Rational Actors or Rational Fools? Implications of the Affect Heuristic for Behavioral Economics

by

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Content Outline

Introduction

This paper introduces a theoretical framework that describes the importance of affect in guiding judgments and decisions. As used here, "affect" means the specific quality of "goodness" or "badness" (i) experienced as a feeling state (with or without consciousness) and (ii) demarcating a positive or negative quality of a stimulus. Affective responses occur rapidly and automatically — note how quickly you sense the feelings associated with the stimulus word "treasure" or the word "hate." We shall argue that reliance on such feelings can be characterized as "the affect heuristic." We will trace the development of the affect heuristic across a variety of research paths and discuss some of the important practical implications resulting from ways that this heuristic impacts our daily lives.

Background

Although affect has long played a key role in many behavioral theories, it has not generally been recognized as an important component of human judgment and decision making. Perhaps befitting its rationalistic origins, the main focus of descriptive decision research has been cognitive, rather than affective. When principles of utility maximization appeared to be descriptively inadequate, Simon (1956) oriented the field toward problem solving and information-processing models based upon bounded rationality. The work of Tversky and Kahneman (1974; Kahneman, Slovic, & Tversky, 1982) demonstrated how boundedly rational individuals employ heuristics such as availability, representativeness, and anchoring and adjustment to make judgments and how they use simplified strategies such as "elimination by aspects" to make choices (Tversky, 1972). Other investigators elaborated the cognitive strategies underlying judgment and choice through models of constructed preferences (Slovic, 1995; Payne, Bettman, & Johnson, 1993), dominance structuring (Montgomery, 1983), and comparative advantages (Shafir, Osherson, & Smith, 1989). In 1993, the entire volume of the journal Cognition was dedicated to the topic, Reason-Based Choice, in which it was argued that "Decisions . . . are often reached by focusing on reasons that justify the selection of one option over another" (Shafir, Simonson, & Tversky, 1993, p. 34). Similarly, a state-of-the-art review by Busemeyer, Hastie, and Medin (1995) was titled "Decision Making from a Cognitive Perspective." In keeping with its title, it contained almost no references to the influence of affect on decisions.

Despite this cognitive emphasis, the importance of affect is being recognized increasingly by decision researchers. A limited role for affect was acknowledged by Shafir et al. (1993) who conceded that "People's choices may occasionally stem from affective judgments that preclude a thorough evaluation of the options" (p. 32, emphasis added).

A strong early proponent of the importance of affect in decision making was Zajonc (1980), who argued that affective reactions to stimuli are often the very first reactions, occurring automatically and subsequently guiding information processing and judgment. According to Zajonc, all perceptions contain some affect. "We do not just see 'a house': We see a handsome house, an ugly house, or a pretentious house" (p. 154). He later adds, "We sometimes delude ourselves that we proceed in a rational manner and weight all the pros and cons of the various alternatives. But this is probably seldom the actual case. Quite often 'I decided in favor of X' is no more than 'I liked X' . . . We buy the cars we 'like,' choose the jobs and houses we find 'attractive,' and then justify these choices by various reasons . . . " (p. 155).

Affect also plays a central role in what have come to be known as "dual-process theories" of thinking, knowing, and information processing. As Epstein (1994), has observed,

> There is no dearth of evidence in every day life that people apprehend reality in two fundamentally different ways, one variously labeled intuitive, automatic, natural, non-verbal, narrative, and experiential, and the other analytical, deliberative, verbal, and rational. (p. 710)

Table 1, adapted from Epstein, compares these two systems. One of the characteristics of the experiential system is its affective basis. Although analysis is certainly important in some decision-making circumstances, reliance on affect and emotion is a quicker, easier, and more efficient way to navigate in a complex, uncertain, and sometimes dangerous world. Many theorists have given affect a direct and primary role in motivating behavior. Epstein's (1994) view on this is as follows:

> The experiential system is assumed to be intimately associated with the experience of affect, . . . which refer[s] to subtle feelings of which people are often unaware. When a person responds to an emotionally significant event . . . the experiential system automatically searches its memory banks for related events, including their emotional accompaniments . . . If the activated feelings are pleasant, they motivate actions and thoughts anticipated to reproduce the feelings. If the feelings are unpleasant, they motivate actions and thoughts anticipated to avoid the feelings. (p. 716)

Also emphasizing the motivational role of affect, Mowrer (1960a, 1960b) conceptualized conditioned emotional responses to images as prospective gains and losses that directly "guide and control performance in a generally sensible adaptive manner" (1960a, p. 30). He criticized theorists who postulate purely cognitive variables such as expectancies (probabilities) intervening between stimulus and response, cautioning that we must be careful not to leave the organism at the choice point "lost in thought." Mowrer's solution was to view expectancies more dynamically (as conditioned emotions such as hopes and fears) serving as motivating states leading to action.

One of the most comprehensive and dramatic theoretical accounts of the role of affect in decision making is presented by the neurologist, Antonio Damasio (1994), in his book Descartes' Error: Emotion, Reason, and the Human Brain. Damasio's theory is derived from observations of patients with damage to the ventromedial frontal cortices of the brain that has left their basic intelligence, memory, and capacity for logical thought intact but has impaired their ability to "feel" — that is, to associate affective feelings and emotions with the anticipated consequences of their actions. Close observation of these patients combined with a number of experimental studies led Damasio to argue that this type of brain damage induces a form of sociopathy (Damasio, Tranel, & Damasio, 1990) that destroys the individual's ability to make rational decisions; that is, decisions that are in his or her best interests. Persons suffering this damage became socially dysfunctional even though they remain intellectually capable of analytical reasoning.

Commenting on one particularly significant case, Damasio observes:

> The instruments usually considered necessary and sufficient for rational behavior were intact in him. He had the requisite knowledge, attention, and memory; his language was flawless; he could perform calculations; he could tackle the logic of an abstract problem. There was only one significant accompaniment to his decision-

> making failure: a marked alteration of the ability to experience feelings. Flawed reason and impaired feelings stood out together as the consequences of a specific brain lesion, and this correlation suggested to me that feeling was an integral component of the machinery of reason. (p. XII)

In seeking to determine "what in the brain allows humans to behave rationally," Damasio argues that thought is made largely from images, broadly construed to include sounds, smells, real or imagined visual impressions, ideas, and words. A lifetime of learning leads these images to become "marked" by positive and negative feelings linked directly or indirectly to somatic or bodily states (Mowrer and other learning theorists would call this conditioning):

"In short, somatic markers are . . . feelings generated from secondary emotions. These emotions and feelings have been connected, by learning, to predicted future outcomes of certain scenarios" (Damasio, 1994, p. 174). When a negative somatic marker is linked to an image of a future outcome it sounds an alarm. When a positive marker is associated with the outcome image, it becomes a beacon of incentive. Damasio concludes that somatic markers increase the accuracy and efficiency of the decision process and their absence degrades decision performance.

Damasio tested the somatic marker hypothesis in a decision making experiment in which subjects gambled by selecting cards from any of four decks. Turning each card resulted in the gain or loss of a sum of money, as revealed on the back of the card when it was turned. Whereas normal subjects and patients with brain lesions outside the prefrontal sectors learned to avoid decks with attractive large payoffs but occasional catastrophic losses, patients with frontal lobe damage did not, thus losing a great deal of money. Although these patients responded normally to gains and losses when they occurred (as indicated by skin conductance responses immediately after an outcome was experienced) they did not seem to learn to anticipate future outcomes (e.g., they did not produce normal skin conductance responses when contemplating a future choice from a dangerous deck). In other words, they failed to show any proper anticipatory responses, even after numerous opportunities to learn them.

Despite the increasing popularity of affect in research programs and recent attempts to acknowledge the importance of the interplay between affect and cognition, further work is needed to specify the role of affect in judgment and decision making. The ideas and studies discussed next are intended as a step toward encouraging the development of theory about affect and decision making and demonstrating how such a theory can be tested.

The basic tenet of this paper is that images, marked by positive and negative affective feelings, guide judgment and decision making. Specifically, it is proposed that people use an affect heuristic to make judgments. That is, representations of objects and events in people's minds are tagged to varying degrees with affect. In the process of making a judgment or decision, people consult or refer to an "affect pool" containing all the positive and negative tags consciously or unconsciously associated with the representations. Just as imaginability, memorability, and similarity serve as cues for probability judgments (e.g., the availability and representativeness heuristics), affect may serve as a cue for many important judgments. Using an overall, readily available affective impression can be far easier — more efficient — than weighing the pros and cons or retrieving from memory many relevant examples, especially when the required judgment or decision is complex or mental resources are limited. This characterization of a mental short-cut leads to labeling the use of affect a "heuristic."

