

The Feeling of Rationality: The Meaning of Neuroscientific Advances for Political Science

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Recent advances in the neurosciences offer a wealth of new information about how the brain works, and how the body and mind interact. These findings offer important and surprising implications for work in political science. Specifically, emotion exerts an impact on political decisions in decisive and significant ways. While its importance in political science has frequently been either dismissed or ignored in favor of theories that privilege rational reasoning, emotion can provide an alternate basis for explaining and predicting political choice and action. In this article, I posit a view of decision making that rests on an integrated notion of emotional rationality.

Passion is a sort of fever in the mind, which ever leaves us weaker than it found us.

—William Penn, *Fruits of Solitude* (1693)

We consider affective processing to be an evolutionary antecedent to more complex forms of information processing; but higher cognition requires the guidance provided by affective processing.

—Ralph Adolphs and Antonio Damasio, “The Interaction of Affect and Cognition” (2001)

Before the Bush administration went to war against Iraq, at least some commentators suggested that the president’s motivation came from a desire for revenge: he wanted to retaliate for Saddam Hussein’s attempt to assassinate his father a decade or so earlier. National Public Radio reported that senior military officials believed that this was President Bush’s real motivation for the war. Whether or not this psychological interpretation of Bush’s predispositions is true, emotional motivations often gain public credence in analyses of international relations. Per-

haps anger and hatred present the most obvious perceived motivations for conflict, although fear and greed have their place in explaining aggression as well.

Most of us are taught from early on that logical, rational calculation forms the basis of sound decisions. Like William Penn, we assume that emotions can only interfere with this process. Certainly we can all think of examples when our emotions made us feel out of control and led us astray. But these effects are not random; specific types of emotions and situations are likely to provoke such counterproductive responses. In particular, intense emotions, such as hate and lust, tend to produce destructive consequences we fear.

But what if we were wrong about the general impact of emotion on decision making? What if, most of the time, emotion serves a productive function, providing the foundation for swift and accurate decision making? What if emotion assumed equal, or even primary, status, in generating choice? What if sound, rational decision making depended on prior emotional processing? The evidence presented here suggests that emotion can serve this kind of critically useful function in decision making.

Recent advances in the neurosciences offer a wealth of new information about how the brain works and how the body and mind interact. The speed and depth of discovery

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in the neurosciences promise the unfolding of the first major theoretical innovation in the social sciences of the twenty-first century: the new neurological revolution is upon us. These findings offer important and surprising implications for work in political science. Neuroscientific research can help answer a question that should be of central concern to political scientists: Under what conditions do emotions help explain decision making? By addressing this question, we can also consider how emotion-based models might amplify existing models of decision making.

After discussing several important theories of emotion, I outline ten ways in which emotion theory can enhance our understanding of decision making. These are the basis for a new neuroscientifically informed, emotion-privileged framework for the analysis of decision making. This move toward a theory of emotional rationality is a first step in seeking to incorporate recent advances in the cognitive neurosciences into political science theory and practice. Finally, I consider some policy implications of an emotion-based theory of decision making.

Definitional Terms

There is no consensual scholarly definition of emotion. As Joseph LeDoux writes in his introduction to the topic of emotion,

Controversy abounds over the definition of emotion, the number of emotions that exist, whether some emotions are more basic than others, the commonality of certain emotional response patterns across cultures and across species, whether different emotions have different physiological signatures, the extent to which emotional responses contribute to emotional experiences, the role of nature and nurture in emotion, the influence of emotion on cognitive processes, the dependence of emotion on cognition, the importance of conscience versus unconscious processes in emotion, and on and on.¹

LeDoux concludes by calling for a more brain-based, neurological understanding of emotion. For my purposes, I will rely on Gerald Clore and Andrew Ortony's definition: "emotion is one of a large set of differentiated biologically based complex conditions that are about something. Emotions in humans are normally characterized by the presence of four major components: a cognitive component, a motivational-behavioral component, a somatic component, and a subjective-experiential component."² Emotion thus encompasses thoughts, motivations, bodily sensations, and an internal sense of experience. However, this definition requires further refinement in order to differentiate emotion from *affect*, *mood*, and *feeling*, which, though often used synonymously, refer to different phenomena.

Affect refers to the way people represent the value of things as good or bad; it can include preferences as well as emotions and moods. Moods are amorphous states—like emotions, but without specific objects or referents. Finally, feelings are the actual experience of value. Clore argues that feelings represent feedback from internal states that provide

conscious information from nonconscious physical, cognitive, or other processes.³

Whether emotions are conscious or unconscious has not been settled, though the question has been present in psychology since its origins, when William James posed his famous question about running from the bear out of fear, or experiencing fear as a result of running from the bear.⁴ Another issue in the ongoing discussion about emotion has to do with the extent to which emotion is a cognitive process. In his original conception of the trilogy of mind, Ernest Hilgard asserted that the mind is made up of cognition, emotion, and motivational processes—therefore supposing that emotion and cognition represent fundamentally different processes.⁵ Robert Zajonc initiated the reemergence of the debate over the place of emotion in cognition, calling for a reincorporation of affect into psychology and arguing that cognition and affect were at least partly independent systems and that the latter could precede the former under at least some conditions.⁶ Recent evidence by Clore and colleagues suggests that these structures may be more intertwined than previously realized, with the brain nonetheless privileging emotional centers of information processing.⁷ In some ways, how much cognition is in emotion remains a definitional chicken-and-egg problem:

The issue of whether emotional processing is dependent on prior cognitive processing is reduced to a question of how we define cognition. If cognition is defined broadly to include sensory information processing . . . then emotional processing . . . is highly dependent on cognitive processing. If cognitive processing is defined narrowly to include only the higher mental functions . . . then emotion is not necessarily dependent on prior cognitive processing.⁸

In short, while some argue that emotion is cognition because it involves appraisal,⁹ Zajonc and others argue that this is not so because cognitive processing represents only one type of information processing.¹⁰ Many of our biological processes (heartbeat, immune system, et cetera) are regulated by unconscious information-processing systems; just because a function requires information processing, like emotion, it need not be cognitive in nature. More recent research strives to integrate theories of cognition and emotion. This matters for political scientists because our analytical perspectives should reflect the fact that emotion is as essential as reason to the decision-making process; one cannot exist without the other.

As noted above, emotion has a physiological foundation. Stimuli from the external world induce physiological changes within the human body. For instance, a fearful situation may provoke production of adrenalin, which induces the classic fight-or-flight response—at least in men.¹¹ The physiological basis of emotion helps explain several aspects of the interconnecting nature of emotion and cognition in decision making. The limbic system, which humans share with other mammals, is hardwired to subserve emotion to maximize chances for survival. This part of the brain regulates basic biological mechanisms like body temperature,

hunger, thirst, sleep, sexual drive, and so on. This area is where the primary emotional centers are located and includes the thalamus, which receives incoming information from the outside world through the sensory organs, and the amygdala. The amygdala comes in two parts, one on each side of the brain, and is about the size of a walnut. Recent research increasingly suggests that the amygdala serves as the lodestone for emotion, especially fear, and as a filter for memory. Overall, the limbic system allows for processing of information, even before or instead of passing it along to the cortex, the neural basis for higher-level social and cognitive functioning. The more advanced part of the brain, located mostly in the prefrontal cortex, develops from birth in interaction with the environment and grows largely in reaction to learning from the outside world. That is why people differ from culture to culture, but they share certain basic human processes. For example, all people use language to communicate, but they do not all use the same language.

