

Affect, Risk, and Decision Making

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Abstract

Modern theories in cognitive psychology and neuroscience indicate that there are two fundamental ways in which human beings comprehend risk. The “analytic system” uses algorithms and normative rules, such as probability theory, formal logic, and risk assessment. It is relatively slow, effortful, and requires conscious control. The “experiential system” is intuitive, fast, mostly automatic, and not as accessible to conscious awareness. The experiential system enabled human beings to survive during their long period of evolution and remains today the most natural and most common way to respond to risk. It relies on images and associations, linked by experience to emotion and affect (a feeling that something is good or bad). This system represents risk as a feeling that tells us whether it’s safe to walk down this dark street or drink this strange-smelling water. Proponents of formal risk analysis tend to view affective responses to risk as irrational. Current wisdom disputes this view. The rational and the experiential systems operate in parallel and each seems to depend on the other for guidance. Studies have demonstrated that analytic reasoning cannot be effective unless it is guided by emotion and affect. Rational decision making requires proper integration of both modes of thought. Both systems have their advantages, biases, and limitations. Now that we are beginning to understand the complex interplay between emotion and reason that is essential to rational behavior, the challenge before us is to think creatively about what this means for informing and educating patients and others about risk.

KEYWORDS: risk perception, risk analysis, the affect heuristic, rationality

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Introduction

Risk in the modern world is perceived and acted upon in two 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 risk management. In the present paper we shall examine what recent research in psychology and cognitive neuroscience tells us about “risk as feelings,” and how it may influence judgments and decisions in cancer prevention and control.

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. Finally, we shall briefly discuss some important implications for communication and decision making pertaining to cancer prevention and treatment.

Two Modes of Thinking

Affect plays a central role in what have come to be known as dual-process theories of 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)

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. 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)

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.

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. 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. We have called this process “the affect heuristic” (see Figure 1). Under this model, affect comes prior to, and directs, judgments of risk and benefit, much as Zajonc proposed. This relation can also be seen in cancer research. Farrell et al. (2002) noted that, although men recognized that the information conveyed in counseling about prostate-cancer screening was unfavorable towards the test, some had positive feelings nonetheless about prevention and concluded that “the benefits of PSA [screening] must outweigh the risks” (p. 6).

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 2). 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 2A).

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.

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. Whereas a medical professional’s understanding of risk as statistical probability may be more heavily influenced by the deliberative system, lay understanding may rely on more experiential ways of knowing (Rventlow, Hvas, & Tulinius, 2001).

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. 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. These results imply that: 1) images of cancer as a highly dreaded disease will increase risk perceptions substantially and 2) patients told about their cancer risk in frequentistic rather than probabilistic terms will perceive even greater risk.

Although frequency formats produce affect-laden imagery, story and narrative formats may sometimes 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. How information is presented to patients and other decision makers may have a large impact on how they respond to risks and benefits.

Insensitivity to Probability

When consequences carry sharp and strong affective meaning, as is the case with a lottery jackpot or a cancer, 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.

These probability-neglect results have implications for cancer communication and control. As a highly dreaded disease, cancer may act as a salient, affectively-laden cue that creates insensitivity to its (often relatively low) risk. For example, Kraus, Malmfors, and Slovic (1992) found that, while expert toxicologists were sensitive to the varying cancer risk posed by different levels of exposure to a cancer-causing agent, the public, with stronger feelings about cancer, was more likely to believe that *any* level of exposure was quite risky. Statistical chances of cancer can be reduced sometimes through genetic testing and monitoring (Reyna, Lloyd, & Whalen, 2001). However, if the risk is reduced but not eliminated, the fear of cancer may remain and continue to drive high risk perceptions despite the actual reduction of risk.

Failures of the Experiential System

Like other heuristics that provide efficient and generally adaptive responses but occasionally get us into trouble, reliance on the affect heuristic 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

The leading controllable cause of cancer is cigarette smoking, which is responsible for more than 400,000 deaths annually in the United States. The harmful effects of smoking cumulate, 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). 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.

Implications for Cancer Prevention and Treatment

We know that the affective and experiential nature of responses to cancer is important. Myer (this issue), for example, demonstrated that affect is highly predictive of cancer-patient decisions. Now that we are beginning to understand the complex interplay between emotion, affect, and reason that is wired into the human brain and essential to rational behavior, the challenge before us is to think creatively about what this means for cancer prevention and treatment. Addressing this challenge is a major task, one that we can only outline briefly here.

One important direction for future research is to explore the implications of affective processes for communicating the risks and benefits of cancer prevention actions and treatment

options. Variations in the way that information is framed have been found to influence the interpretation and use of that information in decisions about cancer screening and chemotherapy (e.g., Edwards, Unigwe, Elwyn, & Hood, 2003; Chao et al., 2003). Affective processes are certain to play a role in determining the strength and direction of such framing effects. Watson, Lloyd, et al. (1999), for example, state that “the *qualitative* aspect of risk is more important than the *quantitative*” (p. 868). Perhaps due to this reliance on experiential factors, risk beliefs appear resistant to numerical risk information, leaving some individuals vulnerable to unnecessary cancer-specific distress (Watson et al., 1999).

