Risk as Analysis and Risk as Feelings: Some Thoughts

about Affect, Reason, Risk, and Rationality

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Introduction

Risk in the modern world is confronted and dealt with in three fundamental ways. *Risk as feelings* refers to our fast, instinctive, and intuitive reactions to danger. *Risk as analysis* brings logic, reason, and scientific deliberation to bear on hazard management. When our ancient instincts and our modern scientific analyses clash, we become painfully aware of a third reality . . . *risk as politics*. In the present paper we shall examine what recent research in psychology and cognitive neuroscience tells us about this first dimension, "risk as feelings," an important vestige of our evolutionary journey.

That intuitive feelings are still the predominant method by which human beings evaluate risk is cleverly illustrated in a cartoon by Garry Trudeau (Figure 1). Trudeau's two characters decide whether to greet one another on a city street by employing a systematic analysis of the risks and risk-mitigating factors. We instantly recognize that no one in such a situation would ever be this analytical, even if their life was at stake. Most risk analysis is handled quickly and automatically by what we shall describe later as the "experiential" mode of thinking.

Background and Theory: The Importance of Affect

Although the visceral emotion of fear certainly plays a role in risk as feelings, we shall focus here on a "faint whisper of emotion" called *affect*. 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 argue that reliance on such feelings can be characterized as "the affect heuristic." In this paper, we trace the development of the affect heuristic across a variety of research paths followed by ourselves and many others. We also discuss some of the important practical implications resulting from ways that this heuristic impacts the way we perceive and evaluate risk, and, more generally, the way it effects all human decision making.

Two Modes of Thinking

Affect also plays a central role in what have come to be known as dual-process theories of thinking, knowing, and information processing. (Chaiken & Trope, 1999; Kahneman & Frederick, 2002; Sloman, 1996) As Epstein (1994) 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 I, adapted from Epstein, further compares these modes of thought. One of the main 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 (Barrett & Salovey, 2002; Clark & Fiske, 1982; Forgas, 2000; Le Doux, 1996; Mowrer, 1960; Tomkins, 1962, 1963; Zajonc, 1980). 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)

Whereas Epstein labeled the right side of Table I the “rational system,” we have renamed it the “analytic system,” in recognition that there are strong elements of rationality in both systems. It was the experiential system, after all, that enabled human beings to survive during their long period of evolution. Long before there was probability theory, risk assessment, and decision analysis, there were intuition, instinct, and gut feeling to tell us whether an animal was safe to approach or the water was safe to drink. As life became more complex and humans gained more control over their environment, analytic tools were invented to “boost” the rationality of our experiential thinking. Subsequently, analytic thinking was placed on a pedestal and portrayed as the epitome of rationality. Affect and emotions were seen as interfering with reason.

The importance of affect is being recognized increasingly by decision researchers. 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. If Zajonc is correct, then affective reactions may serve as orienting mechanisms, helping us navigate quickly and efficiently through a complex, uncertain, and sometimes dangerous world. Important work on affect and decision making has also been done by Isen (1993), Janis and Mann (1977), Johnson and Tversky (1983), Kahneman, Schkade, and Sunstein (1998), Kahneman and Snell (1990), Loewenstein (1996), Loewenstein, Weber, Hsee, and Welch (2001), Mellers (2000), Mellers, Schwartz, Ho, and Ritov (1997), Rottenstreich and Hsee (2001), Rozin, Haidt, and McCauley (1993), Schwarz and Clore (1988), Slovic, Finucane, Peters, and MacGregor (2002), and Wilson et al. (1993).

One of the most comprehensive and dramatic theoretical accounts of the role of affect and emotion in decision making was presented by the neurologist, Antonio Damasio (1994). In seeking to determine "what in the brain allows humans to behave rationally," Damasio argued that thought is made largely from images, broadly construed to include perceptual and symbolic representations. A lifetime of learning leads these images to become "marked" by positive and negative feelings linked directly or indirectly to somatic or bodily states. 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 hypothesized that somatic markers increase the accuracy and efficiency of the decision process and their absence, observed in people with certain types of brain damage, degrades decision performance.

