How Cognition Became Hot: Emotions, Decisions and Policy Making

An Interview With Andrea Scarantino (May 2016)

~~Jennifer S. Lerner~~ is Professor of Public Policy and Management at the Harvard Kennedy School. The first psychologist in the history of the Harvard Kennedy School to receive tenure, her work draws insights from psychology, economics, and neuroscience in order to elucidate human judgment and decision making. Together with colleagues, she has developed a theoretical framework that successfully predicts the effects of specific emotions on specific judgment and choice outcomes. Applied widely, the framework has been especially useful in predicting emotion effects on perceptions of risk, economic decisions, and attributions of responsibility. Lerner also pursues two related programs of research. The first examines mechanisms through which accountability and other authority systems shape judgment and choice; the second examines causes and consequences of stress. Across all areas, her work aims to simultaneously expand understanding of how the mind works and expand the evidentiary base for designing policies that maximize human wellbeing. She received her Ph.D. in 1998 from the University of California – Berkeley. Previously a junior faculty member at Carnegie Mellon, Lerner joined the Harvard faculty in 2007.

Where did you grow up? What did your parents do? What were you like as a child? Do you remember what your career dreams were as a young woman, and how you eventually decided to become a psychologist?

Baby Jenn

I grew up in Newton, Massachusetts – a suburb of Boston. My mom describes me as “happy and playful from Day One.” My parents both taught history in the public school system and my dad also worked as the social studies curriculum coordinator for the city. After taking a few years off, my mom retrained to become a social worker specializing in elderly care at a hospital. My maternal grandparents lived with us so my sister and I always had an adult family member at home waiting for us. My grandfather and I were best buddies; he devoted enormous amounts of attention to every plot I cooked up, encouraging and affirming my ideas until he faded from Alzheimer’s Disease. I suspect that the way he took my many ideas seriously, no matter how ill-formed they were, encouraged my present ability to generate hypotheses.

Jenn as a young, enthusiastic eater

Looking back on my childhood, you might say I was an experimenter of the most primitive sort. I regularly conducted “experiments” around the house, often producing disastrous consequences. For example, around age three I tried to set up the right propulsion conditions for my older sister’s tricycle to lift off in flight (with her on it). Sadly, it did not; she needed several stitches to mend from that experiment. Around age five, my friend and I worked every day on developing a series of magic potions that would transform people into banana splits. We felt we came close to success. Around age eight I took apart the TV to see if it could be reassembled in new ways. It could not. The list goes on. My parents punished me for all my misbehavior but also bought me the Curious George books and viewed my behavior as similar to that of the monkey. For as long as I can remember I have always been curious and I have always approached projects with zeal.

In high school I wasn’t an especially devoted student. But I did figure out that I wanted to become a psychologist – an occupation I understood at the time to mean learning how the mind works and helping people with problems. This career goal arose in part because I had been greatly helped by my high school guidance counselor. Specifically, he helped me begin to cope with the challenge of having a serious chronic autoimmune disease, Systemic Lupus Erythematosus, when I was only 16 years old. Suddenly I had to deal with being different from everyone else, having to drop out of sports, and having to manage chronic illness in all areas of my life. And I had to do all this just at the time when fitting in with others, gaining independence from my parents, and performing well academically were paramount in my teenage mind.

Jenn with her sister, Liz

Jenn in elementary school

I remain deeply indebted to that counselor, but I came to learn in college, and while working as a research assistant afterwards, that doing clinical work was not for me. I had a far greater passion for conducting theory-driven research, and I wanted to teach. I literally fell in love with research while working on my honors thesis at the University of Michigan. It was, not surprisingly, a study about psychosocial adjustment to chronic disease among children. It was “mesearch.” When I turned in the completed thesis to the head of the honors psychology program, Professor Al Cain, I described my feeling of sadness that the project could not go on forever. He summed up my feeling perfectly: “Ah, you could have danced all night.”

Between college and graduate school I worked as a research associate and administrator for Professor John Jonides, a cognitive neuroscientist at the University of Michigan. I helped him develop and evaluate the Undergraduate Research Opportunity Program at the University of Michigan, which exists to this day. His dedication to research and teaching excellence, to thinking in analytic ways, and to developing evidence-based solutions for real-world problems continues to inspire me. That experience cemented my goal of becoming a researcher and educator.

You got your PhD in 1998 at the University of California at Berkeley. What are your most positive and your most negative memories of graduate school? Can you briefly trace the history of your intellectual upbringing at Berkeley and as a postdoc?

Jenn with her dog, Chatham, during graduate school

Am I getting too personal if I say that the best memory from graduate school was falling in love with the man who is now my husband, Brian Gill? He was earning his JD/PhD from Berkeley's School of Law at the time. Other positive memories include basking in the beauty of Berkeley's campus, sailing in the Bay with my Psychology Department roommate, Sheryl Ehrlich, and enjoying the vibrancy of the culture. I also loved the call to excellence I experienced, being among so many brilliant and dedicated scientists. I'll spare the reader these poetic memories and turn now to more concrete academic memories.

My first advisor, Phil Tetlock (now at the University of Pennsylvania), inspired me with incisive interdisciplinary perspectives on a wide range of human behavior. His razor-sharp mind produces outstandingly clear and powerful papers of a quality that is rarely matched. I learned a great deal from him about how to write and how to think in multi-dimensional ways. After he left Berkeley for Ohio State, I continued to be productive but had no official advisor for 2 years. Eventually, my interest in judgment and decision making flowed toward understanding the role of emotion but there was no one on the faculty who covered the intersection of decision making and emotion. I was thrilled when the social psychology area made Dacher Keltner an offer to join our faculty, and I patiently waited for him to move from Madison to Berkeley.

I made sure to schedule an appointment with Dacher on the first or second day after his arrival on campus. I still remember walking into his office for the first time with all my prepared notes, explaining my unusual background, proposing my dissertation topic to him, laying out the hypotheses, and asking if he would be willing to chair my committee. To my delight, he agreed! As a sidebar, I don't recommend this high-risk strategy to current graduate students. Most advisors meeting someone for the first time would not agree to chair their dissertation. But the circumstances of my situation necessitated that I cover a lot of ground in our first meeting. As explained earlier, I'd been "advisor-free" (to put it nicely) in the years after Phil left and before Dacher arrived. I had to move quickly if I were ever going to graduate.

Jenn with her husband, Brian, shortly after she gave the 2015 ISRE (Geneva) keynote address

I recall experiencing the joy of working with Dacher to develop the theoretical framework underlying my thesis on emotions and decision-making (more on it below). Dacher is not only brilliant in his own work but also as a mentor. He has the ability to create an intellectually safe space within which one can try out ideas without fear of being shot down. He also helped me to develop a sense of professional confidence at a time when I felt very vulnerable, having been quite physically disabled at various points during graduate school. I had a series of Lupus-related hospitalizations, chronic nerve inflammation that limited my ability to type, walk, etc., and had to use a handicapped electric scooter for several months in order to get around campus. I still remember him saying, "If Stephen Hawking can be highly productive, you can, too." I knew from then on that he was on board.