The brain's primary purpose is to ensure the organism's survival. Information coming from the external world is first processed through the limbic system, which decides whether the information indicates a challenge to survival. The amygdala has a long neural connection to the thalamus and constantly scans incoming information for signs of an emotional emergency. If there is none, the amygdala recognizes that there is time for more advanced processing through the prefrontal cortex, which is responsible for more abstract, rational thought. But if the brain decides that the information indicates a threat, it shuts down the higher mental processes through the release of catecholamine neurotransmitters, which also turn on the action of the emotional brain to react quickly and efficiently to threats. This processing hierarchy evolved to help humans survive fight-or-flight kinds of challenges. (You need to hit the brake in your car to avoid hitting the child in front of you before you think about who the child is, what you need to do to stop the car, and so on.)

Thus the brain's structural makeup requires that emotional information exert an influence before, and sometimes instead of, higher-level cognitive functioning. This means that rationality, as we understand it, often requires emotional processing first. At least it requires that emotional processing takes place as an integral part of rational cognitive processing. This finding alone begins to undermine theories of rationality that presume that emotion is either not involved in decision making or exists in opposition to the highest-quality decision making. Political scientists, in particular, have generally assumed, contrary to science, that rational processing takes place independently of emotional processing and that the latter only interferes with the proper functioning of the former.

To be clear, my argument is not simply that emotion helps form preferences—although it does—and then rational logic takes over. Rather, I suggest that emotion is part of rationality itself, and that the two are intimately inter-

twined and interconnected processes, psychologically and neurologically. From this perspective, emotion remains endogenous to rationality itself.

Theories of Emotion

Various modern theories have arisen to explain the nature of emotion. Five deserve mention here because of their implications for emotion-based decision making.

First, Robert Zajonc has argued that people can have strong preferences without any prior or simultaneous cognitive inferences.¹² Using subliminal cues, Zajonc showed that people like things due to mere exposure effects. He flashed some unfamiliar objects very quickly across a screen, much faster than a subject could consciously see or recognize. In subsequent judgments, the subjects later claimed to prefer those objects that had been subliminally displayed over other objects which had not.

Second, Barbara Mellers and colleagues argue, in a decision-affect theory, that emotional reactions are not simply the result of the utility and probability of the outcome, as rational theories might suggest.¹³ Rather, unexpected outcomes also exert an impact on emotional reaction; surprises can feel more pleasant (if positive) or more painful (if negative) than expected outcomes. To take another example, even good outcomes seem less pleasant if an unrealized outcome seems better; a \$1,000 raise can enrage a person who had been promised a much larger salary increase. Risk propensity can be understood to result from an attempt to maximize expected emotional reactions.¹⁴ Decision-affect theory thus combines the notions of utilities, expectations, and counterfactuals into a theory of emotional reaction.

Antonio Damasio and his colleagues have conducted some of most sophisticated recent neuroscientific work in this area, and their data have led to another theoretical orientation. They have accumulated one of the most comprehensive inventories in the world of patients with particular kinds of brain damage. Evidence from these patients enables Damasio to argue convincingly for the primacy of emotion in decision making.¹⁵

Consider "Elliot," a patient who sought diagnosis in an effort to obtain disability benefits.¹⁶ He was an obviously intelligent man who was no longer able to hold a job or keep his marriage together in the wake of surgery for a brain tumor, although he did not score outside normal limits on any standard neurological or intelligence tests. Ostensibly the surgery had worked. Yet Damasio characterizes Elliot as a modern-day Phineas Gage—the famous railway worker who had a tamping iron propelled through his skull by an explosion and lived through the accident only to regress subsequently in all aspects of his personal and social life. Elliot had been a happily married man with two young children and a good job at the time that his tumor was discovered and surgically removed. Despite no clear neurological damage after surgery, Elliot's marriage subsequently

failed, he lost his job, and he was fired from several others. Damasio determined that Elliot suffered damage to his ventromedial prefrontal cortex—the same place that Gage had sustained damage¹⁷—which left him unable to properly negotiate his personal and social world despite an intact intelligence. Damasio argues that this ventromedial section of the brain remains critical to emotional processing, and without it, decision making suffers, too. For example, Elliot takes half an hour to choose one of two dates for making his next appointment, using sophisticated “rational” strategies involving cost-benefit calculations. While this process might be optimal in making difficult and important life decisions, it is not effective for everyday tasks.

Damasio argues that these recent neuroscientific discoveries of how the brain processes emotional information demonstrate that reason and rationality are not the distinct functions we have traditionally believed them to be, but are rather processes that involve emotion and feelings in a central way.¹⁸ Without the ability to reference emotion, people remain incapable of making so-called “rational” decisions, especially in the social realm. Damasio and his colleagues demonstrated this process with a series of ingenious experiments conducted with subjects who had preexisting brain lesions in the ventromedial cortex.¹⁹ These people appear normal, do well on intelligence and memory tests, and usually have no impairments in attention, memory, or language skills. They demonstrate little emotion, however, and though they have access to appropriate social information, which they can apply to relevant situations, they repeatedly make very bad social real-life decisions. This appears to result from their inability to envision future consequences. They cannot delay short-term gratification for the purpose of long term gain.²⁰

In their experiment, Damasio and his fellow researchers presented subjects with \$2,000 and four decks of playing cards. Each card had an amount of money that the player wins or loses printed on its face.²¹ Subjects received two “bad” decks of cards, which gave subjects many early large rewards of \$100 but later took large sums away. The two “good” decks paid lower rewards, about \$50 on average, but also took less money away. In the long run, subjects could earn money with the good decks, and would lose money on the bad ones. Subjects with damaged ventromedial sectors never learned to distinguish between the good and bad decks, and continued to lose money by preferring the decks with high payoffs and high losses. Unimpaired subjects quickly learned to pick from the good decks. Even more interestingly, such subjects learned to make correct decisions long before they could say why they were doing so. Although none of the unimpaired subjects reported consciously calculating the outcome in the midst of the game, the good decks “felt right” to them after a few trials. Skin conductance tests demonstrated that the unimpaired subjects received physiological feedback as they played, while the subjects with brain lesions did not experience much stress or nervousness.

