On the Excessive Rationality of the Emotional Imagination: A Two Systems Account of Affective Forecasts and Experiences

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If imagination is an airplane, then we humans are frequent fliers; emerging research in neuroscience suggests that we devote a large portion of our mental lives to traveling into the future, as well as the past, to envision what other times and places would be like and how we would feel when we got there (Buckner & Carroll, 2007; Buckner & Vincent, in press; Gilbert & Buckner, 2007; Szpunar & McDermott, ch. X). Indeed, while the average Labrador seems to display some drooling recognition of how much he will enjoy the leftover steak that has just been placed in front of him, humans possess a qualitatively different ability: We can imagine a situation (or steak) that is faraway in time or place and that we have never before experienced, calculating with some degree of accuracy how we would feel if we were plunged into that situation.

While marveling at this "affective forecasting" ability, psychologists have also been quick to identify its shortcomings. An explosion of recent research has shown that people often overestimate (e.g., Buehler & McFarland, 2001; Gilbert, Morewedge, Risen, & Wilson, 2004), sometimes underestimate (e.g., Dunn, Biesanz, Human, & Finn, in press; Gilbert, Gill, & Wilson, 2002), and occasionally misunderstand entirely (e.g., Woodzicka & LaFrance, 2001) the emotional responses they will experience in the future. In explaining the sources of these errors, researchers have diagnosed a number of specific flaws in the emotional imagination, including immune neglect (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998), focusing illusions (e.g., Dunn, Wilson, & Gilbert, 2003; Schkade & Kahneman, 1998), and empathy gaps (e.g., Loewenstein & Schkade, 1999; Van Boven & Loewenstein, 2005). Although these phenomena have been documented independently—creating the possible appearance of a ragbag of forecasting flaws—we believe that most sources of systematic forecasting errors can be integrated

through the unifying theoretical perspective provided by Seymour Epstein's (1994; 1998a) Cognitive-Experiential Self Theory.

Cognitive-Experiential Self Theory

Similar to other dual process theories, Cognitive-Experiential Self Theory (CEST) posits that humans make sense of themselves and the world around them via two distinct information processing systems that operate in parallel: the rational system and the experiential system (see Table 1).[1] As the new kid on the evolutionary block, the rational system is probably unique to us big-brained humans and allows us to engage in logical reasoning. Relying largely on conscious appraisals of events, the rational system is highly analytic and readily makes sense of abstract numbers and ideas, changing rapidly as these sources of information change. In contrast, the evolutionarily ancient experiential system is affectively-oriented and integrates information holistically, responding primarily to concrete information (e.g., images). The experiential system relies on associations between new information and past experiences, such that change in the operation of this system may occur relatively slowly (Epstein, 1994; 1998a).

According to Epstein (1998a), emotions are a signature product of the experiential system. Affective forecasting, however, is a uniquely human ability that most likely depends to a large extent on the advanced cognitive capacity of the rational system. Thus, in making affective forecasts, humans may rely heavily on the rational system in trying to understand the experiential system. Like an engineer trying to understand a poet or a robot trying to understand a puppy, this cross-talk may provide the basis for a host of misunderstandings. Indeed, we suggest that the core differences between the rational and the experiential system can account for the seemingly disparate sources of recently

documented errors in affective forecasting. In the sections that follow, we address each of these core differences in turn, using CEST to integrate separate strands of research on affective forecasting. Finally, we consider implications of this theoretical perspective for improving affective forecasts and for guiding future research.

Analytic vs. Holistic

One of the most important differences between the rational and the experiential systems is that the former processes information more analytically while the latter processes information more holistically. This core difference in processing styles may underlie the most ubiquitous discrepancies between affective forecasts and emotional experiences. To the extent that people adopt an analytic mindset when making affective forecasts about an upcoming event, they are likely to take the approach of an entomologist, separating the specimen under study from its contextual jungle, placing it under the microscope, and then dissecting it into individual parts.

This analytic approach may underlie the common tendency for affective forecasters to exhibit *focalism*, mentally zeroing in on the "signal" of the focal event while isolating it from the "noise" provided by background distractions and other events (Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). For example, when asked to imagine how they would feel in the days after their college football team won a big game, football fans focused heavily on the game's outcome and therefore anticipated more lasting, victory-induced delight than they actually experienced. These collegiate fans generated more moderate forecasts only when the researchers prompted them to consider that there might be more to student life than football. Recent research in our lab suggests that forecasters may not only ignore relevant situational factors, but may also succumb to

dispositional neglect, ignoring their own stable, dispositional level of happiness (Forrin, Dunn, Biesanz, & Aknin, 2007). Thus, forecasters may go astray by isolating a focal event from the larger background provided by other situational events and their own baseline happiness.

As well as separating a particular event or outcome from its broader context, the analytic forecaster would be expected to dissect an outcome into its component parts and focus on those parts or aspects that most clearly differentiate it from other outcomes. This is exactly what forecasters appear to do. For example, just before college freshmen received their dormitory assignments—which would determine where they lived for the subsequent three years of school—they were asked to predict how happy they would be living in each of twelve dorms (Dunn, Wilson, & Gilbert, 2003). At the time they made these predictions, the students knew a great deal about the dormitories. But in making their affective forecasts, the students focused heavily on physical features of the dorms (e.g., location) that strongly differentiated the dorms from each other, while largely neglecting the important features that the dorms had in common; thus, students exhibited an *isolation effect* (Kahneman & Tversky, 1979), mentally zooming in on the features that differed between options while ignoring the options' shared features. Because of this highly analytic approach, students made erroneously extreme forecasts, overestimating how happy they would be in the desirable dorms and how miserable they would be in the less desirable dorms.

