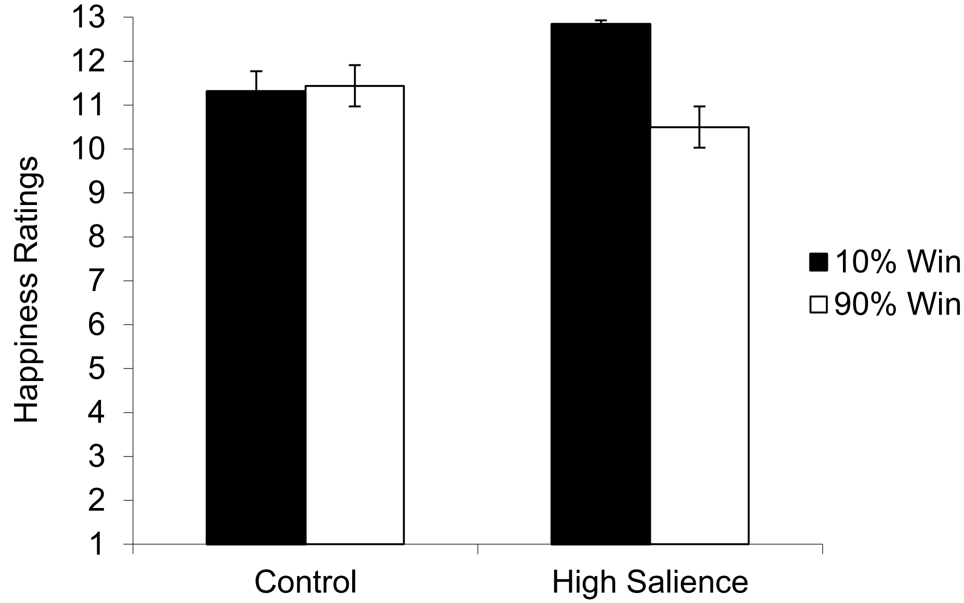

Figure 4. Experiencers were more sensitive to the probability of winning $1 (i.e., 10% or 90%) when probability information was made salient immediately before they reported their happiness in Experiment 4. Bars represent ± *1 SEM.*