Antoine Bechara and his colleagues conclude from these observations that the impaired subjects lacked the bodily signals that stimulate formation of appropriate emotional memories and that their neurological deficit completely prevented them from bypassing the drive for immediate gratification.²² The emotional references quickly available to unimpaired subjects never became available to the impaired patients, whose emotion-processing centers in the limbic system were not properly connected with their decision-making centers in the cortex. In real life many of the impaired patients were badly socialized and suffered from problems of cognitive-impulse control—multiple unwanted pregnancies, drug addiction, and gambling problems—whose appearance coincided with the timing of the various brain injuries. Gretchen Vogel provides the key inference here: “[E]motion apparently is not something that necessarily clouds reasoning, but rather seems to provide an essential foundation for at least some kind of reasoning.”²³

Damasio generalizes these experimental results into a somatic marker hypothesis.²⁴ He posits that information received through physical senses creates emotions, which then serve as the basis for our future decisions by providing a sense of what is good and bad, and what causes pleasure or pain, on the basis of prior learning and experiences. As children grow and develop, certain bodily sensations related to reward and punishment become tied to particular events, people, and circumstances. Later in life, similar contexts elicit the familiar bodily sensations that warn a person that reward or punishment is likely to follow. Obviously, this learning history can be perverted when a child develops inappropriate connections between events and outcomes. By and large, though, these emotional connections serve individuals well later in life in determining quickly, efficiently, and nonverbally which people and events are likely to lead to good outcomes and should be approached, and which should be avoided. These learned emotional responses are continually updated with new information, at least in healthy individuals.

This network of associations allows the brain to use emotions to provide efficient and accurate information about a wide variety of phenomena that help us make decisions. The brain’s processing capacity is far greater than what exists in our consciousness, and emotions allow us to decide what to pay attention to in the world around us. The brain, because of an evolutionary development that stressed survival, privileges, in speed and impact, emotional information over cognitive processing in the first stages of decision making. As Damasio writes, “I see feelings as having a truly privileged status. They are represented at many neural levels. . . . [B]ecause of their inextricable ties to the body, they come in first in development and retain a primacy that subtly pervades our mental life.”²⁵

The fourth emotion theory relevant to the present discussion is the affect-as-information model developed by Gerald Clore and his colleagues.²⁶ This model suggests that

emotion exists to provide feedback to the person about unconscious processes.²⁷ The information is then conveyed to others through facial expressions and vocal intonations, and to ourselves through thoughts and feelings. Judgments can thus prove susceptible to persuasion and manipulation because they can be unduly influenced by unrelated emotional forces.²⁸ For example, voters' responses to particular candidates can be affected if they are emotionally moved by symbolic features associated with a campaign, such as flag waving, patriotic music, or the happy facial expression of an attractive candidate. From this perspective, feelings represent appraisals.

Finally, George Marcus, W. Russell Neuman, and Michael MacKuen developed a model of political involvement that rests on Jeffrey Gray's neural-behavioral theories.²⁹ Gray believes that the limbic system is divided into different systems that relate to reward and punishment.³⁰ Reward is controlled by the behavioral approach system (BAS) and punishment by the behavioral inhibition system (BIS). The BAS produces emotions along a continuum of happy to sad values, while the BIS focuses on threat and novelty. The BIS is responsible for learning, because novelty or threat elicits attention. Marcus, Neuman, and MacKuen predict that anxiety reduces voters' reliance on habits such as party identification and increases attention to new information, such as a candidate's issue positions. They find that political learning is enhanced by increased voter anxiety, while political engagement is fostered by enthusiasm, a function of the BAS.

Emotion in Decision Making

Beyond the general literature on the relationship between emotion and cognition, several areas of research into the impact of emotion on decision making appear directly relevant to political science. Indeed, some of this work has been conducted within political science, including study of the impact of facial expressions on voting,³¹ affective judgment and political behavior,³² and the relationship between emotion and democratic processes.³³ Related work in psychology and political psychology has focused on four areas of research at the intersection of emotion, cognition, and decision making.³⁴ These include emotion during decision making, emotions after decision making, anticipated emotions, and memories of past emotions.

Emotions during decision making

George Loewenstein and Jennifer Lerner provide a comprehensive and concise summary of the mechanisms by which affect influences decision making during the process itself.³⁵ They note the limitations of the consequentialist notion of judgment and decision making, which ignores the impact of emotions—even gut feelings³⁶—or implies that emotion can only lead decision makers astray. They emphasize instead the importance of expected emotions, or predicting the emo-

tional consequences of a given decision. However, people are notoriously bad at predicting their emotional reactions in the future. They respond more to change than to absolute values in assessing the consequences of their decisions. In addition, people tend to compare real outcomes to counterfactual ones and to evaluate utility not only on the basis of real outcome, but also on the basis of what those outcomes say about their own competence relative to others. Objectively good outcomes that make one look bad are not necessarily experienced in a positive light. For example, nominees for high-level government positions often report feeling humiliated by the Senate confirmation process, even if they are eventually confirmed. In addition, people tend to discount outcomes that are uncertain or temporally delayed.

Immediate emotions are experienced at the time of the decision itself. The effects can be direct—the intensity of the emotion itself in the moment—or indirect, through their impact on the expected value, quality, and depth of information processing. Incidental or anticipatory processes—like anxiety about the future—can partially determine immediate emotions. Anticipatory feelings appear insensitive to probability, but very sensitive to timing and vividness; moreover, they depend on the individual's sense of control over his or her environment. Incidental influences on immediate emotions include both state (situational) and trait (enduring characterological) factors, which may be irrelevant to the decision at hand but can nonetheless influence decision making by fostering generalized bad or good feelings.³⁷

Gordon Bower, among others, has established important links between mood and memory that are pertinent to decision making.³⁸ The theory of mood congruence states that individuals are more likely to remember events that are consistent with their present mood. In other words, people selectively take in information consonant with their current mood state.³⁹ Mood-dependent retrieval, on the other hand, examines the way in which people's current mood affects their recall of past events.⁴⁰ For example, depressed people demonstrate a strong bias toward only recalling negative events from their past.⁴¹ The effects appear strongest in the realm of autobiographical memory. Explanations for this phenomenon typically rely on a network association hypothesis, suggesting that people associate emotion with the events or thoughts that take place at the same time. Later research indicated that for such a memory association to take place, the person must causally attribute the temporally relevant events to the emotional arousal.⁴² These effects reliably take place in a wide variety of domains, including individuals' recall and evaluation of prospects for the future, the likelihood of bad or good things happening in the future, accepting positive and negative feedback about their personality, explaining successes and failures, and estimating personal skills.

I believe that the use of historical analogies in decision making conforms to models of mood-congruence. For example, an anxious leader may be sensitive to the emotional content of an enemy's hostile rhetoric, ultimatums, and

graphic pictures of military build-ups than to objective probabilities about the actual likelihood of threat or attack. Further, a general mood of fear or anger, triggered by vivid images or rhetoric, can influence decision making. The leader's mood may then affect which lessons from history are drawn on—events that generated similar emotions of anger or fear in the past become more accessible. Learning from history can thus be driven by affect as well as by rational thought about probabilities or utility assessments.