A similar, analytic forecasting style emerged when students in another study were asked to imagine living in California versus the Midwest (Schkade & Kahneman, 1998). Perhaps unsurprisingly, students residing in both states anticipated that living in

California would lead to greater life satisfaction than living in the Midwest. This prediction stemmed from the fact that students focused heavily on the differences between the two regions—particularly California's superior weather—when imagining what it would be like to live in the other region. Yet, actual satisfaction may depend on a much broader set of life conditions, including social relationships, job opportunities, daily hassles, and other factors that on balance are fairly similar across regions, such that regional differences in life satisfaction may be quite minimal. Indeed, while acknowledging the objectionable nature of their region's weather, the students actually living in the Midwest reported life satisfaction levels that were equivalent to that of their Californian counterparts. A parallel phenomenon emerged in a study of a three-week bicycle trip through California (Mitchell, Thompson, Peterson, & Cronk, 1997). Before the trip, the cyclists focused on core aspects of the trip, including the opportunities to bike and make friends, while giving little thought to potential distractions (e.g., bee stings and flat tires) that might diminish their enjoyment of the vacation. These distractions, however, did influence their actual enjoyment during the trip, contributing to the discrepancy that emerged between the cyclists' highly positive forecasts and their more equanimous experiences.

In separating the "signal" of a focal event from the "noise" of its background, forecasters may also readily neglect the event's temporal context. Exploring this idea, Gilbert, Gill, and Wilson (2002) asked participants to predict how much they would enjoy eating spaghetti with meat sauce either the next morning or the next evening. Their findings suggested that participants first called to mind an image of the saucy spaghetti, isolated from its temporal context, leaving individuals with the initial conclusion that

they would enjoy the pasta as much for breakfast as they would for dinner. Only later—and with some effort—were participants able to correct for the influence of mealtime, subtracting out the potentially unpalatable effects of eating spaghetti with meat sauce first thing in the morning.

As well as struggling to take the holistic future context of an upcoming event into account, forecasters may often fail to fully contextualize such an event within the broader framework of other similar past events[2] (Buehler & McFarland, 2001; Morewedge, Gilbert, & Wilson, 2005). For example, left to their own devices, individuals may imagine that an upcoming New Year's Eve party will be the Best Party Ever, overlooking the patchwork of past celebrations that have turned out to be disappointing. Indeed, the more forecasters focus on a future event in isolation from the broad context of similar past events, the more likely they are to overestimate the upcoming event's emotional impact (Buehler & McFarland, 2001).

Taken together, the research described in the preceding paragraphs seems to paint a rather dull view of the emotional experiences contained in daily life; in contrast to the exciting roller coaster of dizzying highs and devastating lows imagined by forecasters, actual emotional experiences may appear relatively pallid. While giving up the devastating lows might not be so bad, can we ever attain and—more importantly—*maintain* the dizzying highs envisioned by forecasters? Given that forecasters' extreme expectations stem from their tendency to view a focal event in sharp relief from the contextual background, perhaps individuals might be able to experience more potent emotions if a focal event were prevented from being assimilated into the broader fabric of everyday life. Developing this idea, Wilson and his colleagues reasoned that people

might have trouble engaging in such assimilation, or "sense-making," if the meaning or cause of the focal event was uncertain (Wilson, Centerbar, Kermer, & Gilbert, 2005). Consistent with this hypothesis, participants in their studies who could not easily make sense of a positive event experienced more prolonged happiness. In one such study, students at the University of Virginia were led to believe that they had received positive feedback from three opposite-sex students, after having exchanged information with them over the internet (the feedback was in fact controlled by the experimenter). Participants who were not given the source of each flattering comment—and thus had trouble making sense of this positive event—experienced elevated mood for longer than those who were given this information.

Summary. A broad array of recent research supports the notion that forecasters tend to adopt a relatively analytic approach in imagining their emotional responses to future events. Like good analysts, forecasters extract the focal event from the noise of its background and break up the event into its most important parts, devoting careful attention to those parts that distinguish it from similar events. Problems arise, however, because the emotional experiences that forecasters are trying to predict may stem from a more holistic response to events. Only when forecasters are reminded to take a more contextualized approach—or experiencers are prevented from letting an event fade into the background—are forecasters and experiencers likely to converge on this important dimension of information processing. Given this fundamental discrepancy, then, it is perhaps no surprise that forecasters so commonly exhibit an *impact bias*, overestimating the intensity and duration of their own emotional responses to events (Gilbert, Driver-Linn, & Wilson, 2002).

Cold vs. Hot

In keeping with its analytic nature, a second major feature of the rational system is that it is driven by reason rather than emotion. That is, the rational system is better able to process non-affective, conceptual information such as facts and figures than affective information such as feelings and emotional reactions, which are more readily processed by the experiential system. The rational system can thus be thought of as a 'cold' system in that it generates 'logical' responses to events, while the experiential system can be considered a 'hot' system because it is associated with more 'emotional' responses to events. In short, the rational system is oriented to what is sensible, whereas the experiential system is oriented to what feels good (Epstein, 1998a). As a result, the rational system is likely to promote a dispassionate, balanced view of an event, while the experiential system is likely to promote a more motivated view of the same event—allowing one to view the event in a desired light.