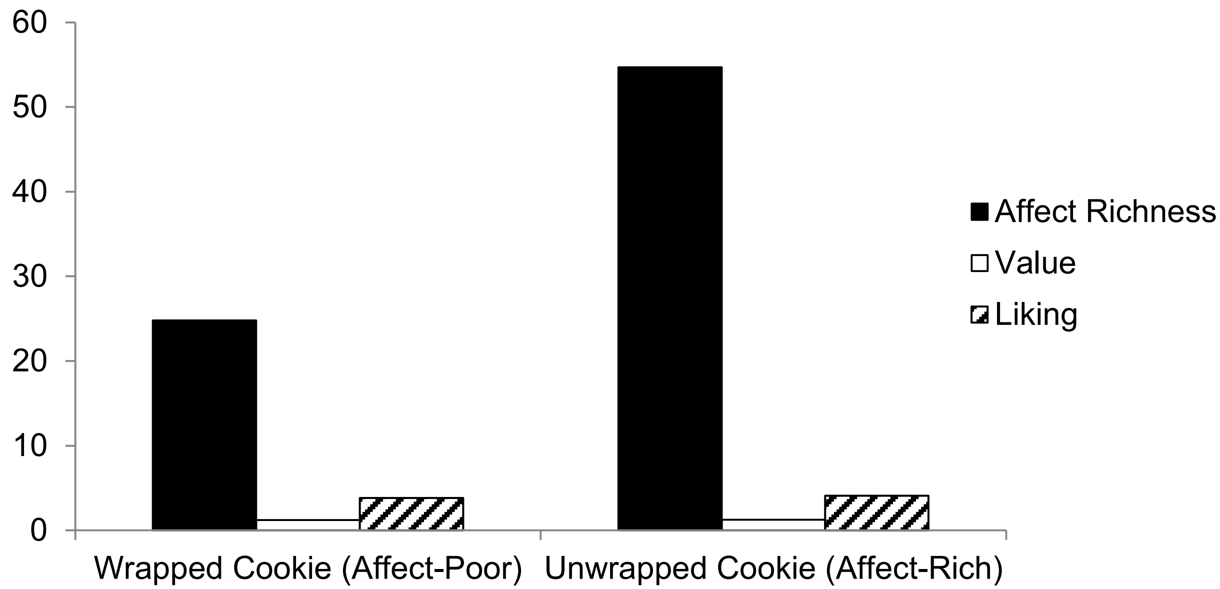

Figure 5. Participants perceived an unwrapped cookie to be more affect-rich than a wrapped cookie in Experiment 5. Perceived value of the cookie and liking for the cookie did not differ between the two wrapping conditions.

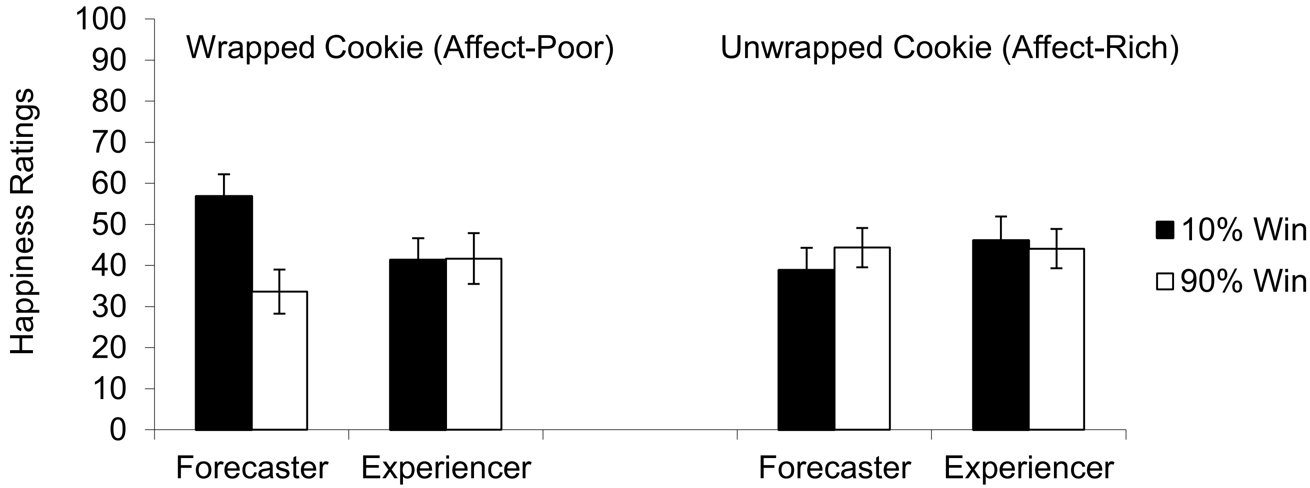

Figure 6. Affective forecasters were more sensitive to the probability of winning a cookie (i.e., 10% or 90%) than were experiencers when the outcome was affect-poor, but were no more sensitive than were experiencers when the outcome was affect-rich in Experiment 5. Bars represent ± *1 SEM*.