We now recognize that the experiential mode of thinking and the analytic mode of thinking are continually active, interacting in what we have characterized as "the dance of affect and reason" (Finucane, Peters, & Slovic, in press). While we may be able to "do the right thing" without analysis (e.g., dodge a falling object), it is unlikely that we can employ analytic thinking rationally without guidance from affect somewhere along the line. Affect is essential to rational action. As Damasio (1994) observes:

> 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)

The Affect Heuristic

The feelings that become salient in a judgment or decision making process depend on characteristics of the individual and the task as well as the interaction between them. Individuals differ in the way they react affectively, and in their tendency to rely upon experiential thinking (Gasper & Clore, 1998; Peters & Slovic, 2000). As will be shown in this paper, tasks differ regarding the evaluability (relative affective salience) of information. These differences result in the affective qualities of a stimulus image being "mapped" or interpreted in diverse ways. The salient qualities of real or imagined stimuli then evoke images (perceptual and symbolic interpretations) that may be made up of both affective and instrumental dimensions.

The mapping of affective information determines the contribution stimulus images make to an individual's "affect pool." All of the images in people's minds are tagged or marked to varying degrees with affect. The affect pool contains all the positive and negative markers associated (consciously or unconsciously) with the images. The intensity of the markers varies with the images.

People consult or "sense" the affect pool in the process of making judgments. Just as imaginability, memorability, and similarity serve as cues for probability judgments, (e.g., the availability and representativeness heuristics, Kahneman, Slovic, & Tversky, 1982), affect may serve as a cue for many important judgments (including probability judgments). Using an overall, readily available affective impression can be easier and more efficient than weighing the pros and cons of various reasons or retrieving relevant examples from memory, especially when the required judgment or decision is complex or mental resources are limited. This characterization of a mental short-cut has led us to label the use of affect a “heuristic” (Finucane, Alhakami, Slovic, & Johnson, 2000).

Empirical Support for the Affect Heuristic

Support for the affect heuristic comes from a diverse set of empirical studies, only a few of which will be reviewed here.

Early Research: Dread and Outrage in Risk Perception

Evidence of risk as feelings was present (though not fully appreciated) in early psychometric studies of risk perception (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Slovic, 1987). Those studies showed that feelings of dread were the major determiner of public perception and acceptance of risk for a wide range of hazards. Sandman, noting that dread was also associated with factors such as voluntariness, controllability, lethality, and fairness, incorporated these qualities into his “outrage model” (Sandman, 1989). Reliance on outrage was, in Sandman’s view, the major reason that public evaluations of risk differed from expert evaluations (based on analysis of hazard; e.g., mortality statistics).

Risk and Benefit Judgments

The earliest studies of risk perception also found that, whereas risk and benefit tend to be positively correlated in the world, they are negatively correlated in people’s minds (and judgments, Fischhoff et al., 1978). The significance of this finding for the affect heuristic was not realized until 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 as measured by rating the activity on bipolar scales such as *good/bad, nice/awful, dread/not dread,* and so forth. 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 how they *feel* about it. If their feelings towards an activity are favorable, they are moved toward judging the risks as low and the benefits as high; if their feelings toward it are unfavorable, they tend to judge the opposite—high risk and low benefit. Under this model, affect comes prior to, and directs, judgments of risk and benefit, much as Zajonc proposed. This process, which we have called "the affect heuristic" (see Figure 2), suggests that, if a general affective view guides perceptions of risk and benefit, providing information about benefit should change perception of risk and vice-versa (see Figure 3). For example, information stating that benefit is high for a technology such as nuclear power would lead to more positive overall affect which would, in turn, decrease perceived risk (Figure 3A).

Finucane et al. (2000) conducted this experiment, providing four different kinds of information designed to manipulate affect by increasing or decreasing perceived benefit or by increasing or decreasing perceived risk for each of three technologies. The predictions were confirmed. Because by design there was no apparent logical relationship between the information provided and the nonmanipulated variable, these data support the theory that risk and benefit judgments are influenced, at least in part, by the overall affective evaluation (which was influenced by the information provided). Further support for the affect heuristic came from a second experiment by Finucane et al. finding that the inverse relationship between perceived risks and benefits increased greatly under time pressure, when opportunity for analytic deliberation was reduced. These two experiments are important because they demonstrate that affect influences judgment directly and is not simply a response to a prior analytic evaluation.

