Hedonomics

Bridging Decision Research With Happiness Research

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ABSTRACT—*One way to increase happiness is to increase the objective levels of external outcomes; another is to improve the presentation and choices among external outcomes without increasing their objective levels. Economists focus on the first method. We advocate the second, which we call* hedonomics. *Hedonomics studies (a) relationships between presentations (how a given set of outcomes are arranged among themselves or relative to other outcomes) and happiness and (b) relationships between choice (which option among alternative options one chooses) and happiness.*

One of humanity's ultimate goals is the pursuit of happiness (Russell, 1930). Research on happiness has flourished in recent years (e.g., Diener, 2000; Diener & Biswas-Diener, 2002; Diener, Suh, Lucas, & Smith, 1999; Easterlin, 1995; Frey & Stutzer, 2002a, 2002b, 2004; Kahneman, 1994; Kahneman, Diener, & Schwarz, 1999; Kahneman, Wakker, & Sarin, 1997; Layard, 2005; Lykken, 1999; Oswald, 1997; Seligman, 2002; Tian & Yang, 2007; Veenhoven, 1991).

A common question posed to happiness researchers is, "How can we increase happiness?" Although the aim of most scientific research is deeper understanding of happiness rather than the development of prescriptions for increased happiness, behavioral research has implications for the popular question. There are at least four research-based answers to the question of how to increase happiness. First, some counsel that there really are no behavioral methods to make a substantial change in happiness or subjective well-being (Gilbert, 2006). The usual rationale for this answer is that each individual is endowed with a personal "set point," analogous to a "basic body weight," and that situational manipulations cannot effectively change this set point (Headey & Wearing, 1992, and Lykken, 1999, affirm the set-point notion, but they still believe that there are methods to improve personal happiness). Therefore, although there may be momentary perturbations in happiness (up and down from the set point), ambient happiness always returns to the standard set-point level. A second answer is promoted by positive psychologists (e.g., Diener & Seligman, 2002, 2004; Huppert, Baylis, & Keverne, 2006; Seligman, 1991, 1993, 2002; Seligman & Csikszentmihalyi, 2000) who focus on personal characteristics such as courage, wisdom, temperance, and empathy and who believe that by identifying and fostering such personal virtues, one can be happier.

Unlike the first two answers, which largely focus on personal variables, the third and the fourth answers focus on the external conditions that affect happiness. The third answer involves enhancing the number or level of desired external outcomes such as income and living conditions. This idea is embraced by a large number of people in our society, including economists, policymakers, and consumers. As a result of their belief in this approach, many people compete to accumulate material possessions and become increasingly wealthy (Frank, 2000). The big puzzle for this approach is that in many cases substantial increases in wealth and material goods are not correlated with comparable increases in self-reported happiness (e.g., Blanchflower & Oswald, 2004; Diener, Sandvik, Seidlitz, & Diener, 1993; Easterlin, 1974, 1995, 2005; Lane, 2000; Layard, 2005).

A fourth answer has emerged from the behavioral decision literature. This approach seeks to improve the presentations of and decisions about external outcomes without increasing the number or level of the external outcomes per se. We refer to this approach as *hedonomics* in contrast to *economics*.

The following analogy illustrates the distinction between the four answers. Imagine that a person who loves wooden blocks receives a set of wooden blocks, plays with them for a while, and becomes bored. How could he make himself happier? There are four possible answers. First, there isn't much he could do to make himself happier. Second, he could try to better appreciate what he has built and feel proud of himself and thankful to the gift giver. These two answers correspond, respectively, to the

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first two general answers about happiness enhancement we delineated earlier.

A third answer in the block example is to acquire more blocks. A fourth answer is to learn scientific ways to better combine the existing pieces and build more enjoyable projects. The third answer, acquiring more blocks, simulates the economic approach, increasing desired material outcomes. The fourth answer, scientifically better combining blocks, mimics the hedonomic approach, scientifically optimizing presentation and decision.

Hedonomics does not replace economics—rather, the two approaches complement one another. Whereas economics studies how to maximize wealth with limited resources, hedonomics studies how to maximize happiness with limited wealth. Notice that hedonomics would not be necessary if happiness depended only on the absolute level of desired external outcomes. Nor would it be necessary if people could accurately predict which option brings them the greatest happiness and could base their choices on their predictions. But neither of these conditions is true. As the research we review in this article indicates, happiness depends not simply on the absolute level of desired external outcomes, but also on how these outcomes are presented and evaluated, just as satisfaction derived from a set of wooden blocks depends not only on the quantity of blocks, but also on how these blocks are combined. In addition, decision makers exhibit systematic biases in predictions and choices leading to failures to maximize happiness, just as individuals do not always know how to combine their blocks to build the most enjoyable project.

Hedonomics is also complementary to economics in its conceptualization of the notion of happiness. The concept in economics that is most comparable with happiness is *utility*. Although utility originally referred to subjective experience (Bentham, 1789/1948) and is sometimes still informally used to mean feelings of satisfaction or dissatisfaction from consuming a good, in modern (neoclassical) economics it is linked to preferences between goods, with no reference to psychological feeling states. Perhaps the clearest expression of the behaviorist character of the neoclassical concept of utility is in Paul Samuelson's revealed preference notion that defines utility functions strictly in terms of behavioral preferences (Samuelson, 1947). In contrast, psychology has defined happiness as an internal feeling state that is measured by self-reports of subjective experiences (and not by behavioral preferences; see Larsen & Frederickson, 1999, for a review of psychological measurement operations). The economic analysis of happiness is behaviorist and external-choice focused, whereas the psychological analysis is subjective and internal-feeling focused. Thus, a major open research question concerns the nature of the relationship between the two approaches: How are economic measures of utility and revealed preference related to psychological measures of happiness and subjective feelings?

In this article, we treat the concept of happiness as a psychological term that describes the positive or negative aspects of hedonic experience. We will use the words *happiness* and *experience* interchangeably because we mean to refer to the positive or negative quality of experiences in the present context. Furthermore, the notion of happiness maximization subsumes not only maximization of positive experiences, but also minimization of negative experiences.

A feeling of happiness (or unhappiness) can be classified at least in three different ways: by its emotional specificity, by its domain specificity, or by its temporal specificity. By emotional specificity, we mean whether the feeling of happiness refers to a specific emotion (such as joy or anger) or to a general positive or negative feeling. Research by DeSteno, Petty, Wegener, and Rucker (2000), Gross, Frederickson, and Levenson (1994), and Lerner (2001) distinguishes between types of emotions (e.g., pride, calmness, sadness, anger). Although we are aware of the importance of such distinctions, in the present article we focus on the general positive or negative aspects of feeling, regardless of their specific emotional qualities.

Second, domain specificity refers to the range of events included in the designated experience. At the extremes, experience can refer to a particular affective response (e.g., a negative reaction at the sight of a snake) or to a diffuse feeling about life in general. In the present article, we focus on experience that is evoked by a specific external event (e.g., feelings about a vacation or one's feeling upon receiving a sum of money), and we discuss how such specific experiences are related to overall life satisfaction in the General Discussion section.

Finally, the temporal specificity of an experience refers to whether the experience is about one's momentary feeling toward an event as the event unfolds or to one's retrospective or global evaluation of the event after the original experience (see Kahneman, 2000; Kahneman & Riis, 2005; Kahneman et al., 2004a, 2004b, for discussions of the differences between momentary and retrospective global evaluations). In the present article, we focus on momentary experience as the event unfolds, though we will discuss how global retrospective evaluations are related to momentary experiences in the General Discussion.

This article draws heavily from the behavioral-decision literature and is selective rather than exhaustive. Our emphasis will be on research that provides novel insights on hedonomics. As noted above, hedonomics is concerned with two topics: the relationship between presentation (how outcomes are arranged among themselves or relative to other outcomes) and happiness, and the relationship between choices and happiness.

PRESENTATION AND EXPERIENCE

We use the term *presentation* broadly to refer to how outcomes are described, framed, arranged, evaluated, and so on. The most studied presentational variable is the location of a *reference point*. People code outcomes as gains versus losses relative to a

reference point, such as the status quo. Gain–loss framing seems to be embedded early in the comprehension process itself, and the effects of framing show up in central brain responses to gains and losses (e.g., Breiter, Aharon, Kahneman, & Shizgal, 2001; De Martino, Kumaran, Seymour, & Dolan, 2006). Depending on the reference point, the same outcome may evoke different experiences and different brain responses. A second presentational variable we will review is *evaluation mode* (both joint and separate). Different situations evoke different evaluation modes. For example, choice (e.g., which of two entrees do you want to order?) invokes joint evaluation, and consumption (e.g., eating the entrée you have ordered) is a matter of single evaluation. Lay intuition suggests that more of a good outcome is always better. But the concepts of evaluation mode and its associated notion of evaluability specify when more is better and when it is not.