To the extent that the experiential system plays a weaker role in generating affective forecasts than in generating actual emotions, forecasters may readily overlook the experiential system's ability to take the sting out of negative events. For example, Democrats made the (perfectly reasonable) prediction that they would be unhappy a month after George W. Bush was elected Governor of Texas (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998). As it turned out though, their happiness had returned to normal by this time. More importantly, they had developed rosier views of Bush, suggesting that they were making the best of a bad situation. According to Gilbert et al. (1998), forecasters succumb to the impact bias, as in the above experiment, because they neglect the power of the *psychological immune system*, which quickly and quietly

transforms life's lemons into lemonade. From the perspective of CEST, such *immune neglect* may occur because forecasters envision future outcomes dispassionately, in keeping with the rational system; they fail to take into account the motivated, pleasure-oriented processing that the experiential system will contribute.

This idea is illustrated by an experiment in which students were led to believe that an attractive member of the opposite sex was moderately likely or moderately unlikely to pick them over another student as a preferred dating partner (Wilson, Wheatley, Kurtz, Dunn, & Gilbert, 2004). Before learning the potential date's final decision, participants took a relatively cool, even-handed view, reporting a moderate degree of interest in dating this person, regardless of whether they expected to be chosen. This balanced perspective was quickly replaced by a more motivated one, however, after participants learned the attractive person's final decision; individuals who were randomly assigned to learn that they had been selected viewed the potential date as a more appealing prospect than did those individuals who were assigned to the rejection condition. Because rejected participants were able to devalue the potential date in ways they failed to foresee, the rejectees' actual emotional experiences were less negative than they anticipated. In this dating game study, participants apparently required little time or effort to reconstrue the potential date according to their own best interests; participants reported feeling equally good regardless of whether or not they were given time to engage in reconstrual after learning whether they had been chosen.

Of course, the successful functioning of the psychological immune system is likely to require time and effort when individuals are faced with more troubling forms of feedback (e.g., denial of tenure); under such conditions, we would argue that the

experiential system may harness the power of the rational system in order to marshal the full repertoire of sophisticated human defense mechanisms. In any case, the key point is that the critical role of the experiential system may be missed by forecasters relying on the rational system, contributing to the impact bias. This suggests that the impact bias should not be seen as resulting from the "distorted" nature of forecasts. After all, affective forecasts—guided largely by the rational system—tend to be logical and objective. Rather, immune neglect (a major source of the impact bias) emerges due to the failure of the rational system to appreciate the important role that the experiential system will play in shaping actual emotions.

As well as neglecting the influence of psychological defenses on future emotions, affective forecasters also tend to ignore the influence of visceral factors. As mentioned in the opening of this section, the rational system is a 'cold' system, driven by reason, and the experiential system is a 'hot' system, driven by emotions. Thus, when making affective forecasts, individuals typically imagine how they will feel in a hot state while they are in a cold state. This creates what Loewenstein and Schkade (1999) refer to as a *hot/cold empathy gap* (see also Loewenstein, O'Donoghue, & Rabin, 2003; Van Boven & Loewenstein, 2003). The hot/cold empathy gap reflects the struggle of the cold rational system to understand the hot experiential system, especially when visceral factors come into play. According to Loewenstein and Schkade (1999), it is difficult to predict the intensity of visceral factors, let alone their influence on future emotions and behaviour. For example, Christensen-Szalanski (1984) found that pregnant women underestimated the pain of childbirth; consequently, most made a non-binding decision to forgo anesthesia—a decision which many reversed after the onset of labor.

Several other studies provide additional evidence that an empathy gap exists between the cold, rational system (the primary source of predicted emotions) and the hot, experiential system (the primary source of actual emotions). Individuals who completed a quiz were offered, as reimbursement, either a candy bar or the answers to the quiz questions (Loewenstein, Prelec, & Shatto, 1998). Among those who made their choice before taking the quiz, only 21% chose the answers; however, a substantially higher percentage of individuals (60%) opted for the answers after having taken the quiz. In their cold state, prior to taking the quiz, individuals apparently underestimated their subsequent curiosity and its effect on their behavior. Similarly, students in another study overestimated their willingness to engage in a public performance for money because they failed to predict the embarrassment and fear they would experience as their performance drew near (Van Boven, Loewenstein, Dunning, & Welch, 2004). Again, the cold rational system appears to be ill-suited to make forecasts regarding the hot experiential system. Because of this fundamental mismatch, empathy gaps may be difficult to correct unless forecasters are given an experiential taste of the situation or outcome they will later encounter (Loewenstein, Nagin, & Paternoster, 1997; Van Boven, Dunning, & Loewenstein, 2000; Van Boven & Loewenstein, 2005). Thus, empathy gaps are likely to arise when the response of the experiential system is merely contemplated by the rational system.

Summary. In this section, we have outlined two shortcomings of people's over-reliance on the rational system in making forecasts regarding the experiential system. The first shortcoming is that the rational system—logical and objective—does not take into account the psychological defenses initiated by the experiential system; this leads to the

impact bias for negative events (i.e., forecasts are more negative than experiences). The second shortcoming is that the 'cold' rational system leads individuals to underestimate the influence of 'hot' emotions and drives on their subsequent behavior. This hot/cold empathy gap can lead to severe forecasting errors, which are unlikely to be mitigated unless forecasters are allowed to "step into the phenomenological shoes" (Van Boven et al., 2000, p. 73) of their future selves.

