2004

Pleasure, Utility, and Choice

Barbara Mellers
University of Pennsylvania

Pleasure, Utility, and Choice

Abstract

When making most choices, people imagine how they will feel about the consequences. This chapter provides an account of the anticipation process and uses it to predict choice. Decisions from several experiments are consistent with a theory in which people are assumed to evaluate alternatives by making trade-offs between predicted pleasure and pain. Then they choose the alternative with greater expected pleasure. The field of decision making has long benefited from the interdisciplinary contributions of philosophers, economists, and statisticians, among others. These interdisciplinary contibutions can be categorized into two camps. One camp specifies how people should make choices if they wish to obey fundamental rules of logic and probability. The other camp focuses on what people actually do when making choices. While rational theories rely on beliefs and utilities, descriptive theories look to psychological processes including cognitive limitations, social norms, and cultural constraints to explain actual choices and the reasons behind alleged deviations from rationality. Both camps are well aware that emotions influence choice. Rational theorists have addressed the question of whether emotions should influence choice, and descriptive theorists have explored how emotions influence choice. This chapter presents a descriptive account of decision making that focuses on anticipated pleasure. We propose that, when making a choice, people imagine how they will feel about future consequences. Comparisons of qualitatively different feelings are made in terms of pleasure and pain. That is, people evaluate each alternative by balancing imagined pleasure against imagined pain and select the alternative with greater average pleasure.

Disciplines
Business | Marketing

17

Pleasure, Utility, and Choice

Barbara A. Mellers

ABSTRACT

When making most choices, people imagine how they will feel about the consequences. This chapter provides an account of the anticipation process and uses it to predict choice. Decisions from several experiments are consistent with a theory in which people are assumed to evaluate alternatives by making trade-offs between predicted pleasure and pain. Then they choose the alternative with greater expected pleasure.

The field of decision making has long benefited from the interdisciplinary contributions of philosophers, economists, and statisticians, among others. These interdisciplinary contibutions can be categorized into two camps. One camp specifies how people *should* make choices if they wish to obey fundamental rules of logic and probability. The other camp focuses on what people actually *do* when making choices. While rational theories rely on beliefs and utilities, descriptive theories look to psychological processes including cognitive limitations, social norms, and cultural constraints to explain actual choices and the reasons behind alleged deviations from rationality.

Both camps are well aware that emotions influence choice. Rational theorists have addressed the question of whether emotions should influence choice, and descriptive theorists have explored how emotions influence choice. This chapter presents a descriptive account of decision making that focuses on anticipated pleasure. We propose that, when making a choice, people imagine how they will feel about future consequences. Comparisons of qualitatively different feelings are made in terms of pleasure and pain. That is, people evaluate each alternative by balancing imagined pleasure against imagined pain and select the alternative with greater average pleasure.

BACKGROUND AND FOREGROUND EMOTIONS

Emotions have direct and indirect effects on choice. Indirect emotions, such as moods, temperaments, and dispositions, occur regardless of whether or not people make a decision. These emotions shape choices in a variety of ways. Happiness produces faster and more efficient decisions (Isen & Means, 1983), more creative problem solving (Isen, 1987), greater associations among ideas, and greater enjoyment in pleasurable tasks (Isen, 1993). Sadness leads to longer response times, greater discrimination between strong and weak arguments, and greater analytical thinking. Anger produces faster responses and less discriminate use of information, and fear leads to greater pessimism and risk aversion (Bless, Bohner, Schwarz, & Strack, 1990; Fiedler, 1988; Forgas, 1992; Luce, 1998; Luce, Bettman, & Payne, 1997; Lerner & Keltner, 2001).

Direct emotions occur when people make decisions. These emotions can take two forms: process emotions and anticipated emotions. Process emotions reflect feelings about the act of deciding. People might feel annoyed when they have no good options or conflicted when they have too many good options (Dhar, 1997; Tversky & Shafir, 1992). People might feel anxious when the stakes are high, the time is short, or the information is ambiguous (Janis & Mann, 1977).

Anticipated emotions are imagined feelings about future outcomes of a choice. These emotions may involve fear, guilt, anger, sadness, or joy. In some cases, these emotions might be qualitatively different and hard to compare. In these cases, pleasure and pain provide the common currency for comparison.

We have studied the process by which people anticipate the pleasure and pain of outcomes and have tried to relate those emotions to choice. We now summarize some of our results.

INVESTIGATING PLEASURE

Several of our studies use what decision theorists call "the gambling paradigm." Participants are asked to make choices between gambles with monetary outcomes of wins or losses. Such choices have clear-cut probabilities and outcomes and, most important, they are easy to manipulate (Mellers et al., 1997, 1999). On any given trial, respondents are presented with two gambles shown as pie charts on a computer screen. Different regions of the pie charts represent wins or losses. In many studies, amounts range from +US$32 to −US$32 and are large enough to produce strong emotional reactions. Participants select the gamble they prefer to play. The gamble is resolved, and the outcome is displayed. Finally, participants rate their emotional reaction to the outcome.

In some tasks, gambles are only "partially" resolved. A spinner appears in the center of the chosen gamble, while the unchosen gamble vanishes.

The spinner begins to rotate, eventually stops, and participants learn the outcome. This situation matches many real-world choices. People do not know what would have happened if they had made the other choice. In other tasks, gambles are "completely" resolved. Spinners appear in the center of both gambles and rotate independently. When the spinners stop, participants learn the outcomes of chosen and unchosen gambles. This information – either expected or imagined – can have powerful effects on choice (Parker, Stradling, & Manstead, 1996; Ritov & Baron, 1990; Simonson, 1992).

We have investigated the pleasure of monetary wins and losses. To examine *anticipated* pleasure, we ask participants to make a choice between gambles with hypothetical outcomes. When the gamble is resolved, people imagine how they would feel. To investigate *actual* pleasure, we ask participants to make choices between gambles with real outcomes. When gambles are resolved, they rate their feelings about what actually happened to them. Anticipated pleasure and actual pleasure are expressed on a category rating scale from 50 (very happy) to −50 (very unhappy).

