

# CHOICE OVER TIME

*Edited by*

GEORGE LOEWENSTEIN AND JON ELSTER

1992  
RUSSELL SAGE FOUNDATION

NEW YORK

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## Utility from Memory and Anticipation

JON ELSTER AND GEORGE LOEWENSTEIN

**A**LTHOUGH not a central focus of economics, the idea that people derive pleasure and pain from other people's experiences is widely accepted by economists. Duesenberry's "relative income hypothesis,"<sup>1</sup> Leibenstein's "bandwagon, snob and Veblen effects,"<sup>2</sup> Robert Frank's work on the market for status,<sup>3</sup> and Roth's research on social comparison in experimental games<sup>4</sup> attest to the wide range of economic implications that stem from such second-order effects. What is less well recognized, although perhaps equally consequential for economics, is the idea that we derive utility not only from contemplating others' experiences, but also from contemplating our own at other times. As Bentham recognized early on,<sup>5</sup> much of the pleasure and pain we experience in daily life arises not from direct experi-

<sup>1</sup>J. Duesenberry. *Income, Saving, and the Theory of Consumer Behavior*. Cambridge, MA: Harvard University Press, 1952.

<sup>2</sup>*Beyond Economic Man: A New Foundation for Microeconomics*, Cambridge, MA: Harvard University Press, 1976.

<sup>3</sup>*Choosing the Right Pond*. New York: Oxford University Press, 1985.

<sup>4</sup>For a recent summary, see A. Roth, *Bargaining Experiments*, forthcoming in *Handbook of Experimental Economics*, 1991.

<sup>5</sup>Bentham included the pleasures and pains of memory, imagination, and expectation in his short list of sources of utility and disutility. See pp. 34-35, *The Principles of Morals and Legislation*. New York: Macmillan (1789), 1948.

ence—that is, “consumption”—but from contemplation of our own past or future or from a comparison of the present against the past or future. The fact that experiences are carried forward in time through memory enables them to affect welfare at later times. Similarly, an experience that is foreseen before it actually occurs can, through anticipation, affect welfare at earlier times. We refer to the effect on current utility of contemplating the past as a *backward effect*, and the effect of contemplating the future as a *forward effect*.

The impact of memory and anticipation on current utility lead to a type of triple counting of experience. A single event can influence utility first through anticipation, then through direct experience, and finally through memory. But the manner in which memory and anticipation influence current utility are qualitatively different.

Unlike the future, the past cannot be altered, so that its effect on the present is largely determined by prior decisions. Our current selves<sup>6</sup> are largely at the mercy of past selves, although we have some limited capacity to direct our thoughts toward or away from the past, and even to represent the past as we wish. But, if past selves have endowed us with an overly rich or lean stock of memories, there are limits to our capacity to cognitively amend them without lapsing into autism.<sup>7</sup> Our relationship to past selves is like that toward other people who care about us, but whose behavior we cannot influence. At the same time, however, our current self plays the role of past for future selves, so that, caring about how our present will be presented as memory to future selves, we may take actions in the present to alter the memories that the future has to draw upon.

Anticipation of the future has its own unique characteristics. Unlike the past, we *can* exert at least a weak influence on the future. Moreover, the future is inherently uncertain, so we have greater freedom to imagine it as we wish than is the case with memory. Our future selves are like children away at college. We can only minimally

<sup>6</sup>References here and later to successive selves do not imply a commitment to a weak concept of personal identity, as advocated for instance by D. Parfit, *Reasons and Persons*, Oxford University Press, 1984. We use the phrase merely as convenient shorthand for a person's experience at different times.

<sup>7</sup>As G. I. S. Shackleton wrote, “We have to distinguish between pure or free imagination, unfettered fantasy, on the one hand, and on the other, that kind of constrained imagination which we call expectation. There are, of course, pleasures to be had from mere daydreaming, but they are of a different sort from those of expectations” [Amsterdam: North Holland (1958): 41]. The degree to which we are able to delude ourselves is discussed in Elster's *Sour Grapes*, Cambridge: Cambridge University Press, 1983, and more specifically our ability to misrepresent our pasts to ourselves, is discussed in Cottle and Kleinberg, *The Present of Things Future*, New York: Free Press, 1974.

influence their behavior and can gain only a fuzzy and distorted image of their experiences; often that is all we desire.

We now proceed as follows. In the first section, we propose a general framework for the study of utility that arises from contemplation of the past and future. In the second section, we focus specifically on the effect of contemplating the past on current utility, drawing on Tversky's distinction between contrast effects and endowment effects.<sup>8</sup> In the third section, we discuss forward-looking effects generated by anticipation, drawing on Loewenstein's earlier work on “savoring” and “dread.”<sup>9</sup> We conclude, in the final section, by considering the impact of these effects on time discounting.

### The Structure of the Emotions<sup>10</sup>

What we shall call the *primary emotions* arise in our immediate encounters with the external world. Paradigm situations that arouse (positive) primary emotions include pleasing sights, sounds, and tastes; sexual stimulation; play and work that allow the use and development of one's powers and abilities; and social recognition and social approval. Negative emotions are, by and large, mirror images of the positive ones. These primary emotions have several properties. First, they derive from my experiences, not from those of other people. Second, they relate to my current experiences, not to my past or future ones. Third, they arise from my actual experiences, not from those I may have or could have had. These experiences, that are here, now, and mine, we call primary experiences. All other experiences we refer to as nonprimary. Many nonprimary experiences are, have been, or will be someone's primary experiences; however, this is not always the case. For example, counterfactual or subjunctive experiences (“If only I could fly . . .” may not ever, in fact, be experienced by anyone.

We call some emotions primary not because they necessarily form

<sup>8</sup>See notably, A. Tversky and D. Griffin, “Endowment and Contrast Effects in Judgments of Well-Being,” forthcoming in R. Zeckhauser (ed.), *Strategic Reflections on Human Behavior: Essays in Honor of Thomas C. Schelling*. The distinction was first aired by Tversky in the early 1980s. Later, we show that it was already present, in a more general form, in the work of Hume.