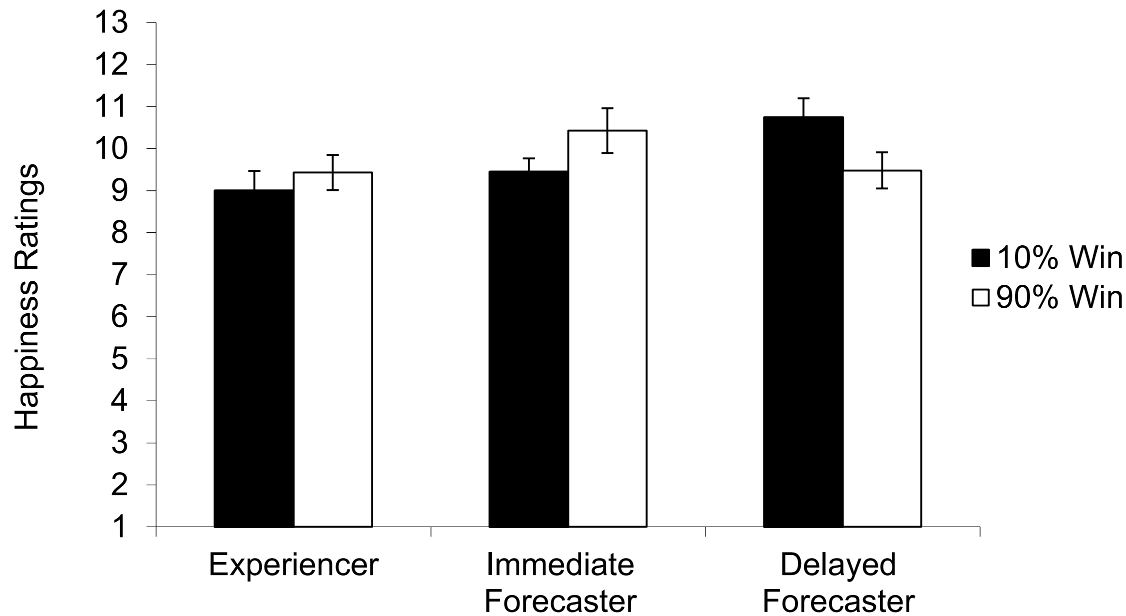

Figure 7. Forecasters who were experiencing less intense affect (delayed forecasters) were more sensitive to the probability of winning $1 (i.e., 10% or 90%) than were experiencers or forecasters who were experiencing more intense affect (immediate forecasters) in Experiment 6. Bars represent ± *1 SEM.*

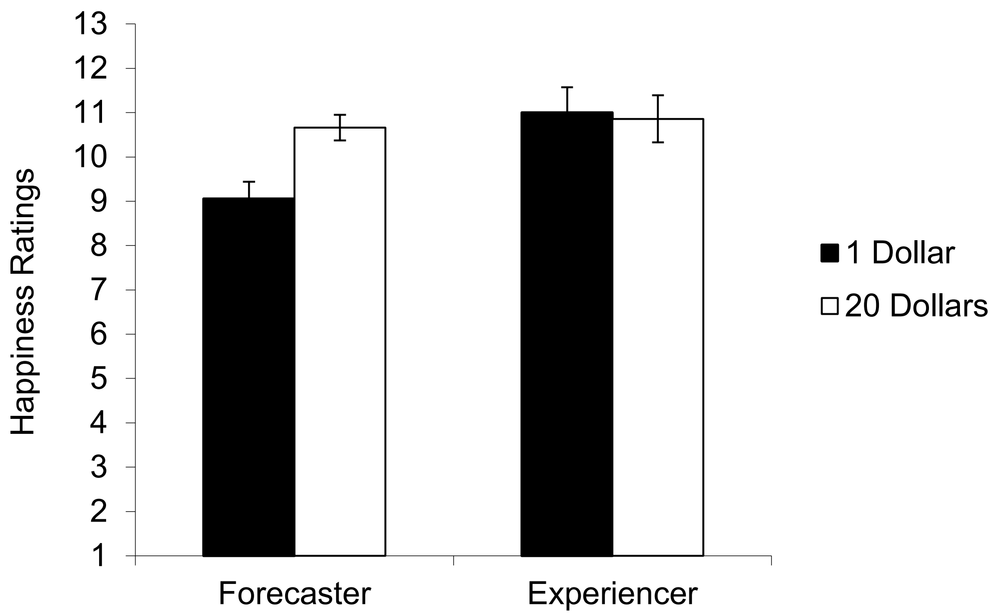

Figure 8. Affective forecasters were more sensitive to the magnitude of an outcome (i.e., winning $1 or $20) than were experiencers in Experiment 7. Bars represent ± 1 SEM.