Emotions are inherently relative, and anticipated pleasure is no exception. Anticipated pleasure depends on changes, not final states. In the gambling paradigm, at least three reference points are salient. The status quo is by far the most important. People are well aware of the difference between adding $5 to their pocketbooks and taking $5 out. A second reference point is the other outcome of the "chosen" gamble. When people imagine an outcome, they are sensitive to whether it is better or worse than the gamble's other outcome. Such comparisons across states of the world (or places the spinner could stop) are called "elation" and "disappointment," respectively (Bell, 1985; Loomes & Sugden, 1986). A third reference point is the outcome of the "unchosen" gamble. Decision makers are also sensitive to whether their outcome is better or worse than the outcome of the gamble they did not choose. Such comparisons across choices are called "rejoicing" and "regret," respectively (Bell, 1982; Loomes & Sugden, 1982).

Figure 17.1 shows the effects of disappointment and regret in our gambling studies. Emotional reactions to $8 wins and $8 losses are presented on the on the left and right, respectively. Slopes of the lines represent disappointment effects; both gains and losses of $8 are more pleasurable when the reference point (i.e., the other outcome of the *chosen* gamble) is worse (−$32) than when the reference point is better ($32). Spaces between the lines represent regret effects. Again, outcomes are more pleasurable when the reference point is worse than when the reference point is better.

Reference points have enormous effects on the pleasure of gains and losses. Feelings about an $8 win range from "very pleasurable" when both reference points are $32 losses to "just above neutral" when both reference
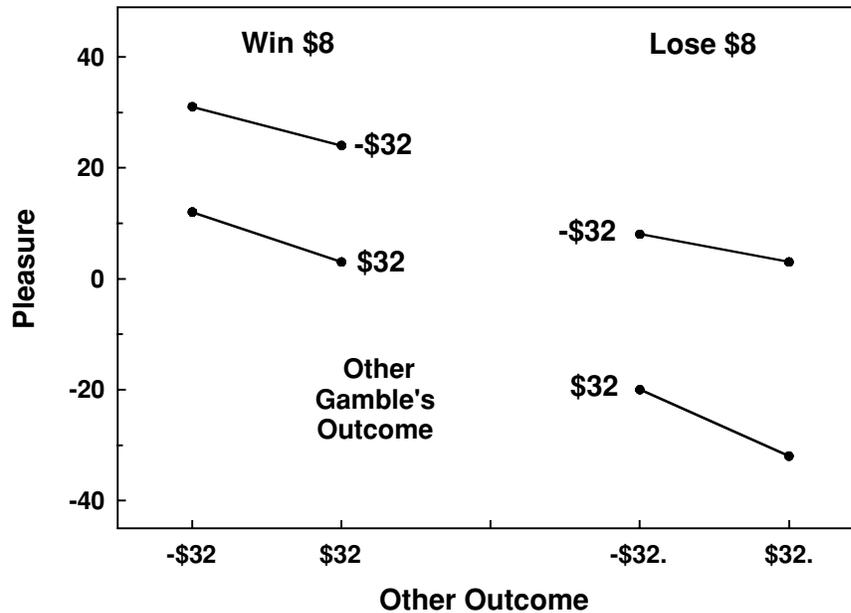
FIGURE 17.1. Disappointment and regret effects for wins and losses of $8, respectively. Each point is the average of three means that differ in the probability of the obtained outcome (.5 or .8), and all else is held constant.

points are $32 wins. Feelings about an $8 loss range from "very painful" when both reference points are $32 wins to "slightly pleasurable" when both reference points are $32 losses. In fact, disappointment and regret effects can make losses more pleasurable than gains. Feelings about losing $8 when both reference points are −$32 are more positive than feelings about winning $8 when both reference points are +$32 (10 vs. 3, respectively).

Comparisons of disappointment and regret effects have revealed that regret is often greater in magnitude than disappointment. Regret, unlike disappointment, involves the element of control. Accountability and/or responsibility often go with regret, but not with disappointment, and these feelings may influence the weight of the comparisons (Kahneman & Miller, 1986; Markman, Gavanski, Sherman, & McMullen, 1995; Zeelenberg, van Dijk, van der Pligt, Manstead, van Empelen, & Reinderman, 1998).

THE ASYMMETRY OF COMPARISONS

In their classic theory of risky choice, Kahneman and Tversky (1979) and Tversky and Kahneman (1992) proposed that people evaluate outcomes relative to the status quo, and that value is asymmetric around the zero point. The pain of a loss is greater in magnitude than the pleasure of
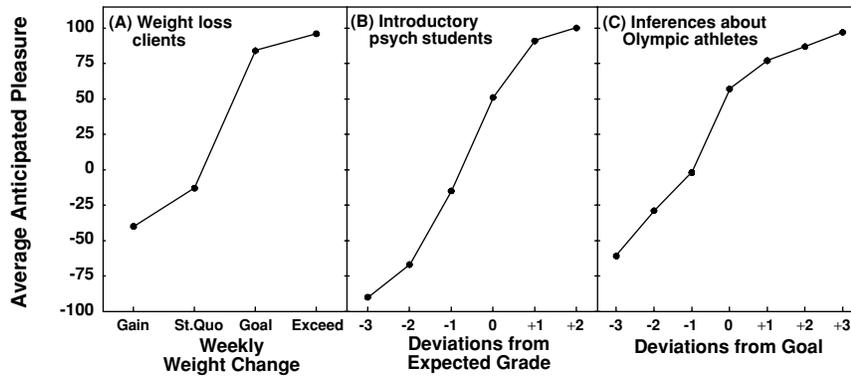
FIGURE 17.2. The asymmetry of comparisons. Slopes are steeper below the reference point than above the reference point. Panels show imagined weight loss relative to the weekly goal, imagined grades relative to the expected grade, and imagined feelings of Olympic athletes with their performance relative to their expected performance.

an equivalent gain. This asymmetry holds around personal comparisons, social comparisons, and even counterfactual comparisons. Negative contrasts have greater impact than positive contrasts. As seen in Figure 17.1, even a gain can *feel* like a loss when compared to an even larger gain.