<sup>9</sup>G. Loewenstein, “Anticipation and the Valuation of Delayed Consumption,” *Economic Journal* 97 (1987): 667–684; see also, for some related ideas, J. Elster, “Weakness of Will and the Free-Rider Problem,” *Economics and Philosophy* 1 (1985): 231–265.

<sup>10</sup>This section draws on J. Elster, “Sadder but Wiser? Rationality and the Emotions,” *Social Science Information* 24 (1985): 375–406.

the most important sources of satisfaction or unhappiness. Parents sometimes derive more happiness from their children's pleasure than from anything they do or experience themselves. Some people are most happy when daydreaming or when reading novels. Rather, these emotions are primary in the purely logical sense of being presupposed by the higher-order emotions. When we have a daydream of being in state *X*, that state is almost never defined as one in which we are daydreaming about state *Y*; rather, it is defined as a state in which we do enjoyable things or enjoyable things happen to us. We can imagine a world in which all emotions were primary ones, but not a world in which there were emotional states without any primary emotions.

Nonprimary experiences enter into emotional life in two ways. On the one hand, we can derive utility from the past or future almost as if the secondary experiences were occurring in the present. Through memory, I may relive a positive or negative experience from my past.<sup>11</sup> Similarly, through anticipatory savoring, it is possible to derive utility from a future event even before it occurs. We shall refer to these as the backward and forward *consumption effect*. The consumption effect can also be applied to altruistic contemplation of other persons' experiences. I suffer when I see my child suffer, and likewise I derive pleasure from her pleasure.

The consumption effect has two defining properties. First, the emotion evoked by contemplation of the nonprimary experience tends to be of the same hedonic sign, and to vary directly in intensity, with the emotion that the experience evokes when and by whom it is experienced directly. Second, the impact of the nonprimary experience does not depend critically on one's current, primary, experiences. For example, to a first approximation, the pleasure we derive from our children's experience does not depend qualitatively on our own level of well-being.

On the other hand, higher-order experiences can change the context of primary experiences, providing new contrasts and conditions that make them more or less gratifying. We refer to this second impact of nonprimary experience on utility as the *contrast effect*.<sup>12</sup> When emerging from an illness, I enjoy my health more than I did before I fell ill. Contemplating other people's misery, I can better appreciate

<sup>11</sup>Cp. T. C. Schelling, "We consume past events that we can bring up from memory," in *Choice and Consequence*, Cambridge, MA: Harvard University Press, 1984, p. 344.

<sup>12</sup>As noted earlier, this term was coined by Tversky for the special case of temporal externalities. (His term for the consumption effect in this case was the *endowment effect*.)

my own well-being. My past experiences shape the upper and lower limits of my range of comparisons, which in turn influence the pleasure I get from any given event.<sup>13</sup> The experiences of other people can extend the range if we can say to ourselves, plausibly, "there but for the grace of God," or more generally, "it could have been me." Such counterfactual ideas can also arise without being attached to other, actual persons. Their impact depends on their plausibility and vividness.<sup>14</sup>

The identifying features of the contrast effect are first, a negative relationship between the emotional quality of the nonprimary experience and the emotion it evokes. The more perfect was the past, the more deficient appears the present; the grander our neighbor's house, the more inadequate seems our own. Second, the effect is interactive; we do not consume the nonprimary experiences directly; instead, they alter the satisfaction or dissatisfaction that we derive from our primary experiences. The same past or future experience can have a very different impact on utility via the contrast effect, depending on the nature of one's current situation.

There are second-order effects that do not neatly fit this dual classification. When we take pleasure in the well-deserved suffering of evil individuals,<sup>15</sup> the experience is due neither to the consumption effect (because the hedonic signs are opposed) nor to the contrast effect (because the experience is independent of our own current welfare). A similar comment applies to the pleasure we occasionally derive from our own past misery if we feel it was deserved. Often we derive pleasure from recalling events that were at the time miserable (e.g., an arduous mountain ascent), and not only because they cast the present in a more favorable light. Just as common are situations that are painful to recall even though they were pleasurable at the time.<sup>16</sup> Moreover, the relationship between nonprimary consumption and the present emotions it evokes is often complex. For example, we may applaud our office colleague's raise if our salary is superior, but

<sup>13</sup>See A. Parducci, "The Relativism of Absolute Judgments," *Scientific American* (December 1968): 84-90, and "Value Judgments: Toward a Relational Theory of Happiness," in J. R. Eiser (ed.), *Attitudinal Judgment*, New York: Springer-Verlag, 1984, pp. 3-21.

<sup>14</sup>For the laws of plausibility, see D. Kahneman and A. Tversky, "The Simulation Heuristic," in D. Kahneman, P. Slovic, and A. Tversky (eds.), *Judgment under Uncertainty*, Cambridge, UK: Cambridge University Press, 1982, pp. 201-208.

<sup>15</sup>Indeed, according to Just-World theory (M. J. Lerner, *The Belief in a Just World*, New York: Plenum, 1980), we tend to infer from the fact that people suffer that they must have done something to deserve it. Indirectly, then, the mere spectacle of suffering may provide the satisfaction of seeing justice done.

<sup>16</sup>This is particularly true when our tastes change, or our sense of propriety

lament (at least inwardly) the raise if it elevates the colleague's salary past the critical threshold defined by our own. Such a pattern suggests a transition from a dominant consumption effect to a dominant contrast effect that occurs at the point of equality.<sup>17</sup>

To our knowledge, the first writer to identify the dual effects of nonprimary experiences was Hume:

In general we may observe that in all kinds of comparison an object makes us always receive from another, to which it is compared, a sensation contrary to what arises from itself in its direct and immediate survey. A small object makes a greater one appear still greater. A great object makes a little one appear less. Deformity of itself produces uneasiness; but makes us receive new pleasure by its contrast with a beautiful object, whose beauty is augmented by it; as on the other hand, beauty, which of itself produces pleasure, makes us receive a new pain by contrast with any thing ugly, whose deformity it augments. The case, therefore, must be the same with happiness and misery. The direct survey of another's pleasure naturally gives us pleasure, and therefore produces pain when compared with our own. *His pain, consider'd in itself, is painful to us, but augments the idea of our own happiness and gives us pleasure*<sup>18</sup>

Hume may also have been the first to recognize the close analogy between interpersonal and intrapersonal (intertemporal) relationships:

Nor will it appear strange, that we may feel a reverse sensation from the happiness and misery of others; since we find the same comparison may give us a kind of malice against ourselves, and make us rejoice for our pains, and grieve for our pleasures. Thus the prospect of past pain is agreeable, when we are satisfied with our present condition; as on the other hand our past pleasures give us uneasiness, when we enjoy nothing at present equal to them. The comparison being the same, as when we reflect on the sentiments of others, must be attended with the same effects.<sup>19</sup>

<sup>17</sup>In a wide range of situations, people dislike any type of inequality between themselves and others; but they feel much more strongly about discrepancies that give the other party more than those that give them more. See G. Loewenstein, L. Thompson, and M. Bazerman. "Decision Making in Interpersonal Contexts," *Journal of Personality and Social Psychology* 57 (1989): 426-441.

