# Wouldn't It Be Nice? Predicting Future Feelings

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In the Beach Boys song "wouldn't it be nice" an adolescent laments parental oppression which stands in the way of the anticipated bliss of marriage to his sweetheart. If his wishes came true, would he be as happy as he believes, or do his parents know something about his future preferences that he doesn't? George Bernard Shaw might have sided with the parents, noting as he did that "there are two tragedies in life. One is to lose our heart's desire. The other is to gain it."

The book in which this chapter appears is mostly about the mechanics of hedonics -- what makes people happy. But this is only half the picture; the other half is whether people are aware of these mechanics and can apply them to their own lives. As Jim March (1978) noted in a seminal article, all decisions involve predictions of future tastes or feelings. Getting married involves a prediction of one's long term feelings towards one's spouse; returning to school for an advanced degree involves predictions about how it will feel to be a student as well as predictions of long-term career preferences; buying a car involves a prediction of how it would feel to drive around in different cars. In each of these examples, the quality of the decision depends critically on the accuracy of the prediction; errors in predicting feelings are measured in units of divorce, dropout, career burnout and consumer dissatisfaction.

The accuracy of people's predictions of their own feelings is important not only for individual well-being but, increasingly, also for public policy.[1] Recent decades have seen an expansion of attempts to base public policies on measurements of public values. The best-known of such efforts is Oregon's experiment in health-care rationing, but attempts to base public policy on public values have been made in diverse areas, such as transportation safety and environmental policy[2] Measurement of public values typically involves surveys in which respondents are asked to predict how they would feel if they were in health conditions or environmental states different from the ones they are in. The meaningfulness of the measured values, and the optimality of the policies based on them, therefore, depend, in part, on the accuracy of predictions of feelings.

Undoubtedly, the great majority of predictions of feelings are reasonably accurate. People know they will feel bad if they lose their job, get rejected by a lover, or fail an examination, that

they will be stressed on the first few days of a new job, and that they will experience a post-jog "high." There do, however, appear to be many situations in which people systematically mispredict their own future feelings. Besides marrying too young, there is shopping for groceries on an empty stomach; professions of love during moments of lust; believing that you can "eat just one chip"; deciding during the winter to vacation in the south during the summer; and believing you could live the "good life" if your income were only 10% higher.

In this chapter, we address the question of when and why such errors in predicting feelings occur. In the following section, we discuss some methodological issues associated with studying predictions of feelings. Next, we review findings from diverse studies that examine the accuracy of such predictions. We then discuss three different sources of prediction errors which, in combination, can account for a large fraction of such errors. Finally, we discuss implications for decision making and social policy of the fact that people do make systematic errors in predicting their own feelings.

## On Studying Predictions of Feelings

To measure the accuracy of predictions of feelings, it is necessary to contrast people's predictions of how they will feel in a certain situation with the feelings they ultimately experience in that situation. Doing so poses significant challenges to researchers, both because of the difficulty of measuring feelings and the intertemporal nature of the phenomenon. In attempting to overcome these obstacles, researchers have employed a variety of different research designs and measurement approaches.

## Research Design Issues

There are many different research designs that can be used to compare predicted against actual feelings. Of these, the best is typically a prospective longitudinal study. To study the accuracy of expectant parents' predictions of how much they will enjoy parenting, for example, we might ask them, prior to the birth of their first child, to predict on a 0-100 point "happiness" scale how happy they will feel at some point following the birth of their child -- say, on the child's first birthday. When the child's first birthday arrives the parents are then asked to report, on the same scale, how happy they actually feel. There are, however, several problems with such a prospective longitudinal design.

First, it is feasible only for short and medium-term phenomena that are predictable. It is impractical for studying the predicted and actual impact of events that can't be predicted by the researcher (e.g., major earthquakes, except in areas where they are extremely frequent), and is also impractical for studying predictions of reactions to long-term processes such as global climate change.

A second problem relates to scaling. The way in which people interpret scales can change over time, either due to self-norming (see Frederick and Loewenstein, this volume) or other effects such as maturation. For example, if parenting produces either extreme emotional highs or extreme lows, parents may change their notion of what it means to be either extremely happy or extremely unhappy so that the anchor points on the 0-100 point happiness scale may have different meanings to them before and after experiencing the joys or miseries of parenting.

Third, people's actual feelings at the time being predicted may be influenced by their predictions in a number of different ways. The act of making a prediction, for example, can artificially increase the salience of prior expectations, leading to an amplification of contrastive emotions such as regret and elation. Thus, parents who explicitly predicted that parenting would be an unremitting joy might feel worse when reporting that it is, in fact, a mixed bag than they would have if they had not made such a prediction. Alternatively, and perhaps most commonly, a

prediction can become a type of self-fulfilling prophecy (see, e.g., Jones, 1977) through a variety of mechanisms that have been discussed in the psychology literature. Finally, it is possible that people may save the effort of introspecting about their current feelings and instead simply report their prior predictions.

All three of these problems associated with having people make explicit predictions are eliminated by conducting a between-subject study in which one group's predictions are contrasted with a different group's actual reports. However, the between-subject design has much lower statistical power and precludes a variety of interesting analyses, such as examining correlates of prediction errors (errors can't be directly measured because each subject provides only a prediction *or* an experience). Perhaps the best design, then, is a mixed between/within hybrid in which half of the subjects make a prediction and half do not, then all report their actual happiness (for examples, see Loewenstein and Adler, 1995; and Rachman and Eyrl, 1989).

Other research designs are possible as well. Some researchers have conducted retrospective studies in which people are asked how they currently feel and are also asked to recall how they expected to feel at some point in the past. For example, Suedfeld, Ramirez, Deaton and Baker-Brown (1982:330) asked inmates in long-term solitary confinement to report their current feelings and also to recall how they had expected to adjust when they were first placed in solitary confinement. The major problem with this design is that people's memories of how they expected to feel are likely to be distorted powerfully by how they actually feel (the "hindsight bias"), most likely in a bias-attenuating fashion. That is, they are likely to remember erroneously that they expected to feel as they actually feel. On the other hand, people may have quite a good memory for disconfirmed expectations (e.g., Mandler, 1975; Hastie, 1984).

Another possibility is a cross-sectional design in which one group of subjects, who face some type of event, are asked to predict how it will affect them, while another group, who have already experienced matched events, are asked how it has affected them. Loewenstein and Frederick (1997) employed such a design to study the predicted and actual (i.e., self-reported) impact on

subjective well-being (SWB) of a variety of long-term environmental (e.g., deterioration of fish stocks) and non-environmental (e.g., weight gain) events. Some subjects were asked to predict how the event would affect their well-being in the next ten years and others were asked whether the event had happened in the last 10 years and to report how it had affected their well-being. Schkade and Kahneman (1997) used a similar design to contrast the self-reported well being of college students in California with predictions of well being made by students in the Midwest (and vice versa). This design suffers, of course, from a number of limitations. First, it can be difficult to match the prospective and retrospective events. Second, as noted above, retrospective reports are notoriously inaccurate. For studying long-term effects in a study of limited duration, however, this may be the only practical design.

## Measuring Feelings

The most straightforward way to assess the accuracy of predictions of feelings is to measure both the predictions and the feelings themselves on the same scale. Thus, for example, in the parenting example discussed above, both predicted and actual happiness were to be measured on a 0 to 100 "happiness scale." Subjective ratings of this type may not do justice to the feelings they are intended to measure for two reasons: because feelings are multidimensional while single rating scales are unidimensional, and because feelings are, by their very nature, "hot," whereas the respondent is likely in a "cold" state when making a prediction of future feelings. For either or both of these reasons, an individual who predicts that parenting will produce a happiness rating of 70 and then subsequently reports a happiness level of 70 might nonetheless feel that she had not correctly predicted how she would feel about parenting.