Empirical Evidence for the Affect Heuristic

Manipulating Preferences Experimentally

The fundamental nature and importance of affect has been demonstrated repeatedly in a remarkable series of studies by Robert Zajonc and his colleagues (see, e.g., Zajonc, 1968). The concept of stimulus exposure is central to all of these studies. The central finding is that, when objects are presented to an individual repeatedly, the "mere exposure" is capable of creating a positive attitude or preference for these objects.

In the typical study, stimuli such as nonsense phrases, or faces, or Chinese ideographs are presented to an individual with varying frequencies. In a later session, the individual judges these stimuli on liking, or familiarity, or both. The more frequent the prior exposure to a stimulus, the more positive the response. A meta-analysis by Bornstein (1989) of mere exposure research published between 1968 and 1987 included over 200 experiments examining the exposure-affect relationship. Unreinforced exposures were found to reliably enhance affect toward visual, auditory, gustatory, abstract, and social stimuli.

Winkielman, Zajonc, and Schwarz (1997) demonstrated the speed with which affect can influence judgments in studies employing a subliminal priming paradigm. Participants were "primed" through exposure to a smiling face, a frowning face, or a neutral polygon presented for 1/250 of a second, an interval so brief that there is no recognition or recall of the stimulus. Immediately following this exposure, an ideograph was presented for two seconds, following which the participant rated the ideograph on a scale of liking. Mean liking ratings were significantly higher for ideographs preceded by smiling faces. This effect was lasting. In a second session, ideographs were primed by the "other face," the one not associated with the stimulus in the first session. This second priming was ineffective because the effect of the first priming remained.

It is not just subliminal smiles that affect our judgment. La France and Hect (1995) found that students accused of academic misconduct who were pictured as smiling received less punishment than nonsmiling transgressors. Smiling persons were judged as more trustworthy, good, honest, genuine, obedient, blameless, sincere, and admirable than nonsmiling targets.

The perseverance of induced preferences was tested by Sherman, Kim, and Zajonc (1998) who asked participants to study Chinese characters and their English meanings. Half of the meanings were positive (e.g., beauty), half were negative (e.g., disease). Then participants were given a test of these meanings followed by a task in which they were given pairs of characters and were asked to choose the one they preferred. Participants preferred characters with positive meaning 70% of the time. Next, the characters were presented with neutral meanings (desk, linen) and subjects were told that these were the "true" meanings. The testing procedure was repeated and, despite learning the new meanings, the preferences remained the same. Characters that had been initially paired with positive meanings still tended to be preferred.

These various studies demonstrate that affect is a strong conditioner of preference, whether or not the cause of that affect is consciously perceived. They also demonstrate the independence of affect from cognition, indicating that there may be conditions of affective or emotional arousal that do not necessarily require cognitive appraisal. This affective mode of response, unburdened by cognition and hence much faster, has considerable adaptive value.

Heart and Mind in Conflict

A number of studies have attempted to demonstrate the interplay between affect and analysis in decision making. For example, Shiv and Fedorikhin (1999) asked respondents to memorize either a two-digit number (low cognitive demand) or a seven-digit number (high cognitive demand). They were then to walk to another room to report this number. On the way, they were offered a choice between two snacks, chocolate cake (more favorable affect, less favorable cognitions) or fruit salad (less favorable affect, more favorable cognitions). The researchers predicted that the condition with high-memory load (seven digits) would reduce the capacity for deliberation, thus increasing the likelihood that the more affectively favorable option (cake) would be selected. The prediction was confirmed. Chocolate cake was selected 63% of the time when the cognitive/memory load was high and only 41% of the time when memory load was low.

Evaluating Gambles

The affect heuristic can explain a finding that has intrigued and perplexed the first author of this paper since he first observed it in 1984. Amos Tversky and Paul Slovic were reexamining the early studies of Slovic and Lichtenstein (1968; Lichtenstein & Slovic, 1971, 1973), which pointed at compatibility between stimulus attributes and response scales as an explanation for preference reversals. Such reversals were exhibited when an individual chose Gamble A (with a high probability of winning a modest amount of money) over Gamble B (with a smaller probability of a larger payoff) but assigned a larger monetary value (buying price or selling price) to Gamble B. Presumably the reversal occurred because the gamble payoffs were given more weight in the pricing response mode than in choice, due to the compatibility between prices and payoffs, both of which were measured in dollars.

Tversky and Slovic decided to replicate the earlier reversal studies with three changes:

1. The complexity of the gamble was minimized by eliminating losses. Each gamble consisted merely of a stated probability of winning a given amount. There was no possible loss of money.

2. Following Goldstein (later Goldstein & Einhorn, 1987), who observed reversals with ratings and prices, we included ratings of a gamble's attractiveness along with choices and pricing as methods of eliciting preferences. The attractiveness scale ranged between 0 (not at all attractive) and 20 (very attractive).

3. To ensure the strategic equivalence of our three elicitation procedures, we devised a method for linking preferences to outcomes that was identical across all conditions. Subjects were told that a pair of bets would be selected and the bet that received the higher attractiveness rating (or the higher price, or that was preferred in the choice task) would be the bet they would play. Consequently, the preferences elicited by prices and ratings should not differ from each other or from the preferences elicited by direct choices. Some of the gambles were, in fact, actually played.

Using this design, Tversky and Slovic observed strong differences between response modes, leading to many preference reversals. Particularly striking was the difference between ratings and prices. Ratings produced an overwhelming dominance of high probability bets over high payoff bets (the bet with higher probability of winning had the higher attractiveness rating 80% to 90% of the time, but was assigned a higher price only 10% to 15% of the time. The mean evaluations of the following two bets were typical:

	Mean price	Mean rating (0 – 20 scale)
29/36 to win $2	$1.25	13.2
7/36 to win $9	$2.11	7.5

Seeking to explain these results in terms of compatibility, the experimenters linked the compatibility effect to the ease of mapping the stimulus component of a gamble onto the response scale. The easier it is to execute such a mapping, the greater the weight given the component. In principle, a gamble's payoff is more compatible with a price response than with a rating, because prices and payoffs are both expressed in dollars. Hence payoffs should get greater weight in pricing than in rating. The extremely high weight given probabilities when rating attractiveness may be explained by the fact that the probabilities are more readily coded as attractive or unattractive than are the payoffs. For example, 29 out of 36 chances to win are very attractive odds. On the other hand, a $9 payoff may be harder to map on a rating scale because it's attractiveness depends on what other payoffs are available.

According to this explanation, if a gamble's payoff was made more compatible with the attractiveness rating, this would presumably enhance the weight given to payoff in the rating response mode. Slovic and Tversky attempted to do this in a new experiment, focusing on the gamble 7/36 to win $9. To make the payoff more compatible with regard to the scale of attractiveness, they added a very small loss (5¢) to the gamble:

7/36 win $9

29/36 lose 5¢.

Whereas the attractiveness of $9 might not be readily apparent, Tversky and Slovic reasoned that a bet offering $9 to win and only 5¢ to lose should appear to have a very attractive payoff ratio. This led us to predict that one might increase the attractiveness of a gamble (p to win X) by adding a loss component to it.

The results exceeded expectations. The gamble with no loss had the lower attractiveness rating (mean = 9.4 on the 0 – 20 scale). Adding a 5¢ loss led to a much higher attractiveness rating (mean = 14.9). Even the bet

7/36 win $9

29/36 lose 25¢

was judged more attractive (mean = 11.7) than the bet with no loss.

Would adding a small loss to the gamble enhance its attractiveness in choice as it did in rating? Slovic recently addressed this question by asking 96 University of Oregon students to choose between playing a gamble, and receiving a gain of $2. For half of the students, the gamble was 7/36 win $9; for the others, the gamble had the 5¢ loss. Whereas only 33.3% chose the $9 gamble over the $2, 60.8% chose the ($9;-5¢) gamble over the $2. A replication study with $4 as the alternative to the gamble produced similar results. The enhancement produced by adding a small loss thus holds for choices as well as for rating responses.

The enhanced attractiveness produced by small losses was originally predicted and explained in terms of compatibility, but it can also be seen as an example of the affect heuristic.

This broader perspective was induced, in part, by results obtained later by Mellers, Richards, and Birnbaum (1992), by Hsee (1995, 1996a, 1996b, 1998) and by subsequent studies of imagery, affect, and decision making. These convergent streams of research are described in the following sections.

Image, Affect, and Decision Making

The early anomalous findings with gambles were laid aside while other means of explaining preference reversals between ratings, choices, and pricing responses were developed (see Tversky, Slovic, & Kahneman, 1990). At the same time, Slovic and colleagues at Decision Research embarked on a research program designed to test whether introducing a hazardous facility into a region might stigmatize that region and cause people to avoid going there to recreate, retire, or do business. Believing self-report to be unreliable ("If they build it, will you not come?"), research on stigmatization was conducted through a number of empirical studies designed to examine the relationship between imagery, affect, and decision making. After conducting these studies, we learned that they fit closely with a large body of existing theory and research such as the work of Damasio, Mowrer, and Epstein, described earlier. They also fit with the imagery-based methods of "motivational research" that have been employed in advertising and marketing since the middle of the past century (e.g., Haire, 1950; Packard, 1957).