Mood influences information processing-strategies as well. Happy people tend to be expansive in their judgments and decisions, using preexisting theories in a top-down manner. Unhappy people, however, tend to focus on details and prefer bottom-up decision-making strategies.⁴³ In other words, optimism can lead to creative decision making,⁴⁴ while pessimism and anger may lead to the opposite.⁴⁵ Furthermore, when people are happy, they overestimate the likelihood of positive outcomes, and when they are sad, they overestimate the probability of negative outcomes. This propensity can bias which options are considered in the face of crisis.⁴⁶

Some intriguing experimental work suggests that game players are affected by mood. Happy players mimic the strategy of their opponent, while sad players make their moves on the basis of detached analysis of the game itself.⁴⁷ Happy players are thus more socially engaged and interactive than sad players. This finding appears relevant to James David Barber's characterization of presidential leadership type along dimensions of positive and negative as well as active and passive.⁴⁸ By extension, leaders who are more positive may indeed be more willing to engage in public debate, while leaders who are more negative may be more secretive in their public style.

This perspective may also shed light on the findings provided by Robert Axelrod's Prisoner's Dilemma tournament contests, which showed that tit for tat emerged as the most successful strategy in competition.⁴⁹ The more socially interactive participants, who mimicked their partner's behavior, appear to have had an advantage. Finally, this emotional perspective offers a compelling alternative explanation for the source of behavior in strategic games; adoption of a particular strategy may reflect and be driven by individual moods as much as by careful analytic surveillance.

Emotional memories that play into decision making may contain preverbal information that is important for rendering accurate social judgments and yet remains unavailable to conscious memory. It appears that the emotional parts of the brain develop first, before the ability to form explicit, declarative, conscious memories that can be expressed verbally. These memories probably remain consciously inaccessible not because of trauma or repression but because of the differential rates at which the brain develops. While we may not be able to obtain conscious access to these memories, they remain in our accumulated emotional cache of nonverbal memories and affect our choices.⁵⁰

When young children have a mature emotional brain but have not yet acquired language, they learn what is good and bad from the reactions of their parents. Children often engage in social referencing, for example, by looking at their parent's face when exploring new situations; a look of fear indicates danger and tells the child to stop.⁵¹ Damasio argues that it is precisely these sorts of emotional lessons that provide us with the "hunches" his control subjects receive from internal cues, telling them that one deck of cards is good and another bad, but that his brain-injured patients are incapable of receiving. Further studies found that brain-damaged subjects were not able to accurately judge the trustworthiness and approachability of faces.⁵² Specifically, brain-damaged patients showed a disproportionately positive bias toward faces that unimpaired individuals judged to be the least trustworthy and accessible. The associations that healthy children learn, which pair our notions of good and bad with appropriate references, provide us with quick, and to some degree accurate, but nonverbal emotionally based information that aids effective decision making throughout life. Instincts and hunches can thus carry important, if inarticulate, information—particularly useful in face-to-face bargaining and negotiation settings. The feeling of trustworthiness or hostility that another person emits in a given interaction should be taken seriously, especially by those trained in reading facial expressions.

Some recent experimental work shows that hostile communications between leaders increases the propensity for violent action in subsequent interactions. This tendency appears particularly strong when such communications are highly personal in nature.⁵³ These dynamics raise the potential for instigating unintended conflict. Hostile rhetoric prior to World War I, for example, played a part in inciting a conflict that no one really wanted. Hostile communications, name calling, and other displays of dominance can reverberate badly not only because they can exacerbate a security dilemma, but also because they can cause hard feelings and a desire for vengeance. Since extreme emotions can sometimes interfere with more reasoned judgment, leaders should try to the extent possible to step back and not make decisions in the heat of the moment. Important public speeches, in particular, should refrain from personalized attacks and name-calling if possibilities for peace are to be encouraged. Decisions and institutions that build in time delays can facilitate the optimal contribution of emotion to decision making. Delay can ameliorate the negative impact of extreme emotions on decision making.

Additional findings on the effect of emotion on decision making offer other provocative implications for political science. First, different emotions clearly elicit different responses. Fear leads to relatively pessimistic judgments of risk in future events, whereas—at least in this analysis—anger leads to relatively optimistic judgments.⁵⁴ So, for example, in a national emergency, it is better for the government

to encourage anger rather than fear in order to promote positive feelings about the future. Raising “alert levels” simply induces fear and spawns pessimistic visions of the future, including increased assessments about the cost of war and the likelihood of failure. A strategy to induce anger can also generate public support for war because anger leads people to be more supportive of punitive and preventive public policy choices. In at least one perverse sense, conspiracy theorists who argue that the government brought about recent terrorist actions get the emotional reality right: inducing anger can make the public more sanguine about the probability of successful retribution.

Gender differences may influence this phenomenon as well. Men tend to be more predisposed to anger than women, who are more susceptible to empathy and depression.⁵⁵ Obviously, there are alternative explanations for gender differences, which can emerge not only as a result of biologically based causes, but also as the product of differences in learning, opportunities, and resources. Regardless of the cause, observable gender-based divergences in mood proclivity may help explain reported gender differences with regard to preferences for public policy on criminal behavior and capital punishment, for example. Specifically, men seem to be more prone than women to anger, which leads them to prefer retribution; women demonstrate more empathy than men, which leads them to prefer more lenient public policy on punishment and to support victim organizations.⁵⁶

Paul Slovic notes that perceptions of risk are related to emotion as well.⁵⁷ People’s estimate of risk relates to their estimate of possible benefit:⁵⁸ if a person sees a particular technology, such as nuclear power, as beneficial to society, he or she is more likely to perceive the associated risk as low. Conversely, a person who sees the risk as high is more likely to see the benefit as low. These associations of threat and value are not necessarily objectively tied, although they appear to be perceptually linked. This may also help explain why many people who supported war against Iraq also indicated that they expected low costs and high benefits, while the reverse obtained for those who opposed the war. From a policy perspective, a government that wants to increase support for a war should lower the perceived sense of risk and cost so that people might see the relative benefits in a different light. Slovic further argues that risk assessments are at least partly based on how a person feels about the target. Thus those who hated Saddam Hussein may have perceived the risk of his weapons of mass destruction as being high, while those who believed he was sane and could have been contained saw the threat as relatively lower. Finally, Slovic claims, emotion serves a similar orienting function as world-views; both help put the pieces of a complicated and uncertain world into meaningful categories through quick and efficient mechanisms.

Some risk assessment work has focused on the impact of factors such as stress and fatigue on decision making. For example, Hockey and his colleagues found that perception

of riskiness is related to fatigue, but not necessarily to anxiety or depression. When situations are very important, or anxiety is high, fatigue impacts are exacerbated.⁵⁹

The cognitive effects of stress deserve special mention in this context. Recent neuroscientific studies demonstrate that stress reactions are precipitated by neuromodulator chemicals called catecholamines, which include dopamine and epinephrine. These chemicals cause us to feel disorganized and distracted, make our unrelated memories darker, and force us to rely on habitual responses. As noted earlier, these chemicals shut down the prefrontal cortex, which houses higher-level cognitive functioning, and encourage primary reliance on the amygdala, or the emotional center, to control behavior. This is the mechanism that operates when you pull your hand away from a hot stove before you think about it. Catecholamines improve memory consolidation, making memories for stressful events better than usual and unrelated memories from the same time less distinct.⁶⁰ Thus combat veterans retain particularly clear images and memories of their stressful battle experiences.