Other positive memories include learning from the creative and smart Berkeley graduate students in my cohort, especially those who hung out at the Institute for Personality and Social Research (where I, thankfully, had an office). I also had a fabulous roommate from the cognitive neuroscience program, Sheryl, who remains a lifelong buddy. We occasionally hung out with the Stanford psychology students through the annual Berkeley-Stanford talks and also through get-togethers organized by another lifelong buddy, Ellen Levy. She was a cog-neuro doctoral student at Stanford. (Both Ellen and Sheryl are now big whigs in Silicon Valley.) Numerous other faculty including Phil Tetlock, Christina Maslach, Geoff Keppel, Shelley Zedeck, Rob MacCoun, Bob Levenson, Barb Mellers, Tom Tyler, Danny Kahneman (brief overlap), Oliver John, Joe Campos, and Gerry Mendelsohn contributed in meaningful and generous ways to my development. Although they may not all remember me, each one stands in my mind as a shining example of research excellence and dedication to training the next generation. During graduate school I also participated in an intensive summer institute in political psychology, funded by the NSF, and hosted by Ohio State University. This was an

important experience in learning more about the foundations of public policy.

But not all was well during graduate school. My most negative memories include living in financial debt from high medical expenses coupled with insufficient health insurance, being on the “indigent patient list” (yes, real designation in my medical file) for all the pharmaceutical manufacturers of my medicine, feeling afraid that academic institutions would be biased against hiring someone with a chronic disability, and wondering how much longer Berkeley would allow me to keep working on research without a dedicated faculty advisor. The low point of my graduate experience was when I learned that, because of my health, some key faculty believed I would be better off in a less demanding career. It took all the strength I could muster to overcome the low expectations some held. If I had not won a National Science Foundation fellowship, establishing some tangible right to be in the doctoral program and providing me with extra financial support, I don’t know if I would have made it through.

Carnegie Mellon, Pittsburgh

My training did not end in graduate school. Although I had accepted my dream job as an assistant professor in the Department of Social and Decision Sciences at Carnegie Mellon, I was permitted to delay my start so that I could do a postdoc with Shelley Taylor at UCLA. While at UCLA I worked on psychoneuroendocrine processes in emotion and social behavior. This was a phenomenally rewarding experience and I remain extremely grateful to Shelley. We began a wonderful collaboration, which has produced several jointly-authored papers. In addition to learning a great deal of psychoneuroendocrinology from her as well as what E.O. Wilson calls a “consilient” approach to science, I also learned from her that it is possible to be a productive female academic who balances work and family. Of course, many others had demonstrated this but Shelley was the first female advisor/mentor with whom I’d ever worked closely.

In some ways, I have never ceased to be in training. As an assistant (and later associate) professor at Carnegie Mellon, I attended numerous seminars in micro-economics and learned to “speak econ” from the many economists in my home department – the Department of Social and Decision Sciences. Those were years of great growth; my department was replete with intellectual luminaries (e.g., George Loewenstein, Robyn Dawes, and Baruch Fischhoff), who taught me more about the practice of interdisciplinary, consilient science. Carnegie Mellon was and remains an intellectual mecca for the study of judgment and decision making.

Let me back up a bit. You mentioned that your dissertation was on emotions and decision-making. How did you get interested in decision-making and how did the emotions come to play a role in your work? Finally, could you summarize the model of emotions and decision-making you first developed as a graduate student and have fine-tuned throughout the years?

I became interested in decision-making because I saw it as the perfect dependent variable: it reflects the first moments when internal processes meet real world outcomes. Decisions also represent a happy middle-ground between micro and macro processes – the point at which individual psychology intersects with societal-level processes like policy making. Having come of age during the cognitive revolution in psychology, I naturally approached this topic in graduate school at Berkeley by focusing exclusively on cognitive processes.

Jenn with her daughter, Siena (1 year old)

But it progressively dawned on me that a driving force in decision processes was missing. I did not yet know how to label it until I started studying “hot cognition” in the context of moral outrage. I tried numerous times to capture moral outrage – the breakdown of moral reasoning – in the lab using cognitive primes, and I

continuously failed to do so. One day I went to Bob Levenson for advice and he suggested that I would continue to fail at it unless I added the emotions to my model. This was revolutionary and changed my direction. Trite as it may sound, it was an a-ha moment that changed my course.

Once I realized the importance of the emotions, I decided to devote my dissertation to studying the effects of fear and anger on the perception of risk. This decision arose from my observation that most theories addressing affective influences on judgment and choice took a valence-based approach, contrasting the effects of positive versus negative feeling states. These approaches had not specified if and when distinct emotions of the same valence would have different effects on judgment. With the help of Dacher Keltner, I therefore proposed in my dissertation a model of emotion-specific influences on judgment and choice. The model has evolved since we first developed it, but core tenets remain in place. I will reconstruct it here in broad strokes.

Two theoretical approaches provided a foundation for my model (Lerner & Keltner, 2000): Cognitive-appraisal theories of emotion and functional (evolutionary) theories of emotion. From cognitive-appraisal theories (e.g. Lazarus,1991b; Ortony, Clore, & Collins, 1988; Roseman, 1984; Scherer, 1988; Smith & Ellsworth, 1985; Weiner, 1980, 1986), I borrowed the idea that a range of cognitive dimensions (rather than just valence) usefully differentiates emotional experience and effects. From functional theories of emotion, I borrowed the idea that emotions serve an impressive coordination role; they trigger a set of responses (physiology, behavior, experience, and communication) that enable the individual to deal quickly with encountered problems or opportunities (Frijda, 1986; Levenson, 1994; Oatley & Johnson-Laird, 1996). Of particular importance, emotion-related cognition interrupts ongoing cognitive processes and directs attention, memory, and judgement to address the emotion-eliciting event (Johnson-Laird & Oatley, 1992; Lazarus, 1991a; Schwarz, 1990; Simon, 1967; Tooby & Cosmides, 1990).

Drawing on evidence that each specific emotion (a) is defined by a set of central dimensions and (b) directs cognition to address specific problems or opportunities, I hypothesized that each emotion activates a cognitive predisposition to appraise future events in line with the central appraisal dimensions that triggered the emotion – what Dacher and I called an *appraisal tendency*. In short, appraisal tendencies are goal-directed processes through which emotions exert effects on judgement and choice until the emotion-eliciting problem is resolved. To pit the valence and appraisal-tendency approaches against one another, I conducted a series of studies that addressed whether two emotions of the same valence but differing appraisals – anger and fear – would relate in different ways to risk perception.

I hypothesized that they would because fear and anger fall at opposite ends from each other on the two dimensions that had been identified in the cognitive literature on risk perception as key predictors. Specifically, Paul Slovic and colleagues (McDaniels, Axelrod, Cavanagh, & Slovic, 1997; Slovic, 1987; Slovic, Fischhoff, & Lichtenstein, 1986) had identified two cognitive metafactors that reliably determine risk assessments: "unknown risk," defined at the high end by hazards judged to be uncertain, and "dread risk," defined at the high end by perceived lack of individual control. It just so happens that fear arises from appraisals of profound uncertainty – a sense that even such basic needs as safety are uncertain – as well as appraisals of situational control – a sense that factors beyond one's control shape outcomes (Smith & Ellsworth, 1985). By contrast, anger arises from appraisals of certainty and of individual control.

Consistent with the appraisal-tendency hypothesis, my dissertation revealed that fearful people made pessimistic judgments of future events whereas angry people made optimistic judgements. In the discussion, I expanded the proposed model and reviewed evidence supporting social moderators of appraisal-tendency processes. This theoretical grounding has provided the basis for much of my future work. In some ways, you could say that I'm still obsessed with the same set of ideas. I've been delighted to discover that one can find biological correlates for the fact that fear and anger trigger opposing responses to uncertainty. For example, working with Ron Dahl, Ahmad Hariri, and Shelley Taylor (Lerner et al., 2007), we've discovered that facial expressions of fear versus mild anger/indignation reveal opposing neuroendocrine as well as cardiovascular stress responses. The more fear individuals displayed in response to stressors, the higher their cardiovascular and cortisol responses to stress.