<sup>18</sup>David Hume, *A Treatise on Human Nature*, Selby Bigge (ed.), Oxford, UK: Oxford University Press, 1960, pp. 375-376. The phrase we have italicized shows that Hume was clearly aware of the dual effect phenomenon.

<sup>19</sup>Hume, op. cit.

Aside from our own past and future experiences and those of other people, there are other nonprimary experiences that also operate via the consumption and contrast effects. Subjective and counterfactual experiences have a dual effect in the same way as do past and future experiences and those of other persons. They can serve both as a source of direct emotional arousal and as a reference point that shapes our reaction to primary experiences.

Consider first the subjunctive emotions, "If I were to . . .," where the dots could indicate getting a promotion, winning the state lottery, or receiving the Nobel prize for chemistry or some other desirable event that is largely independent of any action one could now take to bring it about. (It may, however, depend on actions one has undertaken in the past.) On the one hand, imagining the event occurring is inherently pleasant. On the other hand, by changing the reference point, it provides an unpleasant reminder of the current and less attractive situation.<sup>20</sup>

Counterfactual emotions, characteristically expressed in the phrase "If only . . .," are directed toward states that could have obtained, but did not; they encompass near disasters as well as near successes. Whereas subjunctive emotions turn on events outside the actor's control, counterfactual emotions can be directed both to what the actor could have done and to events that might have come about. The train of thought set in motion by the idea "If only I had asked her to marry me" differs from that of "If only she had agreed to marry me." The former is more poignant, both because it involves a less extensive rearrangement of the world and, hence, is more plausible, and because it tends to induce self-blame<sup>21</sup> that reinforces the negative feelings created by the contrast.

In sum, the consumption effect preserves the hedonic sign of the nonprimary experience: It is pleasant when arising out of a pleasant experience, painful when created by a painful one. In the contrast effect, the hedonic sign is reversed. When both effects operate, both

<sup>20</sup>Tversky and Griffin, op. cit., take the relevant contrast effect in such cases to be the disappointment suffered if the hoped-for event does not materialize, whereas we define it as a negative evaluation of one's current situation induced by the thought of a future, better state of affairs. Similarly they define the endowment effect in such cases as a good or bad feeling created by the lingering memory of past hopes or dreads, whereas we define the analogous consumption effect directly in terms of those hopes or dreads themselves. The memory of an anticipation, like the anticipation of regret, is a tertiary rather than a secondary emotion.

<sup>21</sup>See D.T. Miller and W. Turnbull, "The Counterfactual Fallacy: Confusing what Might Have Been with What Ought to Have Been," *Social Justice Research* 4 (1990): 1-16.

pleasure and pain will be provided. In general, the net effect is indeterminate, but with regard to specific types of experiences, we may be able to determine whether the consumption effect or the contrast effect dominates. Also, the strength of these effects may vary across individuals. People differ a great deal in the extent to which they enjoy reliving old love affairs, dread going to the dentist, suffer from the sufferings of their children, or compare themselves to other people. Thus, while it is possible to adduce some general principles concerning the impact of the two effects in different situations, it is impossible in any specific situation to predict how a particular person will be affected by secondary emotions.

### *The Role of the Past*

The issue of the net utility effect of past experiences preoccupied poets well before it came to the attention of psychologists. A famous verse by Tennyson could be read as asserting the dominance of the consumption effect: "'Tis better to have loved and lost than never to have loved at all."<sup>22</sup> Conversely, the following line from Donne may be understood as asserting the superior strength of the contrast effect: "'Tis better to be foul than to have been fair." Donne may plausibly be taken as saying that the sum of the two positive effects of beauty—the direct benefits of being beautiful and the consumption effect of having been beautiful—is smaller than the loss of utility caused by the contrast effect. *A fortiori*, then, the consumption effect taken by itself must be smaller than the contrast effect. A similar reading of Tennyson would interpret him as saying that the sum of the direct effect and the consumption effect of being in love exceeds the loss of utility caused by the contrast effect, from which nothing follows about the relationship between the contrast effect and the consumption effect taken by itself.

In this section we consider a variety of ways in which past experiences shape current welfare. In addition to the contrast effect and the consumption effect, we discuss the idea of learned discrimination, Stigler and Becker's idea of "consumption capital," Solomon's opponent-process theory, and Scitovsky's theory of pleasure and comfort.

The consumption effect and the contrast effect operate through consciousness. The moment an experience is forgotten, it is no longer

<sup>22</sup> An alternative interpretation is that the sum of primary pleasure from love experienced over time outweighs the primary pain experienced from the loss of that love.

a direct source of pleasure or pain. Similarly, the contrast effect requires, for its operation, that the past event remain present in consciousness to serve as a reference point for evaluating primary experiences. Presence in consciousness is only a necessary condition, however, for an event to be a reference point for current experiences. It must also be similar to them in some relevant respect: A superlatively good meal in a French restaurant may devalue later, more ordinary meals in French restaurants, but need have no impact on meals in Chinese restaurants.<sup>23</sup> Hence, framing and conscious or unconscious psychic manipulation come into play. To maximize happiness, "One should find ways to treat the positive experiences of the past as different from the present (to avoid a sense of letdown). By the same token, one should compare present conditions to worse conditions in the past (to enjoy the benefits of a positive contrast)."<sup>24</sup>

The memory of a good experience is a good memory. Yet, equally good experiences need not generate equally good memories. I may be indifferent now between spending \$15 on a bottle of good wine or on a movie, but get much more pleasure out of the memory of the movie than of the memory of the wine. Often, the act of seeing a movie is not merely perceived as getting 90 minutes worth of entertainment but also as adding to one's stock of movie experiences.