Temporal characteristics are the third presentational variable. For example, the same outcome will evoke a less intense experience if one has been experiencing it for a while than it would if one is experiencing it for the first time. Moreover, for outcomes that continuously change over time, the trend of change, the rate of change, and even the change in the rate of change can affect experiences.

Finally, we will review *distributional characteristics*. Classic research shows that, when holding the objective overall value constant, a set of outcomes will yield better momentary experiences if the distribution of the outcomes is negatively skewed than it would if it is positively skewed. However, recent studies show a more complex pattern, and we will propose an original interpretation to reconcile these apparently conflicting findings.

Reference Points

The same outcome can yield different experiences depending on the reference point one uses. This principle applies to visceral experiences, such as plunging your hand into lukewarm water after immersion in ice water or hot water, and to conceptual experiences, such as your satisfaction with a monetary bonus or a fine, and it is always conditional to your current status or focal expectation. This is a familiar and well-accepted notion, so we will be brief in our review.

Basic Reference Effects

Kahneman and Tversky's (1979) vastly influential prospect theory was originally proposed to predict and explain choices under risk when some of the outcomes are uncertain. Nevertheless, the prospect-theory value function also describes experience with riskless, certain outcomes. Among other principles, prospect theory implies three laws of experience. First, one's experience with an external outcome depends not on the absolute level of the outcome, but on the difference between the absolute level and some reference level. The reference level could be the status quo (current wealth level, current health, etc.), expectations (e.g., Kahneman, 1992), goals (e.g., Heath, Larrick, & Wu, 1999), or even imagined counterfactuals (e.g., Roese, 1997). A positive difference is a gain, and a negative difference is a loss. Second, the negative experience evoked by a loss is more intense than is the positive experience evoked by a gain of the same magnitude. This principle is called loss aversion. Expressed in terms of a utility (value) function, where the x axis denotes the external outcome (gain or loss) and the y axis denotes one's experience, loss aversion means that the slope of the utility function is steeper in the loss domain than it is in the gain domain (see the solid curve in Fig. 1). Finally, the bigger the initial gain or loss, the less sensitive people are to an additional gain or loss. Expressed in terms of the utility function, this principle implies that the marginally diminishing utility function is concave on the gain side and convex on the loss side (see the solid curve in Fig. 1).

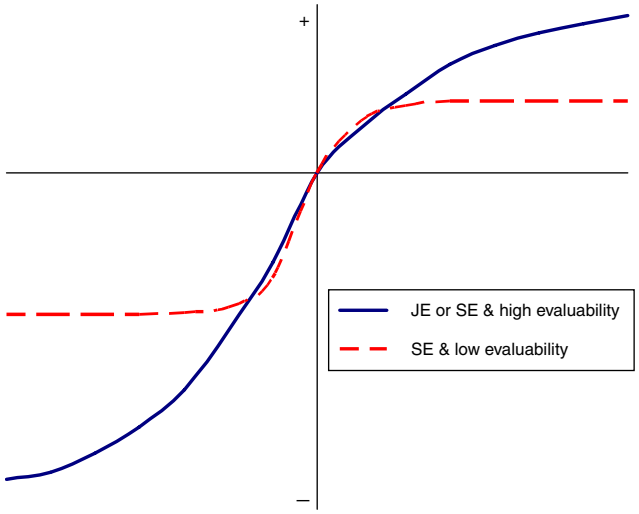

Fig. 1. Utility function under high and low evaluability and in joint evaluation (JE) or single evaluation (SE).

An obvious hedonomic implication of prospect theory is that changing reference points can change experience. For example, framing the purchase of a $200 jacket at a sale price of $100 as a savings of $100 makes the buyer happier than framing it as an expenditure of $100. Reference points can also be imagined counterfactuals. Mellers and her colleagues (Mellers, 2000; Mellers & McGraw, 2004; Mellers, Schwartz, & Ritov, 1999) have provided a thorough analysis of the impact of counterfactual outcomes on pleasure or happiness with obtained outcomes. In their studies, college students rated the pleasure they anticipated feeling after learning they had obtained fixed outcomes (e.g., winning or losing $8) in several situations (casino-type gambles, weight loss effort, scholastic achievement task). The studies found systematic effects of the outcome received (more was better), disappointment–elation (e.g., when the comparison outcome was higher, disappointment followed), regret–rejoicing (e.g., when the comparison outcome was higher, regret followed), and surprise (the more unexpected the actual outcome, the more extreme the emotional feeling). Larsen, McGraw, Mellers, and Cacioppo (2004) and McGraw, Mellers,

and Tetlock (2005) provided an interesting replication "in the field," studying athletes' reactions to their performances. In sum, the evaluation of an outcome depends on the value of the outcome relative to some reference point, and the reference point can be real or counterfactual.

Hedonic Editing

A nonobvious hedonomic implication of prospect theory raises the question of whether to mentally combine or separate multiple outcomes. Thaler (Thaler, 1980, 1985, 1999; Thaler & Johnson, 1990) recommended four strategies, which they termed *hedonic editing*.

First, if a person has two good outcomes to enjoy (e.g., dining out with a charming friend and watching a favorite video), she should enjoy them on separate occasions, because multiple gains will yield greater total happiness if they are experienced separately than if they are experienced as one aggregate gain (due to concavity of the utility function in the gain domain). Second, if a person has to experience two bad outcomes (e.g., seeing a dentist and seeing a nagging aunt), then it is better to experience them in close proximity, because multiple losses will yield less total pain if they are experienced as one integrated loss than if they are experienced separately (due to convexity of the utility function in the loss domain). Third, if a person has a large bad outcome and a small good outcome to experience, it is better to experience them separately, because the utility function in the gain domain is concave, and the utility of a separate small gain can exceed the utility of a reduction from a large loss. Finally, if a person has a small bad outcome and a large good outcome to experience, it is better to experience them in close proximity, because the utility function is convex in the loss domain and losses are experienced more intensely than gains, so the negative utility of a separate small loss can exceed the negative utility of a reduction from a large gain.

Evaluation Modes and Evaluability

The process of evaluation is mysterious, both scientifically and intuitively. One major contribution of the cognitive approach to judgment and choice processes is to "unpack" global concepts and behaviors (such as the general concept of evaluation) into more specific and useful components. In this section, we introduce some obvious distinctions and then derive some nonobvious implications: joint versus single evaluation and evaluable (i.e., easy to evaluate) versus inevaluable (i.e., hard to evaluate) outcomes.

When More Is Not Better

Most theories on utility and value, including prospect theory, assume that more of a good outcome is always better and more of a bad outcome is always worse. For example, receiving 24 chocolates is always better than receiving 12 (assuming one loves chocolates), and losing $200 is always worse than losing $100. Are these assumptions correct? According to recent research by Hsee and colleagues (Hsee, 1996; Hsee, Loewenstein, Blount, & Bazerman, 1999; Hsee & Zhang, 2004), the answer depends on evaluation mode and evaluability.

Evaluation mode refers to the fashion in which the evaluation proceeds. The evaluation of any outcomes proceeds using one of two modes (joint evaluation and single evaluation) or a combination of both. In joint evaluation, two or more outcomes are juxtaposed and evaluated comparatively. In single evaluation, only one outcome is presented and evaluated in isolation.

The evaluability of an attribute (outcome variable) refers to the extent to which one can evaluate the desirability of a value on the attribute when it is presented alone. Evaluability can be a property of the attribute or a property of the evaluator. For a given individual, some attributes are more evaluable than others; for example, for the average person, the sweetness of a candy is more evaluable than the return rate of a stock. For a given attribute, some individuals may find it more evaluable than would others. For example, experienced investors would find the return rate of a stock more evaluable than would college students.

The crux of the evaluability theory is that evaluation mode and evaluability can affect the shape of the utility function of an attribute. In joint evaluation, the utility function is fairly linear and steep, regardless of evaluability, as depicted by the solid curve in Figure 1. People can directly compare different values on the attribute. As long as they know which direction is better, they will feel more positive with more desired values.

In single evaluation, the shape of the utility function will depend on evaluability. When evaluability is low, the utility function in single evaluation will resemble a step function: steep around the neutral reference point and flat elsewhere, as illustrated by the dashed curve in Figure 1. For example, first-time casino goers will be happy if they win and unhappy if they lose, but they will be fairly insensitive to substantial differences in how much they win or how much they lose. Hence, a step-utility function. When evaluability is high, the utility function in single evaluation will resemble the more linear joint-evaluation function (the solid curve in Fig. 1). For example, frequent casino goers, for whom the outcome of a casino visit is a high-evaluability outcome, will be happier the more they win, or less unhappy the less they lose. Hence, their utility function is relatively linear.

To summarize, the utility function in both joint evaluation or in low evaluability will proximate the magnitude-sensitive solid curve in Figure 1. Only in single evaluation with low evaluability will the utility function proximate the magnitude-insensitive dashed curve. However, single evaluation and low evaluability are a particularly important combination. As we will discuss later, life often unfolds in single evaluation—individuals typically experience one outcome at a time, and many outcomes are of low evaluability. In these situations, more is often not better.