By contrast, the more indignation/anger individuals displayed in response to the same stressors, the lower their cortisol levels and cardiovascular responses. As research addressing the role of perceived control in health shows (Seeman, 1999; Taylor, 2003), perceptions of individual control and certainty tend to be adaptive in situations where the contingencies allow some individual control and predictability. Rather than becoming afraid by the social evaluative threat inherent in the stress task (Trier), the indignant individuals maintained a greater sense of control.

To illustrate the overall logic of the Appraisal-Tendency Framework in greater detail, Table 1 (originally developed by Lerner & Keltner, 2000; later updated in Lerner, Li, Valdesolo, & Kassam, 2015) compares predictions for the respective influences of fear and anger on risk perception (negative emotions; left side) and two positive emotions – surprise and pride – on attribution (right side).

Table 1 Two illustrations of the appraisal-tendency framework, originally developed by Lerner & Keltner (2000, 2001) and updated here.[a] Table adapted from Lerner JS, Keltner D. 2000. Beyond valence: toward a model of emotion-specific influences on judgment and choice. *Cogn. Emot.* 14(4):479, table 1, with permission from the publisher

Cognitive appraisal dimensions	Illustrations: negative emotions		Illustrations: positive emotions	
	Anger	Fear	Pride	Surprise
Certainty	High	Low	High	Low
Pleasantness	Low	Low	High	High
Attentional activity	Medium	Medium	High	Medium
Anticipated effort	High	High	Low	Low
Individual control	High	Low	High	Medium
Others' responsibility	High	Medium	Low	High
Appraisal tendency	Perceive negative events as predictable, under human control, and brought about by others	Perceive negative events as unpredictable and under situational control	Perceive positive events as brought about by self	Perceive positive events as unpredictable and brought about by others
Influence on relevant outcome	Influence on risk perception		Influence on attribution	
	Perceive low risk	Perceive high risk	Perceive self as responsible	Perceive others as responsible

[a]Certainty is the degree to which future events seem predictable and comprehensible (high) versus unpredictable and incomprehensible (low). Pleasantness is the degree to which one feels pleasure (high) versus displeasure (low). Attentional activity is the degree to which something draws one's attention (high) versus repels one's attention (low). Control is the degree to which events seem to be brought about by individual agency (high) versus situational agency (low). Anticipated effort is the degree to which physical or mental exertion seems to be needed (high) versus not needed (low). Others' responsibility is the degree to which someone or something other than oneself (high) versus oneself (low) seems to be responsible. We refer interested readers to Smith & Ellsworth (1985) for comprehensive descriptions of each dimension and each emotion's scale values along the dimensions.

In the top panel of the figure, the left column contains six cognitive-appraisal dimensions (e.g. certainty) that differentiate emotions (see Roseman, 1984; Smith & Ellsworth, 1985). For each of the six dimensions, entries indicate the relative position of each emotion (for precise scale values of each emotion on the relevant dimension, see Smith & Ellsworth, 1985). If an emotion is relatively high or low on a given dimension, the dimension is considered central to the definition of that emotion and likely to exert influences on subsequent judgments or choices. In the middle panel, entries indicate the appraisal tendency that is likely to be associated with each emotion. Finally, in the bottom panel, entries indicate predictions for emotion influences on the outcome of interest.

As illustrated in the left side of the figure, fear is defined by three central appraisal themes that are conceptually related to risk perception: uncertainty, unpleasantness, and situational control (e.g. Lazarus, 1991a; Smith & Ellsworth,1985). Drawing on fear's appraisal structure, the model predicts that fear will be associated with the tendency to perceive uncertainty and situational control in new situations and that fearful people will – as a consequence of that appraisal tendency– perceive *greater* risk across new situations. Anger, by contrast, will be associated with the tendency to perceive certainty and individual control in new situations and – as a consequence – to perceive *less* risk across new situations. As illustrated in the right side of Table 1, pride is defined by the central appraisal themes of self-responsibility and pleasantness. The model predicts that pride will therefore be associated with the tendency to perceive the self as responsible for positive events, even in new situations. Surprise, by contrast, will be associated with the tendency to perceive others as responsible, even in new situations.

In a seminal paper with George Loewenstein entitled "The role of affect in decision making" (2003) you have argued that we should distinguish between the impact on decision-making of *immediate emotions* and of *expected emotions*. Could you explain how these two types of affective influences differ?

Sure, I'm happy to explain. *Expected emotion* is a prediction about how one will feel if certain decision outcomes occur. In other words, expected emotion is really a cognition about the future. For example, expected emotion might take the form of a thought about potentially feeling regret if I don't go see a concert just because I am tired. As we explain in the paper, a potential benefit of expected emotion arises from helping to determine an optimal course of action to maximize long term well-being. A potential pitfall arises when expectations are biased because decision making will be commensurately biased. For example, I might think I will deeply regret not going even though that belief is false. The concert may come and go without me, and I will likely forget that I ever worried about whether to go.

Immediate emotion, by contrast, is a feeling experienced at the time of making a decision. The feeling may be conscious or nonconscious. A potential benefit of such emotion is that it can help prioritize information processing, activate rapid behavioral response, and introduce important, but intangible, goals and considerations. For example, the anxiety I experience as I contemplate whether or not to undergo surgery may motivate me to seek out additional information about the surgery that will alleviate my sense of uncertainty. A potential pitfall is that it can propel behavior in directions that are counter to self-interest. For example, the anxiety may be so extreme that it causes me to ruminate without being able to decide in a timely manner. I include below a picture of the model that George Loewenstein and I published in 2003, showing the different types of "emotional" influences.