The problem of multidimensionality complicates the task of measuring predicted and actual happiness, but it can, at least in principle, be solved through the use of multidimensional scales. In such scales people rate themselves (or their predictions) on a variety of different affective dimensions, or check off a variety of adjectives that describe how they currently feel (Melzack, 1975; Niven and Brodie, 1995) . The major problems with such scales is that they are difficult to

work with statistically, and rarely yield a consistent and easily interpretable pattern across scales. Whereas with a monodimensional scale, bias can be measured simply with a t-test, measuring difference on multiple dimensions is more difficult, in part because one must look for changes in the configuration of means across dimensions, and in part due to reduced statistical power.

The problem associated with the hot/cold discrepancy is more knotty and, to our knowledge, has not been discussed in the literature on prediction of feelings. It has, however, received some attention in the literature on memory for pain. Many studies of pain memory ask subjects to rate the pain they are experiencing at a particular point in time, either on a unidimensional or multidimensional scale, and then later to report their memory of the pain on the same scale. The majority of these studies have concluded that memory for pain is relatively accurate -- even though most people actually believe that their own memory for pain is poor. One possible explanation for this discrepancy is that intuitions about memory for pain and studies of memory for pain deal with different aspects of pain memory. Morley (1993), for example, distinguishes between three possible variants of memory for pain: (1) sensory re-experiencing of the pain; (2) remembering the sensory, intensity and affective qualities of the pain without re-experiencing it, and (3) remembering the circumstances in which the pain was experienced. While most studies of pain memory have focused on the second, it seems likely that people are referring to the first when they report poor memory for pain.[3,4] Generalized to other types of feelings, such as anger, happiness or sadness, there is a real risk that "cold" paper-and-pencil ratings fail to capture the "hot" dimensions of feeling states.

The pitfalls of relying on such paper-and-pencil ratings is illustrated by a study of memory for pain conducted by Read and Loewenstein (1996). They included two types of measures of pain memory: (1) conventional ratings of the intensity, and other dimensions of, pain; (2) willingness to accept pain for payment -- a decision-based measure which involved giving subjects the option of holding their hand in ice water for different lengths of time (1,3 and 5 minutes) in exchange for different payment amounts ($1,$3, and $5). Some subjects had just experienced a sample of the ice water, some had experienced it one week earlier, and some had never experienced it. Pain

*ratings* did not differ significantly between the three groups, but willingness to incur pain in exchange for payment differed markedly, and was highest for the group which had not experienced the pain sample and lowest for those who had just experienced it. Whether it is because it tapped into the hot dimension of pain memory, or for some other reason, the decision-based measure of pain memory clearly measured some aspect of pain that the paper and pencil ratings failed to capture.

Other studies have not measured feelings directly at all, but rather have measured tastes or preferences at different points in time before an experience. Under certain conditions, inconsistencies in preferences at different points in time could constitute errors of prediction. For example, Simonson (1990) asked subjects to select snacks they would eat one or more weeks later, and then when the time of consumption arrived, asked them again which snack they would prefer. By comparing these two sets of preferences he was able to identify a systematic discrepancy in preferences over time. While preferences do not directly measure feelings, even when assessed close in time to the experience, the prediction of preferences and the forecasting of feelings are closely related tasks.

## Empirical Research on Predictions of Feelings

Our review of this widely scattered literature is organized around five broad domains in which predicted feelings have been studied: (1) feelings toward objects (i.e., tastes), (2) changed life circumstances (e.g., predictions of subjective well being), (3) changes in health status (e.g., pain or outcomes of medical procedures), (4) behavior under temptation or duress (e.g., craving, social pressure), and (5) other phenomena.

## Feelings Toward Objects

Several studies have examined various processes relating to changes in tastes -- i.e., feelings toward objects -- such as satiation and ownership effects. Kahneman and Snell (1990; 1992), in the first study which explicitly focused on predictions of feelings, had subjects consume a portion of ice cream or plain yogurt while listening to music on 8 consecutive days. At the beginning of the experiment they asked subjects to predict how they would feel about the experience over time, and then to rate the experience during each of the 8 sessions. The subjects who ate the ice cream correctly predicted satiation -- that they would enjoy the ice cream less over time. However, the subjects who ate the plain yogurt also expected to like it less over time but, in fact, liked it more (or disliked it less--for those subjects who considered eating plain yogurt an aversive experience). The most striking finding, however, was the near-zero correlation between individual subjects' anticipated and actual reactions to the experience. Subjects' feelings *did* change substantially over time, but they had little idea, at the outset, about how they would change.

While Kahneman and Snell observed generally inaccurate, but not strongly biased, predictions of tastes, Simonson (1990) observed what could be interpreted as a significant bias. Students in a class choose one snack from among six snack-types to be consumed on three successive class sessions. In the "simultaneous choice" condition, subjects chose all three snacks on the first day of the study. That is, on the first day, they chose the snack they would eat during that class and during the following two classes. In the "sequential choice" condition, students chose each snack on the same day it was to be consumed. Simonson observed that students chose substantially more variety when all the choices were bracketed together (the simultaneous choice condition) than when they were bracketed individually (in the sequential choice condition). He termed the difference the "diversification bias." In a series of studies that extended Simonson's findings, Read and Loewenstein (1995) replicated the diversification bias result, ruled out a variety of artifactual explanations, and showed that in simultaneous choice subjects ended up regretting having opted to change snacks in the second and third weeks -- consistent with the notion that they mispredicted their own tastes.

Loewenstein and Adler (1995) studied people's predictions of how attached they would become to objects they were endowed with, and also observed a significant bias in people's predictions of their own future feelings. Research on the "endowment effect" (Thaler, 1980) has shown that people tend to become attached to objects they are endowed with, even if they would not have desired the object particularly had they not been endowed with it. In a typical demonstration of the effect (see, e.g., Kahneman, Knetsch & Thaler, 1990), one group of subjects (sellers) are endowed with an object and are given the option of trading it for various amounts of cash; another group (choosers) are not given the object but are given a series of choices between getting the object or getting various amounts of cash. Although the objective wealth position of the two groups is identical, as are the choices they face, endowed subjects hold out for significantly more money than those who are not endowed. In one study, Loewenstein and Adler informed some subjects that they would be endowed with an object and asked them to predict the price at which they would sell the object back to the experimenter once they were endowed. These subjects, and others who did not make a prediction, were then endowed with the object and given the opportunity to sell it back to the experimenter. Subjects who were not endowed underpredicted substantially their own post-endowment selling prices. In a second experiment, selling prices were elicited from subjects who were actually endowed with an object and from others who were told they had a 50% chance of getting the object. Selling prices were substantially higher for the former group, and the valuations of subjects who were not sure of getting the object were indistinguishable from buying prices of subjects who did not have the object.