In addition to the consumption effect of memory, there is a "learning effect" by which the movie enhances the pleasure of seeing and remembering later movies or raises my general level of sophistication. This second effect is different from the consumption effect in that it need not be mediated by consciousness. I may remember nothing of a movie I saw 15 years ago, and in fact may not even recall having seen it, and yet it may have had a substantial and lasting impact on my ability to appreciate movies.

Or consider again the superlative French restaurant. When I have a meal later at a mediocre French restaurant, the contrast effect taken by itself reduces my happiness. The impact of the earlier meal could also, however, be mediated by its contribution to my capacity for discrimination—a capacity I may retain after the meal itself is forgotten. That improved capacity can enhance my enjoyment of later meals or reduce it. If a superlative meal is followed by a very poor one, the latter is devalued not only through the contrast effect, but also through a learning effect. It is only as a result of having a taste of the real thing that I fully understand how bad the poor imitation is. If it is followed by a meal that, while not superlative, is quite well

<sup>23</sup> Iversky and Griffin, *op. cit.*

<sup>24</sup> *Ibid.*

prepared, the learning effect may actually make me enjoy it more, whereas the contrast effect, as before, detracts from my enjoyment.<sup>25</sup>

The contrast effect is also related to, yet different from, a number of other mechanisms. The "opponent-process theory," for instance, suggests that positive experiences tend to generate negative ones and vice versa.<sup>26</sup> According to the opponent process theory, a physiological equilibrating mechanism within the body acts to neutralize pain and pleasure. When the source of pain or pleasure is terminated, the opponent process continues to operate for some period, creating the opposite hedonic experience. Thus, upon being told that she does not have the breast cancer she feared, a woman does not return to her normal emotional state but instead experiences intense euphoria. Conversely, interruption of a pleasurable sexual experience creates acute irritation, and it takes some time before one returns to an emotionally neutral state.

While superficially similar to the contrast effect, the opponent-process is a quite different phenomenon. The contrast effect results from the impact of a previous experience on a later, independently generated one. A superlative meal can devalue a later meal. The opponent-process effect arises when one experience generates another of the opposite hedonic sign. A superlative meal can leave a mild depression in its wake.<sup>27</sup> Also, the opponent-process effect is not mediated by conscious memory. It has been demonstrated in dogs no less than in human subjects, and there are indications that the opponent-process mechanism is subject to framing. The two effects differ, moreover, in that the opponent-process effect requires real stimuli: Memory is neither necessary nor sufficient. Thus, the following comment on the contrast effect would not apply to the opponent-process effect: "The ideal lower end-point might be a strong electric shock, unbearable but quickly over. The shock would

<sup>25</sup>Such learning has been described as building up "consumption capital" (see G. Stigler and G. Becker, "De gustibus non est disputandum," *American Economic Review* 67 (1977): 76-90), but this approach is too coarse-grained to be very useful. We need to understand not only why exposure to good music allows us to enjoy it more, but also why it causes us to hear music we used to like as painful rather than pleasant. If we are unavoidably exposed to a good deal of bad music, the net effect of the "consumption capital" may in fact be negative.

<sup>26</sup>See, notably, R. L. Solomon and J. Corbit, "An Opponent-Process Theory of Motivation," *Psychological Review* 81 (1974): 119-145, and R. L. Solomon, "The Opponent-Process Theory of Acquired Motivation: The Costs of Pleasure and the Benefits of Pain," *American Psychologist* 35 (1980): 691-712.

<sup>27</sup>Solomon mentions (*ibid.*, p. 694), as a perceptual analogy to the opponent-process effect, the fact that when a red light is turned off, an aftereffect of green is created. For the contrast effect, the analogy would rather be that a strongly red patch seen at an earlier time causes a patch of medium redness later to be seen as pink.

have to be readministered occasionally, whenever it dropped from the context or whenever its memory ceased to be dreadful."<sup>28</sup>

Another idea that bears a family resemblance to the contrast effect and the opponent-process effect can be traced back at least to Leibniz. Against Locke, Leibniz insisted that pain ("uneasiness") is not the opposite of pleasure, but that discomfort and small pains are integral to pleasure: "Je trouve que l'inquiétude est essentielle à la félicité des créatures, laquelle ne consiste jamais dans une parfaite possession qui les rendrait insensibles et comme stupides, mais dans un progrès continu et non interrompu vers de plus grands biens."<sup>29</sup> Pleasure is produced by the continual overcoming of the pain and discomfort attached to unsatisfied desires. More recently, Scitovsky has argued that "pleasure is the feeling associated with the relief of discomfort."<sup>30</sup> Although he refers to this principle at the Law of Hedonic Contrast, it differs from the contrast effect as we have defined it. Scitovsky sees pleasure as being produced by the cessation of pain, rather than being enhanced by the memory of pain or the observation of the pain of others. Also, he does not allow for the possibility that outstanding pleasures today may ruin later experiences by providing an unattainable benchmark.<sup>31</sup> The Leibniz-Scitovsky effect is similar to the opponent-process effect,<sup>32</sup> but the two frameworks are conceptually quite different. For instance, there is nothing in the opponent-process theory that corresponds to Scitovsky's idea that there is an optimal, that is, pleasure-maximizing, degree of novelty.

## The Role of the Future

The importance of anticipation as a source of pleasure and pain has long been recognized by economists<sup>33</sup> and has been documented in

<sup>28</sup>Parducci, "Value Judgments," p. 16.

<sup>29</sup>G. W. Leibniz, *Philosophische Schriften*, Gerhard Leibzig (ed.), 1875-1890, vol. V, p. 175; see also p. 152.

<sup>30</sup>T. Scitovsky, *The Joyless Economy*, London: Oxford University Press, 1976, p. 62.

<sup>31</sup>Kahneman and Varey, "Notes on the Psychology of Utility," in J. Elster and J. Roemer (eds.), *Interpersonal Comparisons of Wellbeing*, Cambridge, UK: Cambridge University Press, 1991, pp. 127-163.