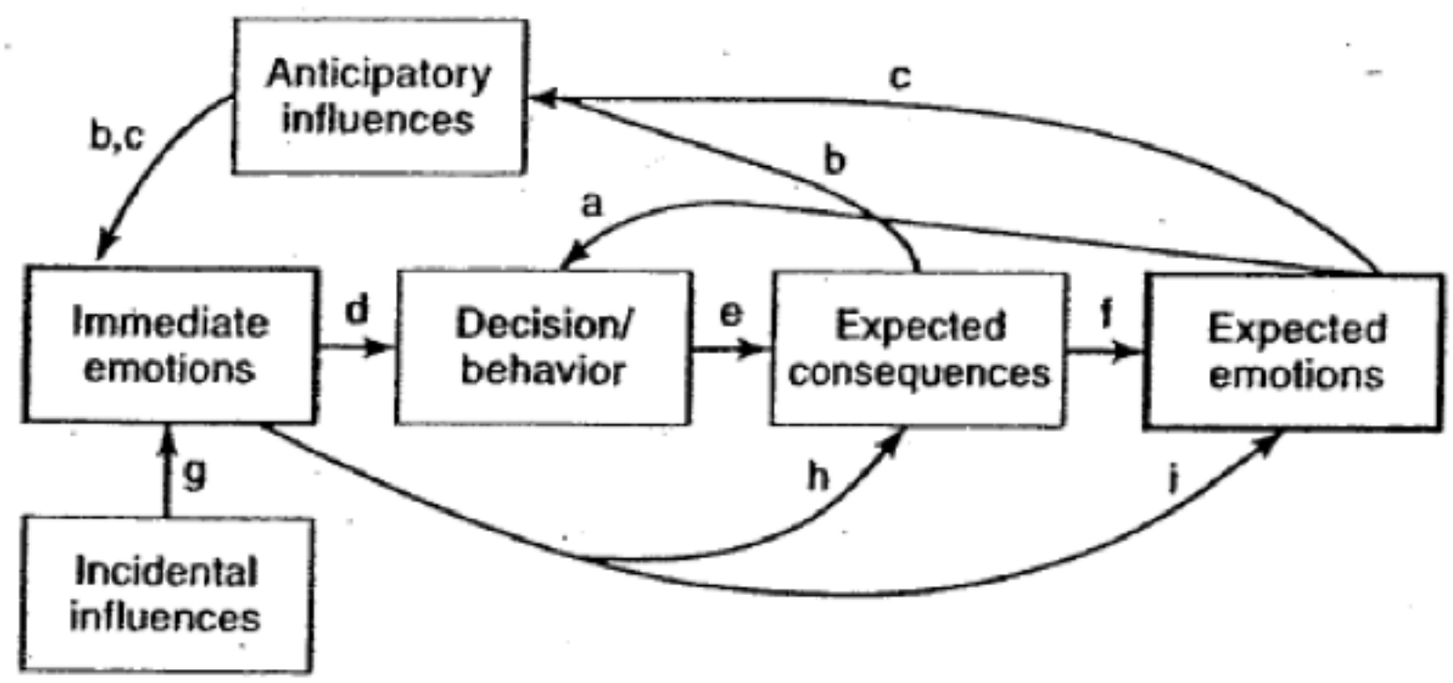


Figure 31.1 Determinants and consequences of immediate and expected emotions.

On the surface, these distinctions might seem like needless semantics. But they are actually critically useful when working at the intersection of economics and psychology. Reading the literature in both fields, one quickly discovers that economists and psychologists often use the same terms with distinct meanings.

For example, economists write about the effect of an "emotion" like regret on decision outcomes even when no one has actually experienced regret. What they mean is rather that subjects made their choice based on the *expectation* of regret had a different choice been made. I'm hoping to avoid sounding too academic here when I say that a psychologist would call that expectation a *cognition* rather than an emotion. These terminological differences lead to cross-purpose talk between fields and make it harder to combine insights from economics and psychology.

Our solution to this problem has been to distinguish between two notions of emotion: the experienced feeling (immediate emotion) and the predicted feeling (expected emotion). We lose no conceptual distinctions, while gaining a precise language to distinguish between what economists and psychologists mean when they talk about emotion. Broadly speaking, the majority of so called "emotion-and-decision-making research" in economics involves expected emotion whereas the majority of so called "emotion-and-decision-making research" in psychology involves immediate emotion.

You recently published in the *Annual Review of Psychology* an overview of the past 35 years of research on emotion and decision-making (co-authored with Ye Li, Piercarlo Valdesolo and Karim Kassam). What is the main take-home message of your overview?

This was the first time in the history of the *Annual Review of Psychology* that a review on emotion and decision making was commissioned. We therefore had a huge amount of literature to take into account. Many take-home messages emerged. (Link to paper here.) Here I will summarize the main developments we observed in the field.

The headline is that emotions constitute potent, pervasive, predictable, sometimes harmful and sometimes beneficial drivers of decision making. Across different domains, important regularities appear in the mechanisms through which emotions influence judgments and choices – i.e., the effects are predictable rather than random. We organized and analyzed what has been learned from the past 35 years of work on emotion and decision making into eight major themes.

The first theme that emerged from this body of work is that immediate *integral emotions* – i.e., the emotions that come about in the course of decision-making and are integral parts of it – often influence decisions in valuable ways. Thus, the conventional Western view that emotions constitute an irrational influence on decision making is a gross overgeneralization. Integral emotions can play a vital role in optimizing choice outcomes. An obvious example of this is that most people would make a decision on whether to accept a marriage proposal by relying on whether contemplating the proposal fills them with love or dread. In this case, the emotions elicited by the decision scenario appear to guide the decision-maker in beneficial ways (marriages may end in dread, but should not start with it!).

Jenn, her sister Liz, father Ed, and mother Joan

Our review points out, however, that the effects of integral emotion are not always beneficial. For example, one may have strong feelings arising from contemplation of a outcome but those feelings may be based on misperceptions. Shakespeare exploits this theme in several comedies. Think of *Twelth Night*. Viola (a woman disguised as "Cesario," a man) becomes a favorite of the noble Orsino, who makes Cesario his page. Viola finds herself falling in love with Orsino —a complicated love to pursue, as Orsino believes her to be a man, and gender norms were far stricter back then. But when Orsino sends Cesario to deliver Orsino's love messages to the unrequiting Olivia, Olivia herself falls for the beautiful young Cesario, believing her to be a man. The love triangle frustrates the reader in just the right way: Viola loves Orsino, Orsino loves Olivia, and Olivia loves Cesario. Everyone is miserable. Then Shakespeare strategically releases the tension as all unravels. In real life, such misperceptions often fail to unravel.

A second theme is that emotions direct thought and action not only for the decision at hand but also for whichever subsequent judgments and decisions arise while the emotion lingers—a process called the carryover of *incidental emotion* (Bodenhausen, 1993, Loewenstein & Lerner, 2003).

Incidental emotions are immediate emotions that occur in the course of decision-making but which are not, unlike integral emotions, normatively relevant for the decision. For example, incidental anger triggered in one situation may automatically elicit a motive to blame in other unrelated situations (Quigley & Tedeschi, 1996; Lerner & Tiedens, 2006; Lerner, Goldberg, & Tetlock, 1998). Here, again, it is important to keep in mind that the effects of incidental emotion are not always uniform. Sometimes incidental emotions can be beneficial if they counter an otherwise undesirable emotional state. I will explain this later in the interview, when talking about ways to counteract unwanted influences of emotion (see DeSteno, Li, Dickens, & Lerner, 2014).

A third theme is that valence is not the only way that emotions influence decision making. As discussed earlier, although most early literature on emotion and judgment and decision making (JDM) implicitly or explicitly took a valence approach, such models cannot account for all influences of affect upon judgment and decision making. Though parsimonious, valence-based models sacrifice specificity while overlooking evidence that emotions of the same valence differ in essential ways. We point out, for example, that emotions of the same valence, such as anger and sadness, are associated with different antecedent appraisals (Smith & Ellsworth, 1985), depths of processing (Bodenhausen et al., 1994b), brain hemispheric activation (Harmon-Jones & Sigelman, 2001), facial expressions (Ekman, 2007), autonomic responses (Levenson et al., 1990), and central nervous system activity (Phelps et al., in press).

As far back as 1998, a review of JDM research in the *Annual Review of Psychology*, although not specifically devoted to exploring emotions and decision making, noted the insufficiency of valence and arousal in predicting JDM outcomes: "Even a two-dimensional model seems inadequate for describing emotional experiences. Anger, sadness, and disgust are all forms of negative affect, and arousal does not capture all of the differences among them…A more detailed approach is required to understand relationships between emotions and decisions (Mellers et al., 1998 , p. 454)."

It is at this juncture that the Appraisal-Tendency Framework (ATF; Lerner & Keltner, 2000; 2001) comes in handy. As described earlier, the ATF systematically links the appraisal processes associated with specific emotions to different judgment and choice outcomes. The ATF points to a clear empirical strategy: research should compare emotions that are highly differentiated in their appraisal themes on judgments/choices that relate to that appraisal theme (Lerner & Keltner, 2000). Han, Lerner, and Keltner (2007) refer to this strategy as the "matching principle." By illuminating the cognitive and motivational processes associated with different emotions, the model brings emotion into the study of JDM in systematic ways, providing a flexible yet specific framework for developing a host of testable hypotheses concerning affect and JDM.