Abstract vs. Concrete

As well as processing information in different ways, the rational and experiential systems respond to different types of input. In particular, while the rational system is adept at drawing meaning from abstract numbers, words, and symbols, the experiential system is relatively insensitive to such information, instead responding more readily to concrete images, metaphors, and narratives. If the rational system plays a dominant role in affective forecasts and the experiential system plays a dominant role in actual emotions, then affective forecasts and experiences are likely to diverge in part because of their differential sensitivity to abstract information.

According to recent research by Hsee and Zhang (2004), forecasters may exhibit greater sensitivity to abstract quantitative information in part because people often make affective forecasts in *joint evaluation* (JE) mode—that is, when they are comparing multiple options. For example, in planning a future ski trip, people are likely to engage in affective forecasting as they weigh the tough choice between Whistler and Aspen. Comparing these options side by side, forecasters' attention might be drawn to the fact that Whistler has 200 trails and a vertical rise of 5280 feet while Aspen has a relatively paltry 76 trails and a vertical rise of just 3276 feet. Because such statistics are easy to

evaluate when making this direct comparison, avid skiers might predict enjoying a Whistler vacation far more than an Aspen vacation. Once immersed in their vacation, however, skiers inevitably find themselves in *single evaluation* (SE) mode, wherein they are faced with only the mountain they selected. In this mode, Whistler's purely quantitative advantages may no longer be salient, such that Whistler's extra 2000 feet may fail to lift skiers' enjoyment above that of their counterparts at Aspen. Therefore, predictions made by forecasters in JE may exaggerate the difference between the pleasure of skiing at Whistler versus Aspen, exhibiting what Hsee and Zhang (2004) term the *distinction bias*.

From this perspective, abstract quantitative information has a greater influence on affective forecasts than on emotional experiences because of the common tendency for people to consider multiple options when making affective forecasts. Pushing this further though, we would argue that if affective forecasts are primarily processed by the rational system, they should be inherently more sensitive to quantitative information than emotional experiences, even when forecasts are made in single-evaluation mode. To test this hypothesis, which was derived from CEST, we exposed participants to information about a deadly forest fire in Spain and manipulated the fire's perceived death toll between-subjects by leading participants to believe that either 5 or 10,000 people had been killed (Dunn & Ashton-James, in press). Participants serving as "experiencers" were asked to read a short newspaper article about the event and to report their feelings afterward. Other participants serving as forecasters were asked to read a brief summary of the article and predict how they would feel after reading the full article. Consistent with the idea that affective forecasts are processed by the rational system, which is sensitive

to facts and figures, forecasters in the 10,000-dead condition predicted feeling much more upset than did forecasters in the 5-dead condition. Experiencers, however, exhibited what we term *emotional innumeracy*; they felt no more upset after reading that 10,000 people had been killed in the fire than that 5 people had been killed, reflecting the insensitivity of the experiential system to numerical information.

Of course, experiencers' insensitivity to death tolls might have stemmed from the fact that the target event (a Spanish forest fire) occurred far away from our American participants and that it was described in dry, journalistic terms. Experiencers also displayed emotional innumeracy, however, when we examined responses to a nearby, high impact event. In the immediate aftermath of Hurricane Katrina, when the storm's true death toll was unknown, we led students at Duke University to believe that either 50 people, 500 people, 1000 people, or 5000 people had been killed (thereby manipulating perceived death toll between-subjects). Consistent with the hypothesis that emotional experiences are largely insensitive to numerical information—even when those numbers refer to the loss of nearby human lives—we found that students' sadness about the hurricane was unrelated to the storm's perceived death toll. Several weeks later, when another major hurricane was approaching the Southeast, we asked one group of Duke students to predict how sad they would feel if 5 people were killed and another group to predict how sad they would feel if 5000 people were killed in the hurricane. In contrast to the emotional innumeracy exhibited by experiencers, our forecasters displayed substantial sensitivity to numbers, with those in the 5000-dead condition predicting that they would feel much greater sadness than those in the 5-dead condition. Thus, death tolls had a more powerful impact on affective forecasts than on actual emotions, consistent with our

argument that the former stem primarily from the rational system and the latter primarily from the experiential system.

From this perspective, the number of people killed in a disaster should influence actual emotions if abstract death toll statistics are translated into a form of information that is meaningful to the experiential system, such as concrete images. To test this idea, we asked students to examine a website, which (a) informed them that either 15 or 500 college students had been killed in the Iraq war effort and (b) either did or did not contain headshots of each individual killed (Dunn & Ashton-James, in press). In the absence of pictures, participants reported feeling about equally sad regardless of whether they were led to believe that 15 or 500 students had died, consistent with our previous studies. But participants did report feeling greater sadness as a function of death toll when these casualties were represented by headshots of each deceased individual, supporting the notion that actual emotions—as a product of the experiential system—are more sensitive to concrete images than to abstract numbers. Yet, because affective forecasting engages the rational system, forecasts are broadly sensitive to quantitative information, leading people to overestimate how upset they would be in response to grand-scale tragedies.