Inherent Evaluability and its Social Implications

Besides evaluability, we wish to highlight another concept: *inherent evaluability* (Hsee, in press). Inherently evaluable attributes are those for which we have an innate, typically visceral and biological scale to judge desirability. Examples include the amount of sleep, severity of pain or allergies, stress from work, ambient temperature, degree of social isolation (loneliness), etc. In contrast, inherently inevaluable attributes are those for which we do not have an innate evaluation scale to assess desirability—to evaluate these attributes, we must instead rely on external reference information or socially learned norms. Examples include the size of a diamond, the amount of income, the material of a kitchen countertop, the horsepower of a sports car, etc. Generally speaking, inherently evaluable variables are more associated with basic biological functions than are inherently inevaluable variables.

Any attributes can be made evaluable through social learning, but they are not necessarily inherently evaluable. For example, the size of a diamond is evaluable for people who have purchased a diamond and know what size is considered large and what is considered small, but it is not inherently evaluable.

A key difference between attributes that are inherently evaluable and attributes that are evaluable through learning is that one's scale for evaluating the former type of attributes is relatively stable and does not change as the external environment changes, whereas one's scale for evaluating the latter type of attributes depends on external reference and varies as the external environment varies.

This analysis can tell us what kind of improvement from one generation to another would increase happiness and what kind of improvement would not. If a new generation enjoys better inherently evaluable outcomes (e.g., warmer room temperatures in the winter or less stress from work) than does an old generation, the generation will be happier, at least when they think about these events. If a new generation enjoys better inherently inevaluable outcomes (e.g., larger diamonds or more powerful cars) than does an old generation, the new generation will not be happier, even when they think about these events and even if these outcomes within each generation are evaluable through learning. The reason is that the temperature that makes one happy is relatively stable and does not increase as the external norm increases. Conversely, what diamond size makes one happy is specific to a given generation and increases as the external standard increases, thus producing a treadmill effect. This proposition has received support from both lab and field data (Hsee, 2008).

Explanations of Well-Known Happiness Phenomena

One of the most celebrated findings in the happiness literature is the Easterlin paradox: the observation that when real income increases across generations, happiness does not (e.g., Blanchflower & Oswald, 2004; Easterlin, 1974, 1995). This finding is often attributed to hedonic adaptation, as we will review later. However, the analysis we outlined in the previous section provides an alternative or complementary explanation: The lack of correlation between income and happiness may arise simply because absolute wealth is inherently inevaluable and each generation's hedonic reaction to its wealth is largely a matter of single evaluation—people do not usually compare their wealth with previous generations' wealth. (Even if they do compare, people in a new and richer generation will not be happier than people in a previous and less wealthy generation, because each generation has a less wealthy previous generation to compare with.) As illustrated previously, people winning $600 in a casino will not feel much happier than people winning $400 if they do not compare with each other and are not familiar with casino payoff distributions. Similarly, people who lived in the 1980s with an annual income of $30,000 would not report feeling happier than would people who lived in the 1960s with an annual income of $20,000. It may not have anything to do with hedonic adaptation or treadmill effects.[1]

Despite the Easterlin paradox, we propose that raising wealth can increase happiness if wealth is spent on improving inherently evaluable goods. This proposition is corroborated by findings that life satisfaction in less developed nations increases as wealth increases across generations (e.g., Clark, Frijters, & Shields, in press) and by findings that people in developed countries are happier on average than are people in less developed countries (e.g., Diener et al., 1993; Kahneman, 2008; Leigh & Wolfers, 2007). To the extent that inherently evaluable variables are related more to basic biological needs than to higher order needs, developing countries offer more room for improvement in inherently evaluable goods than do developed nations. Even in developed nations, we believe there is still room for improvement. Not every American has adequate heating in the winter or air conditioning in the summer, and many Americans still suffer from sleeping disorders, social isolation, chronic pain, and other mental and physical disorders.

Our analysis can also account for two other robust findings in the happiness literature. First, across income levels within a society at a given time, the wealthy are generally happier than the poor (e.g., Diener et al., 1993; Diener et al., 1999; Easterlin, 1995, 2001; Frey & Layard, 2008; Stutzer, 2004). This occurs because both wealthy and poor individuals within a society can easily engage in comparison (joint evaluation) with each other. Moreover, advertisements and other "status reminders" rub people's noses in joint evaluation; differences in assets, possessions, and lifestyle remind almost everyone that they are far from the top of the success ranking (e.g., Frank, 1985, 2000;

[1]Another alternative explanation for the Easterlin paradox is scale renorming: Recent and wealthier generations may actually feel happier than previous and poorer generations, but people interpret the happiness measure scale relative only to their own generation and therefore do not exhibit the cross-generational difference in happiness. For more information on this topic, see Baron et al. (2003), Hsee and Tang (2007), and Kahneman (2000).

Frank & Cook, 1996). Second, people almost always prefer more money to less and believe they would be happier with greater wealth (Campbell, 1981). This occurs because such preferences and beliefs are usually elicited in joint evaluation (comparing different levels of wealth), and the utility function is steep in joint evaluation.

Temporal Factors

So far, we have focused only on stable outcomes. (Even when we discussed improvements across generations, we assumed that the improvement occurs between generations, not within a generation.) However, many outcomes we care about may change in a short period of time; our children may leave us, our salary may rise, and/or our health may fall. If an outcome one cares about changes, how does our experience change? We examine principles concerning adaptation, trend, velocity, and acceleration.

Hedonic Adaptation

When an external situation changes, people may first feel strongly about the change, but with the passage of time, their feelings fade away. For example, when a person first moves from a small apartment to a large one (or from a large apartment to a small one), she will be happy (or unhappy), but with the passage of time, her happiness (or unhappiness) tapers off. This process is called *hedonic adaptation* (see Frederick & Loewenstein, 1999, for a review) and it happens under a wide range of conditions, such as winning a lottery (Brickman, Coates, & Janoff-Bulman, 1978), getting married (Lucas, Clark, Georgellis, & Diener, 2003), and/or a change in health (e.g., Brickman et al., 1978; Patterson, 1993; Riis et al., 2005; Schulz & Decker, 1985; Tyc, 1992) or professional status (tenure; e.g., Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000).

Hedonic adaptation is multiply determined. One reason for hedonic adaptation is basic psychophysical habituation (Helson, 1964). One becomes less sensitive to a stimulus the longer one is exposed to it. Another reason is dilution of attention. When a junior faculty member gets tenured, she will first be overwhelmed with joy, but before long, many other things, such as new administrative duties and annoying students, will grab her attention, and tenure is just one of a myriad of events that affect her life. A third reason for hedonic adaptation is what Wilson, Meyers, and Gilbert (2003) refer to as *ordinization*. Once an affective event happens, people have a tendency to rationalize it, view it as ordinary, and thereby damp its affective impact. This can happen to both positive and negative events. For example, if a junior faculty member gets tenure, she may say to herself, "It's no surprise. I deserved it." If she is denied tenure, she may say to herself, "Who cares, I never wanted to be in this department in the first place."

Although hedonic adaptation seems ubiquitous, different events are associated with different rates of adaptation (Diener, Lucas, & Scollon, 2006; Frederick & Loewenstein, 1999; Schreiber & Kahneman, 2000; Scitovsky, 1978; Smith, Loewenstein, Jankovich, & Ubel, 2008). Uncertain events are more resistant to adaptation than are certain events. For example, Kurtz, Wilson, and Gilbert (2007) found that a gift from a mysterious source (uncertain condition) created longer lasting happiness than did an equivalent gift from a known source (certain condition). Furthermore, inherently evaluable events are probably also more resistant to adaptation than are inherently inevaluable events. For example, raising one's room temperature in the winter from 55 °F to 75 °F will probably have a longer lasting effect on happiness than will upgrading one's kitchen countertop from laminate to granite, assuming that the two events have the same initial effect on happiness.

Theoretically, hedonic adaptation and inherent evaluability are separate concepts. Hedonic adaptation is a within-individual change (e.g., "How fast I adapt to an improvement in temperature") and inherent evaluability implies a between-individual difference (e.g., whether Person A feels better than Person B if A enjoys a warmer temperature in the winter than does B). However, because we suspect that inherently evaluable variables are more adaptation resistant, we wish to reiterate our earlier recommendation: to improve inherently evaluable rather than inevaluable variables. Such improvements have two advantages: (a) they can make the happiness caused by the improvements last longer within an individual and within a generation (due to their adaptation resistance), and (b) they can make our children and future generations, who inherit the improvements, happier than us (due to their inherent evaluability).

Trend, Velocity, and Acceleration

Hedonic adaptation occurs mostly when the changed condition is stable—for example, when a person remains tenured after getting tenured or remains paralyzed after an accident. However, many events we care about change continuously over time. For example, investors care about the price of the stock they own, and stock prices change every moment. How do people react to such ongoing changes? Obviously, one's momentary experience with an ongoing change depends on the direction of the change—the experience is positive if the change is in the desired direction and is negative if the change is in the opposite direction (e.g., Ariely & Carman, 2003; Ariely & Zauberman, 2003; Benartzi & Thaler, 1995; Heyman, Mellers, Tishcenko, & Schwartz, 2004; Loewenstein & Prelec, 1993; Loewenstein & Sicherman, 1991).