This process makes sense evolutionarily. If we need to run or fight to maximize our chances for survival, we must be able to do so reflexively and instinctually. For most of us, our concerns no longer center on literal fight-or-flight issues, but rather surround issues related to paying bills, keeping a relationship together, or being successful at work. In international politics, however, decisions may be about whether to engage with an adversary or not. Should the United States continue to fight in Afghanistan and Iraq? Should the United States launch new military offensives against North Korea? Syria? Iran? Or should it try harder to negotiate with its adversaries? Or should the United States even try to engage in a prosocial, “tend-and-befriend” way, exchanging food and heating oil for restrictions on nuclear weapons development with the North Koreans, as we did in the 1990s? These concerns invoke the same physiological process in decision makers as literal fight-or-flight scenarios.

Emotion after decision making

Decisions do not occur in a vacuum; rather, our choices provide feedback. These outcomes can influence how we feel about past decisions and thus affect future decision making. Most of the research on this topic has concentrated on how regret and disappointment affect decision making. It shows the importance of counterfactual thinking, in the form of regret, in many emotional reactions to decision making.⁶¹ People are most likely to make counterfactual comparisons that alter either the first or last link in a causal chain.⁶² Less surprisingly, they are more likely to think about how a bad outcome might have been better than to dwell on how a good outcome might have been worse.⁶³ This finding is consistent with the predictions of prospect theory, which points out that people are particularly attentive and averse to losses.⁶⁴

Anticipated emotion

When we consider how we might feel in response to particular actions and events, we enter a new area of consideration—anticipated emotion. In making decisions, we want to maximize the chance that our decisions will make us happy and minimize the chance that our decisions will bring us grief. James March noted in his famous article on bounded rationality that all decisions involve some prediction of how the consequences will make us feel.⁶⁵ The problem is that when we try to predict how we will feel in the future, we tend to get it wrong, and worse, we tend not to get better at predicting over time or with increased experience.⁶⁶

Daniel Gilbert and his fellow researchers found that while a group of junior professors all believed that getting tenure would make them happy, there was no difference in happiness among those who had received, as opposed to those who had been denied, tenure five years later.⁶⁷ Perhaps people have incorrect intuitions about what will make them happy; they are unlikely to anticipate that if getting tenure breaks your health or marriage, it will probably not meet expectations.⁶⁸ It may also be that those denied tenure stumbled into a job that suited them better, or discovered that sometimes it can be more pleasant not to be an academic than to be one. Alternatively, this finding may result from the fact that people focus primarily on transitions rather than on ultimate future states, a pattern that David Schkade and Daniel Kahneman label the focusing illusion.⁶⁹

There may be dispositional differences as well, in that some people are naturally more resilient and happy than others, regardless of situational factors. Or perhaps, as Daniel Gilbert and colleagues note in their “sweet lemons” explanation, people are just more robust and resilient than they realize.⁷⁰ Whatever the reason, people are very bad at predicting how they will feel and act in an alternate emotional state: people who are mad, in a “hot” state, have a hard time imagining how they would act when calm, just as those in a “cold” state have a hard time envisioning how their behavior might be affected by a “hot” state of anger or sexual arousal.⁷¹

Emotion and memory

The final area of inquiry into the relationship between emotion and decision making falls under the rubric of memory. Systematic work by Daniel Kahneman, Barbara Fredrickson, and their colleagues demonstrates that people tend to best remember the peak intensity and the end of an emotional experience; they pay little attention to the duration of the experience. As a result, they often make choices that involve more rather than less pain, depending on the pattern by which pain rises and falls during an event. This peak-and-end theory makes evolutionary sense because such attention informs individuals about the capacities they will need in similar situations in the future, and because it marks

closure, which allows for the assessments of personal meaning to begin.⁷² In other words, we learn lessons from our experiences once we decide they are over and have something important to teach us.

In this way, mental accounting matters.⁷³ Deciding when to close a mental account, and how to evaluate it, constitutes a creative emotional act. As Kahneman writes, “[S]trong emotions may be experienced at those times of reckoning. An implication of this insight is that people can to some extent control their own rewards and punishments by choosing whether to close an account or keep it open as well as deciding when to evaluate it.”⁷⁴

Implications for Political Science

Many political scientists have been working on the role of emotions in political behavior for quite a while—to little avail. Albert Somit and Steven Peterson, for example, observe that biopolitics has had very little influence on political science, especially relative to its impact on other fields in the wake of technological advances that allow great depth and sophistication in our understanding of the brain and cognitive functioning.⁷⁵ They claim that this is particularly surprising given that evolutionary theory, upon which many recent neuroscientific findings depend, purports to explain the basis of many assumptions, including self-interest, upon which rational-choice theories depend. In addition, evolutionary theories can easily explain behavior such as altruism that on the surface appears to fly in the face of self-interest. Somit and Peterson trace political scientists’ objections to biopolitics and evolutionary explanations to earlier association of biopolitics with social Darwinism, and the subsequent impalement of social Darwinism on the stake of racist associations.⁷⁶ New evolutionary and neurocognitive models no longer rest on questionable assertions of social desirability; rather, they rest on the most recent technological advances in brain science, genetics, and biochemistry and warrant reconsideration.

Theoretical applications

Particular models of emotion, specifically the theory of anticipated pleasure, add empirical and descriptive value to existing models of rational choice—and to the role of rationality on politics more generally.

Implications for rational choice. Rational people do what they believe to be in their best interest.⁷⁷ They may make poor judgments of probabilities, but they generally pursue choices intended to maximize gains and minimize losses. Imagine what that might mean if those gains and losses were conceptualized in emotional, and not economic or monetary, terms. Most contemporary rational-choice models assume away emotion. Early developments in rational-choice theories, however, depended on emotional assessments of value. In what became expected utility theory, Daniel

Bernoulli argued that people established their values for wealth on the basis of the pain and pleasure that it would give them.⁷⁸ Because these assessments differed from absolute valuations of wealth, he called them utilities. Jeremy Bentham later drew on Bernoulli's ideas to conceive of utility as a balance of pleasure and pain as well.⁷⁹ It was not until the pathbreaking work of John Von Neumann and Oskar Morgenstern that utilities came to represent ranked, measurable, internal assessments of preferences.⁸⁰ Notions of pleasure and pain were eliminated from the understanding of utility when utility was changed from a psychological to an economic construct. To the extent that current models of expected utility theory exclude emotion, they betray their intellectual foundations.