Indeed, previous research suggests that people may sometimes be *more* upset by a tragedy that affects only a handful of individuals than by a broader tragedy. For example, when several miners become trapped deep underground, their individual stories are likely to capture media attention, and the details of their lives and pictures of their families may tear at heartstrings around the world—even while statistics about annual mining deaths fail to provoke public concern. Sherman, Beike, and Ryalls (1999) argue that people may be more emotionally responsive to specific, concrete cases (e.g., three men trapped in a

mine) than to generalized abstractions (e.g., statistics about mining deaths) because the experiential system is engaged more by the former than the latter. Therefore, to the extent that small-scale tragedies are more likely to provoke a focus on the specific individuals affected, people may actually feel worse in response to a disaster that affects few rather than many. Forecasters may overlook this, however, focusing instead on more abstract information about a disaster.

Interestingly, a separate line of research provides evidence that forecasters may be particularly responsive to abstract information when contemplating temporally distant events. Using a variety of measures, Liberman, Sagristano, and Trope (2002, Amit et al., ch. X) demonstrated that people think more abstractly when imagining an event in the distant future versus the near future. Integrating this work with our own recent findings, we would speculate that affective forecasters may be especially sensitive to abstract quantitative information when considering a temporally distant versus imminent event—potentially magnifying forecasting biases for events in the far-off future.

Summary. The research described above suggests that abstract, quantitative information has little influence on actual emotions, but a substantial influence on affective forecasts—not only because of the circumstances in which forecasts are typically made but also because of the rational system's heavy involvement in affective forecasting. As discussed, affective forecasts are typically made in joint evaluation mode, which facilitates attentiveness to quantitative differences between available options. Even when forecasts are made in single evaluation mode though, our experiments (which all used between-subjects designs) demonstrate that affective forecasts are more sensitive to abstract numerical information than are actual emotions. More tentatively, we would

suggest that people may be particularly sensitive to such abstract information when making forecasts for temporally distant versus more imminent events.

Does Forecasting Prime the Rational System?

The diverse lines of research described thus far are remarkably consistent with our theoretical position that the rational system drives affective forecasts, while the experiential system drives actual emotions. Still, with the exception of our recent work on responses to tragedies, the research we have described was developed primarily on the basis of theories other than CEST. It is therefore critical to obtain more direct evidence for our dual systems account of predicted and actual emotions.

With this goal in mind, we examined whether making affective forecasts triggers the operation of the rational system; specifically, we assigned participants to report either affective forecasts or actual emotions and then asked them to complete a seemingly unrelated temporal discounting task (Dunn & Ashton-James, in press). Previous research suggests that activating the experiential system promotes high levels of temporal discounting—such that people are willing to pay much more to receive a good immediately versus at a delay—whereas activating the rational system reduces temporal discounting (e.g., Frederick, 2005). Therefore, if the act of affective forecasting serves to prime the rational system, then people should exhibit lower levels of temporal discounting after reporting affective forecasts versus actual feelings. This is exactly what we found; compared to participants who were asked to report their actual feelings, participants who were asked to report affective forecasts later reported little difference in their willingness to pay for products (e.g., movie vouchers) immediately versus at a delay.[3]

Summary. To the extent that making affective forecasts effectively triggers the rational system, there should be downstream cognitive consequences of affective forecasting, even on seemingly unrelated tasks. Providing one piece of initial support for this proposition, we found that after making affective forecasts, people exhibited reduced temporal discounting, a pattern that implicates the activation of the rational system.

Bridging the Rational-Experiential Divide

If predicted and actual emotions are generated in large part by different systems, as we argue, then there may be little hope for more than occasional, accidental convergence between affective forecasts and emotional experiences. Consistent with this, people seem hard-pressed to learn from their past experiences in making affective forecasts (Wilson, Meyers, & Gilbert, 2001). For example, participants who had just received positive feedback on a social aptitude test failed to use their own emotional response to this event as a guide in predicting how they would feel in the future after receiving very similar forms of positive feedback (Wilson et al., 2001). More broadly, Wilson, Laser, and Stone (1982) found that people possess little insight into the predictors of their own moods. Participants in this study were asked to rate their mood on a daily basis, as well as rating the day's weather, how much exercise they had gotten that day, how much sleep they had gotten the night before, and other predictor variables that could affect mood. At the end of the study, participants were asked to estimate the extent to which each of the predictor variables had been associated with their mood during the study period. In addition, "observers" (students at the same university who did not complete daily ratings) were asked to estimate the relationships that would emerge between the predictor variables and the daily moods of participants in the study.

Amazingly, participants were no more accurate at estimating these relationships—between the predictor variables and their own personal daily moods—than were observers, who had no direct access to participants' emotional experiences. This suggests that in attempting to decipher the determinants of their own moods, individuals must rely heavily on the rational system, which lacks direct access into the workings of the experiential system.

Given this potential for misunderstandings between the rational and experiential systems, how can affective forecasts be improved? One productive strategy may lie in tuning out the rational system. Because the rational system requires mental effort to operate, this system can be distracted from pursuing one task by the demands of another task. Under such conditions, the experiential system may be left to its own devices, producing potential benefits for decision making (Dijksterhuis, 2004; Dijksterhuis, Bos, Nordgren, & van Baaren, 2006; Dijksterhuis & Meurs, 2006; Dijksterhuis & Nordgren, 2006; Dijksterhuis & van Olden, 2006). For example, when students were asked to choose an art poster to take home, they were more satisfied with their poster weeks later if they were distracted before making their choice than if they engaged in conscious deliberation (Dijksterhuis & van Olden, 2006). By tuning out the rational system through distraction, then, the intuitive outputs of the experiential system may receive greater weight in the generation of predicted (as well as actual) emotions, thereby increasing the correspondence between affective forecasts and experiences regarding complex events or outcomes.