Several empirical studies have demonstrated a strong relationship between imagery, affect, and decision making. Many of these studies used a word-association technique. This method involves presenting subjects with a target stimulus, usually a word or very brief phrase and asking them to provide the first thought or image that comes to mind. The process is then repeated a number of times, say three to six, or until no further associations are generated. Following the elicitation of images, subjects are asked to rate each image they give on a scale ranging from very positive (e.g., +2) to very negative (e.g., -2), with a neutral point in the center. Scoring is done by summing or averaging the ratings to obtain an overall index.

This imagery method has been used successfully to measure the affective meanings that influence people's preferences for different cities and states (Slovic et al., 1991) as well as their support or opposition to technologies such as nuclear power (Peters & Slovic, 1996).

Table 2 illustrates the method in a task where one respondent was asked to give associations to each of two cities and, later, to rate each image affectively. The cities in this example show a clear affective preference for San Diego over Denver. Slovic et al. (1991) showed that summed image scores such as these were highly predictive of expressed preferences for living in or visiting cities. In one study, the image score predicted the location of actual vacations during the next 18 months.

Subsequent studies have found that negative imagery that has become associated with places (e.g., contaminated sites such as Love Canal, New York, or Seveso, Italy), products (e.g., British beef), or technologies (e.g., nuclear power, agricultural biotechnology) creates a form of stigmatization that can lead to avoidance and serious economic consequences (Flynn, Slovic, & Kunreuther, 2001). Additional studies have found affect-laden imagery elicited by word associations to be predictive of preferences for investing in new companies on the stock market (MacGregor, Slovic, Dreman, & Berry, 2000) and predictive of adolescents' decisions to take part in health-threatening and health-enhancing behaviors such as smoking and exercise (Benthin et al., 1995).

Evaluability

The research on imagery points to the importance of affective impressions in judgments and decisions. However, the impressions themselves may vary not only in their valence but in the precision with which they are held. It turns out that the precision of an affective impression substantially impacts judgments.

We shall refer to the distributional qualities of affective impressions and responses as "affective mappings." Consider, for example, some questions posed by Mellers et al. (1992): "How much would you like a potential roommate if all you knew about her was that she was said to be intelligent?" Or, "Suppose, instead, all you knew about her was that she was said to be obnoxious?" Intelligence is a favorable trait but it is not very diagnostic (e.g., meaningful) for likeableness, hence its affective map is rather diffuse. In contrast, obnoxiousness will likely produce a more precise and more negative impression.

How much would you like a roommate said to be both intelligent and obnoxious? Anderson (1981) has shown that the integration of multiple pieces of information into an impression of this sort can be described well by a weighted average model where separate weights are given to intelligence and obnoxiousness, respectively. Mellers et al. (1992) further showed that the weights in such integrative tasks are inversely proportional to the variance of the impressions. Thus we would expect the impression produced by the combination of these two traits to be closer to the impression formed by obnoxiousness alone, reflecting greater weight given to obnoxiousness due to its smaller variance (more precise affective mapping). The meaning of a stimulus image appears to be reflected in the precision of the affective feelings associated with that image. More precise affective impressions reflect more precise meanings and carry more weight in impression formation, judgment, and decision making.

Hsee (1996a, 1996b, 1998) has developed the notion of evaluability to describe the interplay between the precision of an affective impression and its meaning or importance for judgment and decision making. Evaluability is illustrated by an experiment in which Hsee asked people to assume they were music majors looking for a used music dictionary. In a joint-evaluation condition, participants were shown two dictionaries, A and B (see Table 3), and asked how much they would be willing to pay for each. Willingness-to-pay was far higher for Dictionary B, presumably because of its greater number of entries. However, when one group of participants evaluated only A and another group evaluated only B, the mean willingness to pay was much higher for Dictionary A. Hsee explains this reversal by means of the evaluability principle. He argues that, without a direct comparison, the number of entries is hard to evaluate, because the evaluator does not have a precise notion of how good or how bad 10,000 (or 20,000) entries is. However, the defects attribute is evaluable in the sense that it translates easily into a precise good/bad response and thus it carries more weight in the independent evaluation. Most people find a defective dictionary unattractive and a like-new one attractive. Under joint evaluation, the buyer can see that B is far superior on the more important attribute, number of entries. Thus number of entries becomes evaluable through the comparison process.

According to the evaluability principle, the weight of a stimulus attribute in an evaluative judgment or choice is proportional to the ease or precision with which the value of that attribute (or a comparison on the attribute across alternatives) can be mapped into an affective impression. In other words, affect bestows meaning on information (cf., Osgood, Suci, & Tannenbaum, 1957; Mowrer, 1960a, 1960b) and the precision of the affective meaning influences our ability to use

information in judgment and decision making. Evaluability can thus be seen as an extension of the general relationship between the variance of an impression and its weight in an impression-formation task (Mellers et al., 1992).

Hsee's work on evaluability is noteworthy because it shows that even very important attributes may not be used by a judge or decision maker unless they can be translated precisely into an affective frame of reference. As described in the next section, Hsee finds evaluability effects even with familiar attributes such as the amount of ice cream in a cup (Hsee, 1998). Research also demonstrates similar evaluability effects with other "familiar" information such as amounts of money or numbers of human lives.

Proportion Dominance

In situations that involve uncertainty about whether or not a critical event will occur or that involve ambiguity about the value of some quantity of a good, there appears to be one information format that is highly evaluable, leading it to carry great weight in many judgment tasks. This is a representation characterizing an attribute as a proportion or percentage of something, or as a probability. At the suggestion of Chris Hsee (personal communication), We shall refer to the strong effects of this type of representation as "proportion dominance."

Proportion (or probability) dominance was evident in the studies of gambles described at the beginning of this chapter. Ratings of a gamble's attractiveness tend to be determined far more strongly by the probabilities of winning and losing than by the monetary payoffs. The curious finding that adding a small loss to a gamble increases its rated attractiveness, explained originally as a compatibility effect, can now be seen to fit well with the notions of affective mapping and evaluability.

According to this view, a probability maps relatively precisely onto the attractiveness scale because probability has a lower and upper bound (0 and 1) and a midpoint below which a probability is "poor" or "bad" (i.e., has worse than an even chance) and above which it is "good" (i.e., has a better than even chance). People know where a given value, such as 7/36, falls within the bounds, and have a good sense for what it means — "I'm probably not going to win." In contrast, the mapping of a dollar outcome (e.g., $9) onto the attractiveness scale is diffuse, reflecting a failure to know how good or bad or how attractive or unattractive $9 is. Thus, the impression formed by the gamble offering $9 to win with no losing payoff is dominated by the relatively precise and unattractive impression produced by the 7/36 probability of winning. However, adding a very small loss to the payoff dimension brings the $9 payoff into focus and thus gives it meaning. The combination of a possible $9 gain and a 5¢ loss is a very attractive win/loss ratio, leading to a relatively precise mapping onto the upper end of the response scale. Whereas the imprecise mapping of the $9 carries little weight in the averaging process, the more precise and now favorable impression of ($9; -5¢) carries more weight, thus leading to an increase in the overall favorability of the gamble.

The effect of adding a small loss to the gamble can also be explained by norm theory (Kahneman & Miller, 1986), which asserts that each gamble will be implicitly compared to different reference classes. Thus the gamble with no loss can be viewed as a relatively mediocre representative of the set of all positive gambles whereas the gamble with a small loss is a relatively attractive member of the class of mixed (win/loss) gambles. This explanation is not inconsistent with an affective account.

The $9;-5¢ experiment has a non-obvious link to two important phenomena in the behavioral literature: the value function of prospect theory (Kahneman & Tversky, 1979) and the asymmetric dominance effect (Huber, Payne, & Puto, 1982; Simonson & Tversky, 1992).

We have interpreted the $9;-5¢ effect as indicating that the meaning of $9 to our respondents was indeterminate — they did not know how good or how bad this payoff was until meaning was "switched on" by the addition of a small loss. If people do not know the "value" of small amounts of money without help from a "reference value" (e.g., -5¢), it should not be surprising that they don't have a precise understanding of their total wealth, even when they know its monetary value. But gains (good outcomes) and losses (bad outcomes) are clearly affective and highly evaluable. This is consistent with the value function of prospect theory (Kahneman & Tversky, 1979), which is defined over gains and losses around some reference point in order to explain a variety of decisions that cannot be accounted for by the traditional view of utility, defined over total wealth. In commenting on the fact that the carriers of value are changes in wealth or welfare, rather than final states, Kahneman and Tversky observe that "Our perceptual apparatus is attuned to the evaluation of changes or differences rather than to the evaluation of absolute magnitudes" (p. 277). Hsee's work on evaluability certainly echoes this view.