Beyond the direction of change, one's momentary experience with a continuously changing outcome also depends on its rate of change or velocity (Hsee & Abelson, 1991). One will feel happier when a positive change happens quickly and will feel less unhappy when a negative change happens slowly. The velocity notion has received support from both lab experiments (e.g., Hsee & Abelson, 1991) and field data (e.g., Clark, 1999).

Beyond velocity, one's momentary experience with an ongoing change further depends on changes in velocity: acceleration and deceleration (Hsee, Salovey, & Abelson, 1994). In a study to test this effect (cited in Salovey, Hsee, & Mayers, 1993), participants watched a hypothetical arm-wrestling match (with prearranged results, unbeknownst to the participants), bet on one of the two contestants, and indicated their momentary feelings as the match proceeded. In one condition, the wrestler the participants bet on was moving in the winning direction at a constant speed. In another condition, the target wrestler was losing before he reversed his position and began to move in the winning direction. With the arm position and the speed of movement being controlled at the time of measurement, participants were happier in the second condition than in the first. In two other conditions, the target wrestler was either losing at a constant speed or had reversed from winning to losing. Again, with the absolute position and the speed of losing being controlled at the time of measurement, participants were more unhappy in the winning-to-losing condition than they were in the constant losing condition. Further research suggests that acceleration could affect experience even if there is no reversion of direction; for example, a win that accelerates (from slow to fast) generates greater happiness than does a quick win, and a loss that accelerates (from slow to fast) generates greater misery than does a quick loss (Hsee, Salovey, & Abelson, 1994).

In sum, people adapt to states but react to changes. And one's momentary experience with an ongoing dynamic outcome depends not only on its direction of change, but also on its rate of change, as well as on the change in the rate.

Distributional Characteristics

Another presentational factor that influences the relationship between outcomes and experiences is how the magnitudes of the outcomes are distributed. We often experience outcomes involving a positively or negatively skewed distribution. For example, some people live in a mildly boring city and only occasionally visit a very lively city (an experience with a positively skewed distribution). Others may live in a mildly interesting city and occasionally visit a very boring city (an experience with a negatively skewed distribution). Early research showed that the person living in the mildly interesting city will be happier on average because the occasional experiences of boredom enhance the positive experience with the mildly interesting city. But the picture is actually more complex, with the summary evaluation depending on which experience is framed as the norm and which is framed as the exception.

Range and Frequency

Will the skewness of a distribution of hedonically relevant outcomes influence experience even when the objective cumulative value of the events is held constant? To illustrate, consider two waitresses, Pam and Nancy, who do not know each other, work in different restaurants, and are paid on a daily basis. Their daily incomes are as follows:

Pam: $88, $88, $88, $128, $88, $88, $128, $88, $128, $88, . . .

Nancy: $112, $112, $112, $72, $112, $112, $72, $112, $72, $112, . . .

Notice that their total earnings during the period are identical, but the distribution of Pam's income is positively skewed and the distribution of Nancy's income is negatively skewed. Suppose that both waitresses report their experience every day as they receive their payments. On average, who reports better daily experiences during this period?

To address this question, Parducci (1965, 1995) proposed a range-frequency theory. According to the theory, negatively skewed distributions generate better overall experiences than do positively skewed distributions. In the waitress example, Nancy would be happier than Pam because a few relatively undesirable outcomes enhance the enjoyment of the more frequent desirable outcomes. The theory has received extensive empirical support (e.g., Hagerty, 2000; Mellers & Birnbaum, 1983; Niedrich, Sharma, & Wedell, 2001; Smith, Diener, & Wedell, 1989; Wedell & Parducci, 1988; Wedell, Parducci, & Geiselman, 1987; for a review, see Parducci, 1995).

Norm and Exceptions

However, recent research depicts a richer picture of the relationship between outcome distributions and happiness than the one depicted by range-frequency theory (Zhang & Hsee, 2006). Whether a positively or a negatively skewed distribution yields greater happiness depends on whether people treat the more frequent outcome (e.g., $88 for Pam and $112 for Nancy) as a norm and treat the less frequent outcome (e.g., $128 for Pam and $72 for Nancy) as an exception. If they do, then a positively skewed distribution will generate greater happiness. For example, if Pam considers $88 as a normal daily income and $128 as an exceptional day, then $88 will not make her unhappy and $128 will make her happy. Likewise, if Nancy considers $112 as the norm and $72 as the exception, then $112 will not make her happy and $72 will make her unhappy.

We propose that two factors determine whether people treat the more frequent outcomes as norms and the less frequent outcomes as exceptions. The first factor is prior knowledge of the existence of these outcomes. If people know in advance about the existence of both the more frequent and the less frequent outcomes, they are less likely to consider the less frequent outcomes an exception. In almost all of the studies demonstrating the range-frequency effect (i.e., better average monetary experience with a negatively skewed outcome distribution), participants had either sampled or were told about the range of the outcomes in advance, before they started to rate the target outcomes. In many real-world situations, however, people do not

know in advance what events lie ahead before they start to experience them. For example, waitresses may not know in advance the distribution of income they will receive. Likewise, when a child is born, he does not know what awaits him; he discovers and experiences life as it unfolds. In such circumstances, a positively skewed distribution will engender greater happiness. For example, if Nancy and Pam do not know the distribution of their daily earnings before they start their jobs, Pam will be happier than Nancy. This is because Pam will consider $88—the amount she earns the first day and also most frequently—the norm and will feel happy when her daily income soars to $128, whereas Nancy will consider $112 the norm and will feel unhappy when her daily income dips to $72. But if Nancy and Pam have worked for an extended period of time or they are otherwise familiar with the distribution of their incomes, then Nancy will be happier than Pam, as range-frequency theory would predict.

Another determinant of whether people treat less frequent outcomes as exceptions is whether they regard less frequent outcomes as viable substitutes for more frequent outcomes. Suppose that a person lives in a boring town and occasionally visits a vibrant city. We suspect that she would feel more unhappy with her life in the boring town if moving to the lively city is a viable option. If moving is not an option, she would consider her experience in the city an exception and would not compare it with her life in the town. If moving to the city were a viable option, she would likely put the locations in the same "choice set" and compare them, which would paint the boring town more negatively.

Summary

To build a good wooden block project requires enough blocks. But simply adding blocks is not sufficient to increase satisfaction; the blocks must be used in pleasing combinations. Similarly, creating happiness requires sufficient desirable external outcomes, such as wealth. But simply increasing external desirable outcomes is not sufficient to increase happiness; it also depends on expectations about how the outcomes are distributed.

The research we have just reviewed focuses on four sets of presentational variables, all involving the notion of reference. The first set of variables is the location of a single reference point, an idea that has been widely studied in psychology. A second set of factors is evaluation mode and evaluability. In joint evaluation, each option serves as a reference point for the other. In single evaluation, people use their internal reference scale or external reference information to make evaluations. An outcome is evaluable if the evaluator has a clear internal reference scale or external reference information; otherwise, it is not evaluable. The third set of factors we reviewed is specific to events that extend over time. People can adapt to outcomes that remain stable after a change, treating the stable outcome as a new reference. However, for events that change continuously over time, people react not only to their outcomes, but also to the velocity and acceleration of the outcomes. Reactions to these higher order variables suggest that these variables can also serve as references; for example, people may treat a given velocity as a reference and react to a change in the velocity, thus producing an acceleration effect. The last set of factors we reviewed concerns how outcomes are distributed over time. When people use the entire range of the outcomes as a frame of reference, a negatively skewed distribution generates more happiness. When people use the most frequent outcome as the neutral reference (norm), a positively skewed distribution yields more happiness.

DECISION AND EXPERIENCE

After reviewing selected findings on the relationship between presentation and experience, we now turn our attention to the ability of people to make experience-optimizing choices. We will report on a series of systematic biases that prevent individuals from making experientially optimal choices. Some of the biases result from failures to appreciate the presentational principles, but many of these biases arise because people's decisions are influenced by other factors, such as myopia and rigid decision rules (Hsee & Hastie, 2006).

Instead of centering our review around these biases, we will organize our discussion in terms of the strategies decision makers use and then examine these biases in the context of each strategy. As with many cognitive achievements, people have more than one strategy to make happiness-seeking decisions; we will discuss the four most basic strategies.

