Emotion Researcher

ISRE's Sourcebook for Research on Emotion and Affect

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VARIETIES OF GUILT AND THEIR FUNCTIONS

In this issue of Emotion Researcher, we focus on guilt, a potent, multifaceted and profoundly human emotion. We are going to ask four main questions about guilt. First, what is guilt? Second, when and how does guilt develop in children? Third, what are the functions of guilt? Fourth, which evolutionary scenarios best explain the origins of guilt?

An Interview With Jennifer Lerner

Read an interview with Jennifer Lerner, one of the world's leading experts on emotions and decision-making. Jennifer discusses why she came to include emotions in her model of decision-making, and how understanding the interplay between emotions and decisions can help us design better public policies (in the picture, Picasso's 1937 Guernica).

Editor's Column

Get a detailed introduction and preview of the issue by clicking on the post's title!

ISRE Matters

ISRE's President talks about guilt.

Spotlight

This issue's spotlight is on June Gruber, a psychologist from the University of Colorado Boulder who studies the negative side of positive emotions.

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Editor's Column

Andrea Scarantino, Department of Philosophy & Neuroscience Institute, Georgia State University

What is the emotion shared by adulterers, overeaters and survivors? What is the emotion Italian mothers are legendarily skilled at eliciting in their offspring? What is the emotion you should be feeling if you are an ISRE member but have not paid your dues? Guilt, guilt, guilt! We are all familiar with the feelings of guilt. The nagging discomfort, the forlorn rumination on deeds done or not done, the yearning to make amends and restore trust with those we have harmed or with our dejected self. Boy, that hurts.

Guilt has a way to taint otherwise alluring activities, many of which have to do with the pleasures of the senses. Who wants to pursue extra conjugal thrills or eat chocolate cake by the barrel, when guilt is the price to pay? Well, a few of us do. But many more abstain from what they take to be ephemeral rewards, because they are unwilling to pay the long-term costs of a guilty conscience.

And there lies the magic of guilt as an anticipated rather than experienced emotion. In order *not* to feel it, we act to protect our most treasured relationships from injury, and we self-regulate in ways that are good for us in the long run. Without guilt patrolling the self's boundaries, a number of industrious members of society would lie in dark basements in underpants, and gorge on cheese nachos and martinis while binge watching Netflix.

Guilt has a way to turn us from Aesopian grasshoppers who sing all summer into ants who store up food for the winter. But not all is well and good with guilt. Sometimes we feel it in circumstances in which atonement is not an option, because guilt does not come from something we have done, or because what we have done can never be undone. And in such cases guilt is like an unruly watercourse that never dries out, burrowing ever deeper in its bed and muddying everything in its wake.

Primo Levi has described in many of his books his guilt for surviving the concentration camp of Auschwitz – although he often labeled his own feelings as ones of shame, reminding us of the fine line that separates these two forms of self-blame. Levi was one of the approximately 7,000 Italian Jews to be deported to Germany by the Nazi regime. Of these, only a few hundreds were able to return home.

For the remaining 40 years of his life, Levi struggled with "the shadow of a suspicion", namely that "each man is his brother's Cain, that each of us…has usurped his neighbor's place and lived in his stead". It is only a suspicion, he acknowledged, "but it gnaws at us; it has nestled deeply like a woodworm; although unseen from the outside, it gnaws and rasps" (DS, 81-82).

Levi was convinced that in the Lager only "[t]he worst survived, the selfish, the violent, the insensitive, the collaborators…the spies… that is, the fittest; all the best died" (DS, 82). On April 11, 1987, one year after publishing his last heartbreaking excursion down the rabbit hole of the Holocaust – *The Drowned and the Saved* (DS) – Primo Levi died of likely suicide.

In this issue of *Emotion Researcher*, we examine guilt, this potent, multifaceted, and profoundly human emotion, from a variety of research perspectives, as our loyal readers have come to expect. We are going to ask four main questions about guilt. First, what is guilt? Second, when and how does guilt develop in children? Third, what are the functions of guilt? Fourth, which evolutionary scenarios best explain the origins of guilt?

We are going to be assisted in our exploration by some of the major figures in guilt research in contemporary psychology, and by a crop of leading philosophers who are starting to apply game theory to the study of the evolution of guilt with potentially transformative results.

We begin with Michael Lewis' seminal cognitive-attributional theory of guilt, according to which guilt is one of a roster of self-conscious emotions that emerge once we evaluate either our actions or our self as below or above the standards, rules and goals (SRGs) we hold. Roughly, guilt is caused by evaluating one's actions as a failure with respect to the SRGs, whereas shame is caused by evaluating one's self as a whole as a failure with respect to the SRGs. Lewis explores the developmental trajectory of guilt, proposing that it emerges after age 3, when children become capable of gauging their responsibilities with respect to normative standards.

Ent and Baumeister offer us an overview of the possible functions of guilt, as well as their eliciting circumstances. They argue that guilt is produced in three main sets of circumstances: (1) transgressions against others, (2) production of resentment in others even when such resentment is not one's fault and (3) self-regulatory failure. They suggest that many of these forms of guilt have a common thread, namely protecting others or the self from the damage produced by failure to override one's selfish impulses. They conclude with an analysis of how guilt can be managed.

O'Connor brings the resources of game theory to bear on the question of the evolution of guilt. She points out that game theory, which aims to model the evolution of strategic behavior, has long neglected the emotions because it has considered them to be feelings rather than behaviors. As she points out, however, insofar as emotions have a characteristic set of associated behaviors, nothing stands in the way of modeling them game-theoretically. This seems to be the case for guilt, which is associated with apology, gift-giving, self-punishment, and a number of other distinctive behaviors. O'Connor's analysis individuates theoretical circumstances in which the evolution of guilt would be more likely, which include the presence of reciprocation, punishment, repeated interactions and transparency. She notes in conclusion that these circumstances held in early hominid groups.

Deem and Ramsey, finally, discuss whether guilt is likely to have been selected by means of individual selection, group selection or both. Two of the most popular models for the evolution of guilt – the self-recrimination model and the commitment model – assume that guilt produces individual advantages of various sorts. Deem and Ramsey urge readers to consider another possibility, namely that guilt may have evolved because it is good for the group despite being bad for the individual. On this view, the evolution of guilt would follow the model of the evolution of altruism, which under certain game-theoretic circumstances can spread throughout populations in spite of being individually disadvantageous.

In his *ISRE Matters* column, Arvid Kappas, ISRE's President, offers a first-person perspective on guilt, describing first some of the mental games he plays to avoid feeling guilty in his professional dealings, and then his personal take on the thorny issue of collective guilt that many Germans still feel about the Holocaust. Kappas concludes with some reflections on the range of emotions he felt – some positive, some negative – when he observed the public responses in Germany and in the USA to the thousands of refugees arriving in Europe over the past year.

This issue's *Spotlight* is on June Gruber from the University of Colorado Boulder, who studies positive emotions, with special focus on their negative effects. Positive emotions are generally defined in terms of their valence – they feel good! – and the assumption has long been that they are adaptive. Gruber considers a variety of circumstances in which this is not the case, which range from the maladaptive effects of striving for happiness to the maladaptive effects of euphoric states that lead to risky behaviors. Of special note is also the Experts in Emotion Interview Series Gruber directs, which is available to all and a very helpful introduction to the main themes of contemporary emotion science.

Last but not least, this *Emotion Researcher* contains a fascinating interview with Jennifer Lerner, one of the world's leading experts on emotions and decision-making. Jennifer shares numerous poignant memories of her childhood and upbringing, and discusses with admirable candidness what it is like to grow up with a serious chronic autoimmune disease, and how her personal struggles have affected her research trajectory. Jennifer also provides us with a substantive and wide-ranging summary of her highly influential theory of how emotions affect decision-making, concluding with an exploration of how the science of decisions can lead to better public policies in the areas of public health and national security. And do check Jennifer's recipe, which easily takes the cake as the least labor intensive recipe ever shared in the pages of this publication!

As usual, be in touch with comments, ideas for future issues, reports about especially promising young researchers, and whatever else strikes your fancy. To whet your appetite, let me also tell you that a new issue of *Emotion Researcher* is in the works, which focuses on emotions in the law. Enjoy the issue!