<sup>32</sup>Scitovsky, *The Joyless Economy*, p. 129 ff. cites the opponent-process theory as closely related to his own.

<sup>33</sup>Jevons saw anticipation as the single most important source of utility, at least for the elite: "There is little doubt that, in minds of much intelligence and foresight, the greatest force of feeling and motive is what arises from the anticipation of the future" (1871, p. 40). Other prominent economists such as Marshall and Pareto also commented on the importance of anticipation as a source of utility; their views are discussed in the first chapter of this book.

diverse social science research. One study that followed the health records of men during 2 years when two factories were scheduled to close found that "the period of anticipation of unemployment was associated with the greatest reported illness" rather than the period of actual unemployment.<sup>34</sup> Another study, in which college students ranked the days of the week, observed that Sunday was ranked below Friday, even though classes were held on Friday. Apparently Sunday was marred by anticipation of the approaching week of classes.<sup>35</sup>

Like memory, anticipated experiences affect current utility through the consumption and contrast effects. Through the consumption effect we are able to, in effect, consume events before they occur through anticipation. As the philosopher Bain stated, "every actual delight casts before it a corresponding ideal." We define *savoring* as the process of deriving positive utility from anticipation of desirable events,<sup>36</sup> and *dread* as the emotional impact of contemplating future negative experiences. Savoring and dread act as multipliers of experience, causing individuals to experience the hedonic impact of future events repeatedly before they actually occur; as Shakespeare's Julius Caesar states, "cowards die many times before their deaths."

Although the exact determinants of savoring and dread are uncertain, some basic principles can be elucidated. As Jevons observed, the intensity of savoring or dread varies directly with the emotional intensity of the anticipated event. Also, savoring and dread become more intense as the event approaches in time:

An event which is to happen a year hence affects us on the average about as much one day as another; but an event of importance, which is to take place three days hence, will probably affect us on each of the intervening days more acutely than the last.<sup>37</sup>

The same properties also apply to memory.<sup>38</sup>

<sup>34</sup>S V Kasl, S Gore, and S Cobb, "The Experience of Losing a Job: Reported Changes in Health, Symptoms and Illness Behavior," *Psychosomatic Medicine* 37 (1975): 105-122.

<sup>35</sup>Saturday was the most preferred and Monday the least. M.L. Farber, "Time Perspective and Feeling Tone: A Study in the Perception of the Days," *Journal of Psychology* 35 (1953): 253-257.

<sup>36</sup>This term was suggested by Robert Abelson.

<sup>37</sup>P. 41, *Theory of Political Economy*. 1871.

<sup>38</sup>See, for example, G Ekman and U Lundberg, "Emotional Reaction to Past and Future Events as a Function of Temporal Distance," *Acta Psychologica* 835 (1971): 430-441.

But, even after allowing for the intensity of future feeling and time delay, future events differ in their capacity to evoke savoring and dread, and there are fluctuations over time in an individual's propensity to experience either emotion. First, it is difficult to savor an event in the future that does not appeal to us in the present. Contemplating a future dinner when we have just overeaten is repulsive, no matter how hungry we will be, and no matter how delicious the dinner will be when it is experienced. Savoring seems to depend mainly on the utility that we would *currently* derive from an anticipated event, rather than the utility that we expect to derive at the time. One reason why luxuries may be such a consistent source of anticipatory pleasure is that the taste for luxuries does not depend very much on transient appetites.

The question of whether we use our current or future tastes to evaluate delayed experiences also has a close analog in the interpersonal domain. Deriving pleasure or pain from another person's experiences, we can base our own feelings either on our own preferences or those of the other person. In the latter case—when we derive pleasure from how they feel—it is like basing savoring on our own future preferences. For example, we might enjoy knowing our daughter is happy at college, without considering the reasons for her happiness. Alternatively, we might apply our own tastes to her experiences, deriving pleasure if her happiness stems from success in school, but pain if her happiness results from a newfound discovery of the pleasures of hallucinogens.

Anticipated experiences also affect current well-being via the contrast effect, by serving as a point of comparison against which current consumption is measured. When the future is expected to be superior to the present, the comparison leads to a denigration of the present. Many social commentators have noted the frustration-engendering effect of expectations of improvement. Tocqueville commented that "evils which are patiently endured when they seem inevitable become intolerable once the idea of escape from them is suggested,"<sup>39</sup> while Gurr in his classic *Why Men Rebel* includes "the promise of new opportunities" among the antecedents of discontentment and rebellion.<sup>40</sup> Like the superior attainments of other people, expectations of personal improvement in the future can become a source of relative deprivation. According to the relative deprivation literature, moreover, people tend to choose as objects of comparison others who

<sup>39</sup>P. 214, *The Old Regime and The French Revolution*, J Bonner (trans.), New York: Harper and Bros., 1856.

<sup>40</sup>P. 14, *Why Men Rebel*, Princeton, NJ: Princeton University Press, 1970.

are similar to themselves. Who could be more similar than our own future selves?

Strangely, however, the contrast effect is completely eclipsed by the consumption effect when current consumption is higher than future consumption. Rarely does one derive satisfaction from comparing the opulence of the present to the poverty of the future. Perhaps any pleasurable contrast effect is squelched by recognition that opulence of the present will eventually form a negative contrast for the future. A similar distaste for downward comparison is observed in research on social comparison; people derive considerable pain when relevant others receive more, but little pleasure from comparing themselves to others who are disadvantaged.<sup>41</sup>

The consumption and contrast effects associated with anticipation are not mutually exclusive. One can derive pleasure from anticipating a scheduled date, but also experience frustration by comparing current loneliness against the bright prospect of companionship. Which effect dominates—that is, whether the scheduled date enhances or detracts from current utility—depends on the relevance of future experiences as a yardstick against which to compare the present, and on how vividly the future can be imagined.<sup>42</sup> Luxury goods such as fancy restaurant dinners or vacations provide considerable anticipatory pleasure without inducing a strong contrast effect because they tend to be vivid, but they are not relevant as referents for the present. Perhaps for the same reason, people do not direct their envy toward the superrich.<sup>43</sup>

When future improvements are expected to be prolonged, the contrast effect will be especially strong. The promise of a job following graduation, the termination of a long and boring journey, or release from prison<sup>44</sup> are all situations in which frustration is often intense

<sup>41</sup>See Messick and Sentsis, "Estimating Social and Nonsocial Utility Functions from Ordinal Data," *European Journal of Social Psychology* 15 (1989): 389–399; Loewenstein, Thompson, and Bazerman, *op. cit.*

<sup>42</sup>For a discussion of this issue, see D. Kahneman and D. T. Miller, "Norm Theory: Comparing Reality to its Alternatives," *Psychological Review* 93 (1986): 136–153.