So how might the contemporary formulations of rational choice be reconciled again with assessments of emotional valuation? Mellers has proposed that such integration might be possible because emotions modify utilities in a dynamic process.⁸¹ For instance, decision makers might incorporate anticipated regret or disappointment into their utilities for a particular decision. If decisions are based on maximizing expected utilities, as most rational-choice models assume, then part of maximizing such utilities should involve an assessment of the anticipated emotions that will follow from particular choices and their possible consequences. Obviously people are often wrong in predicting their future emotional responses, but that need not stop them from incorporating a sense of their future emotional responses into their current choices.

Experimental evidence demonstrates the effect of anticipated regret or rejoicing on decision making.⁸² Decision makers are more likely to regret negative outcomes if they were in control.⁸³ And they are more likely to feel regret if negative actions come from action as opposed to inaction.⁸⁴ There are exceptions, however. People tend to regret things they failed to do more than things they actually did.⁸⁵ For example, older people may regret things they did not do, such as spending time with their families, more than actual mistakes that led to bad outcomes, such as getting fired for a particular decision. This effect is especially pronounced when people make the same decisions repeatedly over a long period of time.⁸⁶

Regret theories note that decision makers expect to feel regret if the outcome is worse than expected, and rejoicing if it is better.⁸⁷ No surprises there. But significantly, such assessments of regret and to rejoice can, and do, influence utility functions. Again, if choice is designed to maximize utility, and utilities are influenced by anticipation of regret and rejoicing, as they are, then rational models of decision making must take account of emotion as a significant element in assessing and predicting the utility of outcomes.

Mellers notes that economists tend to emphasize procedural rationality within a system of preferences and assumptions.⁸⁸ Utilities are usually assumed to exist independent of emotions, which come into play only to the extent that

they obviously influence preferences, which are, in economists' models, prior to utilities. But psychologists tend to focus on substantive rationality, whereby choices are evaluated in terms of how they affect the long-term survival of the organism. The difficulty in reconciling these viewpoints lies in the fact that utilities typically display a monotonic function, yet emotional experience appears to exert a nonmonotonic effect, depending on such factors as expectations and relevant social comparisons. Thus, while maximizing anticipated pleasure may be similar to maximizing expected utility, emotional experience can differ greatly in valence and intensity from rational utility calculations.⁸⁹ This leads us back to Loewenstein and Lerner's argument that cognitive and affective evaluations can diverge.⁹⁰

Speaking as a psychologist, Mellers thus argues that anticipated pleasure should be substituted for utilities in expected utility theory in order to obtain a more empirically and descriptively accurate assessment of utility.⁹¹ She claims that such integration would make outcomes more sensitive to different reference points or varying levels of expectation. Subjective pleasure theory suggests that people will maximize their expected pleasure and minimize their expected pain in rendering their utilities, and ultimately, their decisions. This model can account for findings that might otherwise appear anomalous using a more rational model of utility: surprising smaller wins make people happier than larger expected ones; a loss can feel like a gain if a larger loss was expected (as when a utility bill is less than anticipated); and a gain can feel like a loss if a better but unobtained result was possible, as when a person gets a small grant instead of a large one.⁹²

Thus emotion and rational choice might benefit from alliance by integrating anticipated emotions like regret into assessments of utility. More systematic focus on specific emotions—such as regret, anger, rejoicing, and disappointment—in real-world political situations might help to expand our understanding of their varied impact on a person's utility to action.

Emotional rationality. Neuroscientific arguments about emotion can begin to provide a micro-foundational basis for understanding the origins of preferences and framing effects. Emotional drives can help explain where preferences come from and how they might shift over time or in response to particular situations. In this way, preferences need not be thought of as fixed and given—uncaused causes—as they currently are in rational choice theory; rather, they can be understood as changing dynamically in response to emotional cues. Again, I am not arguing that a focus on emotion only helps us to understand the origins of preferences. Rather, I am suggesting that emotion is intertwined with cognition in a way that requires the processes to be analyzed interdependently; emotion is, inescapably, an essential component of rationality. To the extent that emotions function as motivators and directors of attention, memory,

and sensation, they begin to inform us of at least some of the biological bases for choice.

What would a theory of decision making that incorporated emotion look like? Recall that, from an evolutionary point of view, the older pathway (in which sensory information goes to the visual and auditory thalamus and then directly into the amygdala, where it can immediately connect with the autonomic nervous system to produce somatic responses, like running away from danger) is much faster than the newer pathway (in which sensory information from the eyes and ears passes through the visual and auditory cortexes, respectively, and then to the neocortex and eventually into the hippocampus, the site of long-term memory and potentiation). Speed mattered: it was critical for human survival that we recognize and respond to threat quickly. Emotionally triggered pathways thus present a real evolutionary advantage.

That these emotion-based pathways run parallel to those involving more conscious calculation shows that it is demonstrably false that people make decisions in only one way. What fires together, wires together. Experiences and memories that involve emotional content produce stronger and more vivid memories, and such memories and experiences persist and seem to resist change.

If emotion speeds up decision making, how does that make affect the result? Note first that an emotional impetus to decision making may provide its own psychic benefits, which add independent incentives for action to emotional experiences. For example, emotions arising from insults may prompt individuals to fight and, as a consequence, may produce more testosterone. This hormonal and chemical incentive may then enhance the individual's sense of well-being, inducing confidence and strength. Such feelings thus provide their own internal reinforcement mechanisms.

There are other ways in which a greater understanding of emotion can help illuminate the decision-making process. My goal is to bring cognition and emotion together in a theoretically integrated fashion in order to provide a model for optimal decision making, which may prove useful in situations that involve both strategic calculation and strong emotion. In that spirit I propose that a model of emotional rationality might begin to be built upon the following ten cognitive truths:

1. *Emotions arouse an individual to action with regard to an imagined or experienced event.* This arousal can help bring a decision maker to closure, especially under conditions of uncertainty and ambiguity.
2. *A decision maker's expected emotional state can be understood as part of that person's expected utility calculation.* Emotion models that take into account

Emotion is intertwined with cognition in a way that requires the processes to be analyzed interdependently; emotion is, inescapably, an essential component of rationality.

anticipated emotion can provide decision makers with tools to understand how future feelings may impact current choices. Particularly important is the conscious recognition by decision makers that they are very unlikely to be able

to predict their future emotional states in the present.