## Changed Life Circumstances

From a decision making perspective, one of the most important issues is whether people can predict the impact on their own SWB of life-circumstances that are under their control. For example, many people play the lottery, presumably with the idea that it would make them happy to win. According to Brickman, Coates and Janoff-Bulman (1978), however, this cannot be taken for granted. Brickman et al. asked lottery winners and an informally matched control group a series of questions about past, present, and happiness. The lottery group (n=22) consisted of people who had recently (less than 1 year) won between $50,000 and $1,000,000 in the Illinois State lottery. Lottery winners rated their happiness at 4.0 on a 5 point scale, but the control group rated its happiness at nearly the same level -- 3.82 on the same scale. Brickman et al. (1978) also interviewed a "victim" group consisted of 29 people who had suffered a debilitating accident within the last year that had left them paraplegic or quadriplegic. Accident victims did rate their current happiness as significantly lower than the control group (2.96, on a 5-point scale) but many people find the difference in the two groups' self-rated well-being to be surprisingly small, given the extremity of the debility. Brickman et al. did not ask people to predict their own experience utilities beforehand, since lottery winners and paraplegics cannot be identified beforehand, but it seems likely that both groups would have overestimated the impact of these outcomes on their own well-being.

Schkade and Kahneman (1997) found no difference in self-reported well being between students at California and Midwest universities, despite large differences in satisfaction with their respective climates. However, when rating the well being of another student similar to themselves, students predicted large differences across regions in both overall well being and in satisfaction with the climate. Thus, while students apparently focused on the difference in climate satisfaction, and perceived it accurately, they overextended this observation to conclude that they would be much happier in California, despite the fact that individuals who already live in the two regions report the same overall well being.

Loewenstein and Frederick (1997) had some subjects predict how various personal and environmental changes would affect their well-being over the next decade while other subjects evaluated how matched changes had affected their well-being over the last decade. Some of the changes were environmental (change in local air pollution; rain forest destruction; restriction of sport-fishing due to pollution; and recovery of certain endangered species), some were social (increase in number of coffee shops and cafes; increase in number of television channels and selection of videotapes; reduced risk of nuclear war; and increased risk of AIDS), and some were personal (change in free time; development of pain-causing chronic health condition; change in household income; and increase in body weight). There were significant problems in matching changes retrospectively and prospectively. For example, everyone could be asked to predict how gaining weight would affect their well-being, but the actual (reported) impact of weight-gain could only be elicited from the subset of subjects who had, in fact, gained weight in the prior decade.[5] However, despite the noise introduced by these problems, a clear general pattern emerged from the data: people expected future changes to affect their overall well-being much more than they believed that matched changes in the past had affected their well-being. Viewed retrospectively, it seems, people recognize the relatively minor impact on well-being of specific narrow changes in their circumstances, but they lack the ability to put such changes into perspective when they contemplate them prospectively.

In a study of long-term reactions to noise, Weinstein (1982), reports evidence consistent with overprediction of adaptation. He interviewed people living adjacent to a newly opened highway spur 4 months and 16 months after opening. Subjects became increasingly pessimistic about their ability to adjust to the noise, as if they had overestimated it to begin with. At the 4 month interview 21% were not annoyed by the noise, 44% thought they would eventually adjust, and 30% thought they would not adjust. Sixteen months after the opening, however only 16% were not annoyed, 26% still thought they might adjust in the future, and 52% thought they would not adjust.

In the study mentioned earlier, however, Suedfeld, Ramirez, Deaton and Baker-Brown (1982:330) observed what appears to be underprediction of adaptation on the part of prisoners placed in solitary confinement: "Several of the prisoners indicated that when they had first gone into SC they were afraid that serious mental or physical deterioration would occur, but in general this expectation was not borne out. Similarly, fears of being unable to adjust to the situation were unjustified. The first 72 hours were quite difficult for many prisoners, but the adjustment after that made SC quite tolerable."

Gilbert et al (1997) studied assistant professors' forecasts of how they would feel at various points in time after their tenure decision, and compared these forecasts to the self-reported well-being of others whose tenure decision had been made in the past. The sample frame consisted of all assistant professors who were considered for tenure in the liberal arts college of a major university over a ten-year period, and was divided into three categories: current assistants, those whose decision was five or less years ago, and those whose decision was more than five years ago. Current assistants predicted that they would be much happier during the first five years after a positive decision, but that this difference would dissipate or disappear during the subsequent five years (i.e., they expected to adapt eventually). Surprisingly, there was no significant difference in reported well-being between those who had and had not received tenure in either the first five or the next five years afterward. Overall, assistant professors predicted that they would be less happy during the first five years after being turned down than they actually were. They also predicted that they would be more happy during these five years than those who received tenure actually were (albeit significant only at $p<.12$). No such estimation errors were observed for the second five year period following the tenure decision. These results, both positive and null, should be interpreted with caution due to the small sample size and the possibility of bias introduced by selective non-response (e.g., those who were particularly miserable as a result of not getting tenure may not have responded to the questionnaire).

## Changes in Health Status

Much of the research on predictions of feelings comes from the field of health. Medical providers are especially interested in this issue in part because they would like to know whether patients grant informed consent to medical procedures with a realistic appreciation of what they are getting into (see Ubel and Loewenstein, 1997, for a discussion of this issue).

Llewelyn-Thomas, Sutherland, and Thiel (1993) described to 66 laryngeal cancer patients the types of outcomes they might expect from the radiation therapy they were about to undergo, and elicited from them predictions of how they would feel after four weeks of radiation therapy, contingent on different objective outcomes. Following completion of the therapy, patients described their actual end-of-therapy state and assigned a utility to it. Actual and predicted feelings were measured using direct utility rating scales and time trade-off measures of utility. The researchers found that the utility ratings were remarkably close to the values predicted prior to therapy.[6] Rachman and Eyrl (1989) similarly found that people suffering from chronic headaches were relatively accurate in predicting the intensity of future headaches, and, moreover, that they tended to revise their expectations of future pain in an adaptive fashion -- raising them following an underprediction, and lowering them following an overprediction.

Other studies in the medical domain, however, have revealed systematic errors in predictions of future feelings. Rachman (1988), for example, summarizes a large number of studies showing that people tend to overpredict their own level of fear in a situation. This is true of phobics (e.g., Rachman and Lopatka, 1986) and patients with panic disorder (Rachman, Lopatka and Levitt, 1988), but also with normal subjects. For example, Rachman (1983; also McMillan and Rachman, 1988) found that military trainees undergoing a course of parachuting significantly overpredicted the level of fear they would experience on the final and most difficult jump of their training course. Kent (1985) interviewed 44 dental patients immediately before, immediately after, and 3 months following a dental appointment. On average, subjects overpredicted the degree of pain they would experience, and, perhaps not surprisingly, this tendency was

particularly strong for subjects who were anxious about the appointment. The mean expected level of pain was 16.5 on a 100 cm visual-analog pain scale and the reported actual level of experienced pain was 9.0. The correlation between expected and experienced pain was .16.[7] Arntz, Van Eck and Heijmans (1990) similarly observed a strong tendency to overpredict the pain of dental treatment.

In contrast to studies that have observed overprediction of pain, at least two studies have found underprediction of pain. Interestingly, both of these studies used behavioral measures rather than subjective ratings, suggesting that the two methods may yield systematically different conclusions. Christensen-Szalanski (1984) found that a majority of expectant women stated a desire and intention not to use anesthesia during childbirth, but reversed their prior decision when they went into labor as if they had previously underestimated the intensity of the pain they would experience. The reversal of preference occurred among not only women giving birth for the first time, but also those who had previously experienced the pain of childbirth. Read and Loewenstein (1996) observed a striking difference in the willingness to submit to coldpressor pain in exchange for payment between people who had and had not experienced a sample of the pain, as if those who had not experienced the pain underestimated its intensity.