<sup>43</sup>For discussion of this point see L. Festinger, "Social Comparison Theory," *Human Relations* 7 (1954): 117–140; L. Wheeler, "Motivation as a Determinant of Upward Comparison," *Journal of Experimental Social Psychology Supplement* 1 (1966): 27–31; and, more recently, J. Elster, "Envy in Social Life," working paper.

<sup>44</sup>Kurt Lewin claimed that prison breakouts tend to occur toward the end of prison sentences. If true, an obvious explanation would be that as the end of the sentence draws near, the contrast between current incarceration and impending freedom makes the former intolerable. In informal research on this question, the second author found a relatively flat distribution, even for long sentences. This is itself rather paradoxical, because it would appear to make sense to break out toward the beginning of a long

as one approaches relief. Grinker and Spiegel found that airmen in World War II adopted an attitude of fatalistic and bitter resignation that protected against anxiety. But "the protection . . . often breaks down when the individual comes to the end of his combat tour. . . . During the last few missions, hope of survival again becomes realistic, and at that point concern for his own fate again returns to the individual. Once he begins to hope and to care, he may suddenly develop intense anxiety."<sup>45</sup> The expectation of prolonged improvement in the future seems to engender dissatisfaction with one's current state, although this dissatisfaction is tempered by pleasure derived from savoring the future. Those who would discourage revolution might be advised either to quell expectations or, if that strategy is impractical, to make the expected improvements as vivid and, hence, savorable as possible.

Anticipation is similar to memory in that the consumption and contrast effects are operative. But there is a crucial difference between the backward and forward effects. Memory has as its object events that have already occurred, which are thus certainties. Anticipation focuses on events in the future that are by this fact inherently uncertain. The likelihood that the anticipated event will actually occur is an important determinant of the intensity of savoring and dread.

Stotland, in his book, *The Psychology of Hope*,<sup>46</sup> includes as a basic proposition: "The higher an organism's perceived probability of attaining a goal and the greater the importance of that goal, the greater will be the positive affect experienced by the organism." But the relationship between affect and probability is likely to be more complex.

At very low probability levels, below a threshold of conceivability, savoring and dread will be nil. Beyond this threshold, we would expect a sudden jump and then low marginal sensitivity over a wide range of probabilities beyond that point. Savoring and dread arise from mental imaging of delayed experiences, and it is difficult to incorporate probability into a mental image. One's image of a terrible car crash remains equally vivid if its probability of occurring is 10 percent or 50 percent; the delights of imagining a weekend date do not depend on the probability that one will be stood up. Of course,

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sentence. (Despite movie depictions of dramatic escapes, most breakouts occur from medium- or low-security institutions in which breaking out is a relatively simple matter.) Perhaps more interesting, and also consistent with the contrast effect, was the observation on the part of several wardens that breakouts often tend to occur following an unsuccessful bid for parole.

<sup>45</sup>From Stotland, *The Psychology of Hope*, San Francisco: Jossey-Bass, 1969, p. 35.

<sup>46</sup>*Ibid.*



one may spend more time imagining an event that is more likely to occur, but the opposite is also possible. A date that is certain requires little prior attention, but one that is uncertain requires fall-back planning, which is likely to maintain the focus of attention on the date itself.

The insensitivity of anticipatory emotions to probability can explain simultaneous purchase of lottery tickets and insurance. As lottery managers and marketers understand, people who buy lottery tickets are not simply purchasing a probability of getting rich, but are "buying a dream."<sup>47</sup> If the pleasurable of the dream depends little on the probability of winning, then it is efficient to buy a cheap ticket, which offers a very small chance of winning a very large amount of money, along with a large dose of savoring. Consistent with the notion that people are more focused on prize values than on probabilities, mass media advertisements for lottery tickets are approximately four times as likely to include information about payoffs than they are to include information on odds of winning.<sup>48</sup> Similarly, by purchasing insurance against low probability events, one can buy "peace of mind" at low cost—protection from dread that is out of proportion to the actual probability of the event occurring.

As the probability of the anticipated event rises still further, a curious reversal often occurs. Beyond a certain point, events are reframed; a 90 percent chance of a date with a love object becomes reframed as a 10 percent chance of being stood up. A 90 percent chance that one's cancer is malignant is transformed into a 10 percent chance of escape. Thus, paradoxically, people may experience anxiety when waiting for highly probable desirable events, and hope when waiting for highly probable undesirable events.

## Time Discounting

The notion that utility depends on memory and anticipation has numerous implications for behavior. These are of two types: implications for the timing and sequencing of experiences, and implications

<sup>47</sup>From M. Landau, *A Manual on Lotteries*, Ramat Gan, Israel: Masada Publishing, 1968. "In spite of the great unlikelihood of winning the desirable sum of money, an individual may still be willing to pay a relatively high price for a lottery ticket because of the satisfaction he is deriving from the thrill of anticipation and the illusion that he may succeed and become wealthy" (p. 36).

<sup>48</sup>C. T. Clotfelter and P. J. Cook, *Selling Hope: State Lotteries in America*, Cambridge, MA: Harvard University Press, 1989.

for the types of experiences selected at any one point in time. For example, the backward consumption effect should cause people to shift pleasurable experiences forward in time (to the present), so they can be enjoyed later through recollection, and it also should cause a shift toward pleasurable experiences that are more memorable.

There is a crucial difference between the implications of the backward and forward effects. When memory influences behavior via the consumption or contrast effect, one changes current behavior to alter the memories of future selves. The behavior is in the present and its impact on utility is in the future. When anticipation influences behavior, typically one modifies plans for the future or takes actions in the present that will affect the future in order to alter experiences anticipated by the present self. The behavior is in the future, and its impact on utility is in the present. Thus, the positioning of actor and beneficiary are reversed for memory and anticipation.