Consider, for example, a woman whose age and family history put her at high risk of breast cancer. Should she consider a course of preventative chemotherapy using Tamoxifen? Her Gale Score provides a numerical estimate of the probability she will get invasive breast cancer in the next 5 years. The effect of Tamoxifen in reducing this probability can be estimated and communicated to her. Research on affect implies that the woman will perceive her risk as greater and will be more likely to opt for Tamoxifen if both her Gale Score and the reduction in likelihood of cancer are communicated as relative frequencies rather than as probabilities (a test of this hypothesis is currently underway).

Any deliberative framing of information, whether affective or not, raises ethical questions. Is it right to manipulate patients' preferences in such a way? A strong case for such manipulation is presented by Sunstein and Thaler (2003), who argue for a program of “libertarian paternalism” that acknowledges the fact that there is no neutral framing of information, thus the communication should employ a format that is likely to promote the welfare of the person. But the ultimate choice is left to the individual, following the libertarian perspective. Johnson (this

issue) argues the correctness of one type of framing – the use of default options – in encouraging organ donation.

Other forms of “manipulation” involve “affective coding” of information to make it more noticeable and easier to use. Such coding may involve the use of stars or other symbols to highlight important attributes of a choice or the use of affective verbal qualifiers (e.g., excellent, good) to make numerical information more “evaluable” (Hsee, 1996; Hibbard & Peters, 2003). This line of research suggests that numerical information about the risks and benefits of cancer and prevention and treatment may not have much meaning or be used by patients and their families unless it makes an affective connection. Understanding how information can best be presented so that it has meaning and is used in choices will be of particular benefit in genetic counseling for cancer where patients need to understand the risks and benefits of having a genetic test and any post-test decision options (Croyle & Lerman, 1999). Schwartz (this issue) reviews evidence that use of decision support tool that appeared to increase the evaluability of breast cancer preventative options also increased patient satisfaction and decreased stress.

Although experiential (affective) and analytic thinking are always ongoing in what Finucane, Peters, & Slovic (2003) characterized as “the dance of affect and reason”, the balance between these dual processes has been shown to be influenced by factors such as age (Peters, Finucane, MacGregor, & Slovic, 2000) and cognitive load (e.g., Shiv & Fodorikhan, 1999), both of which lead to greater reliance on affect. Ill health, stress, and time pressures are likely to do the same, as analytic thinking requires more effort and puts greater demand upon attention and memory. The implications of this greater reliance on affect for decisions regarding cancer prevention and treatment are in need of study.

The analysis of affect presented here also has implications for interventions to prevent the initiation of cigarette smoking (Slovic, 2003). In particular, it suggests 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 pro-tobacco 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).

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.

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 us understand the affect heuristic and employ it beneficially in cancer prevention, cancer treatment, and other worthy endeavors.

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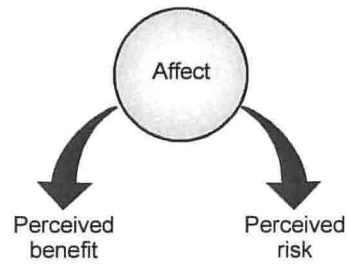


Figure 1. A model of the affect heuristic explaining the risk/benefit confounding observed by Alhakami and Slovic (1994). Judgments of risk and benefit are assumed to be derived by reference to an overall affective evaluation of the stimulus item. Source: Finucane et al (2000).

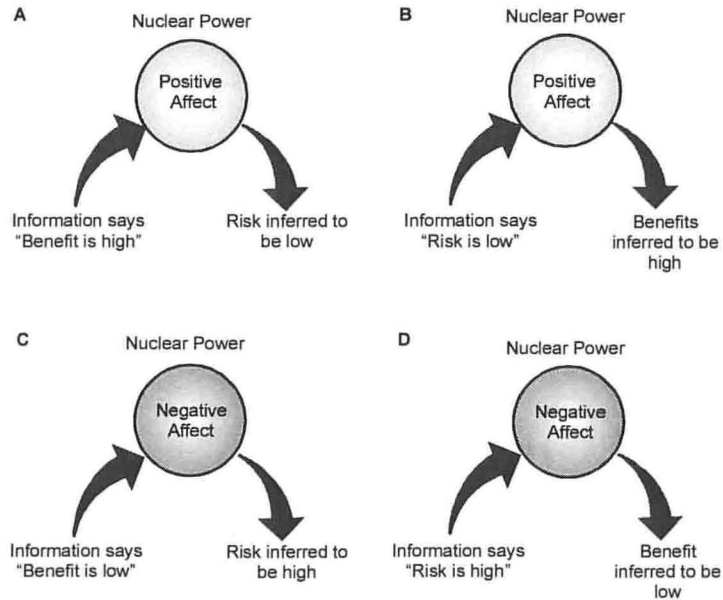


Figure 2. Model showing how information about benefit (A) or information about risk (B) could increase the positive affective evaluation of nuclear power and lead to inferences about risk and benefit that coincide affectively with the information given. Similarly, information could make the overall affective evaluation of nuclear power more negative as in C and D, resulting in inferences about risk and benefit that are consistent with this more negative feeling. Source: Finucane et al (2000).