First, people base their choices on impulses. We suggest that determining if an impulsive decision is experientially optimal depends on whether the options decision makers face involve trade-offs between short-term benefits and long-term costs. Second, people rely on predictions of future experiences with prospective outcomes to decide which option to choose. In doing so, people have a general bias to be influenced by their current state when predicting the future. This bias is manifested in three ways: people use acquisition to predict consumption, they use "cold" (nonvisceral) information to predict "hot" (visceral) experience, and they use joint evaluation to predict single evaluation. Third, people rely on their memories of past experiences to make choices. Memory-based evaluations differ from real online experiences in two respects: First, they are insensitive to the duration of experiences, and second, they are heavily influenced by expectations present at the time of the experience and at the time they recall the experience. Finally, people rely on decision rules and heuristics, such as "focus on economic values," "seek variety," "do not waste," and so on. Most of these rules are antidotes to impulsive decisions, yet they are often applied too rigidly, thus leading to too much self-control and to overindulgence.

Decisions Driven by Impulses

Arguably the most common obstacle to maximizing long-term experience is impulsivity in choice. We define impulsivity as a choice of the option in the available choice set that generates the greatest immediate gratification. For example, choosing the most delicious entrée on the menu of a restaurant constitutes an impulsive choice. Impulsivity would not be especially interesting, except that there are many trade-offs when the choice option that maximizes immediate satisfaction is not the same as the option that maximizes long-term personal welfare. Of course, the most interesting situations are those in which the choosers recognize that they would and should choose for long-term welfare but instead succumb to impulsive, short-term preferences (see Ainslie, 2001; Baumeister & Heatherton, 1996; Baumeister & Vohs, 2003, 2004; Prelec & Herrnstein, 1991; Rachlin & Raineri, 1992; Schelling, 1980, 1984; Thaler, 1980; Thaler & Sherfrin, 1981).

A critical factor that determines whether an impulsive choice is experientially suboptimal is whether the choice options entail a trade-off between short-term and long-term experiential consequences—that is, whether the option that yields the greatest immediate pleasure entails a long-term cost, relative to the other options. Sometimes, the immediately gratifying option does not entail a long-term cost and, in such cases, an impulsive choice may be experientially optimal.

However, oftentimes the option that yields the greatest immediate pleasure will lead to worse long-term experiences than would other options. In such situations, the immediately gratifying option is experientially suboptimal in the long run. Eating fatty foods is one example. Fatty food may produce greater immediate gratification than does healthy food, but fatty food causes obesity and other health-related problems in the long term. Consequently, people who eat fatty food may have worse overall experiences in the long run.

Impulsivity is multiply determined. People may behave impulsively because they mispredict an outcome's consequences. For example, some people may smoke because they underpredict the future negative consequences of this choice. In many cases, however, people commit impulsive behavior because they simply cannot resist the temptation (e.g., Kivetz & Simonson, 2002b; Loewenstein, 1996; O'Donoghue & Rabin, 1999; Thaler & Shefrin, 1981). Many substance abusers are fully aware that drugs are ruining their lives and may even warn their friends to stay away from drugs, but they cannot resist the craving. In other words, people who make impulsive choices do not seem to base their decisions on what they predict will bring them the best overall experience (the sum of immediate and delayed experiences).

Decisions Based on Prediction

The most likely common strategy decision makers adopt when faced with multiple-choice options is to predict or simulate their consumption experience with each option. Who has not imagined the taste of a dish on a menu? Decision makers often do this even for dishes that have never been experienced before, when simple memory for previous experiences would be insufficient for an evaluation (e.g., dill-pickle-flavored sorbet).

Researchers have identified numerous biases associated with simulation or affective forecasting (e.g., Gilbert, 2006; Kahneman & Snell, 1992; Loewenstein & Schkade, 1999; Wilson & Gilbert, 2003). However, almost all of these biases can be traced to the tendency to rely on one's current state to predict future experiences. This general bias manifests itself in three ways. First, people use acquisition experience to prediction consumption experience. Second, they use cold information to predict hot emotion. Third, they use joint-evaluation reactions to predict separate-evaluation reactions.

Acquisition Experience Versus Consumption Experience

Suppose that a prospective home buyer predicts what it will be like if he lives in a 2,500-square-foot house instead of his current 2,000-square-foot apartment. In this example, *acquisition experience* is his experience when first moving from the small apartment to the larger house, and *consumption experience* is his day-to-day experience when actually living in the house. Normatively, in order to decide how much he is willing to pay for the larger house, he should base his decision mostly on his consumption experience. In reality, however, decision makers often fail to distinguish the two and use their predicted acquisition experience to assess their consumption experience. Likewise, dog owners predict how their lives will be if their dog were dead by simulating how they would react upon hearing the news that their dog has died, not on a consideration of the long-term experience of living without the dog.

Confusion of acquisition and consumption experiences would not be a problem if the two experiences were similar, but, these experiences are not usually similar. Consumption experience is usually less intense than acquisition experience. Thus, using acquisition experience to predict consumption experience will lead to overestimation—a phenomenon that Gilbert and Wilson refer to as the impact bias (Buehler & McFarland, 2001; Gilbert, Driver-Linn, & Wilson, 2002; Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson et al., 2000; Wilson & Gilbert, 2003).

As mentioned earlier, there are at least three reasons why consumption experience is less intense than acquisition experience. One is pure adaptation. The second is psychological rationalization or ordinization. When an event happens, people will make sense of it and thereby find it unsurprising (Wilson, Meyers, & Gilbert, 2001, 2003). For example, when a young man is dumped by his girlfriend, he might feel devastated at first, but he might think, "She was not that great anyway" and would stop feeling so sad. The third reason is attention dilution (e.g., Buehler & McFarland, 2001; Dunn, Wilson, & Gilbert, 2003; Lam, Buehler, McFarland, & Ross, 2005; Schkade & Kahneman, 1998; Wilson et al., 2000). At the acquisition stage (e.g., when one first moves to a new house, when one's friend has just left),

attention is focused on the acquired event (life in the new house, life without the friend). But as life goes on, a myriad of other events (e.g., an annoying boss, a traffic accident, a new acquaintance) compete for one's attention, and the original event recedes into the background.

Because acquisition experience differs from consumption experience and because decision makers use the former to predict the latter, they will mispredict the impact of consumption experience and can make suboptimal decisions (e.g., paying too much money to buy a large house, paying too much attention to what others buy).

Cold Information Versus Hot Experiences

Predictors and experiencers may find themselves in different visceral states (Loewenstein, 1996). Sometimes predictors are rested, satiated, or sexually unaroused (in a "cold" state), yet experiencers are tired, hungry, or aroused (in a "hot" state); other times the reverse is true. When people in one visceral state predict experiences in another visceral state for themselves or for others, they often commit a systematic error by projecting their current state into their predictions (Loewenstein, O'Donoghue, & Rabin, 2003; see also Loewenstein, 1996, 1999; Van Boven, Dunning, & Loewenstein, 2000; Van Boven & Loewenstein, 2003). For example, if a person is full now, she will underestimate how much she will enjoy her next meal when she is hungry again.

The projection bias has important behavioral consequences. For example, hungry shoppers at a grocery store buy more items than they need (Nisbett & Kanouse, 1969) or planned to buy, unless they are disciplined and keep to their grocery lists (Gilbert, Gill, & Wilson, 2002). A currently hungry person is likely to choose a candy bar over an apple for future consumption, only to find that she actually prefers apple when that moment comes because she is not so hungry (e.g., Read & Van Leeuwen, 1998).

So far, we have discussed prediction biases that arise because predictors and experiencers are in different arousal states. But even if they are in the same visceral state, predictors and experiencers may base their evaluations on different information. More often than not, predictors base their predictions on cold cognitive information but find that their subsequent experience is dominated by hot experiential information. For example, suppose that a person is first asked to predict how uncomfortable she will feel if she listens to a 60-dB noise, and another person is asked to report how uncomfortable she feels when she actually listens to the 60-dB noise. The predictor bases her evaluation on the information (60 dB), which is a cold, cognitive label, but the experiencer bases her evaluation on the actual auditory experience.

Relating to the distinction we made earlier between inherently evaluable and inherently inevaluable variables, we suggest that cognitive information is inherently inevaluable; people do not have an internal scale to gauge the desirability of the label "60 dB" and they need other (past and context) information to make sense of it. In contrast, experiential information is often inherently evaluable; people do not need to rely on contextual information to tell how uncomfortable a particular noise is.

An implication of this distinction is that predictions are less stable and more susceptible to the influence of context information than experiences are, because predictions are typically based on cognitive information and experiences are based on sensory information. This proposition is consistent with the findings of a series of ingenious studies conducted by Morewedge, Gilbert, Myrseth, and Wilson (2007). In one typical study, for example, research participants either predicted the enjoyment of eating potato chips or they actually ate the chips. In both cases, there was another type of food in the background—either chocolates, pretested to be more appealing to the participants than were the potato chips, or sardines, pretested to be less appealing to the participants than were the potato chips. Participants who predicted the enjoyment of eating potato chips were more influenced by the type of food in the background than were participants who actually ate the potato chips, indicating that predicted experiences are more dependent on external reference information than actual experiences.