Previous Editor's Columns

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ISRE Matters – Guilt Issue

Arvid Kappas, Psychology, Jacobs University Bremen, ISRE's President

Guilty as Charged

May 2016 – It was actually predictable that I may be late in writing this column. Nothing more appropriate than a guilt-ridden column for the *Guilt Issue* of *Emotion Researcher*. But, given that I'm not *that* late, it's not yet full-blown *makes-me-experience-difficulties-sleeping* guilt yet. In fact, as I try to use some serious introspection, I would say that I currently feel nothing more than a vague discomfort combined with the anticipation of more guilt to come if I end up being *really* late. Something like a foreshadowing of guilt. Is it a fear of guilt? No, fear would be too strong a term. A dread of guilt? No, I would describe it perhaps as a generalized state of unease – moderately negative, slightly arousing.

But I can definitely say that part of the reason why I am sitting right now at my computer desk at this late hour, instead of pursuing something more relaxing, is that I want to avoid experiencing future guilt. In other words, what drives me now, as far as I can tell, is not an occurrent state of guilt – the deadline has just passed! – but an anticipation of how guilty I would feel in the future if I let too much time go by after the deadline.

In fact, if I have to be completely honest, things are even more complicated. I have something else to do for which I am already *really* late. And if I wait for too long to start (and finish) this column, then that other task will become even more overdue. So getting this out of the way clears my schedule for the other task (a review if you must know). I am basically hosting in my head a battle of anticipated guilts, and acting so as to prevent the bigger anticipated guilt from actually occurring.

As I try to reconstruct just how I feel at this moment, I remember that I actually did feel guilty today, but on account of something completely different. Earlier this evening, I decided I needed some chicken and fries for dinner to lift my spirit after a difficult day, despite the fact that this would clash with some nutritional deal that I had made with myself (and some economical concerns – I had some leftovers in the fridge that were perfectly OK, but not as satisfying). That made me feel real guilt. What I am now realizing is that writing this column is helping me offset that guilt. Sure, I violated a commitment to healthy living, but look at me now: I am doing the right thing and I won't feel guilty about the late column!

Interestingly, this makes me feel less guilty about the chicken violation through a sort of redemption transfer, a cousin of excitation transfer I guess. Does that sound rational? No, it does not. But these are the everyday mind games I play, and some of you perhaps do so as well. In fact, as I take a broader perspective on this topic, I realize that my day is punctuated by many episodes of the "chicken and column" variety. I do many things to avoid feeling guilty in the future, and these help me feel less guilty in the present about unrelated things. An interesting case of the complex ways in which emotions affect our lives.

I have been pretty forthcoming in confessing my guilt issues, and even referred to some low intensity feelings as guilt when some might deny that they merit the 'guilt' label in the first place. There are people who are very different from me in this respect, in the sense that they deny to ever be driven by guilt. I guess for some people the word 'guilt' is written with a capital g: '*Guilt*'. The sort of Guilt that is elicited by cheating on your partner, committing a crime or

hurting someone.

On the other side of the spectrum, there are some people who extend guilt elicitors to actions for which they are not personally responsible. For example, depending on which culture you come from, you might feel guilt because *your brother* cheated on his partner, or *your mother* committed a crime. Or because you are born from people whose ancestors killed millions of innocent people in Nazi concentration camps. This is a painful issue every German of my generation has had to confront.

Last year, Friedrich von Weizsäcker, who had been German president from 1984 to 1994 died. I will never forget a speech, which I believe I witnessed live on television in 1985, where he addressed the issue of collective guilt of the German people for the horrors of the Nazi regime. Here is a quote from his speech, which I drew from the Wikipedia article also linked above:

"There is no such thing as the guilt or innocence of an entire nation. Guilt is, like innocence, not collective but personal. There is discovered or concealed individual guilt. There is guilt which people acknowledge or deny. […] All of us, whether guilty or not, whether young or old, must accept the past. We are all affected by the consequences and liable for it. […] We Germans must look truth straight in the eye – without embellishment and without distortion. […] There can be no reconciliation without remembrance".

This speech triggered in me and in many of my friends a lot of reflections about the appropriateness of feeling guilty for actions one did not commit. Clearly, in some cultures this would not be complicated to understand at all – but it is particularly in highly independently construed cultures where guilt is a personal and individual thing, but it need not, and we should always be aware that self-construal interacts with feelings of guilt. Obviously. Dealing with these issues it becomes also important that there is a loose connection between guilt, as in being factually responsible, and guilt as in the feeling towards an event or behavior.

Another topic of great interest in this neighborhood concerns the distinction between guilt and other self-conscious emotions like shame. I know that students sometimes get confused when it comes to explaining the difference between shame and guilt and non-emotion specialists do so all the time. Emotions researchers tend to distinguish guilt from shame in terms of how global one's assessment of failure with respect to norms is: we feel guilty about our normatively defective actions, and ashamed when our whole self is appraised as defective.

For me, as an emotion researcher, the last few weeks of news about the refugee crisis in Europe and especially in Germany were a reminder of the complex relationship between guilt and shame. Public responses to the thousands of refugees arriving in Germany produced a wide range of emotions in me. I saw the good, the bad, and the ugly. I was positively impressed that many people went out of their way to volunteer time and money to welcome refugees to Germany. But clearly there was much bad and ugly going on as well, with many episodes of xenophobia and racism, a somber reminder of Germany's dark past. This led to a complicated interplay between shame and guilt. I felt ashamed witnessing acts of verbal and physical violence against refugees in part because I feel guilt regarding German past.

This guilt makes me want members of my nation to atone for its past sins, or at least be sensitive in this regard, and when they do not, I feel shame. An interesting control-condition is offered by my reactions to the same ugliness coming from the USA. When I hear about American voters and politicians treating refugees as human garbage, I feel embarrassed by them, but not necessarily ashamed. What is going on with me when German extremists insult refugees or minorities is what Germans call *Fremdschämen:*

Fremdschämen. Verb. German. Most emotion specialists will have *Schadenfreude* in their toolbox of weird emotions for which no direct translation exists in their language. Well, rejoice, here is another one for your records. *Fremdschämen* is a German word that refers to a sort of shame that you might feel when watching someone else do something very inappropriate or embarrassing. There are elements of vicarious perception, or putting yourself in someone's else's shoes in there, but it is not necessary that the other person is really aware of the situation (yet) or

is acknowledging being ashamed. For those who are familiar with the TV series Frasier – this was much about Fremdschämen. I am not aware of an English translation of the concept. So next time you say: "German language has a term for being amused by the misfortune of another" you can add "but they also have a term for being ashamed for someone else's inappropriate behavior".

So, as we have taken a rollercoaster ride visiting some of my guilt issues small and large (omitting others, like the business with the gym that has not seen me in a long time, professional contexts where I had to use institutional power in a way that makes me cringe as an individual, and many other juicy things that are not fit for print here or elsewhere), you will hopefully have considered some of your own personal guilt issues.

Of course, *you* may not call guilt exactly what *I* call guilt, so you may end up denying being driven by guilt to the extent that I am just because we use words differently. The point is that ordinary language is not great at capturing some of the subtle distinctions between guilt and related phenomena. The fact that there arguably are no specific facial expression, peripheral physiological pattern, or patterns of brain activity characteristic of guilt makes collecting data about guilt even more complex.

This is yet another area in which an interdisciplinary approach can help us by shedding light in the many faces of guilt, and ultimately improve our understanding of what we talk about when we talk about guilt. Some of the best recent interdisciplinary work is covered in this issue of the *Emotion Researcher*, which I very much welcome. There are many other avenues the study of guilt should pursue. Just to mention a few, we should better understand clinical cases of people who do not seem to feel guilt, the role of guilt in psychopathology, the role of guilt as a political and religious issue, the communicative value of guilt expressions, and of course how guilt affects legal responsibility.

What I find most fascinating about guilt, and what I have tried to convey in this column, is how complex and pervasive the impact of guilt is on human motivation. I can conceive of the impact of guilt on motivation using an analogy that we navigate networks of objects that are linked to guilt, or have the potential to be associated with guilt and that attract us or repel us in a field as imagined by Kurt Lewin . This reflection leads me to ask: Do we give guilt its due as a research topic? I am not sure. My impression is that the lack of a stereotypical facial expression has made guilt a less central topic in the history of emotion research than it should have been. But, as this issue of Emotion Researcher testifies, guilt is here to stay. The good news is that I am done with guilt as far as this column is concerned. Now that the screen is full of words, my future guilt has no longer a reason to be. I effectively neutralized it. And that fills me with relief.

Comments are welcome – here, or on our Facebook page. For example, I would be interested to hear whether the concept of Fremdschämen exists in other languages. Please contribute.