Once again, *appraisal tendencies* are goal-directed processes through which emotions exert effects upon judgments and decisions until the emotion-eliciting problem is resolved (Lerner & Keltner, 2000; 2001). The appraisal-tendency hypothesis predicts that emotion can activate a cognitive predisposition to assess future events in line with the central appraisal dimensions that triggered the emotion (for examples, see Table 1 above). Findings consistent with the ATF (Lerner & Keltner, 2000; 2001) have appeared in many other contexts and created a trend toward use of this approach (for discussion, see Bagneux et al., 2012; Cavanaugh et al., 2007; Han et al., 2007; Horberg et al., 2011; Lerner & Tiedens., 2006; Yates, 2007).

Our *Annual Review* paper also identified three overarching ways in which emotions influence decision making. Themes four through six in the paper take these up sequentially.

The fourth theme identifies ways in which emotions shape decisions via the *content* of thoughts. I've already reviewed above in the section on my dissertation an example of how an emotion can shape the cognitive content of subsequent judgments and decisions. My dissertation (Lerner, 1998) revealed not only that fear and anger exerted opposing effects on the perception of risk but also that appraisals of certainty and controllability mediated those effects (later revised and published as Lerner & Keltner, 2000).

Importantly, these processes are not limited to laboratory studies. We conducted an experiment in the wake of the 9/11 terrorist attacks to test whether these patterns would scale up from individuals in a lab to a population-level effect. Using a nationally-representative sample, U.S. citizens read either a real news story selected to elicit fear (on the threat of anthrax) or a real news story selected to elicit anger (on celebrations of the attacks by some people in Arab countries) and then asked a series of questions about perceived risks and policy preferences (Lerner, Gonzalez, Small, & Fischhoff, 2003). Participants induced with fear perceived greater risk in the world, whereas those induced with anger perceived lower risk, both for events related and unrelated to terrorism. Participants in the anger condition also supported harsher policies against suspected terrorists than did participants in the fear condition.

A fifth theme in the literature addresses ways in which emotions shape decisions via the *depth* of thought – that is, the degree to

Jenn finding the perfect fear induction while visiting South Carolina

which it triggers heuristic/shallow thought versus systematic/deep thought. Similar to other emotion research, early studies focused on effects of positive and negative mood (Schwarz, 1990; Schwarz & Bless, 1991). If emotions serve an adaptive role by signaling when a situation demands additional attention, they hypothesized, then negative mood should signal threat and thus increase vigilant, systematic processing. Positive mood should do the opposite, signaling a safe environment and leading to more heuristic processing. Indeed, numerous studies have shown that people in positive (negative) affective states were more (less) affected by heuristic cues, such as the expertise, attractiveness, or likeability of the source, and the length rather than the quality of the message; they also relied more on stereotypes (e.g., Bless et al., 1990; Bless et al., 1996; Bodenhausen et al., 1994a).

But it is also possible to take a more micro approach. Tiedens and Linton (2001) suggested an alternative explanation for the difference between happy/positive and negative/sad moods in depth of processing: happiness involves appraisals of high certainty and sadness of low certainty. In a series of four studies, they showed that high certainty emotions (e.g., happiness, anger, disgust) increased heuristic processing by increasing reliance on source expertise of a persuasive message as opposed to content, increasing usage of stereotypes, and decreasing attention to argument quality. Further, by manipulating certainty appraisals independently from emotion, they showed that certainty plays a causal role in determining whether people engage in heuristic or systematic processing. Lerner and Tiedens (2006) built on those findings and introduced emotion effects on depth of thought into the ATF framework. Taken together, these lines of research are consistent with the idea that appraisal tendencies shape not only the content, but also the process, of thought (for discussion, see Han et al., 2007).

The sixth theme identifies ways in which emotions shape decisions via goal activation. Work in this area arises from the long-proposed idea that emotions serve an adaptive coordination role, triggering an action tendency along with a set of responses (physiology, behavior, experience, and communication) that enable individuals to deal quickly with encountered problems or opportunities (e.g, Frijda, 1986; Keltner & Gross, 1999; Levenson, 1994; Oatley & Johnson-Laird, 1996; Plutchik, 1980).

Although this work is in its early stages, it appears that emotion-specific action tendencies map onto appraisal themes. For example, given that anxiety is characterized by the appraisal theme of facing uncertain existential threats (Lazarus, 1991), it accompanies the action tendency to reduce uncertainties (Raghunathan & Pham, 1999). Sadness, by contrast, is characterized by the appraisal theme of experiencing irrevocable loss (Lazarus, 1991) and thus accompanies the action tendency to change one's circumstances, perhaps by seeking rewards (Lerner et al., 2004).

Lerner, Small, and Loewenstein (2004) followed this logic in a series of studies that tested the effects of incidental sadness, incidental disgust, and neutral emotion on the *endowment effect* – an economic anomaly in which individuals place more value on a commodity they already own than they themselves would pay to purchase the very same commodity. We hypothesized that disgust, which revolves around the appraisal theme of being too close to a potentially contaminating object or idea (Lazarus, 1991), would evoke an implicit goal to expel current objects and avoid taking in anything new (Rozin et al., 2008).

Consistent with this hypothesis, experimentally-induced incidental disgust reduced selling prices among participants who owned the experimental object (an "expel" goal) and reduced buying prices among participants who did not (an "avoid taking anything in" goal). For sadness, which revolves around the appraisal themes of loss and misfortune, selling what one has presents an opportunity to change one's circumstances, whereas buying new goods also presents an opportunity for change. Consistent with predictions, sadness reduced selling prices but increased buying prices. In sum, incidental disgust eliminated the endowment effect, whereas incidental sadness reversed it. Although hypothesized, mediational mechanisms for the appraisal themes were not explicitly measured, highlighting a need to further test this approach.

Jenn with her husband, Brian, and daughter, Siena during holidays 2014

Han, Lerner, and Zeckhauser (2012) attempted to further test the effects of disgust on implicit goals in the context of the *status quo bias* (SQB), a powerful preference for a current possession as compared to an alternative not yet possessed (Samuelson & Zeckhauser, 1988). Examining this relationship allowed us to pit the effects of the discrete state of disgust against its more general affective dimensions of valence and arousal. A valence-based account would predict that any form of negativity should cause the devaluing of all choice options, preserving the SQB (Forgas, 2003). An arousal-based account would predict disgust to enhance the SQB by amplifying the dominant response option (Foster et al., 1998). By contrast, if the relationship between emotion and decision making is best captured by the *implicit goals* associated with disgust, then participants should expel their current possession for an alternative.

Data supported the latter interpretation. Given the choice between keeping one generic box known to contain office supplies given to them by the experimenters (the status quo) or switching to a different, generic box known to include similar office supplies, participants induced to feel incidental disgust were significantly more likely to choose the other box than were participants induced to feel neutral emotion. Importantly, the precise contents of both boxes were unknown to the participants, so their decisions could not have been swayed by the value associated with particular objects. Supporting the interpretation of the switch in preference as revealing goals that are held only implicitly, this effect eluded participants' awareness. Upon reflecting on their decision to reject the status quo, decision makers fabricated reasons related to the relative desirability of the choice options (e.g., "feels more useful," "makes a more interesting noise").

In Lerner, Li and Weber (2013), we followed similar logic and tested whether the effect of sadness on implicit goals would increase financial impatience, creating a myopic focus on obtaining money immediately instead of later even if obtaining it immediately meant settling for much less money. This focus, we reasoned, would increase temporal discount rates. In three experiments, we randomly assigned participants to incidentally sad- or incidentally neutral-state conditions, and then offered intertemporal choices. Incidental disgust served as a comparison condition. As predicted, incidental sadness significantly increased financial impatience: Relative to median neutral-state participants, median sad-state participants accepted 13% to 34% less money immediately to avoid waiting 3 months for payment. Disgusted participants were not more impatient than neutral participants.