Another set of studies has compared how people expect to react and actually react to good or bad *news* about disease prognoses, as opposed to disease states themselves. Intuitively, one might think that facing a $p<1$ chance that one has a disease would not be as bad as knowing for sure that one has the disease. Analogously, one might assume that confirmation of a person's terror of having a disease would be devastating. Indeed, this belief seems to deter people from getting tested (or examining themselves) for diseases such as Huntington's disease (Mastromauro, Myers, and Berkman, 1987) and breast cancer (Kash, Holland, Halper, and Miller, 1992). However, several studies have found little distress among those who learn that they have, or are at increased risk of having, diseases such as Huntington's disease (Brandt et al., 1989) and HIV (Wiggins et al., 1992). The finding that people resist getting such news, but do not seem

extremely adversely affected when they get it, is suggestive of, but does not actually demonstrate, an error in predicting feelings.

To address the issue of prediction accuracy more explicitly, Sieff, Dawes, and Loewenstein (forthcoming) conducted a study in which people who came to a clinic to get tested for HIV predicted how they would feel approximately five weeks after obtaining the test result. Subjects completed a survey consisting of 21 mood inventory items based on how they would expect to feel in five weeks if they obtained a negative (favorable) result and a second identical survey based on how they would expect to feel if they obtained a positive (unfavorable) result. The study was intended to permit within-subject comparisons of expected and subsequently reported affect, but a very low rate of HIV positive results precluded such a comparison for those with positive results. As an imperfect remedy to this problem, the researchers recruited, through advertisements in local newspapers, a comparison group who had received positive HIV test results in the last 4-10 weeks. Consistent with the notion that people underpredict their own robustness in the face of bad news, subjects who made predictions, on average, predicted greater misery from a positive test result than those who tested positive for HIV reported feeling.[8] A within-subject analysis of people who obtained negative test results similarly revealed that people anticipated greater elation following a favorable test result than they actually ended up experiencing.

In a New York Times article, Gina Kolata (1997) reported on differences between healthy and sick persons' attitudes toward "heroic measures" to extend the lives of the terminally ill. Many healthy Americans state that they do not want to die in a nursing home or hospital or, worse yet, an intensive care unit, but 90% of dying patients, most of whom die in acute care hospitals, view favorably the care they receive. In one study (Slavin et al, 1990; cited in Kolata), different groups of respondents were asked whether they would accept a grueling course of chemotherapy if it would extend their lives by 3 months. No radiotherapists said that they would accept the chemotherapy, only 6% of oncologists, and 10% of healthy people; but 42% of current cancer patients say they would. Another study (Danis et al., 1996) found that 58% of patients with serious illnesses said that when death was near they would want treatment, even if it

prolonged life by just a week. Even after they have been subjected to the most advanced medical technology and seen little long-term benefit, a majority of families of patients who died were willing to undergo the extensive intensive care experience again. Danis comments that "the whole premise on which advanced directives [such as living wills] is based is that you want a person to articulate what their wishes are so that you can act on them at a future time, but that presumes that the wishes you express today will be applicable at a time when your health is really different" (Kolata, 1997). It is possible, of course, that healthy people realize that their preferences will change but nevertheless want to impose their healthy preferences on their future sick selves. However, it seems likely that the willingness of the healthy to forego life-extending treatments if they should become sick reflects, in part, a misprediction of future feelings.

## Behavior Under Temptation/Duress

One special category of situations in which people predict their own feelings occurs when people who are in a “cold” state attempt to predict how they will behave in a “hot” state -- for example, in the face of some type of temptation or powerful influence on their behavior (see, Loewenstein, 1996a; 1997). The recovering alcoholic, for example, must decide whether he can safely attend the office Christmas party, and persons considering a visit to Las Vegas might well ask themselves whether they can keep their gambling under control. Likewise, people who hear about acts of savagery and bravery during the holocaust often wonder how they would have behaved in that situation, or how they will behave if they encounter a similar situation in the future. Research findings in this domain present a highly consistent pattern: people tend to overestimate the strength of their own willpower and to underestimate the influence on their behavior of being in a hot state.

Social influences: Two studies point to a general tendency to underestimate the impact of social influences on one’s own behavior. Milgram (1965) conducted a piggy-back study to his famous electric shock experiment in which subjects were asked to predict what they would do if they participated in the experiment (but did not know about it). Most subjects did not think that

they would have succumbed to the pressure to shock, despite their awareness that a substantial majority of subjects delivered what they believed were powerful shocks. In a closely related study, Wolosin, Sherman and Cann (1975) showed that subjects underpredicted their own vulnerability to social pressures to conform.

Sexual desire: Any reader of fiction will find non-controversial the notion that people often underpredict the power of their own sexual desires. Indeed virtually every one of the French novelist Georges Simenon's non-detective novels examines diverse consequences of such *intrapersonal* underprediction. People go on dates planning to refrain from having sex, engage in foreplay with the expectation of using a condom at the next stage, and initiate sex with the plan to "interrupt" prior to the critical moment. As Gold (1993) found in interviews with gay men about their attempts to practice safe sex, however, such resolutions often break down in the "heat of the moment." Daum (1996) exposes the foolishness of admonitions to practice safe sex in a New York Times Magazine article titled "Safe-Sex Lies."

Loewenstein, Nagin & Paternoster (1996) hypothesized that male youths would estimate a higher likelihood of committing date rape when they were sexually aroused than when they were not aroused. They randomly assigned undergraduate males to view sexually arousing or nonarousing photographs and exposed them to a vivid first-person scenario in which "their date" asked them to stop. Aroused subjects reported substantially higher likelihoods of behaving in a sexually aggressive fashion than nonaroused subjects, a finding that is consistent with the prediction that nonaroused subjects would have a difficult time imagining what they might do if they were aroused.

Drug craving: An important prediction for anyone contemplating recreational drug use, including use of cigarettes and alcohol, is the risk of getting addicted. This prediction is likely to hinge, in turn, on the individual's perception of the intensity of the craving they will experience if they consume the drug for a period then attempt to stop. Loewenstein (1996, 1997) argues that underestimation of such craving is one important factor contributing to drug addiction, and

presents scattered supportive evidence. Lynch and Bonnie (1994), for example, report results from a longitudinal study in which high school students were asked whether they expected to be smoking cigarettes in 5 years. Among respondents who were occasional smokers (less than one cigarette per day), only 15% predicted that they might be smoking in 5 years, but 5 years later 43% were in fact smoking. Only 32% of those who smoked at least one pack a day expected to still be smoking in 5 years, but 5 years later 70% still smoked one pack or more per day.[9] To our knowledge, no one has specifically studied the relationship between the predicted and actual intensity of craving.

Curiosity: Loewenstein, Prelec and Shatto (1996) conducted studies which point to a general tendency for people to underpredict the influence of curiosity on their own behavior. In one representative study, subjects attempted to answer 10 geography questions (selected from a group of 11) and were given a choice between receiving the answers to the questions or getting an attractive candy bar. Half the subjects were first presented with a sample geography question randomly chosen from the group of 11 and were asked to choose between the answers versus the candy bar *before* they attempted to answer the remaining 10 questions. The other half were simply given the 10 questions and then were given the answer/candy bar choice. Subjects who made the choice prior to attempting to answer the questions were significantly more likely to opt for the candy bar, as if they underestimated the curiosity they would experience. In a subsequent experiment the same researchers included a condition in which subjects were asked to predict what they would choose, rather than actually choosing, prior to answering the questions. Subjects in this condition underestimated their own subsequent likelihood of opting for the answers.

The urge to spend: Ausubel (1991) noted that large numbers of credit card users expect to maintain a zero credit balance but fail to do so -- apparently underestimating their own future desire for spending. This self-forecasting error can explain the downward stickiness of credit card interest rates since consumers who expect to maintain zero card balances will not care about credit card interest rates.