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We are assisted in our exploration by some of the major figures in guilt research in contemporary psychology, and by a crop of leading philosophers who are starting to apply game theory to the study of the evolution of guilt with potentially transformative results:

1. Michael Lewis (Psychology, Rutgers Robert Wood Johnson Medical School): The Development of Guilt as Repair in Childhood

2. Michael R. Ent & Roy F. Baumeister (Psychology, Florida State University): The Functions of Guilt

3. Cailin O'Connor (Logic and Philosophy of Science, UC Irvine): Guilt, Games, and Evolution

4. Michael J. Deem & Grant Ramsey (Philosophy, Indiana State University and KU Leuven): The Evolutionary Puzzle of Guilt: Individual or Group Selection?

The Development of Guilt as Repair in Childhood

Michael Lewis, Institute for the Study of Child Development, Rutgers Robert Wood Johnson Medical School

May 2016 – While the developmental issues around emotional life have received some attention, it is the self-conscious emotions and their development that need more consideration and study (Lewis, 2014). Darwin, for one, gave them some attention and suggested that these emotions, unlike the primary emotions, are related to the person's thinking about what others think about them. This put self-reflection at the heart of a whole new class of emotional phenomena that include guilt, shame, pride, hubris, and other self-conscious emotions (Darwin, 1965; Lewis, 1992).

Using the blushing response as a sign of activation of self-conscious emotions, Darwin suggested that self-reflection develops before the third year of life. "It is not the simple act of reflecting on our own appearance," he said, "but the thinking what others think of us, which excites a blush" (Darwin, 1965, p. 325). While Darwin's observations are accurate, he did not explore these emotions further, and since he used blushing as a broad and imprecise measure of activation, he could not distinguish between self-conscious emotions. Doing so required developing a theory of the various cognitions that might be necessary to distinguish between them.

Later research on emotional and cognitive development led to the exploration of the origins of self-reflection through the use of mirror recognition, personal pronouns, and pretend, and to the proposal that the ability to self-reflect emerges in the middle of the second year of life (Lewis & Brooks-Gunn, 1979; Lewis & Michalson, 1983; Lewis & Ramsay, 2004). Moreover, it appears to be related to brain maturation and is associated with increased myelination of the left temporal and frontal lobes (Carmody & Lewis, 2012; Frith & Frith, 2006; Lewis & Carmody, 2008). Of interest is also the nature of self-reflection once it emerges. Some, like Hilgard (1977), have thought about self-reflection as a divided attention, while others, like Mandler (1975) and Csikszenthmihalyi and Csikszenthmihalyi (1988), think about it as a function that can be used or not, namely, while it is available it is not always used, and when used it is combined with other cognitive attributes.

As we explore the topic of self-reflection, a word of caution is in order concerning its developmental appearance. There is considerable confusion about the distinction between self-reflection and feeling. Some action patterns that appear early in development, for example, have been wrongly assumed to require self-reflection. But they do not need it insofar as they occur as part of the early patterns of organized behavior. One example is a disgust face which occurs in the newborn infant as a response to bitter tastes, which is quite different from disgust faces prompted by failure (Lewis, 2014; Mennella, 2012; Rozin, Haidt, & McCauley, 2009). Such early disgust faces are best understood as action patterns not involving self-reflection, although in the course of development these same disgust faces can be associated with cognitive attributes once self-reflection emerges.

A question of continuing interest concerns the distinction between different self-conscious emotions. One approach has centered on self-attribution theories which have as their central feature that different self-conscious emotions emerge from different cognitions (Dweck, 1991; Jones, 1976; Weiner, 1986, for example). Another approach grows out of the idea that there are specific elicitors for the different self-conscious emotions, a view represented by Izard (1977) and Tomkins (1962), and some of the early work of the psychoanalysts. Freud (1953) attempted to distinguish between guilt and shame, but said little about shame (see also Erikson, 1950). When he mentioned shame, he usually did so in the context of drives and impulses, but never provided a clear account of how shame differs from guilt. Freud's discussion of guilt, however, seems to suggest two types of guilt and H.B. Lewis (1971) and Tangney (1995) have tried to measure them both, arguing that one type of guilt is quite similar to shame.

In more recent times, much progress has been made in the distinction between self-conscious emotions. It is now widely accepted that the development of the self-conscious emotions requires the emergence of self-reflection, which occurs in all typically developing children by the end of the second year of life (Lewis, 1992; Lewis & Ramsay, 2004; Lewis, Sullivan, Stanger, & Weiss, 1989; Stipek, Recchia, & McClintic, 1992). Once self-reflection is established, embarrassment, one of the earliest self-conscious emotions, emerges (Lewis, 1995), as do empathy and jealousy (Bischof-Kohler, 1991; Hart & Legerstee, 2010; Preston & de Waal, 2002). These self-conscious emotions require few attributions (Lewis, 1995, 2014) and can be seen by 3 years of age. The self-conscious emotions that require elaborate evaluative abilities – i.e. attributions – demand more cognitive capacity and can be seen only after 3 years of age (Lewis, 1992; Stipek et al., 1992). These attributions include: (1) standards, rules, and goals (SRGs); (2) evaluation of one's success or failure *vis a vis* these SRGs; (3) self or other responsibility for the success or failure. In turn, once the self is deemed responsible, the focus of attention can be either global or specific (Weiner 1986; Dweck 2006).

SRGs are the set of beliefs about what is acceptable for ourselves and others in regard to our actions, thoughts, and emotions. This set of beliefs constitutes the information the child acquires through culturalization and differs across time epochs and among individuals of different ages. The SRGs are internalized and do not necessarily need the presence of an adult to influence behavior.

Evaluations, the second step of attributions, occur when children compare their actions, thoughts, and feelings with their SRGs. This evaluation, which is a function of individual socialization, can lead to a verdict of either success or failure. If passing a test with a C fits one person's standards, they have succeeded, whereas if another receives a B, which is lower than their standards, that person will have failed. Thus, success or failure is dependent on individually held SRGs.

Within the study of attribution, the issue of *internal versus external responsibility* has received much attention. Children may succeed or fail with respect to their SRGs, but they can attribute their success or failure to external causes such as chance or the actions of others. Such attributions do not lead to the self-conscious emotions. For example, winning a toy at a fair by chance will make children happy, but will not make them proud, because they have no personal responsibility for the positive outcome.

Furthermore, *attributions* about the self can be either specific or global, depending on the child's focus of attention. Some children focus on themselves and make attributions about whether they, their whole selves, are a success or a failure. This has been called global focus (Weiner 1986) or performance focus (Dweck 2006). Other children focus on the specific features of their actions, thoughts, or feelings (Weiner 1986), or around features of the task (Dweck 2006). The "grain" of focus is the most important feature in the attributional system in distinguishing between guilt and shame, or between pride and hubris (Lewis, 1992).

Simply, guilt is caused by evaluating one's actions as a failure with respect to the SRGs, whereas shame is caused by evaluating one's self as a whole as a failure with respect to the SRGs. On the other hand, pride is caused by evaluating one's actions as a success with respect to the SRGs, and hubris by evaluating one's self as a whole as a success with respect to the SRGs.

Here, I focus on the distinction between guilt and shame (for further discussion of pride and hubris, see Lewis, in press; Tracy & Robins, 2007; for a discussion of embarrassment, see Lewis, 1995). Shame is the consequence of accepting responsibility for a failure of one's SRGs and for a *global* evaluation of that failure, which results in a damaged self. The phenomenological experience of the person in the grip of shame is a wish to disappear, hide, or die. It is a highly negative and painful experience, often accompanied by increases in cortisol response (Lewis & Ramsay, 2002). Such attributions are likely to result in the disruption of ongoing behavior, confusion in thought, and the inability to speak. The observed behavioral pattern that accompanies shame includes a shrinking of the body, and a collapse of the head.

Guilt, on the other hand, has similar attributions of responsibility, i.e. failure of SRGs, but with the major difference

that the focus of attention is on the task itself, a more specific attribution than that associated with a damaged self. In fact, the focus is on the causes of the failure and possible ways of correcting it. Behaviorally, guilt is mostly characterized by the attempts at repairing the failure. Indeed, it is the attempt to undo the failure which is the hallmark of guilt and distinguishes it from shame (Lewis, 1992).

The difference between focusing on the failing act (guilt) and focusing on the failing self (shame) has been studied in children. In several studies, children from three to five years of age were presented with a series of tasks, some of which were easy to solve while others were more difficult. Children had two minutes to complete each task and a large clock with a moving hand showed them the time left. They were told that if they completed the task before the alarm went off, they had succeeded, but if they did not complete the task on time – the clock went off before they were finished – then they had failed. The experiment was designed so that each child succeeded in an easy and a difficult task, and failed on an easy and difficult task. Our results seem to support the distinction between guilt and shame.