Joint-Evaluation Prediction Versus Separate-Evaluation Experience

A third bias associated with simulation of future experience is related to joint evaluation versus single evaluation. Imagine that a person chooses between homes. The two homes are identical on all aspects (including price, distance to work, etc.) except for the following: One house is 2,500 square feet in size and is situated in a location where the person will experience allergies and the resulting red eyes and congested nose from time to time, whereas the second house is only 2,000 square feet in size and is situated in a location where the person will not experience allergies. Although he realizes the difference in allergies, he predicts greater comfort from living in the larger home and therefore chooses the larger home. In reality, however, the difference in home size does not matter much in consumption experience, but the presence and absence of allergies matters a great deal. Therefore, the person may well be happier if he opted for the smaller home and to be free from allergies. This decision bias has been referred to as the distinction bias, because the predictor is sensitive to a distinction (e.g., home size) that is actually inconsequential in the consumption experience.

The distinction bias occurs because the predictor and the experiencer are in different evaluation modes (joint evaluation versus single evaluation) and the predictor fails to put himself in the evaluation mode of the experiencer (Hsee & Zhang, 2004). Typically, affective predictions are made in joint evaluation, and the consequence of a decision is experienced in single evaluation. For example, when we shop for a house, we compare options (joint evaluation). When we live in a house, we experience that house alone (single evaluation). Although we may occa-

sionally think of foregone options, our predominant mode of evaluation during consumption is single evaluation. Prediction is driven primarily by comparisons between the options under consideration, but consumption is not. Even if comparison is involved in consumption, it is usually through general internal standards or partly remembered past consumption experiences.

This analysis can help us specify when predictors exhibit the distinction bias and when they do not: Predictors in joint evaluation will systematically overpredict the impact on experience of low-evaluability attributes but will underpredict the impact of high-evaluability attributes. Let us revisit the example of choosing between two houses. The size of a house (2,000 versus 2,500 square feet) is difficult to evaluate separately, in consumption. Without comparison with other homes, a 2,000-square-foot home would feel nearly as comfortable as a 2,500-square-foot home. Allergies, on the other hand, are inherently evaluable. Even without comparison with other people, people simply feel worse when experiencing allergies than they do when they are not. Thus, in choosing between these two homes, people are likely to overweight the difference in square footage—an attribute that is salient in joint evaluation but will make little difference during consumption.

This interpretation is corroborated in a series of studies by Hsee and Zhang (2004). In one study, respondents chose between two tasks: (a) telling a happy story and eating a large piece of chocolate candy, or (b) telling a sad story and eating a small piece of chocolate. Most respondents chose the sad-story/large-chocolate option, both for themselves and for other participants. Yet it was the respondents who recounted a happy story and ate the smaller chocolate who had a better experience. Further analyses revealed that the choosers overpredicted the difference in experience between eating a small chocolate and eating a large chocolate but that they did not overpredict the difference in experience between telling a sad story and telling a happy story. In comparison with the valence of a story (whether it is happy or sad), the size of a chocolate was more difficult to evaluate in single evaluation.

To find the option that will maximize consumption experience, we suggest that decision makers refrain from direct comparisons (joint evaluation) and simulate single evaluation during the decision process. For example, TV buyers should not compare alternative models side by side as they usually do in a retail store; instead they should examine one model at a time, form a holistic impression of each model separately, and finally choose the model that registers the best overall holistic impression. This advice is consistent with the research demonstrating that gut feelings and intuitions can sometimes lead to better outcomes than do systematic evaluation strategies (Wilson et al., 1993; Wilson & Schooler, 1991). Gut feelings and impulses tend to inhibit joint evaluation and engender single evaluations and are likely more predictive of consumption experience (at least for experiences dominated by sensory inputs).

Decisions Based on Memory

When people choose which event to experience, they often base their choice on their memory of similar experiences in the past. In fact, it is plausible that the primary reason animals evolved memory systems was to provide a record of past gains and losses to guide future foraging activities. Everyday experience is replete with examples of this heuristic: When we consider returning to a restaurant, shop, or website, we spontaneously or deliberately consult our memories of prior experiences in that location or in similar locations. The recently proposed affect heuristic (Slovic, Finucane, Peters, & MacGregor, 2002) and somatic marker hypothesis (Damasio, 2006) both refer to memory-based evaluation mechanisms. However, memory is often biased and is always an incomplete record of the original experience (Karney & Coombs, 2000; Levine, 1997; Mather, Shafir, & Johnson, 2000; Morewedge, Gilbert, & Wilson, 2005).

Duration Neglect Versus Duration Sensitivity

First, memory of a past event is typically a global evaluation of the event. Global evaluation is often dictated by the experiences at the peak and at the final moments of the event, and it is insensitive to the duration of the event (e.g., Fredrickson & Kahneman, 1993; Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993; Varey & Kahneman, 1992; see also Ariely, Kahneman, & Loewenstein, 2000, and Fredrickson, 2000, for review and analysis). Thus, a short painful event would be remembered as having been equally painful as a long painful event. If the short event happens to end with a particularly painful moment, it may be remembered as having been more painful than the long event. This memory bias was demonstrated in a classic experiment by Kahneman et al. (1993). Participants first experienced a short painful episode in which they submerged their hands in very cold water for 60 s. Later in the session, participants experienced a long episode in which their hands were submerged in the same very cold water for 60 s, followed by a less-painful immersion in mildly cold water for an additional 30 s. In terms of integrated momentary experience, the long episode was worse than the short episode as it contained the short episode plus a subsequent unpleasant interval. Yet when respondents were asked retrospectively to indicate their summary evaluation of each episode, they judged the short episode to be worse. Moreover, when respondents were asked to repeat one of the two episodes, most of them chose the long one, which was consistent with their retrospective evaluations.

Recent research by Morewedge, Hsee, Kassam, and Caruso (2006) furthers our understanding of duration neglect by showing that insensitivity to duration and sensitivity to magnitude (peak and end) are due to the differential evaluability of the two types of attributes: magnitude is more evaluable than duration. Consider a novel sound episode that consists of two dimensions: loudness and duration. Relatively speaking, the loudness dimension is more evaluable, because people have an internal (psychophysical) scale to judge whether a given sound

is loud or soft: A barely audible sound is obviously soft and a deafening sound is obviously loud because it is painful. On the other hand, the duration of a novel sound episode is less evaluable, because people have neither an internal clock nor an external scale to judge whether a given duration is long or short.

More generally, the intensity of any stimulus is more inherently evaluable than its scope. For example, the sweetness of a particular chocolate is more inherently evaluable than the number of chocolates a box should contain, the pain of a medical procedure is more inherently evaluable than its duration, and so on. This analysis explains why we often observe insensitivity to scope and rarely observe insensitivity to intensity. However, our analysis also implies that if people are made familiar with a stimulus, then its scope will also be evaluable. In a recent study, research participants listened to short or long episodes of noises and then reported retrospective evaluations (Morewedge et al., 2006). The noises were either described as phone rings (high evaluability) or given no descriptive label (low evaluability). In the low-evaluability condition, retrospective evaluation exhibited the usual insensitivity to duration, but in the high-evaluability (phone ring) condition, retrospective evaluation was significantly sensitive to duration of the noise. Scope (including duration) neglect is a special case of insensitivity to inevaluable attributes.

The Role of Norms in Immediate Versus Retrospective Evaluations

Besides duration and scope neglect, another major inconsistency between retrospective evaluation and momentary experiences is the differential influence of norms. Consider two individuals: One spends a weekend watching comedies, and the other spends the weekend taking care of her newborn baby. The comedy watcher may well report better immediate (momentary) experiences than would the baby's mother, but in retrospective, memory-based evaluations, the baby's mother will report a better experience, at least partly because taking care of one's baby is more socially approvable and because it satisfies long-term life goals. In support of this notion, Schwarz, Kahneman, and Xu (in press) demonstrated that in on-line driving experiences, BMW owners were no happier than Honda or Ford owners, but in retrospective evaluations, BMW owners remembered being happier than cheap car owners. The author's interpretation is that the intrinsic, immediate, on-line evaluations are not much affected by expectations or norms for driving experiences. But the retrospective, memory-based evaluations and subsequent choices are heavily influenced by expectations and norms (see Wirtz, Kruger, Scollon, & Diener, 2003, for an example of on-line versus memory-based evaluations of vacation experiences). Similar reasoning can explain why global, memory-based evaluations of life satisfaction differ greatly across national samples (such as the United States, Denmark, Japan, and France), but immediate, on-line evaluations of pleasure/pain do not (Kahneman & Riis, 2006; Oishi, 2002).

More generally, Schwarz et al. (in press). distinguish between memory-based evaluations of specific, episodic events, which they find are well-predicted by previous momentary, immediate evaluations. However, global memory-based evaluations are based mostly on current naive semantic theories about how pleasant or unpleasant the events should have been. Often, global retrospective evaluations are not correlated with the original momentary evaluations, but they are correlated with expectations existing before the events were experienced, with forecasts before the events were experienced, and with general semantic beliefs after the events were experienced. A version of this general principle was demonstrated in a series of studies by Novemsky and Ratner (2004), which demonstrated that participants' lay belief in contrast effects led them to overestimate the magnitude of contrast effects in memory.