Figure 17.2 shows the asymmetry in nongambling contexts when the reference point depends on personal expectations and desires (Mellers & McGraw, 2001). Panel A shows results from a dieting study. Clients in a commercial weight-loss program were asked to predict their weekly weight loss and anticipate how they would feel about various outcomes. The next week when clients returned, they learned their actual weight and reported their feelings about the outcome. Clients felt slightly pleased about exceeding their weekly goal by one pound, but quite unhappy about falling short of their goal by the same amount.

Panel B of Figure 17.2 shows results from a grading study. At the beginning of the quarter, undergraduates who had decided to take a course in introductory psychology were asked to predict their course grade and anticipate their feelings about all possible grades. The following quarter, the same undergraduates told us their actual grades and their emotional reactions. Getting one grade higher than expected felt mildly good, but getting one grade lower than expected was quite a blow.

Panel C presents findings from a study in which students were asked to imagine the feelings of Olympic athletes who were given information about the medal received and the medal expected. The students reported that Olympic athletes who exceeded their expectations by one place would be slightly happier, but those who fell short of their expectations by the same amount would be much more disappointed.
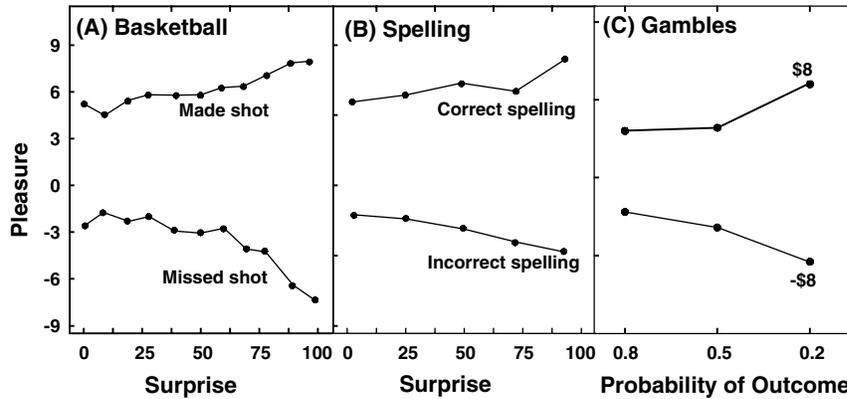
FIGURE 17.3. Surprise effects in tasks of chance and skill. Anticipated pleasure is plotted against surprisingness. Unlikely outcomes are emotionally amplified relative to likely outcomes.

THE WEIGHT OF COMPARISONS

Not all reference points are equally important. Those which are more believable, more salient, more controllable, and more mutable have greater psychological impact. We have found that comparisons between an outcome and a reference point are weighted by the surprisingness of the outcome. Surprise is based on luck or skill, but it can also depend on other factors, such as the vividness of that outcome, the availability of the outcome, and the ease with which it comes to mind. Unexpected or surprising outcomes – either good or bad – have greater emotional impact than expected outcomes (Shepperd & McNulty, 2002). We call this result the surprise effect.

Figure 17.3 presents three examples of surprise effects. Panel A shows results from a task of physical skill. In this case, surprise depends on one's assessment of one's own ability. Recreational basketball players took shots from predesignated locations on the court. Before each shot, they judged their confidence in success. After each shot, they judged their emotional reaction. With tasks of skill, surprise is inferred from confidence. When a player *misses* a shot, we assume that surprise is directly related to confidence. When a player *makes* a shot, we assume that surprise is inversely related to confidence. Surprise is either confidence (with a failure) or confidence subtracted from 100 percent (with a success). Panel A shows that more surprising successes are more pleasurable, and more surprising failures are more painful.

Panel B shows surprise effects from a task of mental skill. In this study, undergraduates participated in a spelling bee. They heard a word, tried to spell it, and judged their confidence that they were correct. Students were

then shown the spelling of the word and rated their feelings about their performance. Pleasure is plotted against surprisingness, as derived from judged confidence. Once again, unexpected successes are more pleasurable, and unexpected failures are more painful.

Panel C shows surprise effects from a gambling study. With tasks of chance, surprise depends on objective probabilities. The anticipated pleasure of an \$8 win is greater when the chances are smaller (20%) than when they are larger (80%). Similar effects occur with losses. In sum, surprising wins are more pleasurable than expected wins, and surprising losses are more painful than expected losses for tasks of both skill and chance.

DESCRIBING ANTICIPATED PLEASURE

The effects of comparisons and beliefs shown in Figures 17.1 through 17.3 can be explained by an account we call decision affect theory (Mellers et al., 1997, 1999). Imagine a decision maker faced with a choice between Gambles 1 and 2. Gamble 1 has two outcomes, A and B. When the decision maker anticipates the pleasure of outcome A, the process can be represented as:

$$R_A = J\,[u_A + d(u_A - u_B)^*(1 - s_A)], \tag{1}$$

where R_A is the anticipated pleasure of A, J is a linear function that converts an imagined feeling to a numerical response, u_A and u_B are the utilities of outcomes A and B relative to the status quo, and $d(u_A - u_B)$ is a disappointment function that represents the pleasure of A relative to B, the other outcome of the gamble. Finally, s_A is the belief that outcome A will occur, and $1 - s_A$ is the surprisingness of A (i.e., the belief that A will *not* occur). The disappointment function is weighted by the surprisingness of A relative to B.

Now consider the anticipated pleasure of outcome A when the decision maker imagines that outcome, C will occur if Gamble 2 is chosen. The anticipated pleasure of outcome A in the context of outcome C is:

$$R_{A(C)} = J\,[u_A + d(u_A - u_B)^*(1 - s_A) + r(u_A - u_C)^*(1 - s_A s_C)] \tag{2}$$

where the first two terms on the right-hand side of the equation are identical to those in Equation 1, and the third term, $r(u_A - u_C)$, is the comparison of A with C. This function is the regret function and is weighted by $(1 - s_A s_C)$, the surprisingness of the joint event of A and C.