While in general children showed more shame than guilt, they showed more shame when they failed an easy task than when they failed a difficult task (Lewis, Alessandri, & Sullivan, 1992). The assumption here is that failing at an easy task is an indictment of one's global abilities as a person, whereas failing at a difficult task simply shows that one's actions are not up to par on a specific occasion.

Crucially, while shame could be seen in bodily collapse and lack of facial expression, guilt was distinguished by the child's attempts to try and finish the task even after the bell rang, which we took to indicate an attempt to undo the failure on the task. We also found that the children who showed guilt were more likely to be task-focused while children who showed shame were more likely to be performance-focused (Matthews, Sullivan, & Lewis, 2012). It is interesting to note that some children who showed guilt-like behaviors had first shown bodily collapse. This suggests that at times there may be a sequence of emotions to one's responses to failure; first shame, and then guilt.

While we often think of emotions as single events, perhaps we need to think of sequences of emotions which can be manipulated by a self which can choose which emotion to have, like a fugue where thoughts about oneself give rise to emotions, which in turn give rise to other thoughts and other emotions (Lewis, Sullivan, & Michalson, 1984). In addition, some children when they fail at a task do not show any of the self-conscious emotions, in part because they think that their failure was not their fault. Indeed, there is some evidence that males are more likely than females to think that they are not responsible for their failure (Lewis, 1992).

Clearly, feeling guilty allows for children as well as adults to undo their bad thoughts about themselves through action, and thus provide the opportunity for correcting failure with respect to their SRGs. In turn, this helps to serve as a prosocial response since it allows for the consideration of others rather than the self.

To sum up, the development of guilt and shame in children requires: (1) that children have the capacity to think about themselves; (2) that children possess standards, rules, and goals as a function of the socialization within their social nexus; and (3) that they feel responsible for the violation of these SRGs. The difference between these two emotions is in the children's focus; in guilt, on the action to correct the failure, and in shame, on the feeling of a damaged self.

From a developmental perspective, it seems clear that by 3 years of age children are capable of thinking about themselves and at the same time thinking about SRGs and responsibility. Because children have limited SRGs even though they have the capacity to think about themselves, they do not possess the equivalent knowledge about SRGs that adults of their group have. Because of this, as well as other limited cognitive capacities, it is likely that there is a developmental direction with an increase in the guilt/shame ratio with age (Lewis, 2014). In fact, more shame is observed than guilt responses in young children, possibly one reason why it is studied less.

Finally, there is the possibility that some children, through socialization and perhaps temperamental differences (Kochanska, Coy, & Murray, 2001), are more shame prone than guilt prone. For example, Alessandri & Lewis (1993) have found that parents are markedly different in what they say to their children when they fail, some focusing on the

failing actions and reparation, and others focusing on the child's failure as a whole. Socialization that focuses on reparation versus self blame is likely to lead to more guilt-like thoughts rather than thoughts of a damaged self.

An increase in research on the self-conscious emotions is sorely needed, especially as it's related to guilt. The ability to differentiate between self-conscious emotions such as guilt, shame, embarrassment, pride, and hubris offered by the attributional theory I have summarized in this paper allows us to explore the development of each of them in more detail.

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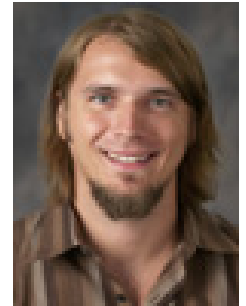Tomkins, S.S. (1962). *Affect, imagery, consciousness: Vol. 1. The positive affects.* New York: Springer.

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The Functions of Guilt

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May 2016 – Humans rely on social relationships and cultural systems for survival and wellbeing. Harming or neglecting one's relationship partners can have dire consequences. Guilt is an aversive emotion that discourages behaviors that could threaten one's ability to get along with others. The of guilt can lead people to repair their relationships and learn from their mistakes; the of guilt can prevent people from damaging their relationships. Therefore, anticipated guilt is particularly functional. Guilt can be elicited by: 1) transgressing against others, 2) failing to self-regulate, or 3) causing resentment among others even when such resentment is not one's fault (e.g., being resented by friends for receiving unfair rewards). Anticipating any of these can also cause guilt. The motivation to minimize guilty feelings can lead people derogate their victims or deny their culpability. More importantly, it can lead people to make amends with their relationship partners and avoid behaviors that might harm their relationships.

Humans rely on social relationships and cultural systems for survival and wellbeing. Harming or neglecting one's relationship partners can have dire consequences. Guilt is an aversive emotion that discourages behaviors that could threaten one's ability to get along with others. The *experience* of guilt can lead people to repair their relationships and learn from their mistakes; the *anticipation* of guilt can prevent people from damaging their relationships. Therefore, anticipated guilt is particularly functional. Guilt can be elicited by: 1) transgressing against others, 2) failing to self-regulate, or 3) causing resentment among others even when such resentment is not one's fault (e.g., being resented by friends for receiving unfair rewards). Anticipating any of these can also cause guilt. The motivation to minimize guilty feelings can lead people derogate their victims or deny their culpability. More importantly, it can lead people to make amends with their relationship partners and avoid behaviors that might harm their relationships.

In what follows, we will address three main issues: the nature of guilt, the functions of guilt, and the management of guilty feelings. As we will argue, guilt helps people to maintain and enhance their relationships with others.

What is Guilt?

Broadly speaking, guilt is a relationship-protecting emotion, which comes about when behaviors that threaten a relationship are either performed or contemplated. Because guilt results from unfavorable assessments of one's behavior or anticipated behavior, it is considered a self-conscious emotion (e.g., Tangney, 1990). Guilt involves evaluating specific behaviors, whereas shame involves evaluating oneself as a person. People might feel shame associated with evaluating specific behaviors if those behaviors lead to a generalized negative self-evaluation. However, people can feel guilty about some of their behaviors without adopting a generalized negative self-evaluation. Feeling bad about specific behaviors can be helpful feedback leading to behavior change; feeling bad about oneself as a whole may be overwhelming and unhelpful as feedback. As a result of this difference in the scope of one's self-evaluation, shame is not associated with the beneficial aspects of guilt (Leith & Baumeister, 1998, Tangney et al., 1996).

Guilt Elicitors

The primary elicitors of guilt are: 1) transgression against others, 2) self-regulatory failure, and 3) causing resentment in others even when such resentment is not one's fault (i.e., no-fault relationship threats). Transgression against others and self-regulatory failure overlap quite a bit in eliciting guilt. Common sources of guilt are harming

others, treating others unfairly, and neglecting one's relationship partners (Baumeister et al., 1994). Thus, a common reason for feeling guilty is failing to override one's selfish impulses for the sake of one's relationships (i.e., failing to self-regulate for the sake other others).

People may sometimes feel guilt associated with failing to self-regulate even if it doesn't directly harm one's relationships (e.g., Tangney, 1992). For example, people may feel guilty after eating a tub of ice cream or spending too much money on superfluous goods. Nevertheless, even those types of self-regulation failure could have social repercussions. If failing to self-regulate could diminish one's ability to gain social status, attract mates, or get along with others, it is likely to cause guilt.

Finally, people may also feel guilt when contemplating threats to one's relationships even when such threats are not one's fault. For example, people may feel guilt associated with turning down a long-time friend's romantic advances. Unrequited love can cause problems within a friendship. Nevertheless, it is often no one's fault.

What Are the Functions of Guilt?

Because guilt is aversive, people are motivated to avoid any behaviors that elicit guilt. The *anticipation* of guilt is beneficial in that it can discourage transgression against others, self-regulatory failure, and indifference to relationship threats. The *experience* of guilt can encourage people to learn from their mistakes and make amends. Thus, both the anticipation of guilt and the experience of guilt can help to foster harmonious interpersonal relationships.

Experiencing and Anticipating Guilt

Experiencing guilt after behaviors that damage one's relationships can encourage people to repair their relationships and avoid such behaviors in the future. Anticipating guilt associated with one's future behavior can prevent people from engaging in relationship-damaging behaviors. For example, people might feel guilty after flirting with a stranger in front of their romantic partner. Those guilty feelings could encourage the flirtatious partner to apologize and make amends. If the flirtatious partner were tempted to flirt in the future, the prior experience of guilt resulting from flirtation could dissuade such relationship-threatening behavior. Thus, the anticipation of guilt is especially beneficial because it can prevent people from transgressing in the first place.