Hunger: It is a commonplace that shopping on an empty stomach leads to overshopping. However, to our knowledge, there is only one study showing this effect. Nisbett and Kanouse (1968) asked shoppers who were entering a supermarket to predict what they would buy and also to tell them when they last ate. Shoppers were then observed as they went through the checkout line to see if they had purchased more than they had planned/expected to. For normal weight shoppers, the researchers observed a positive correlation between overshopping -- that is, buying more than planned -- and hunger as measured by when the shopper last ate. Surprisingly, no such relationship was observed for overweight shoppers. The finding for the former group could be interpreted as a type of prediction error induced by hunger.

## Other

Other types of prediction errors have been documented that don't fit neatly into one of the above categories. Mitchell and co-authors (1996) studied the expectations, actual reports and recollections of happiness of tourists on a European tour, students who went home for Thanksgiving vacation, and students who took a three-week bicycle trip. Respondents tended to make slightly overoptimistic predictions of their own happiness during the event, and also tend to recall themselves as having enjoyed the event slightly more than they actually seem to have.[10]

Nichols, Stich, Leslie and Klein (1994) conducted an experiment based on Ellen Langer's concept of the "illusion of control" in which students who participated in a lottery were either given a number to bet on or allowed to choose a number and then were given the opportunity to sell the ticket back to the experimenter. Consistent with Langer's findings, selling prices were higher when subjects chose their own numbers. However, when another group of subjects was presented with the experimental design and was asked to predict how choosing the number would affect selling prices, these subjects predicted that there would be no difference between the two conditions. Although these researchers did not study self-predictions in this domain, it seems highly likely that subjects would have similarly underpredicted the difference in their own selling prices in the two conditions.

Finally, Tat, Cunningham and Babakus (1988) observed that consumers are quite sensitive to rebate offers when making purchases, but that very few ultimately send in the forms required to obtain the rebate. It seems logical to infer from this finding that consumers overestimate, at the time of purchase, their own likelihood of redeeming the coupon in the future.

## Sources of Error in the Prediction of Feelings

The different examples of mispredictions of tastes and feelings just discussed point to at least three different, but interrelated, mechanisms as major sources of errors in predicting feelings. First, people often hold incorrect intuitive theories about the determinants of happiness. For example, it is commonly believed that women are happier when married, men when single -- contrary to observed patterns. Such an incorrect intuitive theory could lead to errors in predicting marital happiness, both by women and by men. Second, different considerations may be salient when predicting future feelings than the considerations that actually influence experienced feelings. Anticipation of a visit to Disneyworld, for example, is likely to be dominated by images of exciting rides and encounters with Disney characters, while the reality is more likely to be characterized by long waits in line, stifling temperatures, money worries and domestic disputes (Sutton, 1992). Lastly, people seem to have difficulty predicting the impact of drives and emotions such as hunger, pain, and anger. Practicing unsafe sex contrary to one's vows and self-expectations is a classic example of such underprediction.

## Inadequate Intuitive Theories

How do people make predictions of feelings? Intuitive theories of well being would seem to be essential to this task. When it comes to recalling past feelings, it is well-established that people often rely on intuitive theories to reconstruct a plausible rendition of the past rather than on actual personal experience (Ross, 1989). For example, women's recollections of their own menstrual pain correspond more closely to their personal theories about the time-course and intensity of such pain than to diary ratings (McFarland, Ross & DeCourville, 1989). If intuitive theories play such a role in *memory* for feelings, when people actually have relevant past experience to draw upon, inevitably they must play an even more important role when it comes to *predictions* of feelings. Indeed, when it comes to predicting their own tastes and feelings for novel experiences, people have little more to go on than their own intuitive theories of hedonics. The role of theory in both memory and anticipation is illustrated by the commonly-held belief that people tend to become more rigid in their political views as they age. This belief causes young people to exaggerate the degree to which they changed their views in the past *and* leads them to predict that they will become more rigid in their views in the future. In fact, evidence from longitudinal studies of political beliefs does not support the notion that people tend to become more rigid politically as they age (Ross, 1989; Marcus, 1986).

Intuitive theories of hedonics are extremely diverse. People have theories about what types of activities make them happy or unhappy (e.g., good food, human relationships, money, sleep, sex, intoxicants), about how their current experiences will affect their future tastes (satiation, addiction, taste-formation), and about serial correlation between moods at different points in time (e.g. theories about mood swings, and monthly and yearly cycles). Moreover, people differ both in what makes them happy and in the intuitive theories they hold about what makes them happy, which greatly complicates research on the accuracy of such intuitions. Even social scientists disagree in often fundamental ways about the determinants of well-being, and prevailing views often change dramatically over time as illustrated, for example, by the rise and fall of the perceived importance of social comparisons for personal well-being over the last half-century

(see, Diener and Fujita, 1996, for the latest historical development). Few studies have tried to elicit such theories, perhaps because the lack of scholarly consensus makes it impossible to judge their accuracy. Snell, Gibbs and Varey (1995) attempted to get around the problem posed by the lack of consensus among researchers by eliciting respondents' intuitions about hedonic processes that the authors considered non-controversial. These included classical conditioning effects, the Weber/Fechner law, opponent processes, adaptation, mere exposure, and cognitive dissonance effects. Respondents, it turned out, were aware of some processes, such as classical conditioning and the Weber/Fechner law, but not others, such as mere exposure effects.

In a survey which mainly examined perceptions of income inequality, Loewenstein (1996b) asked visitors to the Pittsburgh International Airport to rank from most important (1) to least important (5) a list of "things that might be important when it comes to making people happy." Subjects were then asked to go through the list again and "distribute 100 points between the different factors to indicate how important each is relative to the others." The list, ranks, and importance ratings, (leaving out the category "other") were as follows:

| Item | mean rank | mean points |
|---|---|---|
| family life | 1.7 | 37 |
| friends | 2.4 | 22 |
| satisfying job | 2.5 | 26 |
| high income | 3.6 | 15 |

Ranking the importance of different factors is in theory difficult since importance ratings should logically depend on the expected variance of a particular item (Goldstein & Mitzel, 1992). Nevertheless, it is interesting to note that "high income" ranked, and was rated, below all other items in importance. The lack of importance that subjects place on income relative to other categories seems roughly consistent with findings from the literature on SWB which downplay the

importance of income (e.g., Easterlin, 1995; Diener et al., 1993; Lykken and Telligen, 1996). On the other hand, the downplaying of income as a source of happiness that is evident in these rankings and ratings seems somewhat inconsistent with the effort that people put into securing a high income, relative to other goals. This contradiction offers another case in which ratings and behavioral measures would lead a researcher to different conclusions.

A number of the prediction errors summarized in the previous section could potentially be explained on the basis of theory inadequacy. For example, the failure to anticipate the impact of ownership on their preferences (Loewenstein and Adler, 1995) can be explained by the fact that people are simply not aware of the endowment effect. Indeed, social scientists have themselves only recently discovered the effect, despite considerable research by cognitive dissonance theorists on the effects of choosing objects. Nichols et al.'s finding (1994) that people fail to anticipate Ellen Langer's illusion of control effect can similarly be explained by the fact that most people are unaware of the effect. Indeed this is, in effect, the explanation offered by the authors: "Folk psychology includes no information about the Langer Effect, so predictors get it wrong" (page 19).