3. *Immediate and anticipatory emotion can increase the perceived discount of future payoffs, such that decision makers become more pessimistic about the likely success of their actions.* If a person is anxious when she makes a decision, she will be less sensitive to objective probabilities, more sensitive to the effects of timing and vividness, and her response will depend more on her perceived sense of control over her environment.
4. *Emotion helps decision makers focus on certain important information that may not be otherwise accessible.* Thus threat and novelty may encourage voters to rely less on overlearned habits, such as partisan identification, and to gather new information about a candidate's issue positions. Increased enthusiasm can enhance voter engagement and participation.
5. *Mood can affect the selection of memory.* Mood represents a more general affective state than emotion. Even without a specific object, mood can influence memory, social information processing, judgment and behavior.⁹³
6. *Mood can affect the selection of historical analogies.*⁹⁴ Mood directly affects the predisposition of individuals to both recall past, especially autobiographical, events and to form new memories either positively or negatively.
7. *Emotion can affect risk perception.* Risk propensity can reflect a decision maker's desire to maximize the positive aspects of future emotional states, and individual assessments of risk can be profoundly affected by how a person feels about a future course of action.⁹⁵ Emotion can affect perceptions of the motivations for risk as well: angry people want vengeance more than their fearful neighbors.
8. *Emotional pathways in the brain increase the speed and often the accuracy of judgment and decision making.* Thus both speed and accuracy of decision making can be enhanced through access to nonverbal emotional information.
9. *Specific emotions may predictably bias particular decision makers, or bias decision makers toward specific decisions.* In particular, fear and anger present strong candidates for the kinds of extreme emotions that might overwhelm more cognitively based responses. Even if emotional information usually adds accuracy and efficiency to judgment and decision making,

extreme emotions may limit the ability of decision makers to assess a situation more objectively.

10. *Emotion can provide the basis of hunches.* Emotions can provide the means to express intuitions about the trustworthiness of others, the likelihood of a good or bad outcome occurring, and so on. Such hunches may in fact represent real knowledge that a person has acquired, but that may be impossible to access consciously because of the early emotional, nonverbal way in which it was encoded into memory.

Across all ten propositions, the key point about emotion reduces to its central importance in assigning value to events and outcomes in the social world. As Adolphs and Damasio write:

[O]ur interpretation of the world around us is influenced by mechanisms for assigning social and emotional value, an ability that is clearly essential for survival in a complex social environment. . . . We believe that affect plays a disproportionately important role in social cognition, and it seems likely that the highly differentiated affective states of humans evolved to regulate social behavior.⁹⁶

Policy Implications

This application of recent developments in the neurosciences to political science need not stop at the theoretical door. It has important implications for public policy.

As Kahneman and colleagues write, “[E]conomic indicators hold the most sway in policy circles.”⁹⁷ The reason for this is probably akin to Robert Jervis’s argument about the drunkard’s search.⁹⁸ People look where the light is, and economic indicators are relatively easy to obtain and compare. But is wealth really the only indicator that decision makers are interested in? Probably not. Wealth is not a good indicator of happiness; it is a proxy indicator of health, happiness, productivity or liberty, which are much more amorphous and important variables to measure and assess.

Economic indicators remain poor assessment tools for these important, if amorphous, variables.⁹⁹ Economic indicators focus exclusively on the marketplace, which, by definition, leaves out some of the most central indicators of health, happiness, and longevity, such as marriage, social support, and exercise. Indeed, once basic material needs are met, more amorphous forms of fulfillment and meaning become primary.¹⁰⁰ Economic indicators also assume that people will maximize their self-interest, and yet it is now clear from an abundance of psychological data that this is not always the case, as when people choose to endure more pain with a lower peak rather than less with a higher one. Last, economic indicators can, at best, only indirectly assess the real variables governments should be interested in, which relate to the relative happiness and health of their population. Kahneman and colleagues suggest, for example, that nations should more directly assess final outcome states as well as current economic indicators.¹⁰¹

How can governments start to measure such variables? We can begin with what we do know about what really causes happiness. Since people are bad at predicting their future emotions, perhaps the base rate provides the most instructive information on what makes most people happy. The answer remains complicated, and individual. But research provides some general findings. Freud was right: what matters most is success at work and love.¹⁰² There are, however, qualifications, and some of them are surprising.¹⁰³ Age increases happiness, as anyone who accurately remembers their adolescence might attest. Education helps, mainly through its impact on income and status. Higher social class increases happiness through its impact on leisure and health. Surprisingly, income only seems to matter when people feel bad because they are very poor. Winning lotteries, for example, seems to make people less, rather than more, happy. The one exception to the imperviousness of happiness to wealth appears to be social comparisons in wage negotiations; here, it matters less what the absolute income is than how well a person does in relation to his or her peers.

The most important source of happiness, bar none, derives from social support, which increases every aspect of mental and physical health. Indeed, researchers have discovered that social isolation presents a health risk as great as high blood pressure, obesity, lack of exercise and even smoking.¹⁰⁴ (This effect is not well correlated with economic indicators.) Marriage has the strongest relationship to happiness of any kind of social support; divorced and separated people tend to be less happy. Leisure appears to be an important source of happiness, as long as it is controlled and not imposed, as in unemployment. Unemployment is, in fact, the major source of unhappiness. Exercise, music, and volunteer work all increase happiness. Television exerts only a weak effect on happiness, as does, somewhat surprisingly, intelligence and physical attractiveness. Social skills increase happiness much more than intelligence or attractiveness because they aid in generating social support. Religion increases happiness among the elderly, but appears to be restricted to certain denominations, and seems to operate through the mechanism of increased optimism. Non-Anglo ethnic groups initially appear to be less happy, but this effect decreases once income, education and occupation are controlled.

In short, if happiness derives from social support, governments should place less emphasis on incomes and more on employment and job programs, encouraging leisure activities—by supporting after-school programs and public parks—and supporting marriage and other family relationships.¹⁰⁵ Education appears to be the best mechanism for effecting this change. This conclusion presents both challenges and reassurances to different sides of the political spectrum. While political liberals might not like the idea of government efforts to sustain marriage and other family values, they might support increased government social

services and education. Political conservatives would probably react in just the opposite way.

Political implications extend beyond attempts to improve governmental measurement of well-being. Decision making that incorporates emotion in a more explicit way can help facilitate better choices. As Daniel Goleman writes, emotional intelligence—including attending more closely to others’ emotions—may prove even more important than standard I.Q. in determining a person’s personal and professional success.¹⁰⁶ Mark Greenberg and his colleagues have developed an education program for children called PATHS (Promoting Alternatives Thinking Strategies) that stresses the teaching of emotional intelligence.¹⁰⁷ Originally begun to improve communication in deaf children, but now applied more broadly, this program teaches children to better understand, recognize, and regulate their own and others’ feelings and emotional responses. These programs have proved highly successful in reducing aggressiveness and anxiety, and increasing children’s social and emotional skills and well-being. Such programs, while most effective in children and young adults, whose brains are still forming, can be adapted for adults in order to increase human happiness through increased social skills and support.

Conclusions

Just as in psychology, where the pendulum has swung back and forth between interest in emotion and disinterest in its impact, emotion is out of fashion in the work of political scientists. Psychobiographies and personality studies have gone out of fashion, along with more complicated explorations of leaders and their feelings. No doubt some previous analyses of emotion in political science were misguided. But if nothing else, the honest mirror of introspection should inform scholars that emotion matters, that it influences thoughts, beliefs, and behaviors even when we think it should not. And like the proverbial white elephant, to the extent that we ignore the existence and impact of emotion, it will continue to exert a systematic, unspoken, and pervasive impact on decision making.