Asymmetric dominance refers to the finding that the tendency to choose option X over option Y can be strengthened by the addition of option Z, that is clearly inferior to X but not to Y (see Figure 1). Thus, Z makes X "look good," enhancing its attractiveness relative to Y, much like the 5¢ loss makes $9 "look good", enhancing the attractiveness of the gamble. We see, in these examples, how the affective meaning associated with objects can be altered quickly and fundamentally by changes in frame (seeing them as gains and losses) or by other subtle contextual factors linked to affect.

Proportion dominance surfaces in a powerful way in a very different context, the life-saving interventions studied by Fetherstonhaugh, Slovic, Johnson, and Friedrich (1997), Baron (1997), Jenni and Loewenstein (1997), and Friedrich et al. (1999). For example, Fetherstonhaugh et al. found that people's willingness to intervene to save a stated number of lives was determined more by the proportion of lives saved than by the actual number of lives that would be saved. However, when two or more interventions were directly compared, number of lives saved become more important than proportion saved. Thus, number of lives saved, standing alone, appears to be poorly evaluable, as was the case for number of entries in Hsee's music dictionaries. With a side-by-side comparison, the number of lives became clearly evaluable and important, as also happened with the number of dictionary entries.

Slovic (unpublished), drawing upon proportion dominance and the limited evaluability of numbers of lives, predicted (and found) that people, in a between-groups design, would more strongly support an airport-safety measure expected to save 98% of 150 lives at risk than a measure expected to save 150 lives. Saving 150 lives is diffusely good, hence only weakly evaluable, whereas saving 98% of something — is clearly very good because it is so close to the upper bound on the percentage scale, and hence is readily evaluable and highly weighted in the support judgment. Subsequent reduction of the percentage of 150 lives that would be saved to 95%, 90%, and 85% led to reduced support for the safety measure but each of these percentage conditions still garnered a higher mean level of support than did the save 150 lives condition (see Table 4).

Turning to a more mundane form of proportion dominance, Hsee (1998) found that an overfilled ice cream container with 7 oz. of ice cream was valued more highly (measured by

willingness to pay) than an underfilled container with 8 oz. of ice cream (see Figure 2). This "less is better effect" reversed itself when the options were juxtaposed and evaluated. Thus, the proportion of the serving cup that was filled appeared to be more evaluable (in separate judgments) than the absolute amount of ice cream.

These various forms of proportion dominance are certainly familiar to marketers, who typically advertise sales in terms of percentage savings rather than actual dollars saved. Similarly, consumers are more likely to drive 20 minutes to save $10 on a $25 calculator than to save $10 on a $125 calculator (Tversky & Kahneman, 1981), a proportion-based tendency that Thaler (1980) attributed to the psychophysics of prices.

Insensitivity to Probability

Outcomes are not always affectively as vague as the quantities of money, ice cream, and lives that were dominated by proportion in the above experiments. When consequences carry sharp and strong affective meaning, as is the case with a lottery jackpot or a cancer, the opposite phenomenon occurs — variation in probability often carries too little weight. As Loewenstein, Weber, Hsee, and Welch (2001) observe, one's images and feelings toward winning the lottery are likely to be similar whether the probability of winning is one in 10 million or one in 10,000. They further note that responses to uncertain situations appear to have an all or none characteristic that is sensitive to the possibility rather than the probability of strong positive or negative consequences, causing very small probabilities to carry great weight. This they argue, helps explain many paradoxical findings such as the simultaneous prevalence of gambling and the purchasing of insurance. It also explains why societal concerns about hazards such as nuclear power and exposure to extremely small amounts of toxic chemicals fail to recede in response to information about the very small probabilities of the feared consequences from such hazards. Support for these arguments comes from Rottenstreich and Hsee (2001) who show that, if the potential outcome of a gamble is emotionally powerful, its attractiveness or unattractiveness is relatively insensitive to changes in probability as great as from .99 to .01.

Mid-course Summary

We can now see that the puzzling finding of increased attractiveness for the gambles to which a loss was appended is part of a larger story that can be summarized as follows:

1. Affect, attached to images, influences judgments and decisions.

2. The evaluability of a stimulus image is reflected in the precision of the affective feelings associated with that image. More precise affective impressions reflect more precise meanings (i.e. greater evaluability) and carry more weight in impression formation, judgment, and decision making.

3. The anomalous findings from the experiments with gambles, ice cream preferences, and life-saving interventions, suggest that, without a context to give affective perspective to quantities of dollars, ice cream, and lives, these quantities may convey little meaning. Amounts of anything, no matter how common or familiar or intrinsically important, may in some circumstances not be evaluable.

4. Probabilities or proportions, on the other hand, often are highly evaluable, reflecting the ease with which people recognize that a high probability of a desirable outcome is good and a low probability is bad. When the quantities or outcomes to which these probabilities apply are affectively pallid, probabilities carry much more weight in judgments and decisions. However, just

the opposite occurs when the outcomes have precise and strong affective meanings — variations in probability carry too little weight.

The Affect Heuristic in Judgments of Risk and Benefit

Another stream of research that, in conjunction with many of the findings reported above, led to the affect heuristic, had its origin in the early study of risk perception reported by Fischhoff, Slovic, Lichtenstein, Reid, and Coombs (1978). One of the findings in this study and numerous subsequent studies was that perceptions of risk and society's responses to risk were strongly linked to the degree to which a hazard evoked feelings of dread (see also Slovic, 1987). Thus activities associated with cancer are seen as riskier and more in need of regulation than activities associated with less dreaded forms of illness, injury, and death (e.g., accidents).

A second finding in the study by Fischhoff et al. has been even more instrumental in the study of the affect heuristic. This is the finding that judgments of risk and benefit are negatively correlated. For many hazards, the greater the perceived benefit, the lower the perceived risk and vice versa. Smoking, alcoholic beverages, and food additives, for example, tend to be seen as very high in risk and relatively low in benefit, whereas vaccines, antibiotics, and X rays tend to be seen as high in benefit and relatively low in risk. This negative relationship is noteworthy because it occurs even when the nature of the gains or benefits from an activity is distinct, and qualitatively different from the nature of the risks. That the inverse relationship is constructed in people's minds is suggested by the fact that risk and benefits generally tend to be positively (if at all) correlated in the world (see Figure 3). Activities that bring great benefits may be high or low in risk but activities that are low in benefit are unlikely to be high in risk (if they were, they would be proscribed).

A study by Alhakami and Slovic (1994) found that the inverse relationship between perceived risk and perceived benefit of an activity (e.g., using pesticides) was linked to the strength of positive or negative affect associated with that activity. This result implies that people base their judgments of an activity or a technology not only on what they think about it but also on what they feel about it. If they like an activity, they are moved to judge the risks as low and the benefits as high; if they dislike it, they tend to judge the opposite-high risk and low benefit.

Alhakami and Slovic's (1994) findings suggested that use of the affect heuristic guides perceptions of risk and benefit as depicted in Figure 4. If so, providing information about risk should change the perception of benefit and vice-versa (see Figure 5). For example, information stating that risk was low for some technology should lead to more positive overall affect that would, in turn, increase perceived benefit. Indeed, Finucane, Alhakami, Slovic, and Johnson (2000) conducted this experiment, providing four different kinds of information designed to manipulate affect by increasing or decreasing perceived risk and increasing or decreasing perceived benefit. In each case there was no apparent logical relation between the information provided (e.g., information about risks) and the nonmanipulated variable (e.g., benefits). The predictions were confirmed. When the information that was provided changed either the perceived risk or the perceived benefit, an affectively congruent but inverse effect was observed on the non-manipulated attribute as depicted in Figure 5. These data support the theory that risk and benefit judgments are constructed, at least in part, by reference to some overall affective evaluation.

The affect heuristic also predicts that using time pressure to reduce the opportunity for analytic deliberation (and thereby allowing affective considerations freer rein), should enhance the inverse relationship between perceived benefits and risks. In a second study, Finucane et al. showed that the inverse relationship between perceived risks and benefits increased greatly under time

pressure, as predicted. These two experiments with judgments of benefits and risks are important because they support the contention by Zajonc (1980) that affect influences judgment directly and is not simply a response to a prior analytic evaluation.

Further support for the model in Figure 4 has come from two very different domains-toxicology and finance. Slovic, MacGregor, Malmfors, and Purchase (1999) surveyed members of the British Toxicological Society and found that these experts, too, produced the same inverse relation between their risk and benefit judgments. As expected, the strength of the inverse relation was found to be mediated by the toxicologists' affective reactions toward the hazard items being judged.

In the realm of finance, Ganzach (2001) found support for a model in which analysts base their judgments of risk and return for unfamiliar stocks upon a global attitude, much as in Figure 4. If stocks were perceived as good, they were judged to have high return and low risk, whereas if they were perceived as bad, they were judged to be low in return and high in risk. However, for familiar stocks, perceived risk and return were positively correlated, rather than being driven by a global attitude.