Further support for the model in Figure 2 has come from two very different domains—toxicology and finance. Slovic, MacGregor, Malmfors, and Purchase (n.d.) 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 a second study, these same toxicologists were asked to make a "quick intuitive rating" for each of 30 chemical items (e.g., benzene, aspirin, second-hand cigarette smoke, dioxin in food) on an affect scale (bad-good). Next, they were asked to judge the degree of risk associated with a very small exposure to the chemical, defined as an exposure that is less than $1/100^{th}$ the exposure level that would begin to cause concern for a regulatory agency. Rationally, because exposure was so low, one might expect these risk judgments to be uniformly low and unvarying, resulting in little or no correlation with the ratings of affect. Instead, there was a strong correlation across chemicals between affect and judged risk of a very small exposure. When the affect rating was strongly negative, judged risk of a very small exposure was high; when affect was positive, judged risk was small. Almost every respondent (95 out of 97) showed this negative correlation (the median correlation was -.50). Importantly, those toxicologists who produced strong inverse relations between risk and benefit judgments in the first study also were more likely to exhibit a high correspondence between their judgments of affect and risk in the second study. In other words, across two different tasks, reliable individual differences emerged in toxicologists' reliance on affective processes in judgments of chemical risks.

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. 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 *analytic* system is slow and deliberative, and 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 $1.00 by drawing a red jelly bean from an urn, individuals 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). These individuals reported that, although they knew the probabilities were against them, they *felt* they had a better chance when there were more red beans.

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. Similar results have been found by Yamagishi (1997), whose judges rated a disease that kills 1,286 people out of every 10,000 as more as more dangerous than one that kills 24.14% of the population.

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.

Although frequency formats produce affect-laden imagery, story and narrative formats appear to do even better in that regard. Hendrickx, Vlek, and Oppewal (1989) found that warnings were more effective when, rather than being presented in terms of relative frequencies of harm, they were presented in the form of vivid, affect-laden scenarios and anecdotes. Sanfey and Hastie (1998) found that compared with respondents given information in bar graphs or data tables, respondents given narrative information more accurately estimated the performance of a set of marathon runners. Furthermore, Pennington and Hastie (1993) found that jurors construct narrative-like summations of trial evidence to help them process their judgments of guilt or innocence.

Perhaps the biases in probability and frequency judgment that have been attributed to the availability heuristic (Tversky & Kahneman, 1973) 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.

Proportion Dominance

There appears to be one generic information format that is highly evaluable (e.g., highly affective), 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.

Proportion or probability dominance was evident in an early study by Slovic and Lichtenstein (1968) that had people rate the attractiveness of various two-outcome gambles. Ratings of a gamble's attractiveness were determined much more strongly by the probabilities of winning and losing than by the monetary outcomes. This basic finding has been replicated many times (Goldstein & Einhorn, 1987; Ordóñez & Benson, 1997).

Slovic et al. (2002) tested the limits of this probability dominance by asking one group of subjects to rate the attractiveness of a simple gamble (7/36, win $9; on a 0-20 scale and asking a second group to rate a similar gamble with a small loss (7/36, win $9; 29/36, lose 5¢) on the same scale. The data were anomalous from the perspective of economic theory, but expected from the perspective of the affect heuristic. The mean response to the first gamble was 9.4. When a loss of 5¢ was added, the mean attractiveness jumped to 14.9 and there was almost no overlap between the distribution of responses around this mean and the responses for the group judging the gamble that had no loss.

Slovic also performed a conjoint analysis where each subject rated one of 16 gambles formed by crossing four levels of probability (7/36, 14/36, 21/36, 28/36) with four levels of payoff ($3, $6, $9, $12 in one study and $30, $60, $90, $120 in another). He found that, although subjects wanted to weight probability and payoff relatively equally in judging attractiveness (and thought they had done so) the actual weighting was 5 to 16 times greater for probability than for payoff.

We hypothesize that these curious findings can be explained by reference to the notion of affective mapping. According to this view, a probability maps relatively precisely onto the attractiveness scale, because it has an upper and lower bound and people know where a given value falls within that range. In contrast, the mapping of a dollar outcome (e.g., $9) onto the scale is diffuse, reflecting a failure to know whether $9 is good or bad, attractive or unattractive. Thus, the impression formed by the gamble offering $9 to win with no losing payoff is dominated by the rather unattractive impression produced by the 7/36 probability of winning. However, adding a very small loss to the payoff dimension puts the $9 payoff in perspective and thus gives it meaning. The combination of a possible $9 gain and a 5¢ loss is a *very attractive* win/lose ratio, leading to a relatively precise mapping onto the upper part of the 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.