Decision affect theory predicts that anticipated pleasure reflects weighted changes relative to salient reference points. The utility of A, u_A, is the pleasure of A relative to the status quo. The disappointment function, $d(u_A - u_B)$, is the pleasure of A relative to B, and the regret function,

$r(u_A - u_C)$, is the pleasure of A relative to the C. The impact of the disappointment and regret functions varies with the surprisingness of the imagined outcome. This theory has done an excellent job describing judged pleasure of outcomes in both experimental and observational studies (Mellers, 2000; Mellers et al., 1997, 1999).

RELATING ANTICIPATED PLEASURE TO CHOICE

Recent interest in the relationship between emotions and choice has led to numerous theoretical developments that differ in their assumptions about which reference points are important and the functional form of the comparisons (Bell, 1982, 1985; Gul, 1991; Inman, Dyer, & Jia, 1997; Loomes & Sugden, 1982, 1986; Zeelenberg, van Dijk, Manstead, & van der Pligt, 2001). All of the theories assert that people anticipate their feelings relative to anchors, sum those feelings over outcomes, and select the option with greater anticipated pleasure. Our theory, called subjective expected pleasure theory, falls into this general framework (Mellers et al., 1999). We further propose that the anticipated pleasure of outcomes can be described by decision affect theory. Then we assume that, when evaluating an option such as a gamble, people weigh their anticipated feeling about each outcome by the likelihood that they will experience that emotion and aggregate over anticipated emotions. Finally, they select the gamble with greater average pleasure.[1]

Let us return to the decision maker facing the choice between Gambles 1 and 2. When that decision maker anticipates the pleasure of outcomes independent of outcomes of other gambles, subjective expected pleasure theory predicts that the average pleasure of Gamble 1 will be:

$$s_A R_A + s_B R_B \tag{3}$$

where s_A and s_B are the beliefs that outcomes A and B will occur, and R_A is the prediction of anticipated pleasure from decision affect theory (Equation 1). The expected pleasure of Gamble 2, with outcomes C and D is:

$$s_C R_C + s_D R_D, \tag{4}$$

and our decision maker selects the gamble with greater average pleasure.

Now consider a more complex case in which the anticipated pleasure of an outcome depends on imagined outcomes of the *other* gamble. The

---

[1] Pleasure does not necessarily imply hedonism. It comes from many sources, including acts of virtue or relief from pain. Likewise, pain arises from an aggressive impulse, a sense of injustice, or frustration from falling short of a goal.

average pleasure of Gamble 1 depends on the anticipated pleasure of A in the context of C and D and B in the context of C and D, as follows:

$$s_A[s_C R_{A(C)} + s_D R_{A(D)}] + s_B[s_C R_{B(C)} + s_D R_{B(D)}]. \tag{5}$$

where $R_{A(C)}$ is the anticipated pleasure of outcome A in the context of outcome C from decision affect theory (Equation 2). The expected pleasure of Gamble 2 follows a similar pattern:

$$s_C[s_A R_{C(A)} + s_B R_{C(B)}] + s_D[s_A R_{D(A)} + s_B R_{D(B)}], \tag{6}$$

and the gamble with greater average pleasure is selected.

Subjective expected pleasure theory is similar to the leading rational account of choice known as subjective expected utility theory (Savage, 1954). In subjective expected utility theory, choices are based on a comparison of the average utilities of options. The choice between Gambles 1 and 2 would be a comparison of the expected utility of Gamble 1:

$$s_A u_A + s_B u_B, \tag{7}$$

where s_A and s_B are the beliefs that A and B will occur and u_A and u_B are the utilities of the outcomes with the expected utility of Gamble 2:

$$s_C u_C + s_D u_D. \tag{8}$$

Decision makers select the gamble with greater expected utility.

The key difference between our descriptive theory and the rational one is the distinction between anticipated pleasure and utility. Pleasure often differs from utility. The *utility* of a smaller win can never be greater than the *utility* of a larger win. But the pleasure of a smaller, surprising win can exceed the pleasure of a larger, expected win. Furthermore, the utility of a loss can never be greater than the utility of a win. But the pain of a loss that could have been a much larger can be less than the pain of a win that could have been a much larger. These differences between utilities and emotions are easily predicted by decision affect theory.

SUBJECTIVE EXPECTED PLEASURE THEORY

We have examined the extent to which subjective expected pleasure theory predicts choice proportions in five gambling studies. Predictions for the theory were obtained for group data in the following way. First, decision affect theory was fit to mean judgments of anticipated pleasure separately in each condition (as in Equations 1 or 2). Second, estimated parameters of the theory were used to compute the average anticipated pleasure of each gamble (as in Equations 3 and 4). Third, predicted choices were based on the assumption that people preferred the gamble with greater average pleasure.

The correlation between aggregated choice proportions and binary predictions of subjective expected pleasure theory ranged from 0.66 to 0.86 across the five studies, with an average correlation of 0.74. These correlations may seem low, but it is important to keep in mind that predictions for choice were obtained from fit of another theory (decision affect theory) to another set of data (anticipated pleasure). Decision affect theory provides a theoretical framework for both pleasure and choice.

How well does the theory predict individual choices? To answer this question, we examined the correlation between individual choices and predictions using data from Mellers et al. (1999).[2] First, we fit each individual's judgments of anticipated pleasure to decision affect theory. Using parameters from decision affect theory, we calculated the average pleasure of each gamble. Then, to compute predicted choices, we assumed that individuals would select the gamble with greater average pleasure. The median correlation between predicted and actual choices was 0.34 and 0.38 in conditions with partial and complete feedback, respectively. These correlations, though much lower than those based on group data, differed significantly from zero for virtually all of the seventy-four subjects.