Gilbert et al (1997) theorized that the errors they observed in affective predictions about negative events resulted from subjects' lack of awareness of the potency of their "psychological immune system" (the ability to transform, invent, or ignore information) in mitigating or even eliminating negative affect. In addition to the two studies about changes in romantic relationships and tenure mentioned earlier, they performed exit interviews at a polling station in the 1994 Texas gubernatorial election, asking people who had just voted how happy they were overall, their evaluations of the two candidates (George Bush, Jr. and Ann Richards), and how they would feel if their candidate won or lost. Richards supporters (mostly Democrats) predicted that they would be much less happy if Bush won (the eventual result) and that his winning would not affect their evaluation of him, while Bush supporters expected no difference on either measure. These same voters were called back one month later and asked the same questions. There was no change in overall happiness for either group, but Richards supporters' evaluation of Bush had improved

significantly (although they still liked him less than did his supporters). The authors interpreted this improvement as evidence that the psychological immune system was at work to reduce negative affect, an effect that Richards supporters were apparently unaware of at the time they voted.[11] Two additional experiments further investigated this hypothesis by examining the effects of false negative feedback. Subjects expected negative feedback from both more and less reliable sources to have the same effect on their well being, but they actually felt better later if the feedback came from the less reliable source. The authors argued that feedback from a fallible source was more easily rationalized or discounted by the psychological immune system than subjects believed beforehand. Their overall theme then, is that when making forecasts about their affective reactions to negative events, people are largely unaware of or do not focus on their ability to mitigate or eliminate negative affect.

Shifting reference points may provide another mechanism for predicted-experienced discrepancies. Underprediction of adaptation can be explained by a lack of awareness of the effect of a change in the status quo on evaluations of experiences. The increase in the preference of critically ill elderly patients for grueling medical procedures could result in part from the fact that they have experienced increasing pain for several years, and a procedure that was unthinkably painful ten years ago seems like only a modest imposition now. Thus, the healthy 65 year old signing a living will compares the unpleasant procedure to a normal life and recoils in horror, while the frail 75 year old compares it to the invasive hospital life they are already experiencing and thinks it only another in a series of bodily insults.

Other prediction errors can be attributed to a tendency to overapply those theories that people do hold. The diversification bias demonstrated by Simonson (1990) can be explained in such terms. People have a (correct) theory that, if they eat the same snack repeatedly in one episode, they will come to like it less. However, when faced with a situation in which the snack will be consumed only once a week, they overapply the theory, exaggerating the impact of satiation which would in fact be very weak in such a situation. Consistent with this interpretation, Read and Loewenstein (1995) found that when the salience of the time intervals between class

meetings was increased by first asking subjects to say what snacks they would choose if all were to be consumed immediately *then* asking them to choose snacks for three successive class meetings, the discrepancy between sequential and simultaneous choice was significantly reduced. The many studies by Rachman and his colleagues showing overprediction of fear seem similarly to reflect the exaggerated application of a correct intuitive theory. Snake phobics, for example, know that they are extremely afraid of snakes, but, perhaps because their own phobia is highly salient to them, tend to exaggerate the frequency and intensity of such feelings of fear.

Finally, in some situations people may fail to recognize boundary conditions that limit the applicability of a particular intuitive theory. Thus, for example, there is evidence that people don't adapt to noise, at least in some circumstances (see Frederick and Loewenstein, this volume), but don't recognize that they won't adapt. Given the ubiquitousness of adaptation, it hardly seems surprising that people aren't aware of the few exceptions to the rule.

## Differential Salience

One of the authors was recently camping with a friend in the wilds of Alaska. During the trip, the author's friend played the word "fungo" (a practice ball hit to a fielder by a baseball coach) in a game of Scrabble. Unfamiliar with the word, and lacking a dictionary, the author disallowed it and they both resolved to look it up upon returning to civilization (and at the time fully expected to do so). On the same trip, they decided to obtain a fish book when they got home to determine what type of fish they had been catching and eating. Of course, both the Scrabble game and fish were much less salient when they got back to civilization and the fish remains unidentified as the scrabble word remained unlooked up until it was recalled while working on this chapter. Clearly, the salience of different issues, events, and attributes often changes over time, and such shifts in salience can result in errors of prediction. Can anything systematic be said about what types of features tend to be salient when making predictions, as opposed to when actually experiencing events?

The notion of differential salience has received considerable attention in recent literature. Gillovich and Medvec (1995), for example, argue that, when people think about events in the present or immediate past, they tend to regret acts of commission -- things they did that they wish they hadn't done, such as things they said to people that they shouldn't have. When they contemplate their own more distant past, however, they tend to regret omissions -- things they didn't do that they should have. For example, the prospect of the pain of rejection may be very salient to a boy who is considering asking a girl on a date, but years later that pain seems trivial relative to the memory of never having worked up the courage to ask her out. Similarly, the time that would be required to learn a foreign language seems prohibitively costly from today's perspective, but 5 years from now our failure to learn a foreign language will be more salient than the time that was saved by not doing so. Several ideas closely related to differential salience have been discussed in various papers by Kahneman and colleagues in their studies of memory for extended experiences. For example, they have argued that when people look back on extended episodes, the peak and the end of the episode tend to be highly salient, while the duration of the experience does not (e.g., Fredrickson & Kahneman, 1993; Kahneman, Fredrickson, Schreiber & Redelmeir, 1993; Varey & Kahneman, 1992).

One general rule seems to be that people place disproportionate emphasis on whatever their attention is directed toward. As Loewenstein and Frederick (1997) comment, in explaining their findings, "perhaps, when a respondent's attention is focused on a particular type of change -- e.g., in opportunities for fishing -- they exaggerate its overall importance." Schkade and Kahneman (1997) refer to this phenomenon as the "focusing illusion" and argue that it explains their finding that people's predictions exaggerate the impact of climate on SWB.[12]

Kahneman and Schkade (1996) ran another study that makes the point even more explicitly. They asked large samples of subjects how various features of a new location would affect the well being over time of a couple who unexpectedly had to move there. In the within subject condition subjects were asked to rate the impact on the couple's well being of each feature both during the first few months after the move and during the third year after the move. In the between subject

conditions, subjects were asked only about one time period, ranging from "before the move" to "overall, for the first five years." Subjects in the within condition did not expect much change in the couple's well being over the first three years, although they did predict changes if a simple story about the feature could easily be evoked. For example, it is initially thrilling to escape from a location where "you live near an obnoxious relative who often insists on coming over for dinner," but the thrill fades after three years. The between-subjects conditions produced no differences across time periods. When their attention was drawn to the impact of adaptation in the within-subject design, subjects provided predictions that reflected a belief in adaptation, but when their attention was not so directed in the between-subject design their predictions did not appear to take adaptation into account.

Differential salience can also result from changes in points of comparison that occur with the passage of time. Such shifts can produce such prediction errors as the tendency to exaggerate one's own likelihood of sending in a rebate coupon (Mitchell et al., 1996). A $2.00 rebate from a $6.00 purchase of underwear seems large at the time of making the purchase, but, decoupled from the $6.00, the $2.00 rebate seems trivial days later when it comes time to mail in the coupon. Predictions of future feelings inevitably involve some type of stylized representation of future events. Mental images of future vacations and holidays, for example, typically do not include features such as rain, mosquitoes, and rude service-people, which may help to explain the failure to predict the negative affect often experienced during the trips (Mitchell et al., 1996). Similarly, images of winning the lottery do not typically include unwanted media attention or doubts about the motives of friends who suddenly become friendlier (Brickman et al., 1978), and images of paralysis do not include new hobbies, interests, and personal relationships that people develop to cope with disability.