Proportion dominance surfaces in a powerful way in a very different context, the life-saving interventions studied by Baron (1997), Fetherstonhaugh, Slovic, Johnson, and Friedrich (1997), Friedrich et al. (1999), and Jenni and Loewenstein (1997). These studies found that, unless the number of lives saved is explicitly comparable from one intervention to another, evaluation is dominated by the proportion of lives saved (relative to the population at risk), rather than the actual number of lives saved.

The results of our lifesaving study (Fetherstonhaugh et al., 1997) are important because they imply that a specified number of human lives may not carry precise affective meaning, similar to the conclusion we drew about stated payoffs (e.g., $9) in the gambling studies. The gamble studies suggested an analogous experiment with lifesaving. In the context of a decision pertaining to airport safety, my colleagues and I asked people to evaluate the attractiveness of purchasing new equipment for use in the event of a crash landing of an airliner. In one condition, subjects were told that this equipment affords a chance of saving 150 lives that would be in jeopardy in such an event. A second group of subjects were told that this equipment affords a chance of saving 98% of the 150 lives that would be in jeopardy. We predicted that, because saving 150 lives is diffusely good, hence only weakly evaluable, whereas saving 98% of something is clearly very good, support for purchasing this equipment would be much greater in the 98% condition. We predicted that other high percentages would also lead to greater support, even though the number of lives saved was fewer. The results, reported in Slovic et al. (2002) confirmed these predictions (See Figure 4).

Insensitivity to Probability

Outcomes are not always affectively as vague as the quantities of money 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 et al. (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.

Failures of the Experiential System

Throughout this paper, we have portrayed the affect heuristic 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 (advertising and marketing exemplify this manipulation). 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. The latter problem is discussed below.

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 500 deaths and 600 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)

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 (Viscusi, 1992), analogous to the "street calculus" being spoofed in Figure 1. 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 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.

The data indicate that 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.

Implications

This experiential analysis has a number of implications for interventions to reduce adolescent smoking.

Ban advertising. The affect/experiential thinking account show the need to ban tobacco advertising and promotion. Tobacco marketers have understood the importance of imagery and affect for decades. They have hired sophisticated researchers to do focus groups and surveys designed to help them understand and exploit "smoker psychology," and the results of these studies have guided marketing and promotional activities that now exceed $10 billion per year in the United States. Companies learned that it is image and affect that manipulate the behaviors of their target audiences. Thus, tobacco advertising has virtually no informational value, and what little informational content it does have (e.g., "light," "low tar") has been found to be misleading. Positive imagery in advertising creates the wrong impression of the "smoking experience." Through the workings of the affect heuristic, it likely depresses the perception of smoking risks. The repetitive exposure to smoking and cigarette brands through advertising likely creates positive affect by means of what is known as "the mere exposure effect" (Bornstein, 1989; Zajonc, 1980). As studies using subliminal images show, the influence of affective imagery is powerful, manipulative, and not under conscious control (Winkielman, Zajonc, & Schwarz, 1997). Thus, people, young and old alike, are unaware of these effects and are poorly equipped to defend against them.

Related implications are that antitobacco messages should be designed with the same skill and appreciation of affect that protobacco messages have exhibited. In addition, promotional activities such as giving people cigarettes or clothing with brand logos and the like should be prohibited. We know that such “endowments” manipulate affect and preference (Knetsch, 1989).

Create experiential knowledge. We also know that health statistics designed to engage the analytic mind, have less impact on youths than do experiential knowledge and imagery. The problem is that valid experience is hard for young people to acquire. Adolescents need opportunities to meet and learn from people who are caught in the grip of nicotine addiction and from people who are suffering from tobacco-induced illnesses. They need to become familiar with the misery and feelings of self-loathing being experienced by regular smokers.

Time and risk are hard to understand experientially (Ainslie & Haslam, 1992; Loewenstein & Elster, 1992). Research should be undertaken to help people deal with cumulative risk – risk that increases very slowly but surely over thousands of repeated acts. Similarly, we need to better educate about the difference between dying at age 55 and dying at 70 or 80 for young people whose minds, from a temporal distance, see 55, 70, and 80 as basically the same.