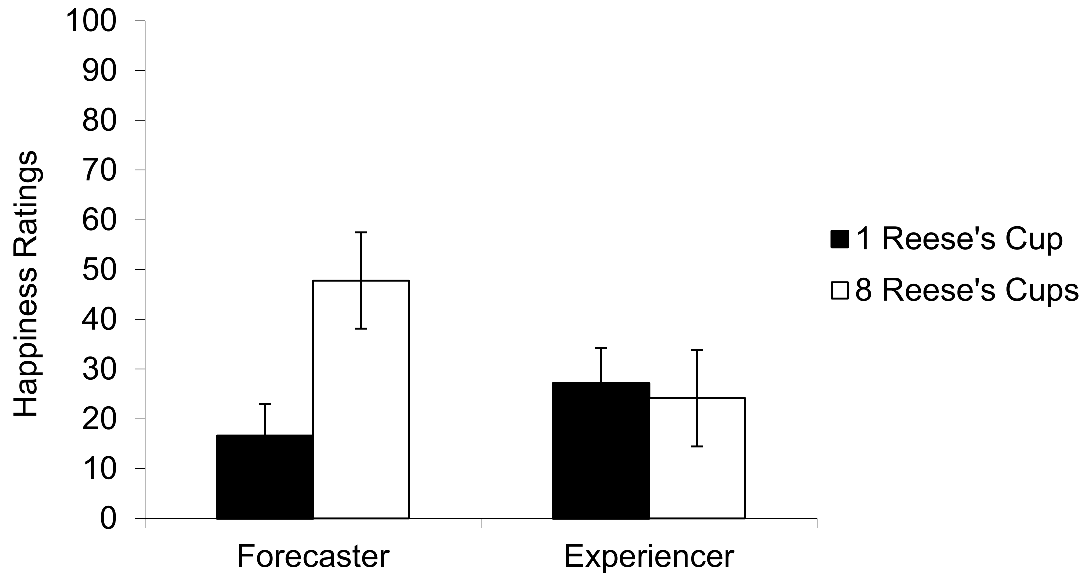

Figure 9. *Affective forecasters were more sensitive to the magnitude of a token of appreciation (i.e., receiving 1 or 8 Reese's peanut butter cups) than were experiencers in Experiment 8. Bars represent ± 1 SEM.*

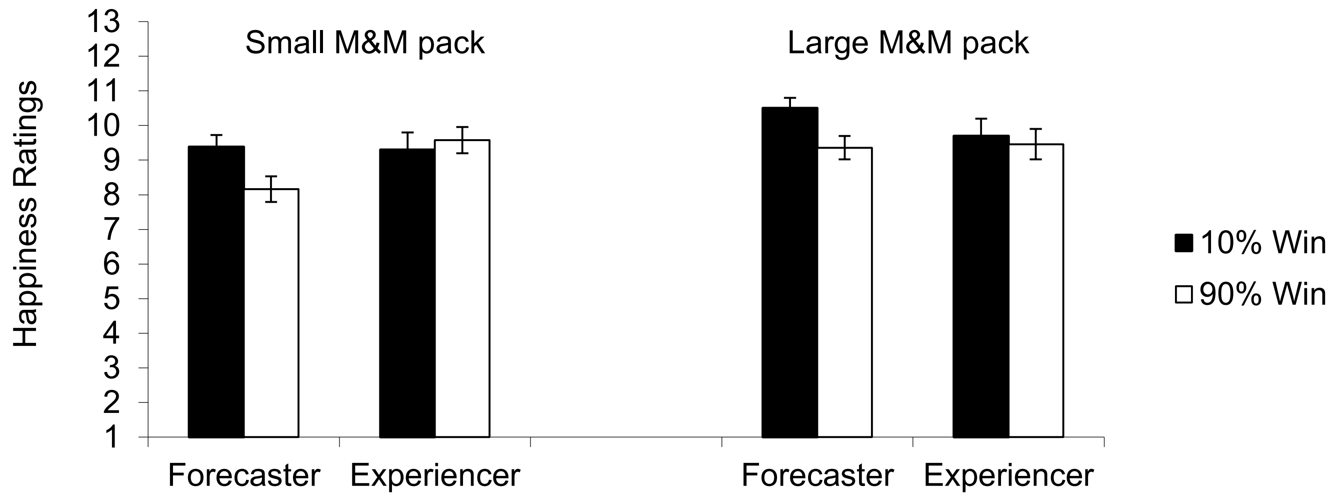

Figure 10. Affective forecasters were more sensitive to the magnitude of the outcome and the probability of winning that outcome (i.e., 10% or 90%) than experiencers in Experiment 9.