Judgments of Probability, Relative Frequency, and Risk

The affect heuristic has much in common with the model of "risk as feelings" proposed by Loewenstein et al. (2001) and with dual process theories put forth by Epstein (1994), Sloman (1996), and others. Recall that Epstein argues that individuals apprehend reality by two interactive, parallel processing systems. The rational system is a deliberative, analytical system that functions by way of established rules of logic and evidence (e.g., probability theory). The experiential system encodes reality in images, metaphors, and narratives to which affective feelings have become attached.

To demonstrate the influence of the experiential system, Denes-Raj and Epstein (1994) showed that, when offered a chance to win a prize by drawing a red jelly bean from an urn, subjects often elected to draw from a bowl containing a greater absolute number, but a smaller proportion, of red beans (e.g., 7 in 100) than from a bowl with fewer red beans but a better probability of winning (e.g., 1 in 10). For these individuals, images of 7 winning beans in the large bowl appeared to dominate the image of 1 winning bean in the small bowl.

We can characterize Epstein's subjects as following a mental strategy of "imaging the numerator" (i.e. the number of red beans) and neglecting the denominator (the number of beans in the bowl). Consistent with the affect heuristic, images of winning beans convey positive affect that motivates choice.

Although the jelly bean experiment may seem frivolous, imaging the numerator brings affect to bear on judgments in ways that can be both non-intuitive and consequential. Slovic, Monahan, and MacGregor (2000) demonstrated this in a series of studies in which experienced forensic psychologists and psychiatrists were asked to judge the likelihood that a mental patient would commit an act of violence within 6 months after being discharged from the hospital. An important finding was that clinicians who were given another expert's assessment of a patient's risk of violence framed in terms of relative frequency (e.g., of every 100 patients similar to Mr. Jones, 10 are estimated to commit an act of violence to others...") subsequently labeled Mr. Jones as more dangerous than did clinicians who were shown a statistically "equivalent" risk expressed as a

probability (e.g., “Patients similar to Mr. Jones are estimated to have a 10% chance of committing an act of violence to others”).

Not surprisingly, when clinicians were told that “20 out of every 100 patients similar to Mr. Jones are estimated to commit an act of violence,” 41% would refuse to discharge the patient. But when another group of clinicians was given the risk as “patients similar to Mr. Jones are estimated to have a 20% chance of committing an act of violence,” only 21% would refuse to discharge the patient. Unpublished follow-up studies showed that representations of risk in the form of individual probabilities of 10% or 20% led to relatively benign images of one person, unlikely to harm anyone, whereas the “equivalent” frequentistic representations created frightening images of violent patients (example: “Some guy going crazy and killing someone”). These affect-laden images likely induced greater perceptions of risk in response to the relative-frequency frames. Similar differences between reactions to relative frequencies and reactions to probabilities have been found by Yamagishi (1997), Siegrist (1997), and Koehler (in press).

Perhaps the biases in probability and frequency judgment that have been attributed to the availability heuristic may be due, at least in part, to affect. Availability may work not only through ease of recall or imaginability, but because remembered and imagined images come tagged with affect. For example, Lichtenstein, Slovic, Fischhoff, Layman, and Combs (1978) invoked availability to explain why judged frequencies of highly publicized causes of death (e.g., accidents, homicides, fires, tornadoes, and cancer) were relatively overestimated and underpublicized causes (e.g., diabetes, stroke, asthma, tuberculosis) were underestimated. The highly publicized causes appear to be more affectively charged, that is, more sensational, and this may account both for their prominence in the media and their relatively overestimated frequencies.

Further Evidence

The studies described above represent only a small fraction of the evidence that can be marshaled in support of the affect heuristic. Although we have developed the affect heuristic to explain findings from studies of judgment and decision making (e.g., the inverse relationship between perceived risks and benefits), one can find related proposals in the literature of marketing and social cognition. For example, Wright (1975) proposed the “affect-referral heuristic” as a mechanism by which the remembered affect associated with a product influences subsequent choice of that product (see also Pham, 1998).

Returning to the literature on judgment and decision making, Kahneman and colleagues have demonstrated that responses as diverse as willingness to pay for the provision of a public good (e.g., protection of an endangered species) or a punitive damage award in a personal injury lawsuit seem to be derived from attitudes based on emotion rather than on indicators of economic value (Kahneman & Ritov, 1994; Kahneman, Schkade, & Sunstein, 1998).

Hsee and Kunreuther (2000) have demonstrated that affect influences decisions about whether or not to purchase insurance. In one study, they found that people were willing to pay twice as much to insure a beloved antique clock (that no longer works and cannot be repaired) against loss in shipment to a new city than to insure a similar clock for which “one does not have any special feeling.” In the event of loss, the insurance paid $100 in both cases. Similarly, Hsee and Menon (1999) found that students were more willing to buy a warranty on a newly purchased used car if it was a beautiful convertible than if it was an ordinary looking station wagon, even if the expected repair expenses and cost of the warranty were held constant.

Loewenstein et al. (2001) provide a particularly thorough review and analysis of research that supports their "risk-as-feelings hypothesis," a concept that has much in common with the affect heuristic. They present evidence showing that emotional responses to risky situations, including feelings such as worry, fear, dread, or anxiety, often diverge from cognitive evaluations and have a different and sometimes greater impact on risk-taking behavior than do cognitive evaluations. Among the factors that appear to influence risk behaviors by acting on feelings rather than cognitions are background mood (e.g., Johnson & Tversky, 1983; Isen, 1993), the time interval between decisions and their outcomes (Loewenstein, 1987), and vividness (Hendrickx, Vlek, & Oppewal, 1989).

The Downside of Affect

Throughout this chapter we have made many claims for the affect heuristic, portraying it as the centerpiece of the experiential mode of thinking, the dominant mode of risk assessment and survival during the evolution of the human species. But, like other heuristics that provide efficient and generally adaptive responses but occasionally get us into trouble, reliance on affect can also mislead us. Indeed, if it was always optimal to follow our affective and experiential instincts, there would have been no need for the rational/analytic system of thinking to have evolved and become so prominent in human affairs.

There are two important ways that experiential thinking misguides us. One results from the deliberate manipulation of our affective reactions by those who wish to control our behaviors. The other results from the natural limitations of the experiential system and the existence of stimuli in our environment that are simply not amenable to valid affective representation. Both types of problems are discussed below.

Manipulation of Affect in Our Daily Lives

Given the importance of experiential thinking it is not surprising to see many efforts being made to manipulate affect in order to influence our judgments and decisions. For example, when Shiv and Fedorikhin (1999) demonstrated that reducing the availability of processing resources (by increasing memory load) led to greater reliance on affect, they advised marketers of affect-laden products to increase consumers' impulse buying by putting distracting displays or music into the shopping environment. Other examples can be seen in the answers to some everyday questions about the world of entertainment and the world of consumer marketing:

1. Why do entertainers often change their names?

Answer: To make them affectively more pleasing. One wonders whether the careers of John Denver, Sandra Dee, and Judy Garland would have been as successful had they performed under their real names — Henry Deutschendorf, Alexandra Zuck, and Frances Gumm. Students of onomastics, the science of names, have found that the intellectual products of persons with less attractive names are judged to be of lower quality (Harari & McDavid, 1973; Erwin & Calev, 1984) and some have even asserted that the affective quality of a presidential candidate's name influences the candidate's chances of being elected (Smith, 1997).

2. Why do movies have background music? After all, can't we understand the events we are watching and the dialog we are hearing without music?

Answer: Music conveys affect and thus enhances meaning even for common human interactions and events.

3. Why are all the models in the mail-order catalog smiling?

Answer: To link positive affect to the clothing they are selling.

4. Why do packages of food products carry all those little blurbs such as “new,” “natural,” “improved,” or 98% fat free?

Answer: These are “affective tags” that enhance the attractiveness of the product and increase the likelihood it will be purchased, much as adding “Save 98%” increased the attractiveness of saving 150 lives.

As noted earlier, marketers of consumer products have long been aware of the powerful influence of imagery and affect (Packard, 1957). Perhaps no corporate entities have more zealously exploited consumers’ affective sensitivities than the tobacco companies. A recent ad for Kool Natural Lights cigarettes, for example, uses the affective tag “natural” thirteen times in a single half-page advertisement. The attractive images of rugged cowboys and lush waterfalls associated with cigarette ads are known to all of us. Indeed, affective associations between cigarettes and positive images may begin forming in children as young as three years old (Fischer, 1991). As Epstein (1994) observes, “Cigarette advertising agencies and their clients are willing to bet millions of dollars in advertising costs that the ...appeal of their messages to the experiential system will prevail over the verbal message of the Surgeon General that smoking can endanger one’s life, an appeal directed at the rational system” (p. 712). Through the workings of the affect heuristic, as explicated by Finucane et al. (2000; Figure 5), we now have evidence suggesting that cigarette advertising designed to increase the positive affect associated with smoking will quite likely depress perceptions of risk.