Finally, if social scientists during the last half century have exaggerated the importance of social comparison for SWB, as Diener and Fujita (1996) argue, this exaggeration could similarly be attributed to differential salience. For most persons, social comparisons are periodically sources of profound misery. The tendency to infer from this that they are an important cause of

SWB may be due to the failure to take into account the infrequency with which such feelings of misery from social comparison are actually experienced.

## Hot/Cold Empathy Gap

As discussed in Loewenstein (1996a), when in a “cold” state people often have difficulty imagining how they would feel or what they might do if they were in a “hot” state -- for example, angry, hungry, in pain or sexually excited. It may also be the case that, when in a “hot” state people frequently have difficulty imagining that they will inevitably cool off. Both of these types of hot/cold empathy gaps lead to errors in predicting both feelings and behavior.

The source of hot/cold empathy gaps may be closely related to the measurement problem associated with measuring hot emotions with cold paper and pencil ratings. People may not be able to predict how they will behave under the influence of drives and emotions because our ability to conjure up such drives and emotions is highly constrained. Except under exceptional circumstances, memory for emotions, drive states, and other “visceral factors” (Loewenstein, 1996a) appears to be qualitatively different from other forms of memory. Human memory seems to be well-suited to storing visual images, words, and semantic meaning, but ill-suited to storing information about visceral sensations. Visual recall, for example, activates brain systems that are involved in visual perception (Kosslyn et al., 1993). To imagine a visual scene is, in a very real sense, to "see" the scene again. The same is true for music and words; one can render a tune in one's head or articulate a word without producing any externally audible sound. Memory for visceral states, on the other hand, seems to correspond mainly to Morley’s first notion of memory -- remembering the circumstances under which the feeling was experienced. Thus, Scarry (1985:15) notes that descriptions of pain rarely describe the pain itself, but instead tend to focus on the external agent of pain (e.g., "it feels as though a hammer is coming down on my spine"), or on the objective bodily damage associated with the pain ("it feels as if my arm is broken at each joint and the jagged ends are sticking through the skin"). Fienberg, Loftus and Tanur (1985:592)

conclude their review of the literature on memory for pain with the question: "Is it pain that people recall or is it really the events such as injuries and severe illnesses?"

All of the errors in predicting feelings classified under the heading behavior under temptation/duress" can be understood as consequences of hot/cold empathy gaps. Pregnant women may eschew anesthesia, for example, because the pain of childbirth does not seem 'real' to them until they actually experience it. People underpredict the shock they would give in the Milgram experiment (Milgram, 1965), and overestimate how honorably they would have behaved in Nazi Germany because they are not actually experiencing the coercive forces that would be operational in the situation. Similarly, people who are not sexually excited underestimate the impact of such excitement (Gold, 1993, 1994; Loewenstein, Nagin and Paternoster, 1996); people who are not craving drugs underestimate the force of such craving (Lynch and Bonnie, 1994; Loewenstein, 1997); people who are not curious underestimate the force of curiosity (Loewenstein et al., 1996); and people who are not in a shopping situation underestimate the "urge to splurge" (Hoch and Loewenstein, 1991) that they will experience when they enter a shopping mall (Ausubel, 1991).

## Other Mechanisms

Other work calling into question the accuracy of taste predictions includes a theoretical analysis of what Harrison and March (1984) call "postdecisional surprises." The basic idea is that if a decision maker estimates the desirability of choice items, those estimates are a combination of the true average value and an error term, and the choice is of the alternative with the highest expected return, then the choice will also tend to have a large positive error of estimate. Thus, the actual desirability of a chosen good will tend to be lower than its predicted desirability, and realized satisfaction will fall below anticipated satisfaction. The postdecisional surprise phenomenon is a one-person analog of the better known 'winner's curse' whereby the person who purchases an item in an auction is likely to be the one who most overestimated its value

(Bazerman and Samuelson, 1983). To our knowledge there have been no empirical tests of expectations inflation, although at least one prediction error documented in the literature could be understood in these terms (Mitchell et al., 1996).

## Discussion

In this chapter we have surveyed, and proposed several mechanisms to account for, errors in predicting future feelings. A great diversity of such errors have, indeed, been documented. However, as we mentioned in the introduction, it would be foolish to conclude from the length of the list that people typically mispredict their own feelings. While people might judge poorly whether dinner or a movie will make a more enjoyable evening out, they clearly understand that a trip to the dentist would be decidedly inferior to either.[13] A decision making system that gets these large distinctions right might perform at a high level despite inconsistencies within smaller categories. The great disproportion of studies that find biases and errors in predictions of feelings probably reflects the fact that most researchers probably test for prediction accuracy in domains where they expect to find errors. Nevertheless it would be a mistake to conclude that errors in predicting feelings are uninteresting or unimportant. Although errors may be rare, they can also be momentous when they occur: Experimenting with crack because you think you can resist your own future craving, marrying "on the rebound" or while in the thrall of transient passion, blurting out an unfortunate remark because you are sure you will forever feel the anger that you feel in the present, or committing suicide because you are convinced that you'll never feel happy again, are only a few examples of the diverse and significant consequences of errors in predicting feelings.

Why are errors in predicting feelings not corrected as people learn from personal experience? Although people do, sometimes, respond to their errors by appropriately adjusting subsequent predictions (see e.g., Hoch and Loewenstein, 1989; Rachman and Eyrl, 1989), a variety of mechanisms apparently impede such learning from experience. First, considerable research

suggests that the intuitive theories that drive predictions are resistant to correction based on individual experience. The resistance of theories to empirical observation is in part due to the confirmation bias --the tendency to focus on theory-confirming evidence (see, Klayman & Ha, 1987) and to ignore or denigrate the evidentiary value of discordant observations (Lord, Ross & Lepper, 1979).

Second, even when theories do change with experience, the memories of experience on which these changes are based may themselves be biased. For example, as documented in numerous experiments conducted by Fischhoff (1975; 1982) and others (Marcus, 1986), there is a tendency to forget one's own past predictions and to recall oneself as having predicted whatever is known to have occurred. If people don't remember what they originally predicted when an outcome is realized, they will be unaware of, and thus unable to correct for, prediction errors. Similarly, the previously mentioned tendency to remember extended experiences in terms of the peak and the end, and to de-emphasize duration, leaves only a very limited representation of the experience to be processed (Kahneman, 1994).

Third, self-correction of predictions requires repeated observation of errors, but situations rarely repeat themselves exactly. If a person underpredicts his own hunger on one occasion, his own sex drive on another, and his curiosity on a third, is it likely that he will draw any connection between these three events? Even if hunger is the operational drive-state in all three instances, the circumstances may be sufficiently different in each case to disguise the repetitive nature of the error. More broadly, Kleinmuntz and Schkade (1993, p.226) argue that the dissimilarity in criteria for success across situations inhibits learning about the accuracy of judgment and decision strategies.

**What can be done to help?**

The evidence we have reviewed, which shows that people make systematic errors in predicting their own future feelings and preferences, raises the question of whether paternalistic interventions would be justified. For example, suppose a doctor knows from experience that people will remember a painful medical procedure more positively if a medically unnecessary period of diminishing pain is added at the end of the procedure. Should the doctor go ahead with this extra pain, on behalf of the patient's future well being, even though the patient would probably reject the option at this time? Should governments ignore current fears of global warming, since people will be happier than they think because they underestimate adaptation? On the one hand, numerous paternalistic policies that are already in place -- e.g., social security, prohibitions against suicide, criminalization of narcotics use, and consumer protection clauses -- reflect a recognition by policy makers that people make mistakes in predicting their own feelings and preferences. On the other hand, our understanding of hedonic prediction errors is far too preliminary to justify further paternalistic interventions. In any case, given the risk of "slippery slopes," such policies should be only be implemented under dire circumstances.