In sum, growing evidence indicates that emotions may indeed shape decisions via at least three different routes – altering the content of thought, altering the depth of thought, and altering implicit goal activation. All three of these areas, of course, represent areas of research in their infancy.

The seventh theme that emerged in the 35 years of research on emotion and decision making involved influences of emotion on interpersonal decision making. This area is one of the least well developed, possibly because interpersonal emotion research is so difficult to conduct. In the *Annual Review*, we highlighted a number of encouraging findings that are likely to gain traction and draw attention to the great need for more work in this domain.

The eighth and final theme we found in the literature involved ways that unwanted effects of emotion on decision making can sometimes be reduced. Although emotion's influences on JDM are not always harmful, a number of strategies have been examined as ways to minimize the deleterious effects of emotions on decision making. These strategies broadly take one of two forms: (a) minimizing the magnitude of the emotional response (e.g., through time delay, reappraisal, or inducing a counteracting emotional state), or (b) insulating the decision process from the emotion (e.g., through crowding out emotion, increasing awareness of misattribution, or modifying the choice architecture). We reviewed each of these in terms of their relative strengths and weaknesses. Here, too, much more research is needed. I am touching on this section only lightly for the present piece because of the relative lack of work in this area.

In an act of extreme synthesis, our *Annual Review* paper attempted to summarize all the findings into one emotion-imbued choice (EIC) model, which accounted for inputs from traditional rational-choice theory as well as from newer emotion research. That is, we sought to synthesize scientific models from respective disciplines engaged in decision research into a unified model that might be useful to psychologists as well as to neo-classical economists. Our model drew inspiration from the risk-as-feelings model (Loewenstein et al., 2001, Figure 3, p. 270) and Loewenstein and Lerner's (2003, Figure 31.1, p. 621) model of the determinants and consequences of immediate and expected emotions. It would take many pages here to explain all the pathways in the entire model, shown below, so instead I refer the interested reader to the *Annual Review* paper. I welcome critiques and comments.

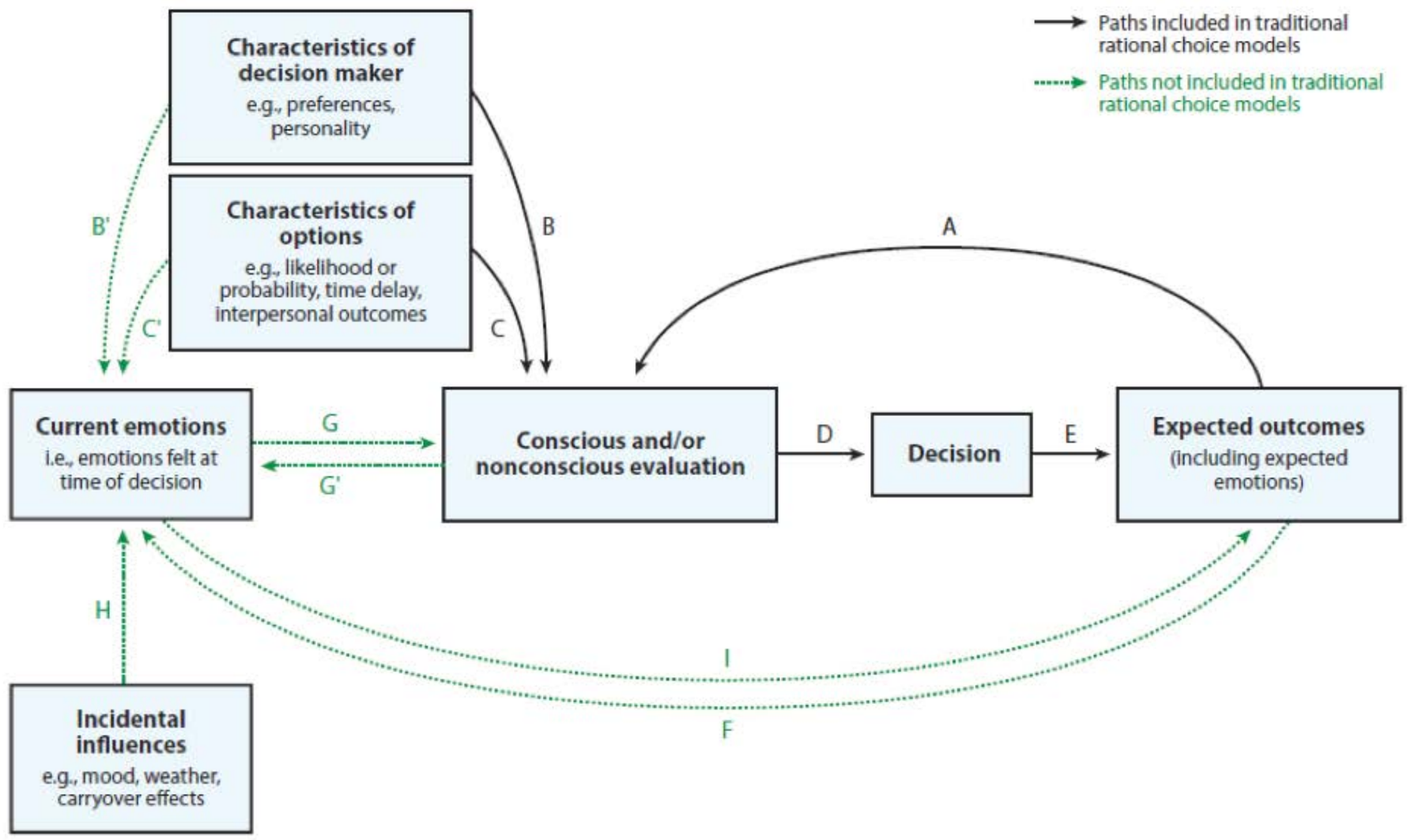


Figure 2

Toward a general model of affective influences on decision making: the emotion-imbued choice model.

We ended the review by synthesizing all the material into a set of concluding ideas:

(1) Emotions and cognitions continually interact in the brain, and each has the potential to bias or improve decision making, depending on the type of decision.

(2) Emotions constitute powerful and predictable drivers of decision making. Across different types of decisions, important regularities appear in the underlying mechanisms through which emotion effects occur. Thus, the effects are not random or epiphenomenal.

(3) Emotions are not necessarily "System 1" heuristic influences on JDM, even though they are initially elicited rapidly, because some emotions (e.g., sadness) trigger "System 2" systematic thought.

(4) Emotions can take the form of integral or incidental influences, with incidental emotions most often producing unwanted, non-conscious influences.

(5) Theories that generate predictions for specific emotions appear to provide more comprehensive accounts of JDM outcomes than do theories that generate predictions for positive versus negative moods.

(6) Although emotions may influence decisions through multiple mechanisms, considerable evidence reveals that effects occur via changes in depth of thought, content of thought, and implicit goals—three mechanisms summarized within the Appraisal-Tendency Framework.

(7) When emotional influences are unwanted, it is difficult to reduce such effects through effort alone.

(8) The field of emotion and decision making is growing at an accelerating rate but is far from mature. Most subareas contain few competing theories, and many areas remain relatively unexplored. Existing studies can raise as many questions as they answer. The research pathways ahead therefore contain many fundamental questions about human behavior, all ripe for study.

(9) Despite the nascent state of research on emotion and decision making, the field has accumulated enough evidence to move toward a general model of affective influences on decision making. Here we propose the EIC model, building on existing models and nesting rational choice models.We hope it provides a useful framework for organizing research in the future.