Attempts at affective manipulation often work directly with language. Communicators desiring to change attitudes toward stigmatized technologies, for example, created “nukespeak” to extol the virtues of “clean bombs” and “peacekeeper missiles,” while promoters of nuclear power coined a new term for reactor accidents: “excursions.” Genetically modified food has been promoted as “enhanced” by proponents and condemned as “frankenfood” by opponents.

Manipulation of attitudes and behavior by persuasive argumentation is often quite effective, but at least it tends to be recognized as an attempt to persuade. Manipulation of affect is no less powerful but is made more insidious by often taking place without our awareness. It is unlikely that Hsee’s subjects recognized that what they were willing to pay for the used music dictionary was determined far more by the torn cover than by the more important dimension, number of entries.

Legal scholars such as Hanson and Kysar (1999a, 1999b), paying close attention to research on affect and other judgment heuristics, have begun to speak out on the massive manipulation of consumers by the packaging, marketing, and public relations practices of manufacturers. Such manipulation, they argue, renders ineffective three primary forms of legal control over dangerous products — warning requirements, product liability suits, and regulation of advertising. Hanson and Kysar (2001) point to the need for new regulatory strategies that would take into account the full liability of manufacturers who manipulate consumers into purchasing and using hazardous products.

Failures of the Experiential System

Judgments and decisions can be faulty not only because their affective components are manipulable, but also because they are subject to inherent biases of the experiential system. For example, the affective system seems designed to sensitize us to small changes in our environment

(e.g., the difference between 0 and 1 deaths) at the cost of making us less able to appreciate and respond appropriately to larger changes further away from zero (e.g., the difference between 570 deaths and 580 deaths). Fetherstonhaugh et al. (1997) referred to this insensitivity as "psychophysical numbing." Albert Szent-Gyorgi put it another way: "I am deeply moved if I see one man suffering and would risk my life for him. Then I talk impersonally about the possible pulverization of our big cities, with a hundred million dead. I am unable to multiply one man's suffering by a hundred million."

Similar problems arise when the outcomes that we must evaluate are visceral in nature. Visceral factors include drive states such as hunger, thirst, sexual desire, emotions, pain, and drug craving. They have direct, hedonic impacts that have a powerful effect on behavior. Although they produce strong feelings in the present moment, these feelings are difficult if not impossible to recall or anticipate in a veridical manner, a factor that plays a key role in the phenomenon of addiction (Loewenstein, 1999):

> Unlike currently experienced visceral factors, which have a disproportionate impact on behavior, delayed visceral factors tend to be ignored or severely underweighted in decision making. Today's pain, hunger, anger, etc. are palpable, but the same sensations anticipated in the future receive little weight. (p. 240)

Choices over time. Just as visceral factors are hard to anticipate and evaluate beyond the present moment, so is time. The experiential mode of thinking is designed to facilitate action in the present. It did not evolve to enable us to cope with the distant future. We might expect, therefore, that it would be difficult to process in a consistent manner the affect associated with outcomes that occur repeatedly over time, change slowly over time, or are remote in time. Indeed a large and important body of research indicates that this is the case (Loewenstein & Elster, 1992). Kahneman (2000), for example, finds that retrospective evaluations of affective episodes are strongly influenced by the affect experienced at singular moments, notably the moment at which affect was most extreme and the final moment. Such evaluations show little or no sensitivity to duration of affect. Thus, adding an extra period of diminishing discomfort to an unpleasant episode improves its remembered utility by reducing the unpleasantness of its ending (Kahneman, 1994; Schreiber & Kahneman, 2000).

Kida, Smith, & Maletta (1998) asked experienced business executives to evaluate ten firms (in two sets of five) with regard to their attractiveness as potential stock investments. Each firm was described by 10 numerical accounting measures, such as return on assets, market share, etc. One firm, B, clearly dominated the other four firms in its set, presumable creating strong positive affect. One hour later, the executives were given the second set of five firms to study, no one of which stood out. After another hour, the executives were asked to choose one firm from the combined set of ten, without having the data in front of them. Firm B was selected by 82% of the executives even though it was only third best in the combined set. This suggests that the positive affective memory trace for Firm B carried more weight than the memories of the numerical data.

Gilbert, Pinel, Wilson, Blumberg, and Wheatley (1998) observed what they called "durability bias," a tendency to overestimate the length of time that positive or negative affect would last after one experiences a pleasant or unpleasant future event.

Kunreuther, Onculer, and Slovic (1998) asked people to make choices and indicate the maximum they would be willing to pay for measures that would protect them from burglary (dead-bolt lock) or earthquake damage (bracing the foundation of one's house) over time periods ranging

between 1 and 10 years. Most individuals in the study did not take into account the added benefit of having a measure in place over a longer period of time when deciding whether to purchase protection or indicating the maximum price they were willing to pay.

Numerous studies have documented hyperbolic discounting, whereby individuals prefer the larger and later of two prizes when both are distant in time, but prefer the smaller, earlier one when both are near (see Ainslie chapter, this volume). These results are inconsistent with the discounted utility model widely used by economists. Ainslie and Haslem (1992) refer to such temporary preferences for poorer, earlier alternatives when they are immediately available as "a paradigm for self defeating behavior." Such behavior seems to reflect a psychophysical function for time, akin to the functions that apply to our perceptions of brightness, loudness, money, and lives. That is, the one-day difference between today and tomorrow looms much larger than the difference between one year from now and one year and a day from now (Gibbon, 1977).

Implied discount rates appear remarkably sensitive to contextual factors, leading Frederick, Loewenstein, and O'Donoghue (2002) to question whether there is any unitary construct of time preference underlying all intertemporal choices. Indeed it appears likely that time preference is best viewed as a composite of basic cognitive and affective processes mediated by a variety of situational influences.

A very different effect of time horizon has been observed in studies asking investors to estimate the future performance of their stock portfolios over varying time periods. During the exceptional bull market of 1998, U.S. investors were extremely optimistic regarding the coming 12-month period, expecting an annual return of about 14% (Dreman, Johnson, MacGregor, & Slovic, 2001). When asked to forecast their average annual return over the next 10 years, the estimates were even more optimistic, averaging 17.4%. Asking for forecasts adjusted for inflation did not diminish this discrepancy. Numerous other surveys conducted prior to September 11, 2001 show the same antiregressive tendency for already extreme short-term forecasts to become even more extreme for the long term.

The representativeness heuristic, whereby forecasts are made to be similar to or representative of recent data (Kahneman & Tversky, 1972), may explain why 10-year forecasts did not regress to the long-term base rate of 10%-11% for U.S. stocks. However, it cannot explain why the 10-year forecasts actually exceeded the extremely favorable one-year returns that were projected.

Dreman et al. (2001) suggest that this great optimism towards long-term returns might be explained by the affect heuristic coupled with a concept that Trope has called "temporal construal" (Trope & Liberman, 2000, 2001). When a person forecasts rate of return on investments, the time frame is likely to determine the representational imagery associated with that investment. According to Trope and colleagues, the greater the temporal distance, the more likely events are to be represented in terms of a few abstract or general features that convey the perceived essence of the event under consideration. Events nearer in time are likely to be represented in terms of more concrete and specific details. Trope and Lieberman (2001) offer a visual analogy: "From a distant perspective we see the forest, but from a proximal perspective, we see trees." (p. 23).

In the case of investments, the optimism underlying the near-term (one-year) forecasts in 1998 may have been tempered by awareness of some of the specific uncertainties and problems for that period. The Russian default and the enormous indebtedness of Long Term Capital, which

together threatened a financial debacle, presented a real threat of a worldwide financial crisis. In addition, many conservative investors believed that the Internet tech bubble might soon burst.

The imagery associated with the 10-year forecasts is unlikely to be burdened by these specific "local" details. Instead, global phenomena such as "baby boomers investing heavily for retirement," or general feelings of optimism are likely to dominate the affect pool that is salient for the long-term projections. To the extent that these general representations are positive (obviously they do not have to be), they will produce more favorable forecasts than those made for the near term. In their studies of temporal construal, Trope and colleagues have produced considerable experimental evidence documenting the differential nature of short-term and long-term representations.

The decision to smoke cigarettes. Cigarette smoking is a dangerous activity that takes place, one cigarette at a time, often over many years and hundreds of thousands of episodes. The questionable rationality of smoking decisions provides a dramatic example of the difficulty that experiential thinking faces in dealing with outcomes that change very slowly over time, are remote in time, and are visceral in nature.