How does emotion affect behavior? Many traditional theories have assumed that the primary function of emotion is to drive behavior. In some cases, emotion does seem to directly cause behavior (e.g., fear causes fleeing, which is adaptive). But a recent review concluded that emotion seems to function primarily as a feedback mechanism that prompts people to reflect on their actions and outcomes, leading to change in subsequent behavior (Baumeister, Vohs, DeWall, & Zhang, 2007). Guilt provides a vivid illustration of emotion functioning as a feedback system. The experience of guilt following a behavior helps to shape rules that guide future behavior (e.g., "if I do X, then I will feel guilty").

When contemplating future behaviors that caused guilt in the past, people may experience automatic affective responses that discourage such behavior (see also, Damasio, 1994). Chang, Smith, Dufwenberg, and Sanfey (2011) found that neural systems associated with the anticipation of guilt were active when participants considered whether to act fairly or selfishly in an economic exchange game. To be sure, the experience of guilt is important in that it can directly motivate people to make amends and can serve as a reference for shaping future behavior. Anticipated guilt is crucial for *preventing* undesirable behavior.

Guilt and Transgressions Against Others

When people transgress against others, they often experience guilty feelings, which encourage them to learn from their mistakes and make amends. When people contemplate future transgressions, they often anticipate guilt, which discourages them from harming others or damaging their relationships. As a result, guilt can stem aggression (Tangney, Wagner, Hill-Barlow, Marschall, & Gramzow, 1996), promote cooperation (de Hooge, Zeelenberg, & Breugelmans, 2007), and generally help people to protect and enhance their interpersonal relationships (for review,

see Baumeister, Stillwell, & Heatherton, 1994). These facts support the view that one of the primary reasons that guilt may have evolved is to protect people's relationships (Baumeister, Stillwell, & Heatherton, 1994; Trivers, 1985).

Guilt is a fairly common experience. Results from an experience sampling study suggest that people feel guilt approximately 13% of their waking lives, though the guilt reported was typically mild (Baumeister, Reis, & Delespaul, 1995). The researchers examined what types of activities and thoughts were associated with guilty feelings and found that participants were most likely to feel guilt when thinking about the self in relation to other people. Such thoughts were accompanied by reports of some guilty feelings close to 40% of the time. This finding underscores the interpersonal nature of guilt. Perhaps surprisingly, participants were no more likely to report feeling guilty when engaged in social interaction than when they were alone. Guilt doesn't seem to wield its influence primarily during the course of interpersonal interaction. Instead, it arises when people reflect on their interactions with others. By doing so, guilt may help people to realize how their past or future behavior may threaten their relationships.

People are especially likely to experience guilt within the context of close relationships. Baumeister, Stillwell, and Heatherton (1995) randomly assigned some participants write autobiographical narratives about an incident in which they made someone feel guilty and some to write about an incident in which someone made them feel guilty. Out of over 100 responses, only one described guilt toward a stranger, while 93% indicated that they had a close relationship with the person in their guilt narrative. Thus, guilt responses are especially attuned to threats to close relationships.

Guilt can benefit relationships by encouraging people to alter their behavior in a pro-relationship fashion. For example, 40% of participants in one study who wrote about a time in which they felt guilty indicated that they learned a lesson from the guilt-inducing incident, and over 20% indicated that they changed their subsequent behavior as a result (Baumeister, Stillwell, & Heatherton, 1995). Guilt is also associated with taking the perspective of one's relationship partners, which can benefit relationships. Leith and Baumeister (1998) instructed participants to describe an interpersonal conflict from their own perspective and then from the perspective of the other person. Participants high in guilt proneness were especially likely to change perspectives between their first and second rendition.

In addition, the first story (from the participant's perspective) was coded for whether the participant mentioned considerations of the other person's perspective even before being prompted to do so by the experimenter. High guilt proneness was associated with spontaneous perspective taking. Thus, guilt proneness is tied to both an ability to engage in perspective taking when prompted as well as a proclivity to do so of one's own accord. Guilt can encourage people to learn from their mistakes, alter relationship-damaging behavior, and consider their relationship partners' perspectives.

People can influence others by inducing guilt. In many circumstances, people spontaneously feel guilt as a result of contemplating their transgressions. However, people are not always aware that they have caused suffering until their victims protest. Victims can induce guilt to elicit apologies, recompense, and behavior change from perpetrators. Guilt may be used as an influence technique especially among people who lack formal authority or social power.

People typically use guilt induction as a means to influence their close relationship partners, rather than acquaintances or strangers. The most common reason that people induce guilt in others is the perception that their close relationship partners fail to pay them adequate attention or spend enough time with them (Baumeister, Stillwell, & Heatherton, 1995). Given that guilt can motivate people to change their behavior, it is not surprising that people would use guilt to influence others. Nevertheless, using guilt as a means of influence has drawbacks.

Baumeister, Stillwell, and Heatherton (1995) found that over a third of participants who wrote about a time in which someone made them feel guilty indicated some level of resentment about being made to feel guilty — but only 2% of participants who wrote about a time in which they induced guilt in another person indicated that the target seemed resentful. Thus, people who use guilt to influence others may unknowingly cause others to resent them. Another side effect of using guilt as an influence technique is that people sometimes feel guilty about making someone else feel

guilty. Although inducing guilt can be used to influence others, it is costly to both the target and the person inducing the guilt.

Guilt and Self-Regulation

Self-regulation involves altering one's responses to bring them up to standards. People often engage in self-regulation to thwart selfish impulses and thereby get along with others. Failure to thwart selfish impulses for the sake of one's relationships can lead to guilt. People may also feel guilt associated with self-control failure that does not directly involve other people, but such guilt tends to be less reliable and often pertains to relationships anyway. Tangney (1992) collected participants' accounts of guilt-inducing episodes and found that the accounts were heavily interpersonal in nature. The lone exception was guilt resulting from failures in dieting. Whether dieting is solitary or interpersonally motivated is debatable: one of the most common reasons that people diet is to appear attractive to others (O'Brien et al., 2007).

Guilt can aid self-regulation. Anticipating guilt associated with self-regulatory failure can motivate people to self-regulate and thereby avoid guilty feelings. Self-regulation may even promote guilt. To experience or anticipate guilt, people often need to examine their behavior, compare it to standards, and consider how they could have behaved differently. Engaging in these types of high-order cognitive processes requires self-regulation (Xu, Bègue, Sauve, & Bushman, 2014).

Engaging in self-regulation temporarily diminishes one's capacity to self-regulate (Baumeister, Bratslavsky, Muraven, & Tice, 1998). The state of temporarily lacking self-regulatory capacity due to prior exertion is known as *ego depletion*. Ent and Baumeister (2016) found that ego depletion attenuated anticipated guilt. Ego-depleted participants said they would feel less guilty if they failed to reach their personal goals in the coming weeks, as compared to non-depleted ones. Follow-up measures (three weeks later) indicated that actual guilt over failing to reach goals was independent of whether they had been depleted. Notably, all participants overestimated how guilty they would feel if they failed to reach their goals — so ego depletion simply reduced the overestimation. The implication is that overestimating future guilt motivates people to self-regulate so as to reach them. When they are depleted (and lack the wherewithal to self-regulate), they discount guilt over future failures.

Guilt and No-Fault Relationship Threats

People may feel guilty even in the absence of actual or anticipated transgression, self-regulatory failure, or direct relationship-threatening behavior. For example, people may feel guilty for surviving events that killed others or for being able to keep their jobs despite coworkers being fired (i.e., survivor guilt; Lifton, 1967; Brockner, Davy, & Carter, 1985). People may also feel guilty for receiving unfair rewards (Austin, McGinn, & Susmilch, 1980). In addition, people who reject would-be lovers tend to feel guilty for doing so (Baumeister, Stillwell, & Wotman, 1993).

No-fault types of guilt can also be explained in terms of the broad relationship-protecting function of guilt. The key point here is that rejecting others, keeping one's job when coworkers are fired, and receiving unfair rewards could all cause resentment from one's relationship partners, and so they could become indirect threats to the relationship. Because a primary function of guilt is to protect one's relationships, such events can cause guilt despite one's lack of culpability. Such guilt may lead people to attend to and mitigate factors that may threaten their relationships. For example, anticipated guilt people might motivate people to refuse unfair rewards for the sake of their relationships. Similarly, experiencing guilt for keeping one's job despite coworkers being fired might motivate people to try to invest in or repair their relationships with former coworkers. Thus, even guilt resulting from no-fault relationship threats can protect one's relationships.