The rational system, however, may be effective when it comes to making decisions between relatively simple options. For example, Dijksterhuis et al. (2006) argue

that when consumers choose between simple products (e.g., oven mitts) they should rely on conscious thought (engaging the rational system). Conversely, when consumers choose between complex products (e.g., cars) they should tune out the rational system and rely on unconscious thought (engaging the experiential system). As discussed in the *Analytic vs. Holistic* section, the rational system tends to break the available options down into a few key components, an approach that may work better for simple than complex decisions.

Forecasts might be improved not only by tuning out the rational system but also by *tuning in* the experiential system. Consistent with the idea that these two systems can operate in parallel, an individual who imagines tomorrow's root canal may generate a mental prediction about the level of pain that will be felt tomorrow, while also experiencing a visceral feeling of dread in the present (Clore, 1992; Damasio, 1994; Loewenstein, 1996; Loewenstein & Lerner, 2003; Loewenstein, Weber, Hsee, & Welch, 2001; Schwarz, 1990; Slovic, Finucane, & Peters, 2002). Whereas the rational system may be largely responsible for generating the prediction about expected pain tomorrow, the experiential system may be largely responsible for generating the anticipatory emotion of dread the patient feels today. Often the output provided by these two systems will closely converge; the patient who predicts greater pain tomorrow will typically feel greater dread today. Yet, there are common circumstances in which the outputs of these two systems may diverge (for a review, see Loewenstein & Lerner, 2003), and under such circumstances, the information provided by the two systems will be non-redundant, such that taking both sources into account may allow for a more diagnostic prediction of future feelings.

Drawing on CEST, Rawn and Dunn (2007) examined one such circumstance. Dieters and non-dieters were presented with a gooey chocolate chip cookie. As soon as the cookie was unveiled, two research assistants unobtrusively rated each participant's facial expression, providing a measure of anticipatory emotions (i.e., the emotions experienced in anticipation of devouring the cookie). Participants then predicted how much they would enjoy eating the cookie, providing a measure of expected emotions (i.e., affective forecasts). Finally, participants ate the cookie and reported how much they had actually enjoyed it. For dieters, being presented with a cookie in this way may create a potential conflict between the rational and experiential systems. According to CEST, the rational system is capable of switching quickly to a new set of rules, allowing it to readily adopt a new set of diet-friendly guidelines specifying that cookies and other high-fat foods might not be so delectable after all. The experiential system, by contrast, is more resistant to change, potentially leaving it clinging to the long-held notion that eating a chocolate-chip cookie is one of life's finest pleasures. Consistent with this perspective, Rawn and Dunn (2007) found that participants' anticipatory emotions predicted unique variance in actual enjoyment (above expected emotions), but only among dieters—for whom a divergence in the output of the two systems would be expected. Tentatively, then, we would suggest that people may sometimes be able to more accurately foresee their own future feelings if they pay attention to the flash of affect that the experiential system generates when the future outcome is imagined (though whether such accuracy is always desirable is another question).

Tuning in the experiential system in this way may be easier for events that lie in the near versus distant future; a variety of research suggests that people experience

stronger flashes of affect as an event draws closer in time (Loewenstein & Lerner, 2003). Engaging the experiential system may also be easier when the occurrence of an outcome is relatively certain. As already discussed, when participants in Wilson et al's (2004) "dating game" study were led to believe that there was a strong, but still uncertain, chance that an attractive person would end up selecting them for a date, forecasters exhibited the balanced, objective style characteristic of the rational system. But when participants in a follow-up study were led to believe that the attractive person was virtually certain to select them, forecasters took a more motivated approach, seeing the person in a rosier light, suggesting that the experiential system had begun to kick in. Thus, particularly for imminent, highly certain future events, the experiential system may offer a read-out on the value of the event—which may provide a useful source of information in predicting how the event will actually feel when it happens.

Arguably though, the predictions people make about imminent, highly certain events may be less important for shaping appropriate planning behavior than the predictions they make about more distant, uncertain events. For example, recognizing that one would feel embarrassed about flubbing a conference talk is more likely to promote successful preparatory behavior if this affective forecast is made several days before the talk, as opposed to moments beforehand. Is it ever possible to engage the experiential system in making affective forecasts about relatively remote events? Recent research suggests that the answer may be yes, at least for people who have grown up in cultures where experiential thinking is valued and cultivated. In an elegant series of studies, Lam and his colleagues demonstrated that East Asians are less prone to exhibit focalism than are Westerners because East Asians engage in more holistic thinking,

situating a focal event within its broader context (Lam, Buehler, McFarland, Ross, & Cheung, 2005). For example, when forecasting how they would feel on the first warm day of spring, Euro-Canadian students focused more heavily on the warm weather (the focal event) than Asian students; consequently, only the Euro-Canadian students exhibited the impact bias (Lam et al., 2005, Study 1). Although this research specifically examined cultural differences in holistic vs. analytic thinking, East Asians may also be relatively adept at tuning in the experiential system more broadly when making affective forecasts.