Tests of subjective expected pleasure theory with observational studies are more difficult for two reasons. First, we used participants who had already made a choice, so we did not know the other options under consideration. Second, all participants in each study made the same choice (taking a course, having a pregnancy test, or joining a weight-loss program). Despite these difficulties, there is a weak, though testable, implication of the theory. For each individual, we can ask whether the expected pleasure of the chosen option was greater than zero. That is, does the average pleasure of the chosen option exceed that of the status quo?

Figure 17.4 shows the average anticipated pleasure of the chosen option for individuals in three observational studies. Panel A presents data from a pregnancy study. Women who were waiting for a pregnancy test at Planned Parenthood imagined how they would feel about negative or positive test results. They also told us the probabilities that each result would occur. A small percentage of women felt very unhappy, but for the majority, the expected pleasure of the chosen option of unprotected sex was positive. Similar patterns appeared with the grading and dieting experiments in Panels B and C. On average, most of the students expected to feel good about their performance in the course. Similarly, clients at the weight-loss program expected to be pleased, on average, with their dieting attempts. Thus, the majority of participants in the three studies chose options that

---

[2] When we fit decision affect theory to individual judgments of anticipated pleasure, we assumed that subjective beliefs were equivalent to objective beliefs and utilities were power functions with exponents that could differ for gains and losses.
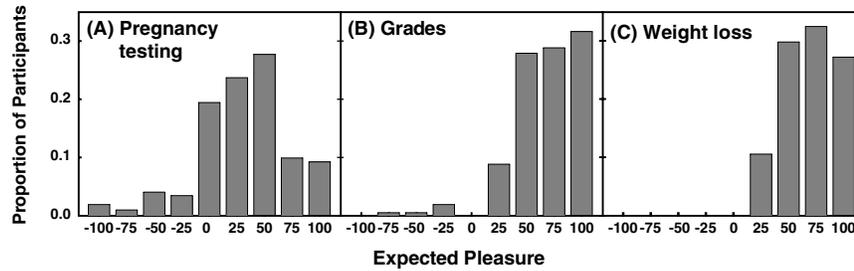
FIGURE 17.4. Tests of subjective expected pleasure theory in three observational studies. The theory predicts that the average pleasure of the selected option will be greater than zero. For most subjects the prediction holds.

were associated with positive expected feelings, as predicted by subjective expected pleasure theory.

HOW ACCURATELY DO PEOPLE ANTICIPATE PLEASURE?

If decision makers compare options by attending to expected pleasure, the accuracy of their affective forecasts becomes essential. Inaccurate predictions could easily lead to suboptimal choice (Kahneman, 1994). Several experiments have identified errors in affective forecasting (Loewenstein & Schkade, 1999). Some of these errors are different forms of myopia. One such error arises when we allow our immediate feelings to have undue influence on our predictions of future feelings. When feeling happy, people overestimate the probability of a favorable outcome, underestimate the chances of an unfavorable outcome, and retrieve more happy memories (Johnson & Tversky, 1983; Nygren, Isen, Taylor, & Dulin, 1996; Wright & Bower, 1990).

Another error occurs when people focus on the immediate but irrelevant features of future outcomes. Gilbert, Pinel, Wilson, Blumberg, and Wheatley (1998) asked assistant professors to predict their feelings about getting and not getting tenure. Not surprisingly, the same professors expected to be happy if they received tenure, and extremely unhappy otherwise. Some time later, Gilbert et al. interviewed the same professors, found out what had happened, and asked them how they actually felt. Those who had been denied tenure were much happier than they had expected to be.

Schkade and Kahneman (1998) also demonstrated that, when predicting affect, people tend to focus on features of an outcome that are salient at the moment. They asked students in the Midwest and California to judge how happy they were and how happy they thought other students like them living in the other region were. Schkade and Kahneman's survey was designed to highlight the advantages of California – better climate, more

Pleasure, Utility, and Choice   291
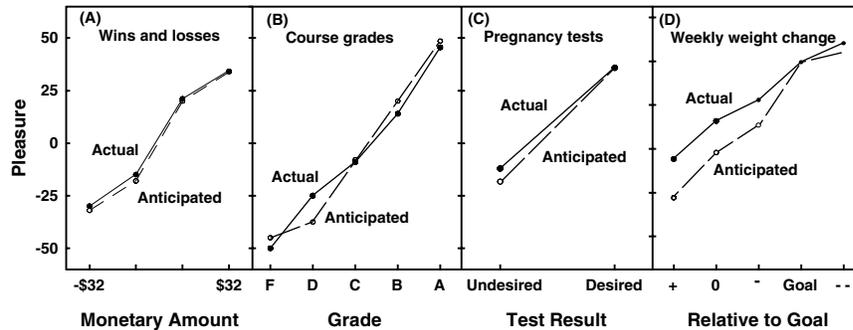

FIGURE 17.5. Accuracy tests of anticipated pleasure. Anticipated and actual pleasure, shown as dashed and solid lines, respectively, from the gambling, grading, pregnancy, and dieting studies. For the most part, average forecasts are accurate, although dieters tend to expect to feel worse about gaining weight than they actually feel.

cultural opportunities, and greater natural beauty over the Midwest. Both Californians and Midwesterners thought students in California would be happier, but in fact, the groups were equally happy on average.

Some of our experiments allow us to check the accuracy of affective forecasts. Figure 17.5 shows average anticipated pleasure (dashed lines) and average actual pleasure (solid lines) as a function of outcomes in the gambling, grading, pregnancy, and dieting experiments. Participants were reasonably good, on average, at forecasting their feelings. In the gambling study, the dashed and solid lines were quite close. Even at the level of the individual decision maker, average errors between anticipated and actual feelings about monetary outcomes rarely deviated significantly from zero. Students in the grading study were also reasonably accurate at forecasting their feelings about course grades. Moreover, women at Planned Parenthood could also predict their feelings about test results.

The only experiment that showed systematic deviations between actual and anticipated feelings was the dieting study. Clients expected to feel worse about gaining (or not losing) weight than they actually felt. They overestimated the pain of an undesirable outcome. However, this prediction error might have been strategic; clients may have tried to convince themselves that they would feel worse about gaining weight in an effort to control their behavior. We now turn to the topic of strategic emotions.