Decisions Based on Rules and Heuristics

Decision makers often base their choices not solely on predicted experience, but also on decision rules, including heuristics and personal policies (e.g., Ames, Flynn, & Weber, 2004; Prelec & Herrnstein, 1991; Simonson, 1989; Simonson & Nowlis, 2000). These rules may simplify choices, but they may also lead decision makers to choose a different option than the one they predict will yield the best experience or produce the best experience.

Lay Rationalism

In a scenario study conducted by Hsee, Zhang, Yu, and Xi (2003), respondents were told that they had won one of two sets of four dinners to be consumed in the following 4 weeks. One set had an improving trend (i.e., each subsequent dinner was more expensive and better than the previous one). The other set had a deteriorating trend (i.e., each subsequent dinner was less expensive and worse than the previous one). However, the total value of the deteriorating set was higher. Half of the respondents were asked to predict which set of dinners would give them more enjoyment in the next 4 weeks and the other half were asked to choose one set to consume. Most predictors favored the improving set, but most choosers opted for the deteriorating set. Apparently, predictors appreciated the importance of trend, yet choosers based their choices on economic value.

More generally, decision makers have a tendency to base their choices on factors they consider sound and rational (e.g., Shafir, Simonson, & Tversky, 1993). Hsee, Zhang, Yu, and Xi (2003) label this tendency as *lay rationalism*. Lay rationalism manifests itself in different forms. One is *lay economism*: the tendency to base decisions on the financial aspects of the options and to ignore other happiness-relevant factors. The finding from the dinner-set study is an example. Another example is a classic study by Tversky and Griffin (1990). Participants were given a choice between working for a company where their annual salary would be $33,000 and their colleagues' salary would be $31,000 versus working for a

company where their salary would be $35,000 and their colleagues' salary would be $37,000. Participants predicted that working for the former company would result in greater happiness, yet they chose to work for the latter company. Apparently, people understood the importance of reference point (social comparison) in happiness, yet they based their choices on economic considerations. (An alternative explanation for the Tversky and Shafir finding is that the happiness measure does not capture the long-term benefits of having more money. But, Hsee, Zhang, et al., 2003, replicated the same happiness-choice reversal when the long-term effect was controlled.)

Besides lay economism, other manifestations of lay rationalism include *lay functionalism*, a tendency to focus on one primary objective of the choice options, and *lay scientism*, a tendency to base choice on "hard" (objective and quantified or easy-to-quantify) attributes rather than "soft" (subjective and hard-to-quantify) attributes (see Hsee, Zhang, et al., 2003).

Other Decision Rules

Other than the general motivation to make "rational decisions," people also base their choices on specific decision rules. Popular decision rules include "seek variety" (e.g., Benartzi & Thaler, 2001; Ratner, Kahn, & Kahneman, 1999; Simonson, 1990), "waste not" (e.g., Arkes & Ayton, 1999; Arkes & Blumer, 1985), "don't pay for delays" (Amir & Ariely, 2004), and "more options are better" (Schwartz, 2004). Like lay rationalism, these decision rules can also lead decision makers to forgo an option they themselves predict to be experientially superior in favor of one that is consistent with the rule.

Variety seeking, for example, can lead to an inconsistency between predicted experience and decision. In one of the original studies on variety seeking, Simonson (1990) asked one group of students to make simultaneous commitment to candies for several episodes of future consumption and asked another group of students to make sequential choices of candies right before each consumption episode. Most simultaneous choosers chose a variety of snacks, but most sequential choosers chose only their favorite snack repeatedly. What is more interesting about this study is that it included a third group: those who were in the position of the simultaneous one-time commitment choosers and were asked to predict their future consumption experiences. They predicted better feelings resulting from low variety than from high variety, suggesting that simultaneous choosers were able to tell, if asked, that low variety would yield better experiences but that the rule of variety seeking prevailed in simultaneous choice. In another study of variety seeking, Ratner et al. (1999) asked participants to construct a song sequence from one of two sets of songs. One set contained more songs than the other, but the additional songs were less enjoyable. Participants who were given the larger set constructed sequences with greater variety, but they enjoyed them less. In another study of variety seeking in a group context, Ariely and Levav (2000) found that restaurant goers tend to order different items than those chosen by their friends, but they enjoy the items less.

Similarly, the waste-not heuristic can also lead decision makers not to choose the predicted most enjoyable option and to commit the "sunk-cost fallacy." Arkes and Blumer (1985) asked participants to imagine that they had purchased a $100 ticket for a weekend ski trip to Michigan and a $50 ticket for a weekend ski trip to Wisconsin. They later found out that the two trips were for the same weekend. They could not return either of the tickets and had to pick one to use. Although the participants were told that the trip to Wisconsin was more enjoyable, the majority of them chose the trip to Michigan.

Most people also prefer more options to fewer options, believing that they will be happier with what they eventually choose if they have more options. In reality, this belief is not always correct (e.g., Botti & Iyengar, 2004; Carmon, Wertenbroch, & Zeelenberg, 2002; Schwartz, 2004). A large number of options can be demotivating because they are complex and involve too many trade-offs for people to manage; making trade-offs can be painful (Luce, Payne, & Bettman, 2001). For example, shoppers were less happy with the candy they eventually chose if they had 30 truffles to choose from than they were if they had only 6 options (Iyengar & Lepper, 2000).

Moreover, the presence of multiple desirable options can highlight their relative disadvantages and thus make people dissatisfied with any of the options (Brenner & Rottenstreich, 1999; Hsee & Leclerc, 1998). For example, suppose that a person, who has never been outside of the continental U.S., wins a free vacation package. Consider the following sequence of events. She first learns that she wins a free trip to Paris. Will she be happy? Most likely she will. She is then asked if she wants to have another destination option in addition to Paris. Chances are that she will say yes (due to the seek-options heuristic). She is then given the additional option of Hawaii. Will she be more or less happy? We believe she will be less happy. In fact, she will be probably be less happy regardless of whether she eventually chooses to go to Paris or go to Hawaii than she would if she only had the option to go to Paris or only had the option to go to Hawaii, because a comparison of the two options reveals their relative shortcomings: Paris does not have Waikiki Beach, and Hawaii does not have the Louvre. Accepting one option from a choice set with several attractive options means losing the rejected options (Carmon et al., 2002).

Medium Maximization

Another decision rule (heuristic) is medium maximization. When people exert effort to obtain a desired commercial outcome, the immediate reward they receive is usually not the outcome per se, but a "token": an instrument that they can trade for the desired outcome (e.g., Kivetz & Simonson, 2002a; Van Osselaer, Alba, & Manchanda, 2004). Because the token connects effort to the desired outcome, it is referred to as a *medium*. For example, points that members of a consumer loyalty program

earn from purchases and the miles frequent flyers earn from flying are both examples of media. More notably, money we earn from work is also a medium. Normatively, when people exert effort to achieve a certain final outcome, they should choose the option that yields the greatest effort–outcome return. In reality, people often choose the option that yields the best effort–medium return. Consequently, the presence of media may lead people to exert more effort and end up with a less desirable outcome.

For example, in one of the experiments demonstrating the effect of media, respondents were given a choice between a short task that would award them 60 points or a long task that would award them 100 points. They were also told that with 60 points they could get a serving of vanilla ice cream and with 100 points they could get the same amount of pistachio ice cream. Most respondents chose to work on the long task. However, when asked which type of ice cream they preferred or which type of task they preferred, most favored the vanilla ice cream and the short task. It seems that the presence of an intervening medium led the respondents to work more and enjoy less.

Generally speaking, the presence of a medium can lead people to exert extra effort when the medium makes the outcome that requires more effort (a) look better than it actually is, (b) look more certain than it actually is, and (c) have a more linear (and less concave) relationship with effort than it actually has. For details, see Hsee, Yu, Zhang, and Zhang (2003).

Rules as Overapplied Antidotes to Impulsivity

So far, we have reviewed two ostensibly disparate types of behaviors: impulsivity and decisions based on rules. Yet they share a dialectical relationship. Most rules are antidotes to impulsivity and are self-control mechanisms that help the decision maker maximize delayed happiness. For example, suppose that an employee who is approaching her retirement age and has little savings receives a cash bonus. She can either save the bonus or spend it on a luxury cruise. Taking the cruise is enjoyable in the short run, but saving the money will benefit her in the long run. If she opts for the cruise, it would be an impulsive decision. Lay rationalism would prompt the soon-to-be-retiree to save the money. Although a few decision rules encourage immediate gratifications (e.g., "life is short, seize the day"), most are created as self-control, delay-consumption mechanisms.