For those of us who rely largely on the rational system in making affective forecasts though, the best bet may lie in training the rational system to better understand the workings of the experiential system; with a more fine-tuned understanding of the inner workings of the experiential system, the rational system would have a stronger information base upon which to predict future emotional experiences. This form of knowledge is captured by Salovey and Mayer's (1990) conceptualization of emotional intelligence, which they define as knowledge about the causes and consequences of one's own and others' experience of emotions, including the automatic processes that underlie the sensory perception, interpretation, experience, and management of emotions. As noted by Epstein (1998b), this approach to EI essentially reflects how well the rational system understands the workings of the experiential system. Hence, we would argue that individuals who are high in EI should be able to generate more accurate affective forecasts.

To test the hypothesis that individuals with more emotionally intelligent rational systems make more accurate affective forecasts, we asked participants who had

previously completed a performance measure of EI (the Mayer-Salovey-Caruso Emotional Intelligence Test; Mayer, Salovey, & Caruso, 2003) to predict how they would feel two days after a political event (Study 1, US presidential election), three weeks after a personal event (Study 1, academic exam), or the morning following a sporting event (Study 2, college basketball game). At the specified time following each event, participants were asked to report how they were actually feeling (Dunn, Brackett, Ashton-James, Schneiderman, & Salovey, 2007). In support of the idea that emotional intelligence should facilitate accurate affective forecasts, we found that there was less discrepancy between the affective forecasts and experiences of individuals high in EI compared to individuals low in EI, across these diverse events.

From our theoretical perspective, affective forecasting accuracy depends in part on the extent to which the rational system has access to complete and correct information about the reality of emotional experiences in everyday life. Consistent with this, we found that forecasting accuracy was most strongly related to the 'emotional management' component of EI (Dunn et al., 2007), which measures knowledge of social, environmental and cognitive factors that influence the intensity and duration of emotional experiences (Mayer & Salovey, 1997). Hence, a viable route to reducing errors in affective forecasting may be to develop one's emotional intelligence so that the rational system has sufficient information upon which to base predictions about emotional experiences.

Summary

The gulf between affective forecasts and experiences may be bridged either by increasing the role of the experiential system in the formulation of affective forecasts, or

by improving the rational system's understanding of the experiential system. Tuning in the experiential system may entail quieting the rational system through distraction (e.g., Dijksterhuis et al, 2006) or directing people's attention to their current affective states as a source of information about their future affective state (Rawn & Dunn, 2007). Alternatively, affective forecasting accuracy may be improved by increasing the "emotional intelligence" of the rational system—that is, improving one's knowledge about the causes and consequences of emotions. Thus, separate strands of research conducted by Dijksterhuis and colleagues and Dunn and colleagues provide support for the viability of a two-systems approach to understanding when forecasts and experiences will converge.

Conclusion and Implications

In view of the recent proliferation of research demonstrating systematic errors in affective forecasting, it is clear that our frequent flights to the emotional future rarely arrive at the correct destination. Previous research has identified a number of seemingly unrelated factors that steer us off course, leading to affective forecasts that either overshoot or undershoot the emotional mark, including immune neglect (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998), focusing illusions (e.g., Dunn, Wilson, & Gilbert, 2003; Schkade & Kahneman, 1998), and empathy gaps (e.g., Loewenstein & Schkade, 1999; Van Boven & Loewenstein, 2005).

Throughout this chapter, we have argued that CEST provides a coherent theoretical framework for understanding the relationship between these seemingly disparate sources of affective forecasting errors. Specifically, we have suggested that discrepancies between affective forecasts and experiences stem in large part from a

tendency for humans to rely heavily on the rational system in making predictions about affective responses that are generated predominantly by the experiential system. Because the rational and experiential systems process information about the world in fundamentally different ways—the rational system is relatively analytic, cold, and conceptual, while the experiential system is relatively holistic, hot, and sensual—errors in affective forecasting should occur to the extent that individuals rely on the rational system in making forecasts about their emotional experiences.

Supporting this idea, we have reviewed several factors that create biases in affective forecasting and have argued that in different ways, each of these variables is associated with reliance upon the rational system. In line with the rational system's analytic style, forecasters tend to pluck a target outcome from its broader contextual framework, focusing on a few key features that distinguish it from other similar outcomes, while largely neglecting background events and distractions, relevant past events, and the temporal context—all of which are relevant to actual emotional experiences. Furthermore, exhibiting the cold, logical approach typical of the rational system, forecasters commonly overlook the motivated processes that will take the sting out of negative events, as well as the hot, visceral factors that will shape their future feelings and behaviors. Forecasters are also highly responsive to abstract quantitative information, consistent with the rational system's sensitivity to abstract numbers, words, and symbols. Of course, our argument is not meant to imply that forecasts are fully rational; the rational system surely plays a less dominant role in driving affective forecasts than in driving some other types of judgments. Our key point is that the rational system appears to play a larger role in shaping affective forecasts than in shaping the

emotional experiences that those forecasts are meant to predict—producing diverse, yet systematic discrepancies between forecasts and experiences.

Such discrepancies may be reduced when this imbalance is corrected. Emerging research suggests that this may be accomplished by usurping the rational system's resources, leaving the experiential system free to take the lead in information processing. As well as tuning out the rational system, forecasters may be able to tune in the experiential system. New research in our lab implies that when people contemplate an impending event, the experiential system produces a flash of affect—detectable in individuals' facial expressions—that in some cases predicts actual emotional experiences above and beyond more rational, thoughtful affective forecasts. Although anyone may be able to learn to tune in to such information, individuals who have been raised in cultures that value experiential thinking may have a leg up in this domain. Finally, individuals who possess strong, verbalizable knowledge about the inner workings of the experiential system also appear to be particularly adept at affective forecasting.