STRATEGIC EMOTIONS

In a classic paper, Taylor and Brown (1988) argued that people are often overly optimistic about themselves and their assessment of the future.

Moreover, such inflated self-perceptions could be strategic if they led to more creative and productive work (Taylor, 1989; Taylor and Brown, 1994). Despite the potential virtues, excessive optimism can have the undesirable effect of setting people up for disappointment.[3] People appear to be aware of this problem and often take actions to avoid disappointment by adjusting their beliefs downward to more realistic or even pessimistic levels (Sanna, 1999; Shepperd, Ouellette, & Fernandez, 1996; Taylor & Shepperd, 1998; Taylor & Gollwitzer, 1995; van Dijk, Zeelenberg, & van der Pligt, 2001). In one example, Shepperd et al. (1996) asked college sophomores, juniors, and seniors to estimate a starting salary for their first postgraduate job. Salaries were predicted at the beginning and end of the spring term. Only seniors looking for jobs immediately after graduation lowered their estimates at the end of the term, right before they would face the world. People are aware that bad news feels worse when unexpected, and they strategically change their expectations to avoid disappointment.

Strategic shifts of emotions can also occur *after* a decision was resolved if the outcome was bad. Tykocinski, Pick, and Kedmi (2001) identified a process they call retroactive pessimism. In an attempt to regulate disappointment, people change their beliefs about the likelihood of an unfavorable outcome and take the position that the event was inevitable. Decision affect theory predicts that such shifts in belief, both before and after the decision is resolved, can diminish the pain of unfavorable outcomes.

CONCLUSION

Anticipated pleasure is inherently relative and governed by change with respect to reference points. Kahneman and Tversky have suggested that the pain of a loss has greater impact than the pleasure of comparable gain, an effect they called loss aversion. Furthermore, they asserted that change around the status quo has differential impact, with negative comparisons having greater impact than positive comparisons. We have found similar asymmetries around other reference points. Not only is the pain of a loss greater than the pleasure of an equivalent gain, but the pain of a *relative* loss is greater in magnitude than the pleasure of a comparable *relative* gain.

Effects of reference points have been investigated with functional imaging studies. Breiter, Aharon, Kahneman, Dale, and Shizgal (2001) presented participants with monetary gambles. A spinner appeared in the center

---

[3] Harrison and March (1994) have also argued, albeit on entirely different grounds, that when people make decisions, they often expect too much and set themselves up for disappointment.

of each gamble, rotated, and eventually stopped. Breiter et al. examined neurological responses to constant outcomes that were either the best or the worst possible consequences of the gamble. Dopamine neurons in several regions of the brain were sensitive to reference point effects. Holding all else constant, greater activation of dopamine neurons occurred when the *same* outcome was the best possible consequence of the gamble than when it was the worst.

The anticipated pleasure of outcomes also varies with beliefs about what will occur. Unexpected outcomes are more intense than expected ones; surprising good outcomes are more pleasurable, and surprising bad outcomes are more painful. Once again, there are parallels between judgments of anticipated pleasure and electrophysiological studies of dopamine neurons (Schultz et al., 1992, 1993, 1997). When monkeys expect a reward, dopamine neurons start to fire. When monkeys receive that reward, neuronal firing depends on prior expectations. Unexpected rewards lead to greater firing than expected rewards.

We have summarized the effects of outcomes, comparisons, and surprise in an account of anticipated pleasure called decision affect theory. The theory predicts that anticipated pleasure is relative and governed by changes and beliefs. This account of pleasure has also been applied to choice. We offer a theory of choice called subjective expected pleasure theory in which people anticipate the pleasure of outcomes, weigh their feelings by the chances they will occur, sum over outcomes, and select options that, on average, provide them with greater pleasure. Anticipated pleasure can be described by decision affect theory.

Are people aware of the expected pleasure associated with risky options? Schwartz (1997) investigated this question by asking people to judge the average pleasure they imagined feeling each time they played a gamble, if they could play it an infinite number of times. People were quite good at judging their average feelings, and overall evaluations of gambles were closely related to the subjective expected pleasure of the gambles.

Another way to investigate the awareness of expected pleasure is to look into whether participants are capable of using different hedonic choice rules. In a two-part study, Schwartz, Mellers, and Metzger (1999) asked people to make choices between gambles and judge the pleasure of monetary outcomes. Later, they asked the same people to make choices between the same gambles, but this time, they were instructed to either maximize the pleasure of their experiences or minimize the displeasure of their experiences. Predictions for these hedonic choice rules could be constructed by examining the judged pleasure of outcomes from the first part of the study and determining, for each individual, what choice would maximize pleasure or minimize displeasure. Participants did not follow instructions

294   *Barbara A. Mellers*

perfectly, but they did adjust their choices in the right directions. The results provide further evidence that people are, at least to some extent, aware of the influence of emotions on choice and at least partially capable of controlling their choices to achieve hedonic goals.

How *Should* Emotions Influence Choice?

Emotions have traditionally been regarded as impediments to rational choice. They wreak havoc on orderly thought and interrupt logical reasoning. However, some theorists have recognized the beneficial effects of emotions. Darwin (1872) noted that many emotional expressions are adaptive. Surprise often leads people to open their eyes as wide as possible and obtain as much new information as they can. Anger often leads to aggressive expressions. Chimpanzees who are threatened show their teeth and in the process signal their ability, and perhaps intention, to attack. Such expressions have evolved for long-term survival.

Scherer (1984) argues that emotions may have evolved to replace reflexes, instincts, and simple stimulus-response chains. The decoupling of a single response from an eliciting stimulus allows opportunities for a wide array of reactions. Fridja (1986) has noted that emotions help to mobilize behavior by serving as relevance detectors. Others point out that emotions provide useful information about our internal states (Clore & Parrott, 1991; Clore, Schwarz, & Conway, 1994; Schwarz, Bless, & Bohner, 1991).