For many years, beginning smokers were portrayed as "young economists," rationally weighing the risks of smoking against the benefits when deciding whether to initiate that activity (e.g., Viscusi, 1992). However, recent research paints a different picture. This new account (Slovic, 2001) shows young smokers acting experientially in the sense of giving little or no conscious thought to risks or to the amount of smoking they will be doing. Instead, they are driven by the affective impulses of the moment, enjoying smoking as something new and exciting, a way to have fun with their friends. Even after becoming "regulars," the great majority of smokers expect to stop soon, regardless of how long they have been smoking, how many cigarettes they currently smoke per day, or how many previous unsuccessful attempts they have experienced. Only a fraction actually quit, despite many attempts. The problem is nicotine addiction, a visceral condition that young smokers recognize by name as a consequence of smoking but do not understand experientially until they are caught in its grip.

The process of becoming addicted appears to begin surprisingly soon after one begins to smoke. Recent research indicates that adolescents begin to show signs of nicotine dependence within days to weeks of the onset of occasional tobacco use (DiFranza et al., 2000). As noted above, Loewenstein (1999) explains the process of addiction as being governed by immensely powerful visceral factors or cravings that, from an experiential perspective, are very hard to anticipate and appreciate.

The failure of the experiential system to protect many young people from the lure of smoking is nowhere more evident than in the responses to a survey question that asked smokers: "If you had it to do all over again, would you start smoking?" More than 85% of adult smokers and about 80% of young smokers (ages 14-22) answered "no" (Slovic, 2001). Moreover, the more individuals perceive themselves to be addicted, the more often they have tried to quit, the longer they have been smoking, and the more cigarettes they are currently smoking per day, the more likely they are to answer "no" to this question.

We can now address a central question posed by Viscusi (1992): " . . . at the time when individuals initiate their smoking activity, do they understand the consequences of their actions and make rational decisions?" Visusi went on to define the appropriate test of rationality in terms of

"...whether individuals are incorporating the available information about smoking risks and are making sound decisions, given their own preferences..." (p. 11).

The data indicate that the answer to Viscusi's question is "no." Most beginning smokers lack the experience to appreciate how their future selves will perceive the risks from smoking or how they will value the tradeoff between health and the need to smoke. This is a strong repudiation of the model of informed rational choice. It fits well with the findings indicating that smokers give little conscious thought to risk when they begin to smoke. They appear to be lured into the behavior by the prospects of fun and excitement. Most begin to think of risk only after starting to smoke and gaining what to them is new information about health risks.

These findings underscore the distinction that behavioral decision theorists now make between decision utility and experience utility (Kahneman, 1994; Kahneman & Snell, 1992; Loewenstein & Schkade, 1999). Utility predicted or expected at the time of decision often differs greatly from the quality and intensity of the hedonic experience that actually occurs.

It is not surprising that the tobacco industry, which currently spends more than $8 billion annually in the United States on advertising and promotion (U.S. Federal Trade Commission, 2001), has also invested heavily in market research to guide these expenditures. Industry aims, methods, and findings in this area are described in dozens of formerly confidential, but now public, internal documents. These documents tell a story that is quite consistent with the account derived from academic research. They indicate that initiation of smoking typically takes place among children and adolescents whose decision-making capabilities are immature — weighing imagery, affect, emotion, and social relationships more than logic, reason, or analysis of risk. Advertising and marketing practices are designed for "creative exploitation" of these tendencies (Katzenstein Associates, 1977).

Conclusion: Are We Rational Actors or Rational Fools?

We hope that this rather selective and idiosyncratic tour through a mélange of experiments and conjectures has conveyed the sense of excitement many behavioral researchers now feel toward the role of affect in judgment and decision making. The affect heuristic appears at once both wondrous and frightening: wondrous in its speed, and subtlety, and sophistication, and its ability to "lubricate reason"; frightening in its dependency upon context and experience, allowing us to be led astray or manipulated — inadvertently or intentionally — silently and invisibly.

It is sobering to contemplate how elusive meaning is, due to its dependence upon affect. Thus the forms of meaning that we take for granted and upon which we justify immense effort and expense toward gathering and disseminating "meaningful" information, may be illusory. Thus, for example, we cannot assume that an intelligent person can understand the meaning of and properly act upon even the most basic of numbers such as amounts of money or numbers of human lives, not to mention more esoteric measures or statistics, unless these numbers are infused with affect.

Contemplating the workings of the affect heuristic helps us appreciate Damasio's (1994) contention that rationality is not only a product of the analytical mind, but of the experiential mind as well:

The strategies of human reason probably did not develop, in either evolution or any single individual, without the guiding force of the mechanisms of biological regulation, of which emotion and feeling are notable expressions. Moreover, even after reasoning strategies become established .

. . their effective deployment probably depends, to a considerable extent, on a continued ability to experience feelings. (p. xii)

Under the right conditions, the perception and integration of affective feelings, within the experiential system, appears close to the sophisticated maximization process postulated by economic theories since the days of Jeremy Bentham. These feelings form the neural and psychological substrate of utility. In this sense, the affect heuristic enables us to be rational actors in many important situations. But not in all situations. It works beautifully when our experience enables us to anticipate accurately how we will like the consequences of our decisions. It fails miserably when, as is the case with most cigarette smokers, the consequences turn out to be much different in character than were expected. In the latter circumstances, the rational actor becomes, to borrow the words of Amartya Sen (1977), the rational fool.

Postscript

Behavioral Economics and Classical Economics: Continuity or Discontinuity?

We have been struck by the many points of contact between the ideas expressed in this paper and the other chapters in this volume. The work by Hauser and colleagues, based upon the studies of Bechara and Damasio, is clearly consistent with the studies of experiential and analytic processes presented here, as is Gifford's analysis of emotions and language in choice and Shafir's discussion of constructed preferences and alternative selves. The affect heuristic certainly would make a good, general purpose addition to Gigerenzer's "adaptive toolbox" along with the specialized "fast and frugal" heuristics he describes.

Our analysis of the affect heuristic would seem to fit well within *picoeconomics*, the interaction of basic and motivational processes that Ainslie (1992) called upon to predict the multiple selves observable in studies of hyperbolic discounting and other phenomena (Elster, 1979; Schelling, 1984; Posner, 1997). Our portrait of cigarette smokers certainly illustrates such multiple selves,with preferences changing markedly over time.

The chapter by Posner, critiquing "behavioral law and economics," contains many arguments consistent with our thesis. In particular, Posner argues that emotionality may be a component of rationality and reasoning cannot be thought irrational merely because it leads to preferences that we would not have if we were not emotional beings. As we have argued, taking our cue from Damasio (1994), emotionality is actually essential for rationality.

Posner's chapter is replete with examples that fit well with our views. His lobster story is a striking illustration of the power of imagery and affect to change preferences. His observation that " . . . our instincts are easily fooled when confronted with conditions to which human beings have never had a chance to adapt biologically" explains why the young cigarette smoker is a "rational fool" — evolution did not prepare the experiential pathways of the human brain to protect us against hazards whose major damages occur decades after exposure. Similarly, we are struck by Posner's discussion of Darwinian politics, following Rubin (2002), to explain our inability to grasp the significance of probabilities and statistics, especially when they pertain to large numbers of deaths — note the congruence with our discussions of "psychophysical numbing" and the difficulties people have in thinking consistently about probabilities and relative frequencies. The peculiarity of criminal punishment that Posner describes ("a reduction in its probability cannot easily be offset by an increase in its severity") is a an important, non-laboratory example of the affect-based phenomenon we have called *proportion dominance*.

Posner chides behavioralists for "undertheorization," failure to provide a causal account of behavioral man and his decisional structure, and inability to do more than present a seemingly unrelated set of phenomena that elementary models of rational choice do not explain. He also criticizes behavioralists for their puzzling "lack of interest in, and indeed hostility to, evolutionary theory." We do not believe that these criticisms apply to the theoretical development we have presented here. Just as Posner argues that behavioralists have critiqued a "too-narrow conception of the rational-choice model," we believe that we have demonstrated that Posner has been critiquing a too-narrow conception of behavioral models.

Evidence of this "new behavioralism" pervades the papers presented at this symposium and indicates that there is indeed a continuity between behavioral and neoclassical economics.

During the course of the symposium the limitations of the concept of economic rationality have become evident. All behavior is, in some sense, rational, but it may lead us into actions that do not serve our best interests. Rather than debate the concept of rationality, we need to understand behavior and its implications for individual and societal welfare.

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Table 1. Two Modes of Thinking. Comparison of the Experiential and Rational Systems

Experiential system	Rational system
1. Holistic	1. Analytic
2. Affective: Pleasure-pain oriented	2. Logical: Reason oriented (what is sensible)
3. Associationistic connections	3. Logical connections
4. Behavior mediated by "vibes" from past experiences	4. Behavior mediated by conscious appraisal of events
5. Encodes reality in concrete images, metaphors, and narratives	5. Encodes reality in abstract symbols, words, and numbers
6. More rapid processing: Oriented toward immediate action	6. Slower processing: Oriented toward delayed action
7. Self-evidently valid: "experiencing is believing"	7. Requires justification via logic and evidence

Source: Adapted from Epstein (1994).