The two-systems account of affective forecasts and experiences that we have proposed in this chapter allows us to go beyond existing research and make novel predictions about potential sources of affective forecasting errors, as well as identifying conditions under which affective forecasting accuracy should be improved. For example, our two-systems perspective suggests that forecasters may often go astray by neglecting emergent properties of future experiences; that is, given the analytic nature of the rational system, forecasters might take a piecemeal approach, selecting a favorite wine and favorite entrée at a restaurant, while giving insufficient weight to the holistic quality of the food-wine pairing.

Our perspective also implies that affective forecasting accuracy may be improved by a number of variables that promote experiential processing or direct attention to the outputs of the experiential system. For example, attention may be subtly directed to experiential cues by the presence of a mirror, which enables visual processing of one's own facial expression. Given that facial expressions of emotion are perceived automatically and often guide judgments without conscious awareness (Murphy & Zajonc, 1993; Winkielman, Berridge, & Wilbarger, 2005), the information provided by one's facial expressions while imagining future events should be automatically integrated into the construction of an affective forecast, potentially improving accuracy.

Our theoretical perspective also leads to the novel prediction that individual difference variables associated with rational versus experiential thinking styles may be correlated with forecasting accuracy. If the discrepancy between affective forecasts and experiences stems from an over-reliance on the rational system to make predictions about phenomena that are processed and generated largely by the experiential system, then seemingly desirable dispositional qualities such as need for cognition may be negatively correlated with affective forecasting accuracy. Need for cognition is a trait associated with a preference for analytic, thorough, logic-based thought and systematic information processing over the use of cognitive short-cuts, intuition, experiential cues, and heuristic processing (Cacioppo & Petty, 1982). Thus, someone who is high in need for cognition would tend to process information using the rational system, while a person with a low need for cognition may rely more heavily on the experiential system (Epstein et al., 1996). Individuals who are high in need for cognition should, therefore, be more

susceptible to affective forecasting errors due to their dispositional tendency to utilize the rational system over the experiential system in information processing.

In conclusion, building on CEST, the two-systems model of affective forecasts and experiences that we have proposed not only provides a broad explanation for diverse sources of error in affective forecasting, but also provides a clear framework upon which to predict and prevent significant errors in affective forecasting. In essence, we posit that predicted emotions are primarily driven by the rational system, while actual emotions are primarily driven by the experiential system. Like an engineer and a poet, or a robot and a puppy, the rational and experiential systems process the world in fundamentally different ways, often leading to divergent outputs despite similar inputs. To the extent that we can encourage the engineer to think like a poet, or program the robot to utilize the experience of the puppy, our affective forecasts and experiences may be reconciled.

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Footnotes

[1]Akin to the distinction between the rational and experiential systems, related dual process accounts draw a parallel distinction between rule-based and associative processing (Smith & DeCoster, 2000; see also Sloman, 1996), systematic vs. heuristic processing (Chaiken, 1980, 1987), information-based vs. experience-based processing (Koriat & Levy-Sadot, 1999), and central vs. peripheral processing (Petty & Cacioppo, 1986).

[2]Individuals may be particularly inclined to overlook past *negative* events when making affective forecasts. According to Taylor's (1991) mobilization-minimization hypothesis, people are quick to respond to negative events and minimize their impact, causing such events to fade from memory quickly. This may help to explain why individuals overlook the disappointments associated with past events (e.g., last year's party) when making forecasts for future events (e.g., the upcoming party). Moreover, the memories associated with past events may be colored by implicit theories (Ross, 1989).When these implicit theories are positive (e.g., parties are fun) they may lead to past events being recalled in a more positive light, which may in turn generate more positive affective forecasts.

[3]One might argue that the act of forecasting simply led people to place greater value on the distant future. However, participants in this experiment were asked to predict how they would feel in the immediate future, not the distant future; specifically, participants were asked to complete the temporal discounting measure after reporting their predicted or actual feelings in response to a Spanish forest fire, as part of the experiment described earlier in the chapter.

Table 1

Comparison of the Experiential and Rational Systems

Experiential	Rational
1. Holistic	1. Analytic
2. Automatic, effortless	2. Intentional, effortful
3. Affective: pleasure-pain oriented (what feels good)	3. Logical: Reason oriented (what is sensible)
4. Associationistic connections	4. Logical connections
5. Behavior mediated by "vibes" from past events	5. Behavior mediated by conscious appraisal of events
6. Encodes reality in concrete images, metaphors, and narratives	6. Encodes reality in abstract symbols, words, and numbers
7. More rapid processing: oriented toward immediate action	7. Slower processing: capacity for long-delayed action
8. Slower and more resistant to change: changes with repetitive or intense experience	8. Changes more rapidly and easily: changes with strength of argument and new evidence
9. More crudely differentiated: broad generalization gradient, stereotypical thinking	9. More highly differentiated
10. More crudely integrated—dissociative, emotional complexes; context specific processing	10. More highly integrated: context-general principles
11. Experienced passively and preconsciously: we believe we are seized by our emotions	11. Experienced actively and consciously: we believe we are in control of our conscious thoughts
12. Self-evidently valid: "experiencing is believing"	12. Require justification via logic and evidence

Note. From *The relational self: Theoretical convergences in psychoanalysis and social psychology* (pp. 111-137, at 123), R.C. Curtis (Ed.), 1992. New York: Guilford Press. Copyright 1992 by Guilford Press. Adapted with permission.