Frank (1988) has stressed the advantages of emotions as solutions to commitment problems. Some choices require difficult-to-reverse commitments that may run counter to short-term interests. Couples considering marriage and children may feel reluctant to enter into an agreement for fear of the other leaving when a more attractive mate becomes available. The bonds of romantic love can provide solutions that work far better than detailed contracts. Emotions solve social problems as well by providing constraints for proper behavior. Most people can imagine feeling guilty about lying or cheating, and those imagined feelings encourage socially acceptable behavior. Positive feelings also provide constraints. Widely known and shared positive feelings about fairness deter people from behaving selfishly.

The topic of how people *should* use their emotions is controversial one. Some argue that regret and disappointment are often momentary feelings that distract us from long-range plans. On the other hand, the emotional consequences of decisions may be just as important as the material consequences. In this view, emotions are an essential part of what it means to be rational (Damasio, 1994). These philosophical debates are not easily resolved. However, it is abundantly clear that cognition and emotion are closely intertwined, and connections between these processes are highly relevant to decision making. We believe rationality and emotion-based

decision making are not as far apart as was once thought. Our results suggest that the rational theory may be a special case of certain emotion-based choices.

References

Bell, D. E. (1982). Regret in decision making under uncertainty. *Operations Research*, *30*, 961–981.

Bell, D. E. (1985). Disappointment in decision making under uncertainty. *Operations Research*, *33*, 1–27.

Bless, H.; Bohner, G.; Schwarz, N.; & Strack, F. (1990). Mood and persuasion: A cognitive response analysis. *Personality and Social Psychology Bulletin*, *16*, 331–335.

Breiter, H. C.; Aharon, I.; Kahneman, D.; Dale, A.; & Shizgal, P. Functional imaging of neural responses to expectancy and experience of monetary gains and losses. *Neuron*, *30*, 619–639.

Clore, G. L., & Parrott, W. G. (1991). Moods and their vicissitudes: Thoughts and feelings as information. In J. Forgas (Ed.), *Emotion and social judgment* (pp. 107–123). Oxford: Pergamon Press.

Clore, G. L.; Schwarz, N.; & Conway, M. (1994). Emotion and information processing. In R. S. Wyer and T. K. Srull (Eds.), *Handbook of social cognition* (2d ed., pp. 323–417). Hillsdale, NJ: Erlbaum.

Damasio, A. (1994). Descartes' error: Emotion, reason, and the human brain. New York: Grosset/Putnam.

Darwin, C. (1872). *The expression of the emotions in man and animals*. New York: New York Philosophical Library.

Dhar, R. (1997). Consumer preferences for a non-choice option. *Journal of Consumer Research*, *24*, 215–231.

Fiedler, K. (1988). Emotional mood, cognitive style, and behavioral regulation. In K. Fiedler and J. Forgas (Eds.), *Affect, cognition, and social behavior* (pp. 100–119). Toronto: Hoegrefe International.

Forgas, J. P. (1992). Affect in social judgments and decisions: A multi-process model. *Advances in experimental social psychology* (Vol. 25, pp. 53–60). New York: Academic Press.

Frank, R. (1988). *Passions within reason*. New York: Norton.

Frijda, N. H. (1986). *The emotions*. Cambridge: Cambridge University Press.

Gilbert, D. T.; Pinel, E. C.; Wilson, T. C.; Blumberg, S. J.; & Wheatley, T. P. (1998). Immune neglect: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology*, *75*, 617–638.

Gul, F. (1991). A theory of disappointment aversion. *Econometrica*, *59*, 667–686.

Harrison, J. R., & March, J. G. (1984). Decision making and postdecision surprises. *Administrative Science Quarterly*, *29*, 26–42.

Inman, J. J.; Dyer, J. S.; & Jia, J. (1997). A generalized utility model of disappointment and regret effects on post-choice valuation. *Marketing Science, 6*, 97–111.

Isen, A. M. (1987). Positive affect, cognitive processes, and social behavior. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20, pp. 203–253). New York: Academic Press.

Isen, A. M. (1993). Positive affect and decision making. In M. Lewis and J. M. Haviland (Eds.), *Handbook of emotions* (pp. 261–277). New York: Guilford Press.

Isen, A. M., & Means, B. (1983). The influence of positive affect on decision-making strategy. *Social Cognition*, *2*, 18–31.

Janis, I. L., & Mann, L. (1977). *Decision making*. New York: Free Press.

Johnson, E., & Tversky, A. (1983). Affect, generalization, and the perception of risk. *Journal of Personality and Social Psychology*, *45*, 20–31.

Kahneman, D. (1994). New challenges to the rationality assumption. *Journal of Institutional and Theoretical Economics*, *150*, 18–36.

Kahneman, D. (2000). Evaluation by moments: Past and future. In D. Kahneman and A. Tversky (Eds.), *Choices, values, and frames*. New York: Cambridge University Press.

Kahneman, D., & Miller, D. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review*, *93*, 136–153.

Kahneman, D., & Tversky, A. (1979). Prospect theory. *Econometrica*, *47*, 263–292.

Lerner, J., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology*, *81*, 146–159.

Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, *65*, 272–292.

Loewenstein, G., & Schkade, D. (1999). Wouldn't it be nice? Predicting future feelings. In D. Kahneman, E. Diener, and N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 85–108). New York: Russell Sage Foundation.

Loomes, G., & Sugden, R. (1982). Regret theory: An alternative of rational choice under uncertainty. *Economic Journal*, *92*, 805–824.

Loomes, G., & Sugden, R. (1986). Disappointment and dynamic consistency in choice under uncertainty. *Review of Economic Studies*, *53*, 271–282.

Luce, M. F. (1998). Choosing to avoid: Coping with negatively emotion-ladden consumer decisions. *Journal of Consumer Research*, *24*, 409–431.

Luce, M. F.; Bettman, J.; & Payne, J. (1997). Choice processing in emotionally difficult decisions. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *23*, 384–405.