Perhaps educational interventions could help for certain types of prediction errors, such as those caused by theory inadequacy. Educational interventions designed to help people predict how they will feel are currently limited to the domain of medicine. Researchers concerned with the question of whether patients are really giving *informed* consent to medical procedures have begun to develop sophisticated decision aids using modern technologies such as interactive videodisks , the value of which is the subject of current research (see, Hopper et al., 1994; Agre, Kurtz & Krauss, 1994, Holmes-Rovner, 1995, and Ubel & Loewenstein, 1997, for a discussion of this general issue). The educational approach would seem to be least promising for errors that result from hot/cold empathy gaps, whose very existence suggests a resistance to cognitive interventions.[14] On the other hand, education about hot/cold empathy gaps could be partially effective if decision makers use this knowledge to avoid situations in which the dangerous

temptations might occur. Successful educational interventions may require the possibility of direct experience and highly structured feedback.

## Concluding Comments

In closing, it is probably worth returning to, and questioning, the initial premise of this essay which is, as expressed by March (1978), that "all decisions involve predictions of future tastes or feelings." In fact, as Langer (1989) and others have pointed out, many decisions involve little conscious deliberation. People decide based on rules (Anderson, 1987; Prelec, 1991), habits (Ronis, Yates and Kirscht, 1989), and gut feel (Damasio, 1994), none of which involve explicit predictions of future feelings. The most common source of experiential surprises could, therefore, be the *absence* of an explicit prediction in the first place.

Indeed, there may be some situations in which making explicit predictions of future decisions, whether accurate or inaccurate, leads to worse decision outcomes. For example, when one of the authors of this chapter cooks for his family, he has the bad habit of making, and announcing, optimistic predictions of the quality of the meal (e.g., "Prepare yourself for a DELICIOUS meal!") . To judge by the ensuing quality of the food on these occasions, it is a big mistake to make, or at least to broadcasting, such predictions. Despite counterexamples of this type, however, we suspect that in a wide range of situations explicit prediction of tastes improves the quality of decision making (see, e.g., Frisch & Jones, 1993). In many decision contexts, the only thing worse than mispredicting one's tastes may be not to predict them at all.

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# Notes

1. In addition to serving as important inputs into decision making, predictions of future feelings are important for other reasons as well. Anticipation is an important source of pleasure and pain in its own right (Bentham, 1789; Tiger, 1979; Loewenstein, 1987; Elster & Loewenstein, 1992; people who expect to feel good in the future typically feel good in the present and negative expectations similarly induce immediate negative affect. Anticipations are also an important determinant of post-decision feelings such as regret and disappointment (Loomes & Sugden, 1982; Gillovich & Medvec, 1995) because people naturally compare how they feel in a situation with how they expected to feel.

2. In the environmental arena, the "contingent valuation" method has been used to measure public values for different environmental amenities which are then used as inputs into decisions about allocating government spending, siting and development decisions, and for guidance in litigation involving environmental damage, such as oil or chemical spills.

3. Morley conducted a study in which subjects were asked to recall a pain event and then were asked questions designed to measure, for that event, the extent of the three variants of pain memory dimensions. When asked questions about the second variant type of pain memory, 59% were able to recall at least some aspect of the pain sensation, while the remaining 41% reported that they had no recall of the pain sensation at all and were thus unable to rate the vividness of their pain experience. For example one subject reported "I remember the pain getting worse and worse, but I can't remember what the pain felt like at all." Not a single subject reported actually reexperiencing the pain. Strongman and Kemp (1991) found that spontaneous accounts of pain tended to fit Morley's first variant of pain memory -- remembering the circumstances in which the pain was experienced: "Overwhelmingly, the descriptions were of 'objective' details of the events rather than of the feelings of the respondents" (page 195)

4. There is another possible interpretation of the common failure to find a bias in memory for pain. Even apart from personal experience, people may have a good idea of how painful different experiences are, so when asked to report their memory of a pain they experienced, they may instead report their intuition about how painful such a stimulus would be likely to be. Consistent with this concern, Niven and Brodie (1995) found little difference between the multidimensional ratings of labor pain made by women who had and had not undergone labor.

5. This creates potential selection effects since it is possible that the people who allow themselves to gain weight are those who are least bothered by doing so.

6. A weakness of the study is that subjects' evaluations of their objective state may have been influenced by how they felt subjectively. That is, they may have said to themselves "I feel bad and therefore my health state must be unfavorable." This type of confound would attenuate or eliminate any bias that was present.

7. Kent also found that memories for pain three month after the appointment were more highly correlated with predicted (r=.49) than with actual reported (r=.42) pain. On average, people remembered the pain as having been 17.9 on the visual analog scale -- quite close to the predicted value of 16.5.

8.. Given the noncomparability of the groups, however, the results for positive tests must be treated with skepticism.

9. There is also anecdotal evidence pointing to an underprediction of the intensity of craving. Seeburger (1993:152), for example, in a recent book on addiction, comments that the motivation to stay off a drug... "lasts as long as the memory of the undesirable consequences stays strong. But... before long, the memory of the pain that one brought on oneself through the addiction begins to pale in comparison to the anticipation of the satisfaction that would immediately attend relapse into the addiction." Wiktor Osiatynski (1992:128) refers to the alcoholic's rocky road in coming to appreciate the power of addiction to alcohol: "After hitting bottom and achieving sobriety, many alcoholics must get drunk again, often not once but a few times, in order to come to believe and never forget about their powerlessness." O'Brien et al. (1988:18), report that patients undergoing cocaine addiction treatment, "often return home after a period of brief treatment feeling well and confident that they will not resume drug use. They are usually surprised to suddenly feel craving, withdrawal, or even "high" when they encounter people or places associated with their prior drug use."

10. Unfortunately, they seem to have screened subjects for their positive expectations, which opens their results to interpretation as regression to the mean.

11. An alternative interpretation is that Bush ended up doing a better job than his opponents anticipated.

12. The focussing illusion has ramifications that go beyond predictions of future feelings. For example, Strack et al (1996) asked students a question about their overall well being and then a question about how many dates they had been on recently, or vice versa. When the overall SWB

question was asked first, the correlation between the two responses was only .12, but rose dramatically to .66 when the dating question was asked first. Apparently, asking about dates first focussed subjects' attention on that aspect of their lives, and increased its perceived importance. The focussing illusion is also related to research on "metamemory" which shows that people tend to overestimate the likelihood that they will remember whatever happens to be on their mind at a particular time.

13. We thank Ed Diener for suggesting this example.

14. Many different types of interventions have been attempted to help people in a cold state imagine what it would be like to be in a hot state. For example, recent driver's ed tools include a cart into which the student is strapped. The card rolls down a short incline, gathering speed, and hits a rubber barrier, providing the occupant with the bodily sensations accompanying a 5 mph collision. Now several auto companies are competing to produce realistic drunken driving simulators. By introducing time delays in response to the steering wheel and control pedals, such simulators seek to make salient to the simulate, the loss of control that accompanies drunkenness. Similarly the "scared straight" program introduced in New Jersey, and since implemented elsewhere, brought juvenile delinquents to a maximum security prison for a field trip where they were harassed by inmates and verbally abused by guards. All of these interventions seem premised on the view that knowledge of abstract consequences are insufficient to deter undesirable behavior; individuals actually need to experience the consequence and the emotions associated with it. Unfortunately, the effect of such interventions has typically been found to be weak and short lived, or even counterproductive. In most cases, it seems, the emotions induced by the program fade quickly and the impact on behavior along with them.