The implications of backward effects—those mediated by memory—depend on whether the consumption or contrast effect dominates. If the consumption effect dominates, then consuming more in the present contributes to future well-being.<sup>49</sup> There is a type of "trickle down" from present to future that can justify immediate indulgence. Suppose that at  $t = 1$ , one knows that in the ordinary course of events a certain pleasurable event will take place at  $t = 3$ , but that one has the option of (costlessly) moving it forward or backward 1 unit of time. A person who derives much utility from consuming the past might choose to move it up to  $t = 2$  so as to lengthen the period of pleasurable recollection. Consumption early in life provides a stock of memories that can be drawn upon for the duration of life; concentrating consumption early in life is efficient because it gives one ample time to "amortize" the investment in memories. The hyperrationalist might conjecture that the high level of risk taking and experience seeking of adolescents reflects an optimal early investment in memories.

The consumption effect also has implications for atemporal choice. Given two options, one might choose the option with smaller immediate utility if the expected stream of memory-utilities is sufficiently much greater. If people derive disproportionate pleasure from peak

<sup>49</sup>The contrast effect, as we said, is subject to framing. Although the problem of frame selection is poorly understood, one hypothesis is that people choose the frame that will make them best off. For obvious reasons, though, such choices can hardly be made consciously. Unconscious mechanisms are certainly conceivable, but existing evidence does not support the "hedonic framing" hypothesis. See R. Thaler and E. Johnson, "Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice," *Management Science* 36 (1990): 643–660.

experiences—for example, if one excellent dinner is recalled more pleasurable than two mediocre dinners—then one might opt for the former, even if the latter were more gratifying in the short run.

To what extent do people internalize (take account of) the backward consumption effect when making current consumption decisions? On the one hand, people do seem to invest in memories. Phrases like “we’ll remember this for the rest of our lives” ease the massive expenditures associated with huge weddings and expensive cruises, and help the participants to enjoy them rather than to focus on their shrunken savings. However, whether this is evidence of the consumption effect influencing behavior, or actually ex-post rationalization, is questionable. Similar rationalizations follow decisions that were obviously bad—for example, “well, it may have been crazy to go down into the canyon in midsummer, but it’s an experience we won’t forget.” If individuals ignore or underweight backward effects in planning current consumption, as some have argued,<sup>50</sup> then we have the intrapersonal equivalent of an interpersonal externality—a situation in which one self ignores the impact of his or her actions on future selves. Herrnstein, Loewenstein, Prelec, and Vaughan<sup>51</sup> refer to situations in which people ignore the indirect consequences of their own behavior for themselves as “internalities.”

Whether deliberate memory creation is even possible, is questionable. Many of the good things in life are characterized by surprise, spontaneity, serendipity, and lack of planning. Hence, the idea of novelty seeking for the purpose of memory creation borders on the paradoxical or self-defeating, as in the “be spontaneous!” paradox. To act in the present for the sake of (among other things) future memory streams could easily undermine the spontaneity and value of the immediate experience and devalue the stream of memories flowing from it. Reliving old loves can be wonderful, but memory investment by itself hardly justifies engaging in a love affair. People who go on vacation constantly on the lookout for the opportunity to take photographs that will remind them later of what a wonderful

<sup>50</sup>Richard Thaler (personal communication) argues that people do not adequately take account of the backward consumption effect and thus invest insufficiently in memorable experiences. From a myopic perspective, two pleasant restaurant dinners might be valued equally with one spectacular dinner; but the one spectacular dinner is much more likely to be remembered. Thaler’s argument is similar to Scitovsky’s notion that we tend to opt for comfort instead of pleasure, even though in the long run, pleasure provides greater satisfaction than comfort

<sup>51</sup>“Utility Maximization and Melioration: Internalities in Individual Choice,” working paper, Department of Social and Decision Sciences, Carnegie-Mellon University, 1990.

time they had, may not have much of a wonderful time.<sup>52</sup> Sometimes, to live in the future imperfect is not to live at all.

The backward contrast effect has the opposite consequence for behavior. If the contrast effect alone were operative, we would want to hold back on pleasure in the present to create a low referent against which the future will be evaluated. We speak of children who are “spoiled,” suggesting that too many possessions or too much attention at an early age can spoil a person’s later life. As Parducci commented, “If the best can come only rarely, it is better not to include it in the range of experience.”<sup>53</sup>

The backward contrast effect should induce a preference for sequences of experiences that improve over time. In such sequences the present is superior to almost any summary (e.g., mean, maximum) of the past. This prediction has received considerable empirical support. Survey respondents report that they would prefer wage profiles that increase yearly over flat or declining profiles of equal undiscounted value.<sup>54</sup> Others, asked to choose between different orderings of three weekend dinners, one crummy, one mediocre, and one fancy, overwhelmingly prefer to eat the crummy one first and the fancy one last.<sup>55</sup>

To summarize, if an experience is positive, we would like it to carry forward via the consumption effect rather than the contrast effect so as to enhance future well-being. If unpleasant, we should attempt to carry it forward via the contrast effect. We should engage in enjoyable behaviors that are memorable, but that do not create a standard against which future experiences are judged. And we should expose ourselves to painful experiences to lower our standards, as long as the memory of those experiences (the consumption effect) is not too painful.

When one turns to anticipation, the implications for behavior are more straightforward. If, as we have claimed earlier, the consumption effect swamps the contrast effect when the future is inferior to

<sup>52</sup>For a further discussion of these problems, see Chapter II of J. Elster, *Sour Grapes*, Cambridge, UK: Cambridge University Press, 1983.

<sup>53</sup>Parducci, op cit p 90.

<sup>54</sup>This research is reported in G. Loewenstein and N. Sicherman, “Do Workers Prefer Increasing Wage Profiles?” *Journal of Labor Economics* 9 (January 1991): 67–84. See, also, Chapter 15 from this volume, and C. K. Hsee and R. P. Abelson, “Velocity Relation: Satisfaction as a Function of the First Derivative of Outcome Over Time,” *Journal of Personality and Social Psychology* 60 (1991): 341–347.