Markman, K.; Gavanski, I.; Sherman, S. J.; & McMullen, M. (1995). The impact of perceived control on the imagination of better and worse possible worlds. *Personality and Social Psychology Bulletin*, *6*, 588–595.

Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological Bulletin*, *126*, 910–924.

Mellers, B. A., & McGraw, A. P. (2001). Anticipated emotions as guides to choice. *Current Directions*, *10*, 210–214.

Mellers, B. A.; Schwartz, A.; Ho, K.; & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science*, *8*, 423–429.

Mellers, B. A.; Schwartz, A.; & Ritov, I. (1999). Emotion-based choice. *Journal of Experimental Psychology: General*, *128*, 332–345.

Nygren, T.; Isen, A.; Taylor, P. J.; & Dulin, J. (1996). The influence of positive affect on the decision rule in risk situations. *Organizational Behavior and Human Decision Processes*, *66*, 59–72.

Parker, D.; Stradling, S. G.; & Manstead, A. S. R. (1996). Modifying beliefs and attitudes toward exceeding the speed limit: An intervention study based on the theory of planned behavior. *Journal of Applied Social Psychology*, *26*, 1427–1453.

Ritov, I., & Baron, J. (1990). Reluctance to vaccinate: Omission bias and ambiguity. *Journal of Behavioral Decision Making*,

Sanna, L. J. Mental simulations, affective, and subjective confidence: Timing is everything. *Psychological Science*, *10*, 339–345.

Savage, L. J. (1954). *The foundations of statistics*. New York: Wiley.

Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K. R. Scherer and P. Ekman (Eds.), *Approaches to emotion* (pp. 293–318). Hillsdale, NJ: Erlbaum.

Schkade, D. A., & Kahneman, D. (1998). Does living in California make people happy? *Psychological Science*, *9*, 340–346.

Schultz, W.; Apicella, P.; & Ljundberg, T. (1993). Responses of monkey dopamine neurons to reward and conditioned stimuli during successive steps of learning a delayed response task. *Journal of Neuroscience*, *13*, 900–913.

Schultz, W.; Apicella, P.; Scarnati, E.; & Ljungberg, T. (1992). Neuronal activity in monkey ventral striatum related to the expectation of reward. *Journal of Neuroscience*, *12*, 4594–4610.

Schultz, W.; Dayan, P.; & Montague, P. R. (1997). A neural substrate of prediction and reward. *Science*, *275*, 193–199.

Schwartz, A. (1997). *Expected feelings about risky options*. Unpublished Ph.D. dissertation. University of California, Berkeley.

Schwartz, A.; Mellers, B. A.; & Metzger, T. (1998). Manipulating hedonic strategies of choice. In J. Shanteau, B. A. Mellers, and D. Schum (Eds.), *Decision research from Bayesian approaches to normative perspectives: Reflections on the contributions of Ward Edwards*. New York: Kluwer.

Schwarz, N.; Bless, B.; & Bohner, G. (1991). Mood and persuasion: Affective states influence the processing of persuasive communications. In M. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 24, pp. 161–199). San Diego, CA: Academic Press.

Shepperd, J. A., & McNulty, J. K. (2002). The affective consequences of expected and unexpected outcomes. *Psychological Science*, *13*, 85–88.

Shepperd, J. A.; Ouellette, J. A.; & Fernandez, J. K. (1996). Abandoning unrealistic optimism: Performance estimates and the temporal proximity of self-relevant feedback. *Journal of Personality and Social Psychology*, *70*, 844–855.

Simonson, I. (1992). The influence of anticipating regret and responsibility on purchasing decisions. *Journal of Consumer Research*, *19*, 1–14.

Taylor, S. E. (1989). *Positive illusions: Creative self-deception and the healthy mind*. New York: Basic Books.

Taylor, S. E., & Brown, J. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin*, *103*, 193–210.

Taylor, S. E., & Brown, J. (1994). Positive illusions and well-being revisited: Separating fact from fiction. *Psychological Bulletin*, *116*, 21–27.

Taylor, S. E., & Gollwitzer, P. M. (1995). Effects of *mindset* on positive illusions. *Journal of Personality and Social Psychology*, *69*, 213–226.

Taylor, S. E., & Shepperd, J. A. (1998). Bracing for the worst: Severity, testing, and feedback as moderators of the optimistic bias. *Personality and Social Psychology Bulletin*, *24*, 915–924.

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, *5*, 297–323.

Tversky, A., & Shafir, E. (1992). Choice under conflict: The dynamics of deferred decisions. *Psychological Science*, *6*, 358–361.

Tykocinski, O.; Pick, D.; & Kedmi, D. (2001). Retroactive pessimism: A different kind of hindsight bias. Manuscript under review.

Van Dijk, W. W.; Zeelenberg, M.; & van der Pligt, J. (2001). Blessed are they who expect nothing: Lowering expectations as a way of avoiding disappointment. Manuscript under review.

Wright, W., & Bower, G. (1992). Mood effects on subjective probability assessment. *Organizational Behavior and Human Decision Processes*, *52*, 276–291.

Zeelenberg, M., & Beattie, J. (1997). Consequences of regret aversion 2: Additional evidence for effects of feedback on decision making. *Organizational Behavior and Human Decision Processes*, *71*, 1–16.

Zeelenberg, M.; Beattie, J.; van der Pligt, J.; & de Vries, N. (1996). Consequences of regret aversion: Effects of expected feedback on risky decision making. *Organizational Behavior and Human Decision Processes*, *65*, 148–158.

Zeelenberg, M.; van Dijk, W. W.; Manstead, A. S. R.; & van der Pligt, J. (2000). On bad decisions and disconfirmed expectancies: The psychology of regret and disappointment. *Cognition and Emotion*, *14*, 521–541.

Zeelenberg, M.; van Dijk, W. W.; van der Pligt, J.; Manstead, A. S. R.; van Empelen, P.; & Reinderman, D. (1998). Emotional reactions to outcomes of decisions: The role of counterfactual thought in the experience of regret and disappointment. *Organizational Behavior and Human Decision Processes*, *75*, 117–141.