Conclusion

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. We cannot assume that an intelligent person can understand the meaning of and properly act upon even the simplest of numbers such as amounts of money or numbers of lives at risk, not to mention more esoteric measures or statistics pertaining to risk, unless these numbers are infused with affect.

Contemplating the workings of the affect heuristic helps us appreciate Damasio’s contention that rationality is not only a product of the analytical mind, but of the experiential mind as well.

The perception and integration of affective feelings, within the experiential system, appears to be the kind of high-level 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 the consequences turn out to be much different in character than we anticipated.

The scientific study of affective rationality is in its infancy. It is exciting to contemplate what might be accomplished by future research designed to help humans understand the affect heuristic and employ it beneficially in risk analysis, risk communication, and other worthy endeavors.

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Table I

Two Modes of Thinking: Comparison of the Experiential and Analytic Systems

Experiential system	**Analytic 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

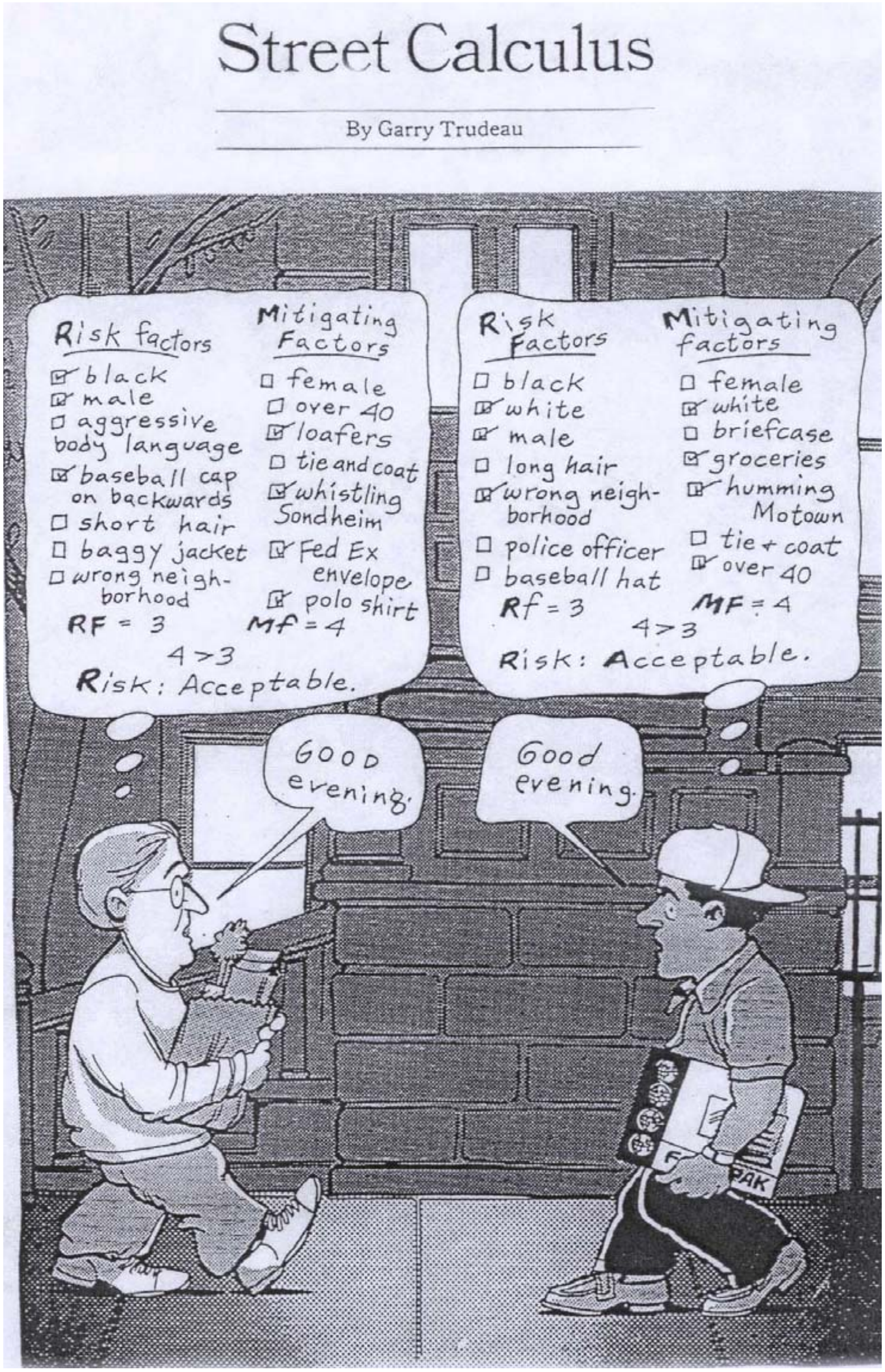

Figure 1. Street calculus.