Thank you for the exhaustive summary! Very helpful indeed. Another one of your areas of expertise concerns the effects of leadership status and accountability on decision-making. Could you share a couple of your most significant discoveries in these two domains?

I am broadly interested in the effects of emotional and social influences on judgment and choice. I've discussed emotional factors at length so far. In terms of social factors, I've concentrated on understanding the effects of accountability because, as Phil Tetlock has eloquently described, it serves as a natural linking variable between micro- and macro-level processes. Here I define accountability as the expectation that one will have to account to a social group, either implicitly or explicitly, for one's behavior.

Accountability also interests me because it serves as a policy lever one can use for improving judgment and decision making, if you apply the right kind of accountability for the right kind of decision process. Together with Phil Tetlock, I reviewed the entire literature on accountability and JDM and developed a flexible-contingency model for predicting when accountability will improve JDM biases, when it will have no effect, and when it will degrade JDM (Lerner & Tetlock, 1999). Of note for emotion researchers, certain kinds of accountability serve as a useful correction for emotion bias. Specifically, when decision makers are pre-decisionally accountable to an unbiased audience, decision makers rely less on incidental feelings in forming a judgment and more on normatively relevant cues (Lerner, Goldberg & Tetlock, 1998).

My interest in leadership status represents an attempt to understand how such naturally-occurring feelings like stress and anxiety are shaped by social-structural status. Contrary to the common belief that organizational leaders have more stress than lower level workers, we predicted and found that leaders have the least amount of stress within the organizations they lead. The reason is that leaders have higher levels of controllability and certainty. We have a few papers examining these patterns, each taking a bio-behavioral approach. Two papers of note include Sherman, Lerner, Josephs, Renshon, & Gross (2015) and Sherman, Lee, Cuddy, Renshon, Oveis, Gross, & Lerner (2012).

A notable feature of your academic profile is that you not only study decision-making in the abstract, but also use your expertise to help design public policies, especially in the areas of health and national security. What are some examples of this more applied research you do?

Jenn posing for the cover of the Kennedy School Magazine

At the Harvard Kennedy School, I teach not only master's and doctoral level graduate students but also senior executive level students. In my executive courses, I regularly have leaders from governments and militaries around the world as well as leaders from private sector organizations that have public impact – everything from pharmaceutical companies to financial firms. Almost all of the applied work I do grows out of teaching these students and responding to their requests. Because there are more interesting opportunities for applied work than I can manage, I try to select only problems in the areas of national security, health, and economic behavior.

These represent three areas that I consider very important and where I feel that the application of behavioral science will yield considerable benefits. To give you one specific example, I work in an ongoing capacity with U.S. Army Special Forces, helping them to harness behavioral insights about emotion and decision making to make their estimates and operations less biased and more accurate. Special Forces represent some of the brightest minds in the Army and they are highly receptive to scientific information. One of the things I learned from them is how to strategically reappraise fear-inducing situations.

For example, one Special Forces officer mentally rehearses all of things that are within his own control, like how exactly he will dial numbers on a key pad and what the key pad will look like when he will call for a medical evacuation of men in his team. This enables him to amplify in his mind all things that are controllable and predictable, presumably crowding out thoughts of all that is uncontrollable and unpredictable. These soldiers had neither been exposed to any of my theories about the cognitive dimensions of fear nor to any of James Gross's theories of reappraisal in emotion regulation, and yet they came up with a strategy that each of our theories would individually predict.

Do highly successful executives tend to share psychological traits, e.g. being low stress under pressure? Also, do you have evidence that what they learn from you helps them make better real world decisions?

We don't yet know whether executives have risen to the top because they have lower stress or if they have lower stress because they are at the top. I suspect both processes hold. For now, all we know is that (1) those of the top excrete lower cortisol and (2) although testosterone level normally predicts higher status attainment within an organization, it does so only if one has low cortisol. (By way of background, cortisol is a stress hormone and testosterone is a hormone from the androgen group, typically higher in dominant males).

But we do have evidence that they learn to make better decisions as a result of taking classes in decision-making. We do pre- and post-test designs to document that they have learned to be, for example, less over-confident and less susceptible to framing effects. Fortunately, students can learn to correct many biases. Generally speaking, our executive students love learning how to design decision environments that make organizations smarter; I hear success stories of application regularly. For example, many of my executive students now use simple linear models with key criteria and weights rather than relying on gut feelings when making hiring decisions.

If a student wanted to become an expert on how decision-making impacts public policy, what would you recommend they do in the way of graduate training and career development?

I would recommend that they first ask themselves if they really want to do the extra work involved with living at the rocky intersection of multiple fields and never in the well-paved center of any of them. Then, assuming they do, I would recommend that they major either in psychology, behavioral economics or decision science as an undergraduate. Next I would recommend that they gain some experience working in the policy world. Finally, I would recommend that they do doctoral training and a postdoc at major universities with excellence in all of the necessary fields to pull this together.

I myself wish I had had more practical experience when I was younger; all I managed by way of practical experience before becoming a professor of public policy was a summer internship as a congressional intern. Now, of course, I soak up every opportunity I can find to interact with practitioners. My newest and most exciting assignments include helping a branch of the U.S. Department of State to develop curriculum for training new ambassadors and serving as a member of the Advisory Panel to the Secretary of the Navy. It the latter capacity, I will be the first behavioral scientist and one of the first women in history to serve on the panel.

I’ve actually written in a more comprehensive way about this career path. My chapter will appear in the forthcoming APA book entitled, “Career Paths in Psychology,” edited by Robert Sternberg. If a reader would like a preprint, just Email me or check my website.

You have written on the role of emotions in foreign policy. Can you use the recent accord with Iran on nuclear proliferation to provide some examples of the role emotions do, and perhaps should, play in international negotiations?

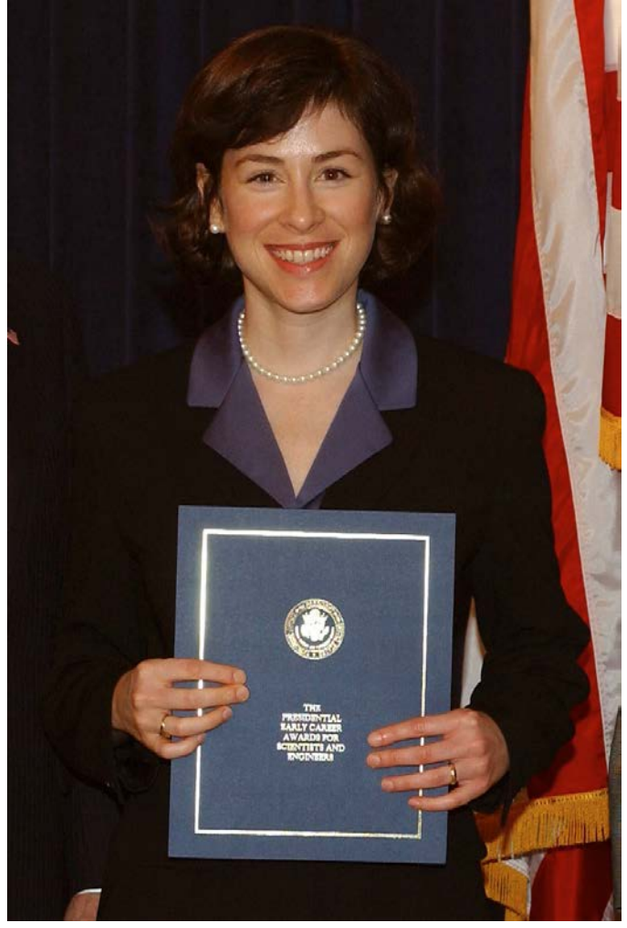
I’d love to better understand the role of emotion in the recent negotiations with Iran but as yet I have not managed to acquire sufficient data. This is a good opportunity to say, however, that I am very opposed to arm-chair speculation.