<sup>55</sup>For a discussion of preferences for outcome sequences, see Loewenstein and Prelec, “Negative Time Preference,” *American Economic Review* 81 (1991): 347–352 and “Preference Over Outcome Sequences,” *Psychological Review*, 1992 (forthcoming).

the present, then there is a strong incentive to build improvement over time into one's plans. The preference for sequences that improve over time, discussed earlier, may be so robust because it is overdetermined. In Proust's *Swann's Way*, the narrator's desire to defer a good-night kiss illustrates the two motives for deferral: "So much did I love that goodnight kiss that I reached the stage of hoping it would come as late as possible, so as to prolong the time of respite during which Mamma would not have appeared." On the one hand, the narrator wants to be able to look forward to the goodnight kiss (a forward consumption effect). On the other hand, he doesn't want to be in a position in which the kiss has already occurred (a backward contrast effect).

The dominance of the consumption effect when the future is inferior to the present suggests that people will take measures to prevent such a state of affairs from arising. The so-called equity puzzle in finance—the almost pathological levels of risk aversion evident in the high return paid on risky stocks relative to safe bonds—may reflect a strong aversion to investments that would permit the future to be worse than the present.

Whether forward effects actually contribute to a preference for improvement, or rather to a desire for constancy over time, depends on the relative strength of the consumption and contrast effects. If the consumption effect dominates, people should prefer sequences that improve over time; if the contrast effect dominates, they should prefer constant sequences of utility. Once again, which effect dominates depends on the characteristics of the individual and on the nature of the experience. Again, for luxury goods or goods experienced over a short duration, the consumption effect should dominate the contrast effect. Consistent with this intuition, most respondents to a survey on timing decisions reported that they would prefer to defer a kiss from the movie star of their choice, at least by a few days, and would get a nonlethal electric shock over with immediately, if given the option.<sup>56</sup> Both of these choices are inconsistent with time discounting and can be explained by the operation of a forward consumption effect.

The many possible configurations of backward and forward consumption and contrast effects, when combined with even mundane exponential time preference, can lead to a wide range of overall patterns of discounting. For example, strong backward consumption effects could augment the preference for the present leading to disproportionate discounting of short delays. As Strotz and Ainslie have

<sup>56</sup>See Loewenstein, *op. cit.*, 1987.

demonstrated, such a discount function produces choice reversals characterized by impatience in the present with intentions of future farsightedness. But a more likely scenario is a choice reversal of a dramatically different "miserly" type that would result if backward contrast and forward consumption effects were dominant.<sup>57</sup> Such a pattern would give rise to a choice reversal in which a person, instead of indulging him- or herself, plans to consume an item in the near future, but repeatedly defers when the scheduled time for consumption arrives. Consider a simple example, involving only memory and anticipation. A person is planning how to distribute 1 unit of a consumption good over four time periods. The person's pure time preferences lead him or her to attach equal weight to each of the future periods. We assume for simplicity that his or her utility from current consumption is proportional to the amount consumed. The mental externalities are defined as follows: Current utility of one utile in the last period is  $\frac{1}{3}$ , whereas the current utility of one utile in the next period is  $\frac{1}{2}$ . It is then easy to show the following. At the beginning of period 1, the person plans to concentrate all his or her consumption in period 3. In period 2 this remains the preferred plan, but when period 3 comes, the person wants to concentrate it entirely in period 4. Misers and children who store away their Halloween candy until it goes stale exemplify such a pattern.

As a consequence of the hedonic effects discussed earlier, pure time preferences cannot immediately be read off observed behavior. A person who saves little for the future may do so despite a low rate of time discounting due to very strong backward externalities. Conversely, a person who saves much may have a high rate of time discounting, but very strong forward externalities. An analogous distinction arises in interpersonal contexts. A person may take account of the welfare of others on impersonal utilitarian grounds, or because he derives pleasure from their pleasure; *sympathy* is sometimes defined as the former, *empathy* as the latter.

And just as in the interpersonal case it is seemingly impossible to determine the relative importance of sympathy and empathy, the same is true in the intertemporal case. Perhaps there is no such thing as intertemporal sympathy. As Jevons seemed to believe, perhaps the only reason we defer consumption is because we derive immediate pleasure from savoring it. Or maybe "pure" discounting is effectively

<sup>57</sup>Prelec and Loewenstein, "Decision-Making Over Time and Under Uncertainty: A Common Approach," *Management Science*, 37 (1991): 770–786, argue that the backward contrast and forward endowment effects are likely to dominate the backward endowment and forward contrast effects in most situations

zero, as Ramsey advocated. Maybe if it weren't for the forward contrast effect that makes us, in effect, envy our future selves, we would not discount future satisfactions at all.

The reality is undoubtedly complex. People differ in the extent to which they derive utility from memory and anticipation and in the degree to which they compare the present to the past and future. A person can be myopic for a number of reasons: because the backward consumption effects dominate contrast effects, or forward contrast effects dominate consumption effects. Alternatively, myopia can arise if a person attaches little weight to his or her welfare in later periods, independently of any pleasure or pain derived from contemplating the past or future. Just as understanding interpersonal interactions requires an appreciation of utility interdependencies between persons, our understanding of time preference can be enhanced by an appreciation of the complex interdependencies between selves at different points in time.

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## Melioration

RICHARD J. HERRNSTEIN AND DRAZEN PRELEC

**E**CONOMIC theory assumes that people's choices are efficient, in the sense that they can be interpreted as flowing from constrained maximization of a well-defined objective function. However, a growing body of evidence from both human and animal choice experiments points to systematic departures from optimal choice, departures that typically do not diminish with prolonged exposure to the experimental situation. A common finding is that instead of equalizing the marginal returns per unit investment (e.g., in choice frequency, time, or money), subjects settle into stable choice patterns at which average returns are equalized.

We present a theory (*melioration*) that formalizes this pseudomaximizing search for higher average values. The choices predicted by melioration are reasonably efficient in some situations, markedly inefficient in others. An experiment is described in which the majority of subjects were induced to meliorate, even though this choice pattern *minimized* the rate of money earnings from the experiment. On a more speculative level, a variety of apparent suboptimalities in consumer behavior, such as underinvestment in skills and pathological addic-