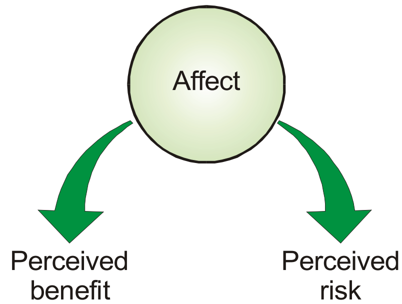

Figure 2. A model of the affect heuristic explaining the risk/benefit confounding observed by Alhakami and Slovic (1994). Judgments of risk and benefit are assumed to be derived by reference to an overall affective evaluation of the stimulus item. Source: Finucane et al. (2000).

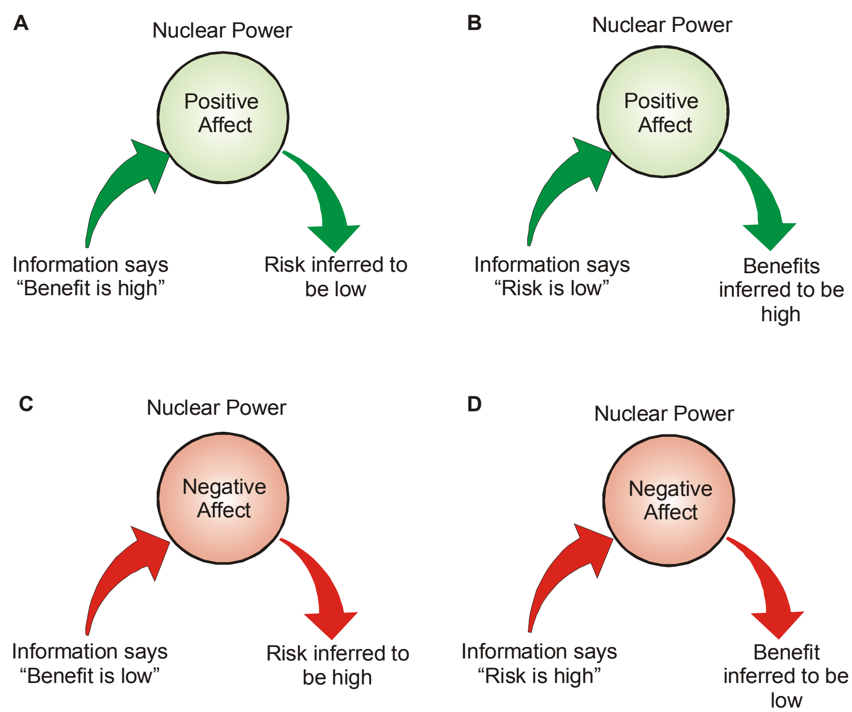

Figure 3. Model showing how information about benefit (A) or information about risk (B) could increase the overall affective evaluation of nuclear power and lead to inferences about risk and benefit that coincide affectively with the information given. Similarly, information could decrease the overall affective evaluation of nuclear power as in C and D.
Source: Finucane et al. (2000).

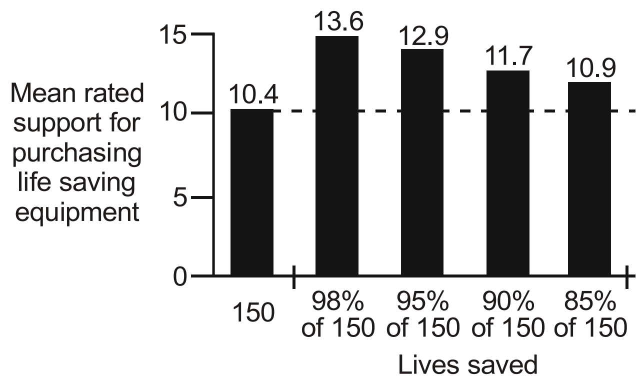

Figure 4. Saving a percentage of 150 lives received higher support than saving 150 lives (Slovic et al., 2002).