Working at the Harvard Kennedy School and giving talks at places like the Pentagon, NATO Headquarters, the United Nations, the Institute for Foreign Service, etc. has taught me that there is a big difference between writing on a topic in the abstract and actually advising policy makers. Doing the latter carries much higher stakes and requires extremely careful procedures. Moreover, there is enormous potential for abuse of influence as the hideous American Psychological Association (APA) debacle with torture revealed.

As many readers will recall, APA psychologists worked with officials from the Defense Department and the CIA to basically facilitate the torture of detainees. According to credible reports, this involved issuing loose ethical guidelines that endorsed existing Department of Defense interrogation policies. Specifically, rather than applying APA principles of ethics, it appears that the ethics director of the APA first found out what leaders in the US Army Special Operations Command wanted to do and then he found ways to justify them. I have withdrawn my membership in APA as a result of this episode.

I am humbled by the challenges involved in applying emotion science to foreign policy whether such policies include diplomatic or military action. In fact, I am loathe to comment on foreign policy unless I have examined something from all sides, had it vetted, replicated, and well critiqued. Moreover, I am at present working primarily on the descriptive side, helping decision makers to better understand mind-brain-behavior relationships, rather than on the prescriptive side, recommending particular action.

You are the recipient of several honors for your research achievements, including the National Science Foundation’s Faculty Early Career Development (CAREER) Award and the Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor bestowed by the U.S. government to young scientists and engineers. Most recently, you received the “Sensational Sixty” Award from the National Science Foundation in which NSF recognized the sixty most prominent scientists whose first grants were National Science Foundation graduate fellowships. Do you have any tips to share on how to develop a productive scientific research program early on in one’s career?



Jenn receiving her Presidential Early Career Award at the White House in 2004

Honestly, I am the least likely person to offer such advice. My goal all along has simply been to stay in the game, and to avoid having Lupus put me on the bench. I continue to struggle with bouts of the disease. For example, I've fractured 6 bones in the past 5 years as a result. Lupus, an autoimmune disease in which the body attacks its own tissue, weakens my skeleton among many other effects. For many years, I felt I had to try to hide the disease, for a variety of reasons. I am trying to change that now, and am hoping to create more awareness about the fact that people with disabilities can be full contributors in academia so long as certain accommodations are made and so long as the central nervous system CNS is not affected by the disease.

I never dreamed I would receive this kind of recognition. I hoped only to be employable. Mostly my "strategy," so to speak, has been to work only on important problems and to do the best possible job I can do on them. I figured that I would never have the physical ability to be a mass producer, pumping out hundreds of studies. Instead I aimed to be a selective producer, publishing fewer papers but ones that would advance the field in a truly significant way. I have a few strategies for selecting topics.

One strategy is putting ideas through my own home-grown version of a cross-disciplinary test. Specifically, I have to be able to convince my husband (trained in policy and law), my parents (trained in history and philosophy), my sister (trained in theology) and sometimes even my brother-in-law (trained in aerospace engineering) that what I am studying matters for the world. This does not mean that every question has to matter for their areas of interest but simply that the idea has to matter to an educated person.

Another strategy is to ask myself whether doing a particular study would advance theory in a meaningful way or solve an important practical problem in an meaningful way. Ideally it would do both. With limited time and resources, I cannot afford to pursue a "let's see what happens" approach. My great concern with whether an idea is worth pursuing can sometimes frustrate others who are more eager to work inductively. I don't think that my approach is the best approach. It is simply the one I am able to do.

Finally, in an unexpected way, the fact that I have always felt different (due to Lupus) freed me to do research that is different. I never expected to follow a standard path as a social psychologist in any way, shape, or form. This feeling is hard to explain. The best I can do is to say that, professionally, I've always been a person who can't seem to follow a well-paved path.

Can you describe your typical workday?

My typical workday is actually enormously fun. I am not kidding when I say that each day is an adventure. I am the clichéd kid in a candy store being able to design from scratch all the courses I teach and design from scratch all the research projects I conduct. Mixing all that together with the fact that world leaders are right outside my door creates an energy and excitement I can hardly describe.

That said, here is the mundane list.

Early morning: Wake early, pray and meditate, talk on the phone to members of my support group, eat breakfast with my family, pet our doggie, and go to the gym to exercise in the pool. Late morning to early evening: Read Email, write/edit papers, read Email, eat lunch with students or colleagues, hold research meetings and conference calls, go to faculty meetings, and teach. When reading Email I find at least one exotic invitation per day like "would you be willing to teach our group of ambassadors?" Evening: Eat dinner at home with family. Drive daughter to swim practice or go to parent/community meeting or host graduate students for an event (we are housemasters at Harvard). Read Email. Lament all that I did not accomplish. Write in my journal, transforming lamentation into gratitude. Read fiction, usually aloud with my husband. Go to sleep way too late.

What are your hobbies?

I love to play games with our daughter, walk our dog, read fiction, watch my daughter compete in synchronized swimming meets, read aloud with my husband, meditate, swim, lift weights, and sleep. I also devotedly listen to NPR and read the *New York Times*.

Do you enjoy cooking, and if so do you have a favorite recipe to share?

I am part Jewish and part Italian so loving food comes to me naturally. That said, although I prepare three meals a day, I have no time for gourmet cooking. Here is

my favorite working-mom's recipe for fresh, warm chocolate chip cookies. It involves five full steps but please don't be daunted by the complexity.

Step 1. Send the baby sitter to the grocery store.

Step 2. Have sitter buy frozen pre-made cookie dough.

Step 3. Turn on oven.

Step 4. Put pre-formed cookie dough on cookie sheets & bake in oven.

Step 5. Take cookies out of oven and give to family. Bask in warm glow of domestic bliss.

What are you working on these days?

I have a full plate of empirical projects but the most important project is writing a book proposal. I want to write a book for a general audience on emotion and decision making. There are so many misconceptions in the world that I'd like to clear up, starting with the idea that emotion is necessarily a harmful influence on decision making.

Please list five articles or books that have had a deep influence on your thinking.

Aristotle, Nicomachean Ethics

Charles Darwin, The Expression of Emotion in Man and Animals

E.O. Wilson, Consilience

Herbert Simon, collected works

Thomas Kuhn, The Structure of Scientific Revolutions

What are the most pressing questions we should try to answer in order to better understand the role emotions play in decision-making?

As mentioned above, the field is in its infancy. We know a reasonable amount about how one emotion effects one decision in one individual. We need to extrapolate out from that one careful step at a time until we can model the ways in which multiple emotions shape sequential or parallel decisions in interpersonal and group settings. Then we need to be able to model this at multiple levels of analysis, from the neuron to the neighborhood, as we like to say. And we need to model this across the lifespan, from birth to death. We must also do this across cultures, across historical periods, and across the human-machine interface. We have a lot of work to do!

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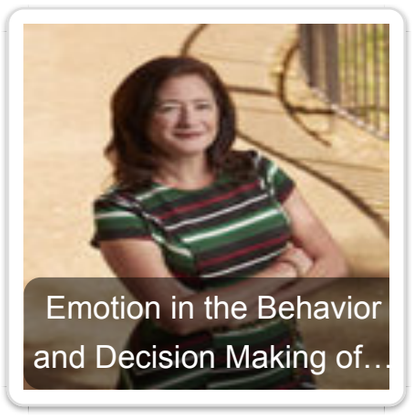

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