Table 2. Images, Ratings, and Summation Scores for One Respondent

Stimulus	Image number	Image		Image rating
SAN DIEGO	1	very nice		2
SAN DIEGO	2	good beaches		2
SAN DIEGO	3	zoo		2
SAN DIEGO	4	busy freeway		1
SAN DIEGO	5	easy to find way		1
SAN DIEGO	6	pretty town		2
			Sum =	10
DENVER	1	high		2
DENVER	2	crowded		0
DENVER	3	cool		2
DENVER	4	pretty		1
DENVER	5	busy airport		–2
DENVER	6	busy streets		–2
			Sum =	1

Note. Based on these summation scores, this person's predicted preference for a vacation site would be San Diego. Source: Slovic et al. (1991).

Table 3. Attributes of Two Dictionaries in Hsee's Study of Evaluability

	Year of publication	Number of entries	Any defects?
Dictionary A	1993	10,000	No, it's like new
Dictionary B	1993	20,000	Yes, the cover is torn; otherwise it's like new

Source: Adapted from Hsee (1998).

Table 4. Proportion Dominance and Airport Safety.

Saving a percentage of 150 lives receives higher support ratings than does saving 150 lives.

	Potential benefit				
	Save 150 lives	Save 98%	Save 95%	Save 90%	Save 85%
Mean support[a]	10.4	13.6	12.9	11.7	10.9
Median[a]	9.8	14.3	14.1	11.3	10.8
% of ratings ≥ 13	37	75	69	35	31

[a]Cell entries in these rows describe mean and median responses to the question: "How much would you support this proposed measure to purchase the new equipment?" (Critics argue that the money spent on this system could be better spent enhancing other aspects of airport safety). The response scale ranged from 0 (would not support at all) to 20 (very strong support). An overall ANOVA resulted in $F_{4,200} = 3.36$, $p = .01$. The save 98% and save 95% conditions were both significantly different from the save 150 lives condition at $p < .05$, Tukey HSD test.

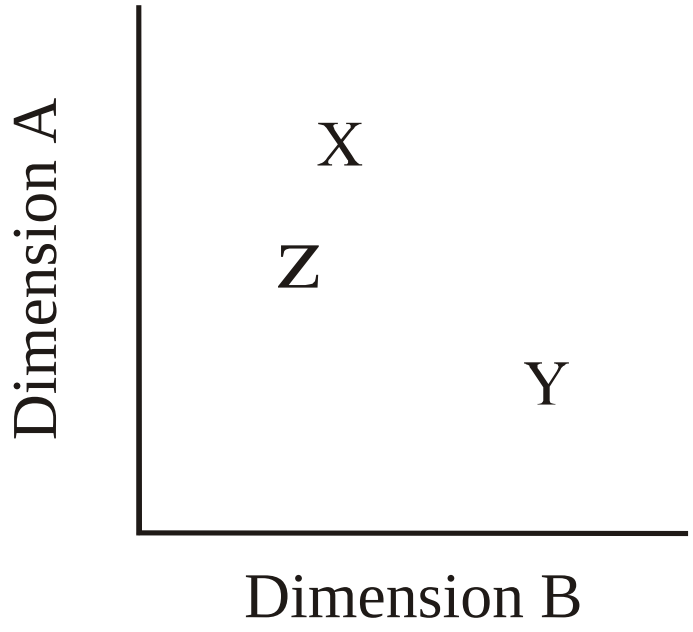

Figure 1. A schematic representation of asymmetric dominance. The tendency to choose X over Y can be increased by the addition of alternative Z. (Source: Shafir, Simonson, & Tversky, 1993).

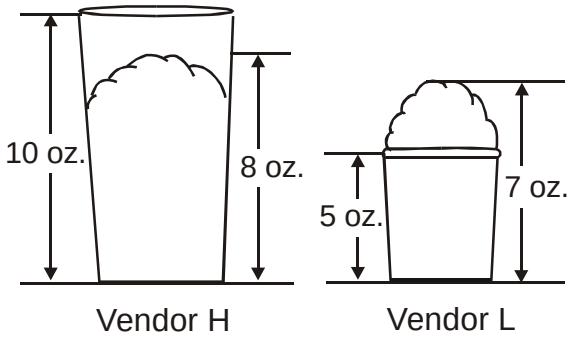

Figure 2. Stimuli in ice cream study by Hsee (1998). Participants were given the sizes of the cups and the amounts of ice cream.

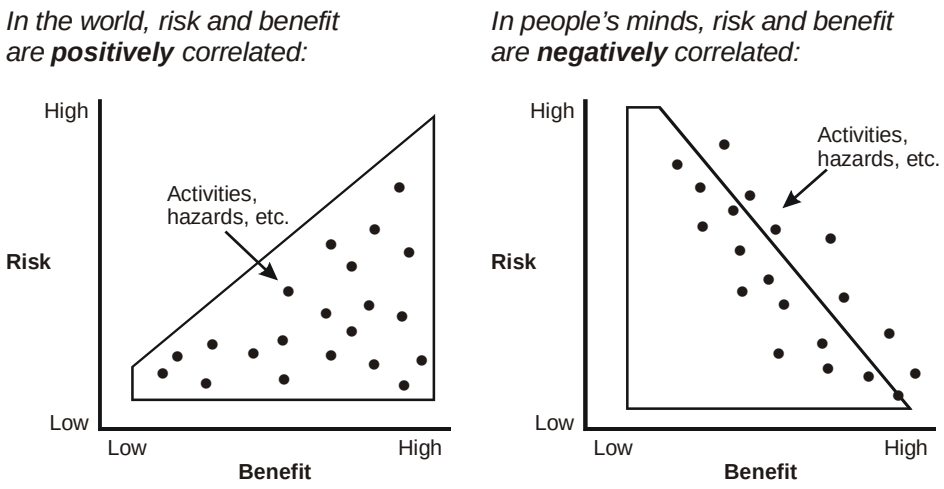

Figure 3. Risk and benefit relationships across hazards.

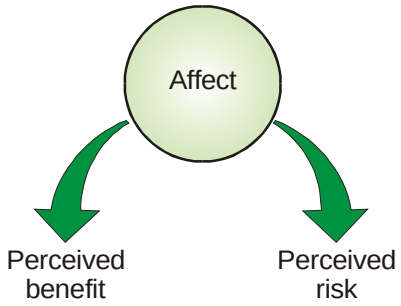

Figure 4. A model of the affect heuristic explaining the risk/benefit confounding observed by Alhakami and Slovic (1994). Judgments of risk and benefit are assumed to be derived by reference to an overall affective evaluation of the stimulus item. Source: Finucane et al. (2000).

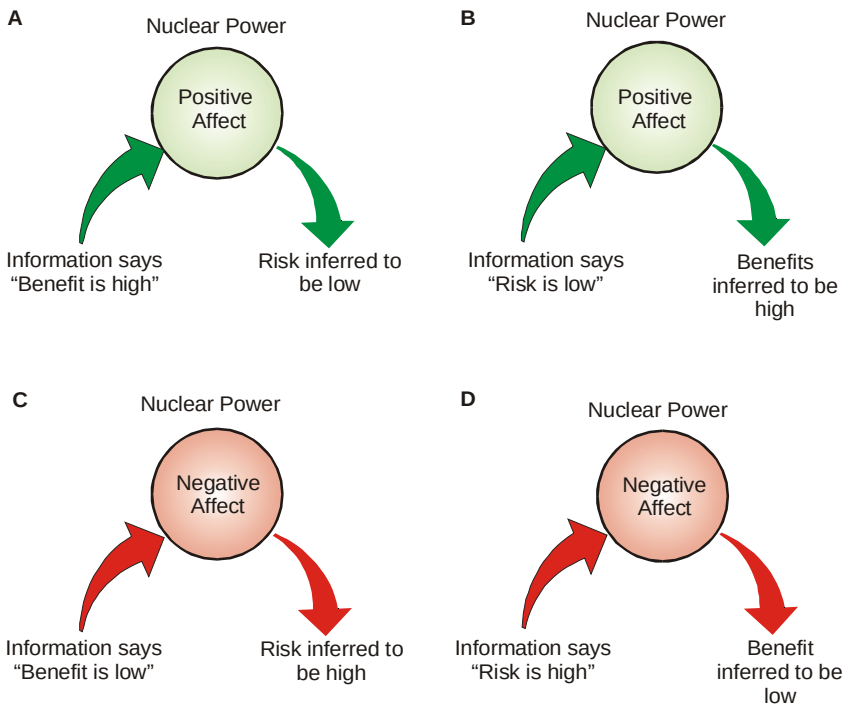

Figure 5. Model showing how information about benefit (A) or information about risk (B) could increase the overall affective evaluation of nuclear power and lead to inferences about risk and benefit that coincide affectively with the information given. Similarly, information could decrease the overall affective evaluation of nuclear power as in C and D. Source: Finucane et al. (2000).