Managing Guilt

All emotionally healthy people have to cope with guilty feelings because of their transgressions, their failures at self-regulation, or because of other threats to their relationships. People may attempt to reduce their guilty feeling follow-

ing a transgression by apologizing to and compensating their victims. But there is a less savory path to the regulation of guilt, and that is to deny culpability or blame the victim. These types of guilt-reduction strategies might mitigate the guilt felt by perpetrators by making them lack a sense of responsibility for any damage to their relationships or by making them devalue the relationships that they may have damaged. Baumeister, Stillwell, and Wotman (1990) had participants write two autobiographical narratives: one from the perspective of a victim and one from the perspective of a perpetrator. Unlike victim narratives, perpetrator narratives tended to regard the transgression as an isolated incident that was understandable and at least partially due to extenuating circumstances. Casting the transgression in that light could help perpetrators to reduce their guilty feelings.

An interesting test case for how people deal with guilt is constituted by situations in which all options lead to guilty feelings. For example, soldiers may be forced to choose between harming others and disobeying authority. This type of tradeoff was the subject of Milgram's (1963) famous obedience studies. People feel guilty over harming others. People may also feel guilt associated with disobeying authority – insofar as disobedience can undermine social institutions, offend authority figures, and violate codes of conduct (e.g., social norms or laws). Individual differences in guilt proneness may affect how people respond to such tradeoffs. Generally speaking, people high in guilt proneness experience guilt more often and more intensely than people low in guilt. Therefore, when they are faced with moral tradeoffs, they may be especially likely to choose the least guilt-inducing option.

Ent and Baumeister (2015) found that people high in guilt proneness were especially likely to disobey authority to prevent another person from having to suffer through an unpleasant task. Participants were in charge of randomly assigning a confederate to engage in a pleasant task (watching videos on the internet) vs. an unpleasant task (proofreading a passage from a statistics book for grammatical errors). The participants were instructed to roll a die – while the experimenter was absent – to decide which task to assign. Then, participants reported to the experimenter which task should be assigned to confederate based on the roll of the die. Unlike participants low in guilt proneness, those high in guilt proneness assigned the pleasant task at a rate greater than chance. This suggests that at least some of the highly guilt-prone participants lied to the experimenter to save the confederate from an unpleasant task. Thus, guilt proneness makes people willing to perform unethical behaviors (lying to authority) in service of a higher moral good (avoiding harm). Choosing the least guilt-inducing option when faced with moral tradeoffs can be a way for people to manage (i.e., minimize) their guilt.

To sum up, people can use lots of strategies to cope with guilty feelings. These strategies may range from apologizing and offering recompense to denying one's culpability and blaming one's victims. In facing moral tradeoffs, people may make decisions based on how much guilt each option would cause and favor the least guilt-inducing option.

Conclusion

Guilt protects relationships by discouraging relationship-damaging behavior and encouraging people to repair their damaged relationships after they have transgressed. People sometimes deliberately induce guilt in others as a means of influence, yet such guilt induction can be costly to one's relationships. The wish to avoid guilt also motivates people to self-regulate, which has positive effects for self and society.

Because guilt is an aversive state, people adopt many strategies to minimize guilt (e.g., making amends, denying culpability, etc.). Although guilt may have a bad reputation among many in the general public, it is an indispensible aspect of human social life — and often a positive force for good behavior and good relationships.

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Guilt, Games, and Evolution

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May 2016 – Evolutionary game theory is a branch of mathematics used to model the evolution of strategic behavior in humans and animals. This framework is not typically used to shed light on the evolution of emotions because emotions are not themselves behaviors.[1] I have previously argued, however, that the huge amount of literature from evolutionary game theory on the evolution of cooperation, altruism, and apology can be used to study the evolution of guilt by showing where and when guilt can provide individual fitness benefits to actors by dint of causing adaptive behaviors (O'Connor, 2016). In that paper, and in subsequent evolutionary game theoretic work, Sarita Rosenstock and I have focused in particular on potential benefits accruing to guilt-prone individuals as the result of costly apology (Rosenstock and O'Connor, unpublished).
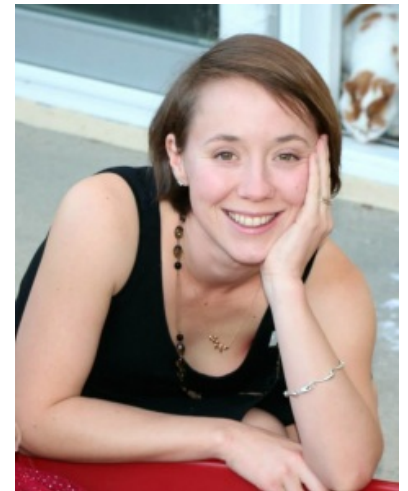
In this article, I will summarize findings from these papers. As I will point out, there are three main sets of results in evolutionary game theory that shed light on the evolution of guilt. First, work on altruism in the prisoner's dilemma game indicates that in environments where actors engage in reciprocation and punishment, guilt can provide individual benefits by promoting altruism. Second, work on the stag hunt shows that when actors are in groups of relatively cooperative partners, and especially when they are engaged in repeated interactions with neighbors, guilt can promote fitness by leading to cooperation. And lastly, results on costly apology show that, perhaps unintuitively, paying costs can allow actors to successfully apologize and to reap the cooperative benefits of doing so. These findings do not fully explain the evolution of guilt, but they do clarify the conditions under which it provides evolutionary benefits. For this reason, they have the potential to help emotions researchers in building more detailed pictures of the evolution of moral emotions.

In the next section, I'll describe the modeling strategy used throughout the paper, and the behaviors typically associated with guilt. Following that, I will describe the models and results from each of the three branches of research mentioned above. In the conclusion, I will argue that these models can help determine conditionals of the form 'if X obtains, guilt can provide individual fitness benefits' that emotion researchers can employ in forming and assessing more detailed accounts of the evolution of guilt.

Evolutionary Game Theory and Guilt

Evolutionary game theoretic models represent populations of actors whose behaviors evolve over time. In particular, there are two elements of these models. Games represent the sorts of strategic interactions that individuals, including humans, encounter in social contexts. (There are games, for example, to represent bargaining, coordination, communication, public goods dilemmas, etc.) Dynamics are rules for how actors who play these games will change their behaviors over time. For example, if actors learn to repeat behaviors that benefit them, dynamics can be used to model this sort of change. In a biological evolutionary scenario, if actors who make successful choices have more offspring, and these offspring have similar behavioral genes, dynamics can be used to represent the spread of these beneficial genes. Throughout this paper, results described will typically be from models using the replicator dynamics – a model of change assuming, simply, that strategies that do better on average tend to spread while those that do worse on average tend to die off.

Games, the first element of evolutionary game theoretic models, have explicit features intended to represent three things: players, strategies, and payoffs. Players correspond to the actors in an evolving population. For our pur-

poses, these will be humans in populations where guilt can potentially evolve. Strategies correspond to the behavioral choices these actors can make. In the models discussed below, strategies will include choices like 'behave altruistically' or 'apologize'. Payoffs correspond to what the players get for combinations of strategies. Two players who coordinate their actions, for example, may receive good payoffs compared to actors who mis-coordinate. Notice that games do not include explicit representations of emotions. In O'Connor (2016), however, I describe a strategy for modeling the evolution of guilt using evolutionary game theoretic models. Rather than focusing on the emotion itself, I focus on the behaviors associated with guilt. When these behaviors provide selective advantages, we can assume that guilt also comes under some level of positive selection pressure by dint of causing them.

To employ this strategy to model the evolution of guilt, then, it will first be necessary to say something about the behaviors associated with guilt. There are three general classes of behavior that are of interest. First, the anticipation of guilt prevents transgressive behavior in humans (Tangney et al., 1996). In particular, guilt-proneness is associated with higher levels of altruism and cooperation, and with decreased norm violation (Regan, 1971; Ketelaar and Tung Au, 2003; Malti and Krettenauer, 2013). Second, the experience of guilt leads humans to engage in reparative behaviors including apology, acceptance of punishment, gift giving, and self punishment (Silfver, 2007; Ohtsubo and Watanabe, 2009; Nelissen and Zeelenberg, 2009). And lastly, humans are impacted by signs of guilt in others. Apology and expressions of guilt and remorse are often met with a decrease in punishing behavior (Gold and Weiner, 2000; Fischbacher and Utikal, 2013; Eisenberg et al., 1997). In the next sections, I will describe evolutionary models of these sorts of behaviors. The idea is that in cases where these behaviors provide evolutionary benefits, guilt has the potential to do so as well.