The key challenge in moving toward a theory of emotional rationality lies in accepting the fact that emotion does not merely exert a negative impact on optimal decision making. Rather, accurate emotional processing constitutes an inherent part of rationality itself; emotion facilitates quick, effective, and accurate decision making. In most normal circumstances, emotional responses offer important and useful information about other people, oneself, and outside events. And just as evolutionary analysis pervades other disciplines from economics to sociology and psychology at the macro level, micro-foundational advances in the cognitive neurosciences will provide the basis for the new social science revolution. Political science, too, can benefit from these discoveries by recognizing that rationality depends on feelings as much as on cognition.

Notes

- 1 LeDoux 1995, 209.
- 2 Clore and Ortony 2000, 24.
- 3 Clore 1992.
- 4 James 1884.
- 5 Hilgard 1980. Hilgard’s distinction rested on the question of what separated cognition from an overall notion of mind if emotion was subsumed under cognition.
- 6 Zajonc 1980; Zajonc 1984. This work sparked a heated debate with Richard Lazarus, who argued that cognition remained primary. See Lazarus 1982; Lazarus 1984. Zajonc responded with an impressive array of evidence supporting the notion that affect could be primary. This evidence included physiological documentation that affect develops phylogenetically and ontogenetically prior to cognition. Zajonc suggested that separate neuroanatomical structures existed for cognition and affect. Zajonc 1984.
- 7 Damasio 1996.
- 8 LeDoux 1995, 224.
- 9 Lazarus 1982; Lazarus 1984.
- 10 Zajonc 1980.
- 11 Shelley Taylor’s recent work (2002) exploring women’s tendency to “tend and befriend” in stressful situations may indicate how emotion can reduce stress as well.
- 12 Zajonc 1980; Zajonc 1984.
- 13 Mellers et al. 1997.
- 14 Ibid.
- 15 Damasio 1996.
- 16 Ibid.
- 17 Damasio et al. 1994.
- 18 Damasio 1996.
- 19 Bechara et al. 1997.
- 20 Ibid.; Bechara, Tranel, and Damasio 2000.
- 21 Bechara et al., 1997.
- 22 Ibid.; Bechara, Tranel, and Damasio 2000.
- 23 Vogel 1997, 1269.
- 24 Damasio 1996.
- 25 Ibid., 159.
- 26 Schwarz and Clore 1983.
- 27 The affect-as-information model rests on ten principles about the ways in which affect can influence such processes as memory, judgment, and decision making. Clore, Gasper, and Garvin 2001; Clore et al. 2001.
- 28 Clore and Isbell 2001.
- 29 Marcus, Neuman, and MacKuen 2000.
- 30 Gray 1987.
- 31 Masters 1991; Sullivan and Masters 1988; Way and Masters 1996.
- 32 Marcus, Neuman, and MacKuen 2000.
- 33 Marcus and Rahn 1990.

- 34 Schwarz 2000.
- 35 Loewenstein and Lerner 2003
- 36 Loewenstein and Prelec 1992; Loewenstein and Prelec 1993.
- 37 Loewenstein and Lerner 2003.
- 38 Bower 1981. See also Bower and Forgas 2001, in which the authors note four ways in which mood can affect the selection of memory. It often accompanies our sense of personal failure, or failed expectations; this prompts us to pay particular attention to, and learn from, the preceding and surrounding events. Mood also directs attention to those features of a situation which are judged to be significant or causative of failure, thus leading to preferential encoding and learning of those events. Emotional arousal decays slowly, leading to the prolonged mental rehearsal, consolidation, and encoding of those events that are judged to have caused the initial emotional arousal. Finally, because intense emotional experiences are relatively rare, their very novelty makes them memorable.
- 39 Bower 1983.
- 40 Bower 1981.
- 41 Lewinsohn and Rosenbaum 1987.
- 42 Bower 1992; Eich and Macauley 2000.
- 43 Schwarz and Clore 1983; Schwarz 2000.
- 44 Isen 1993.
- 45 Keinan 1987; Forgas 1992.
- 46 Johnson and Tversky 1983.
- 47 Hertel et al. 2000.
- 48 Barber 1992.
- 49 Axelrod 1984.
- 50 LeDoux 1995.
- 51 Campos and Barrett 1984.
- 52 Adolphs, Tranel, and Damasio 1994.
- 53 McDermott and Cowden 2003.
- 54 Lerner and Keltner 2000.
- 55 Gault and Sabini, 2000.
- 56 Ibid.
- 57 Slovic 1999.
- 58 Alhakami and Slovic 1994.
- 59 Hockey et al. 2000.
- 60 Arnsten 1998.
- 61 Zeelenberg et al. 1998; Zeelenberg and Beattie 1996. Regret is associated with imagining how one might have acted differently to produce a better outcome. Disappointment results from envisioning how a better outcome might have been achieved if some aspect of the situation had been more favorable.
- 62 Kahneman and Miller 1986.
- 63 Gavanski and Wells 1989.
- 64 Kahneman and Tversky 1979; Kahneman and Tversky 1984.
- 65 March 1978.
- 66 Loewenstein and Schkade 1999.
- 67 Gilbert et al. 1998.
- 68 Argyle 1999; Schkade and Kahneman 1998.
- 69 Schkade and Kahneman 1998.
- 70 Gilbert et al. 1998.
- 71 Loewenstein 1996.
- 72 Fredrickson 2000.
- 73 Thaler 1999.
- 74 Kahneman 2000, xiv–xv.
- 75 Somit and Peterson 1999.
- 76 Ibid.
- 77 Bueno de Mesquita 2000.
- 78 Bernoulli 1954.
- 79 Bentham 1982.
- 80 Von Neumann and Morgenstern 1947.
- 81 Mellers 2000.
- 82 Ritov and Baron 1990; Simonson 1992; Tetlock and Boettger 1994.
- 83 Markman et al. 1995.
- 84 Ritov and Baron 1990.
- 85 Inman and Zeelenberg 2000.
- 86 Gilovich and Medvec 1995.
- 87 Bell 1988; Loomes and Sugden 1982.
- 88 Mellers 2000.
- 89 Mellers et al. 1997.
- 90 Loewenstein and Lerner 2003.
- 91 Mellers 2000.
- 92 Mellers et al. 1997.
- 93 Bower and Forgas 2001.
- 94 Khong 1992.
- 95 Slovic 1999.
- 96 Adolphs and Damasio 2001, 43.
- 97 Kahneman, Diener, and Schwartz 1999, xi.
- 98 Jervis 1993.
- 99 Kahneman, Diener, and Schwartz 1999.
- 100 Maslow 1970.
- 101 Kahneman, Diener, and Schwartz 1999.
- 102 Freud 1923.
- 103 Michael Argyle (1999) compiles the most comprehensive relevant data.
- 104 Bernstein and Cacioppo 2002; House, Landis, and Umberson 1988.
- 105 Argyle 1999; Kahneman, Diener, and Schwartz 1999.
- 106 Goleman 1997.
- 107 Greenberg and Kusche 1998.

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