These self-control devices may help in some situations and hurt in others. Specifically, if the decision maker faces a trade-off between worse short-term and better long-term consequences, these self-control strategies may help; otherwise, they may hurt. For example, if the soon-to-be retiree is poor, taking a cruise and saving for retirement entails a trade-off between immediate and delayed happiness. Following these self-control mechanisms will enable her to experience greater delayed happiness and possibly greater overall happiness as well. On the other hand, if the soon-be-retiree is already wealthy, taking a cruise dominates saving for retirement, because taking a cruise will not affect her financial condition or her happiness in the future. In this scenario, following these self-control mechanisms will lower her overall happiness, as she will miss a significant immediate source of happiness (with insignificant long-term costs; see Van Boven & Gilovich, 2003, for a related discussion).

Most individuals do not effectively distinguish between situations that involve trade-offs between short-term and long-term experiences and those that do not, and their behavior is too regressive. When situations do involve such trade-offs, individuals often do not exert enough self-control, which yields a myopic response. When situations do not involve such trade-offs, individuals often rigidly apply these self-control mechanisms and deny themselves optimal happiness. The crux of this analysis is that the same behavior may appear either too impulsive or too prudent depending on the nature of the trade-off between short-term and long-term experiences.

Summary

To create a satisfying wooden-block project, people must be able to predict accurately what a project will look like if they combine the blocks in a particular way and combine the blocks based on their predictions. Likewise, to pursue happiness, decision makers must be able to accurately predict the affective consequences of their options and make their choices based on their predictions. The research we reviewed in this section explores why decision makers fail to make accurate affective predictions and in which situations they fail to act upon their predictions.

We believe that the theoretical literature in psychology has been slow to develop a framework for describing the primary modes of evaluation in choice. The existing literature documents many perturbations and biases in choices but lacks a positive account of the elementary processes and strategies that are perturbed and biased. Our review initiates such a framework by proposing a spectrum of modes of choosing. We begin with the most automatic, intuitive, impulsive choices. We then move to the more controlled, deliberate, thoughtful simulation-based and memory-based modes. We conclude with rule- and heuristic-based choices, noting that many of these rules and heuristics are antidotes to impulsive choices. Each elementary mode—impulse, simulation, memory, and rule-based—is associated with signature biases (e.g., myopia, empathy gap, duration neglect, medium-maximization). Our catalog of choice strategies is probably not complete, but we submit that this initial framework of modes of choice provides a useful foundation for future development.

GENERAL DISCUSSION

This article advocates a specific approach to increasing personal happiness that we label hedonomics. Unlike traditional economics, which focuses on objective levels of external outcomes, hedonomics studies how presentations of existing outcomes and

choices made among those outcomes can influence happiness. Accordingly, this article reviews research about the relationships between choice presentations and experience and between decisions and experience.

We will devote the remainder of this article to a discussion of other meanings of happiness than the specific psychological interpretation we have utilized so far. In this article, we assume that happiness is a momentary experience, associated with specific external events, and that people should maximize the sum or integral of momentary experiences over the duration of the event. In the case of a vacation, for example, we have assumed that what should be maximized is the temporal integral of one's momentary experiences during the vacation event. Without a doubt, this assumption is simplistic, and we wish to comment on several qualifications.

Central Versus Peripheral Experiences

The experience people try to maximize (e.g., a vacation) may not be limited to experiences during the event. Here, we make a distinction between four types of utilities or experiences: news utility, anticipation utility, consumption utility, and memory utility. *News utility* refers to one's experience upon first hearing the news about the event (upon hearing the news "You have won a 3-day vacation to Paris"). *Anticipation utility* is one's experience when waiting for the occurrence of the event (when preparing for the Parisian trip). *Consumption utility* is one's experience during the consumption event (when in Paris). *Memory utility* is one's experience when recalling the event.

Anticipation utility and memory utility have been well-studied in the literature (e.g., Loewenstein, 1987; Loewenstein & Elster, 1992). News utility, on the other hand, has been less studied and deserves more attention.

Central or consumption utility is like a light source, and peripheral utilities, such as news and anticipation, are like its halos. Without the light source, there will be no halo. But with the light source, the halos can shine even brighter than the source. Intuitively, the main source of happiness from an event resides in the consumption of the event; thus, the consumption utility can be considered central, and the other utilities can be considered peripheral. In reality, however, the peripheral utilities are important and may sometimes even exceed the central utility. This is especially true if one integrates the peripheral utilities over time and compares the sum happiness (temporal integral) with the sum of the central utility (temporal integral). For example, the sum of the temporally integrated happiness resulting from hearing the news that one has won a free 3-day trip to Paris, anticipating the trip, and recalling the visit for the rest of one's life may well exceed the temporally integrated happiness experienced during the 3-day trip itself. In this sense, it may not be a mistake if one chooses an action that does not bring the greatest experience during the action, but that instead produces the greatest experience before and after.

Momentary Experience Versus Life Satisfaction

News, anticipation, and consumption utilities are all momentary experiences. However, what people try to maximize may not be these specific momentary experiences, but their overall evaluation of the event. As we noted earlier, overall evaluation is closely related to retrospective evaluation or memory utility, and retrospective evaluation can differ significantly from momentary experiences, especially those during the event (e.g., Schwarz et al., in press). One could argue that retrospective evaluation is usually more important than momentary experience: People may not care so much about their fleeting feelings when they run around trying to catch a subway or finish a job; what they care most about is their overall experience when they close their eyes and reflect on their lives.

In our view, overall retrospective evaluation is also a momentary experience; it is one's experience when recalling the past experiences and making a summary judgment. However, we do not think a temporal integral of momentary experience assigning equal weight to different moments should be the standard for happiness maximization. Instead, we should give different weights to different moments; for example, momentary experience when reflecting on one's life should be given more weight than momentary experience when having a bowel movement (unless the person is doing the two things simultaneously). The challenge is how to assign weights. This should be an intriguing future topic for hedonomic researchers.

Socrates Unsatisfied Versus The Fool Satisfied

So far, we have only focused on maximization of experience or happiness. Critics may argue that what people try to maximize is not just happiness, but other things, such as wisdom, friendship, and religion. Choosing an experientially suboptimal option is not a mistake if it maximizes other aspects of life that people care about (e.g. Kimball & Wills, 2006). For example, if you ask people whether they prefer to be an unsatisfied Socrates or a satisfied Fool, most would say they prefer to be an unsatisfied Socrates. Critics argue that this preference is not a mistake and is evidence that people do not always maximize happiness. We agree with the critics that this preference may not be a mistake, but we disagree that it violates happiness maximization.

Let us explain. First, to say that Socrates is unsatisfied and The Fool is satisfied implies single evaluation, but to ask people whether they prefer to be an unsatisfied Socrates or a satisfied Fool imposes joint evaluation. It is possible that without direct comparison (i.e., in single evaluation) Socrates feels unsatisfied and The Fool feels satisfied (just as without direct comparison an American making $30,000 a year feels poor and a Haitian making $10,000 a year feels wealthy). But this does not mean that with direct comparison (i.e., in joint evaluation) Socrates will still feel less satisfied than The Fool (just as it does not mean that in direct comparison the American will still feel less wealthy than the Haitian). If we were to answer the Socrates/Fool

question, our answer would be, "If we didn't know of the existence of Socrates, we would be satisfied by being the satisfied Fool. But since you give us both options and make us aware of the existence of Socrates, it is impossible for us to be The Fool and remain satisfied. Therefore we would rather be an unsatisfied Socrates, because in comparison we would be happier by being Socrates."

Second, even in joint evaluation, it is possible that when asked to rate his happiness, Socrates still reports less happiness than The Fool. Is this evidence that people do not maximize happiness? We do not believe so. The problem is that most existing measurements of happiness capture only current and low-level happiness and overlook long-term and high-level happiness (Larsen & Frederickson, 1999; Loewenstein, 2008). Socrates may well experience a deeper sense of happiness—from understanding the meaning of life and from helping his people—than does The Fool, but this deep sense of happiness is not captured by the layperson's interpretation of the words *happy* or *satisfied*. Likewise, people may choose to watch tragedies rather than comedies or choose to be on diet rather than to indulge. These decisions are not violations of happiness maximization; instead, they are seeking deep-sense happiness and long-term happiness.

One challenge for hedonomic researchers is to develop more comprehensive and sensitive measurements of happiness that capture both short-term and long-term happiness and to measure both pleasure and deeper meanings of happiness. On this topic, positive psychologists have made significant progress (see Lyubomirsky, 2007; Seligman, Rashid, & Parks, 2006; Seligman, Steen, Park, & Peterson, 2005), but this research is still in its infancy.

Conclusion

As a complement to existing approaches to happiness, hedonomics seeks to enhance happiness by optimizing the relationship between external outcomes, choices, and experiences. Hedonomics challenges two commonly held assumptions: First, increasing desired external outcomes (such as wealth) approximates increasing happiness, and, second, the assumption that what people choose is what makes them happy. Correspondingly, it studies how external outcomes actually affect happiness and why and when decisions fail to maximize happiness. A better understanding of these topics will enable individuals to maximize their own happiness holding income and other objective material goods constant, companies to maximize their employees' happiness holding payroll constant, and governments to maximize their citizens' happiness holding gross national product constant.

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