Before continuing, I should note that this article will not discuss potential group level benefits from guilt. Much work in evolutionary game theory has focused on group level benefits of altruism, and, as noted, altruism is associated with guilt. As such, this may be a promising avenue for using evolutionary modeling to inform the evolution of guilt. For more on group selection and see Deem and Ramsey (2016a) and Deem and Ramsey (2016b) (this issue of *Emotion Researcher*).

The Prisoner's Dilemma and Altruism

The first relevant set of results employs the famous prisoner's dilemma game to model the evolution of altruism. By altruism I mean a behavior in which an actor decreases their own payoff to increases another's. The game works as follows – two players each have two strategies, to 'cooperate' (or behave altruistically) or to 'defect'. Players who jointly cooperate outperform actors who jointly defect. The game is a dilemma, however, because regardless of what the other player does, each player is incentivized by her payoffs to defect. Figure 1 shows a payoff table representing this game. Rows represent the strategies of player one and columns the strategies of player two. Entries to the table show payoffs for any combination of strategies, with player one listed first. Joint cooperation yields a payoff of 2, joint defection 1, defecting against a cooperator yields 3, and cooperating against a defector 0.

		Player 2	
		Cooperate	Defect
Player 1	Cooperate	2,2	0,3
	Defect	3,0	1,1

Figure 1: A payoff table for the prisoner's dilemma. Rows represent player one's strategies and columns represent player two's strategies. Entries represent payoffs with player one listed first.

A Nash equilibrium is a set of strategies in a game where neither player can switch and improve their payoff. For this reason, Nash equilibria are important as predictions of actors' behavior. Once actors play them, they have no incen-

tive to change strategies. The single Nash equilibrium of this game is for both players to defect. Of course, in the real world, humans do exhibit altruistic behavior under many circumstances. This observation has turned the evolution of altruism into a puzzle – although altruistic behavior is *prima facie* not rational from an individual choice perspective, the evolutionary game theoretic literature seeks to explore the conditions under which it can evolve nevertheless.

In this literature, the mechanisms which have been identified that can create individual level benefits for altruism are *reciprocity* and *punishment*. (See Nowak (2006) for an overview of the evolution of altruism in the prisoner's dilemma. Other mechanisms – like group selection, kin selection, and network structure – can also lead to the evolution of altruism, but not via individual benefits, so I do not discuss them here.) In environments where actors reciprocate, when an actor defects group members will respond by defecting right back. In contrast, a cooperator will be met with cooperation. This gives cooperators an evolutionary edge. As for punishment, in groups where actors punish those who defect, the payoff for defection is decreased. This means that, for the right level of punishment, it will no longer be a Nash equilibrium to defect, and so defection is not expected to evolve.

When it comes to guilt, these observations mean that in groups where actors reciprocate and punish, guilt can provide individual fitness benefits by promoting altruistic behaviors. Guilt-prone actors are less likely to behave selfishly, and as a result they reap the benefits of reciprocal altruism. For example, suppose a hunter feels guilty if they keep all the meat they catch, and so they share it with the group. In a reciprocating group, this hunter will receive enough meat in the future to more than make up for the loss, and so ultimately benefits as a result of her prosocial emotion. Likewise, guilt-prone actors can avoid punishment by group members and benefit in that way. If a hunter is expected to share meat, and guilt leads her to do so dependably, she will avoid the negative social consequences of failing to share and at least occasionally getting caught and punished. It is noteworthy that both reciprocity and punishment are observable in human groups and were probably part of the social evolutionary environment for modern humans (Boyd, 2009; Boyd et al. 2003). This means that in this social environment guilt should be expected to come under positive selection pressure by dint of promoting altruistic behavior.

The Stag Hunt and Cooperation

The second set of relevant results employs the stag hunt to model mutually beneficial cooperation. (To be perfectly clear, although 'cooperate' is the conventional name of the prosocial strategy in the prisoner's dilemma, it is more properly thought of as altruistic, while 'stag' in the stag hunt is a truly cooperative strategy.) Imagine two hunters who each have the choice to either hunt for stag or hare. If they hunt stag, they both capture a great deal of meat. Hunting hare generates less bounty. But stag hunting is risky in that it requires both actors to attend to the task for success. As the payoff table in figure 2 shows, mutual stag hunting yields a payoff of 3, hare hunting always yields a payoff of 2, and hunting stag while an opponent hunts hare yields a payoff of 0.

		Player 2	
		Stag	**Hare**
Player 1	**Stag**	3,3	0,2
	Hare	2,0	2,2

Figure 2: A payoff table for the stag hunt.
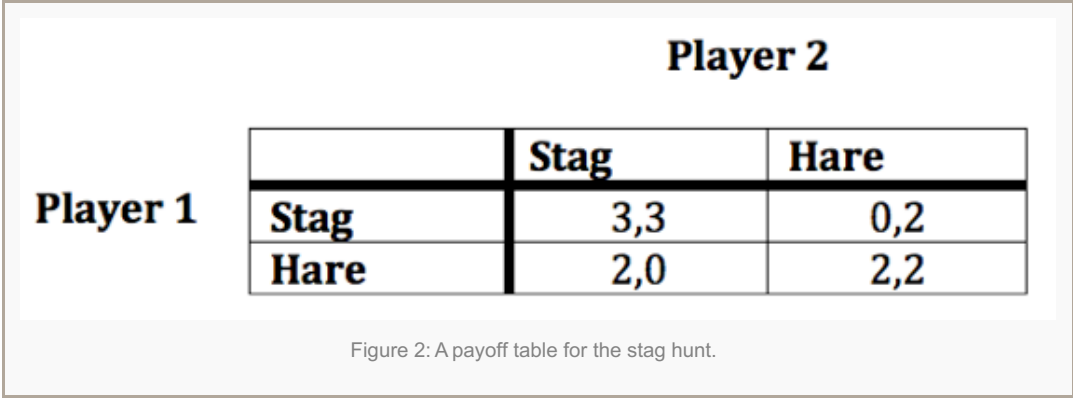
Unlike the case of the prisoner's dilemma, mutual cooperation is a Nash equilibrium of the stag hunt. When two players both hunt stag, they have no incentive to switch strategies. But stag hunters do not do particularly well in populations composed of hare hunters. In other words, for cooperation, and emotions leading to cooperation, to be

beneficial, actors must be in a group with other cooperators. To give an example, imagine an actor who has agreed to work on a joint project – say building a dike – but feels tempted to simply laze around instead. Suppose further that this actor is guilt-prone, and decides to engage in the joint work in spite of the temptation to shirk it. If her partner likewise works on the dike, the guilt-prone actor benefits as a result of her emotion. If her partner does not work on the dike, she suffers. This means that once some level of cooperation is off the ground in human groups, an emotion like guilt can come under positive selection pressure to stabilize and improve cooperation.

Alexander (2007) shows that cooperation in the stag hunt is especially likely to evolve in groups where the same actors tend to interact repeatedly, as in early human groups. See Skyrms (2004) for more on the stag hunt and the evolution of cooperation.

The Iterated Prisoner's Dilemma and Costly Apology

There is one last body of work to discuss, and this is work on the evolution of costly apology. The iterated prisoner's dilemma is a game where actors play the prisoner's dilemma again and again over the course of some number of rounds. In this game, reciprocating strategies, briefly mentioned above, can help actors do well. Reciprocators tend to cooperate with cooperators and defect with defectors. In this way, they gain the benefits of mutual altruism, and avoid being taken advantage of by selfish partners.

What happens, though, when a normally altruistic partner accidentally behaves selfishly? This, in fact, happens all the time in human groups. A normally well behaved child sometimes steals a cookie, a normally fair-dealing work partner cheats because she is under great financial pressure, a normally dependable co-author fabricates data in desperation to publish.

In such cases, a reciprocator will respond by defecting as well, which may lead the original defector to reciprocate against this new defection, etc. In other words, actors who reciprocate can sometimes get stuck in spirals of mutual revenge, leading them both to poor outcomes. For example, suppose a hunter fails to share meat because they are especially hungry, or in a bad mood, or distracted. If a partner then refuses to share meat on the next hunt as a result, the mutually altruistic relationship they have may unravel, hurting them both. One solution to this problem is apology. In models of the iterated prisoner's dilemma, apologies can help solve the retribution problem just described. But, in order to be successful, these apologies must be costly (Okamoto and Matsumura, 2000; Ohtsubo and Watanabe, 2009; Ho, 2012; Han et al., 2013), hard to fake, or some combination of costly and hard to fake (O'-Connor, 2016).

Why is this the case? When actors can apologize cost-free, selfish types can defect against a partner, apologize, and defect again the next day. I will call these actors fake apologizers, or 'fakers'. When enough fakers are in a population, there is no reason to trust an apology one receives, because such apologies do not necessarily mean that your partner will behave altruistically next time. If actors pay some cost to apologize things are slightly different, though. For an altruistic type engaged in mutual altruism, the benefits of apologizing are enormous. Upon apologizing they, and their partner, will continue to reap the benefits of mutual altruism over the course of a long, fruitful engagement. For a selfish type, the benefits of issuing an apology are relatively small. They will manage to take advantage of their partner again, but after doing so will have to apologize once more to avoid negative reciprocation. This means that altruists gain a disproportionate benefit for apologizing. When the right costs are introduced, only altruists will still be willing to apologize, because it will no longer be worthwhile for fakers to bother paying the costs to regain the trust of their partner.

Consider the following (silly) example to drive this home. Bob works for Allison making cupcakes, and, as a payment, receives one cupcake every day. On Friday he steals an extra cupcake. Allison is tempted to fire him, but Bob begs forgiveness. He insists that he will clean the entire cupcake factory to prove his remorse is real. If he were planning to steal again the following day, it would not be worthwhile for Bob to pay this cost. (One extra cupcake is not worth the benefit of cleaning an entire factory.) If, however, Bob plans to keep to the agreement and receive a cupcake every day for the rest of his working life, cleaning the factory is a small price to pay. Under these conditions,

strategies for costly apology can benefit individuals, and so can evolve.

How does guilt factor in? Remember that empirical work on guilt shows that it causes a suite of costly behaviors such as self-punishment, gift giving, and acceptance of punishment. All of these can count as costs that ensure genuine apology. If a group member observes such costly behavior, she has reason to trust the apologizer. So, unintuitively, paying these costs may actually benefit guilty individuals. Under these conditions, costly apology, and guilt, can evolve.

Note, though, that these costs are still detrimental to those who pay them. What if guilt-prone actors, who intend to behave altruistically in the future as a result of their moral emotional tendencies, could somehow convince others that their apologies are real without paying costs to do so? This possibility is related to work by economist Robert Frank. He argued that moral emotions evolved as honest signals of cooperative intent in humans (Frank, 1988). The idea is that moral emotions are hard to fake, and so can be used to pick good altruistic partners. In O'Connor (2016), I point out that if guilt allows actors to honestly signal their remorse upon defection, it can evolve to promote cost free apology as well. The idea here is that after Bob steals the extra cupcake, he apologizes and professes his guilt. If Allison can actually tell that he really feels guilty, i.e., if his emotional signal is unfakeable, she can trust him because guilt-prone people do, in fact, tend to behave altruistically.

The problem with this account is that guilt, unlike many other emotions (joy, fear, anger), is not associated with stereotypical facial and body postures. In other words, it is at least somewhat fakeable. For this reason in O'Connor (2016) and in Rosenstock and O'Connor (unpublished), we explore models where apologies may be both costly *and* somewhat hard to fake. The idea is that if people are even a little bit able to read each others' guilt, this may allow for the evolution of guilty apology that is only a little bit costly. (This builds off of work by Huttegger et al. (2015) arguing that costly signalers may employ lower costs if their signals are also somewhat hard to fake.)

To make this third possibility for guilty apology clear, imagine that Bob again steals the cupcake and apologizes profusely, saying that he feels guilty. And suppose that if Bob really does feel guilty, he will be somewhat better at convincing Allison that he feels guilty. If so, a strategy where he pays a smaller cost – cleaning just the floor in the cupcake room instead of the entire factory – and she accepts his apology, will be able to evolve.

In Rosenstock and O'Connor (2016), we look in detail at the conditions under which such partially costly and partially honest apologies are likely to evolve. In doing so, we clarify the conditions under which guilt will come under positive selection pressure by dint of leading to apology. When guilt is easy to fake, costs can, indeed, allow guilty apology to evolve by stopping fakers. But these costs always inhibit the evolution of guilt, at least to some degree. When guilt is harder to fake, costs are unnecessary for the evolution of guilty apology. The better humans are at reading each other, the better the evolvability of guilty apology. In all cases, guilty apology provides bigger benefits when actors are involved in long, repeated interactions. This is because those that apologize are situated to reap larger benefits from doing so.

Conclusion

The body of work just described can be employed by emotions researchers to clarify, improve, and assess their detailed and more realistic accounts of the evolution of guilt in humans. In particular, game-theoretic research on guilt has individuated circumstances in which guilt can be individually advantageous. These circumstances can be summarized through a set of conditionals of this form: "Ceteris paribus, if circumstances X apply, guilt produces individual fitness benefits and is more likely to evolve'. To summarize once more, these circumstances are that actors reciprocate, punish, are generally cooperative, repeat interactions with the same neighbors, and, for the purposes of apology, engage in long repeated interactions and are somewhat able to read each others emotions. It is suggestive that many of these conditions held in early hominid groups.

There is one last thing that must be mentioned. Cultural evolution was almost certainly a factor shaping the biological evolution of guilt. Furthermore, many researchers have pointed out that the production of guilt is culturally

mediated in that it is sensitive to cultural norms. The models described here do not include any sort of gene-culture co-evolution, nor do they explicitly include cultural features. This, however, does not really pose a problem given the proposed purpose of these models. This is because the conditions under which guilt provides individual fitness benefits can be a result of either the natural or the social environment. Furthermore, even if guilt is culturally produced, and spreads via cultural evolution, the same models provide insight into where and whether this is expected to occur.

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[1] The indirect evolutionary approach in economics focuses on the evolution of preferences, but these are not exactly emotions.

The Evolutionary Puzzle of Guilt: Individual or Group Selection?

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May 2016 – Some unpleasant emotions, like fear and disgust, appear straightforwardly susceptible to evolutionary explanation on account of the benefits they seem to provide to individuals. But guilt is more puzzling in this respect. Like other unpleasant emotions, guilt is often associated with a host of negative effects on the individual, such as psychological suffering and social withdrawal (Harder 1995; Luyten et al. 2002). Moreover, many guilt-induced behaviors, such as revealing one's offenses and placing oneself before the mercy of others, could levy a cost to individuals that is not outweighed by guilt's benefits. Supposing there is an evolutionary story to tell about the origins of guilt, the question is how such negative effects were sufficiently outweighed by the potential fitness payoffs that guilt might have yielded to individuals. In this article, we consider which forms of evolution could have resulted in guilt, and whether current evidence can tell us which form of evolution most likely occurred.

There are two forms of evolutionary selection on which we might draw when explaining guilt, individual selection and group selection. Individual selection occurs when individuals in a population vary from one another with respect to some trait, and some of this variation is fitness-affecting and heritable. The traits in this case are individual-level traits, and the selection occurs within groups or populations of individuals, leading to increased frequency of some traits and a decrease of others within the populations. Much of evolution occurs in this way.

But there is also a form of evolution that operates at a group level. The idea here is that *groups* of individuals exhibit traits and can fare better or worse than other groups because of these traits. Although groups and their individual members can sometimes exhibit the same property (e.g., a group of wildebeest might be fast when all or most of its members are fast), groups frequently exhibit traits no individual organism can bear, such as sex ratio (the proportion of males and females). Things get interesting when a trait is *selected against* at the individual level, but *selected for* at the group level. Such a trait benefits the group and helps it prosper, even though it is not in the evolutionary interest of individuals to bear it.

One such trait with these characteristics may be biologically altruistic behavior. In this case, it might not on balance be biologically advantageous for individual organisms to exhibit biologically altruistic behavior, but it might be biologically advantageous for the group to be composed of altruistic individuals. If the group-level selection pressure is strong enough, the altruistic trait can spread throughout the species in spite of its individually-maladaptive character. This is the conclusion reached by Darwin in his (1871) *Descent of Man* when he argued that brave warriors could evolve because warring groups with brave warriors will conquer groups without—or with fewer—brave warriors, even if there is an individual-level fitness cost to being brave. Contemporary work on altruism draws similar conclusions with respect to strong group-level selection (Sober & Wilson 1998).

Group selection, however, has a fraught history, with some challenging the tenability of selection at a level higher than that of genes or individuals (see Okasha (2006) for a general overview of this debate). But the consensus position today among biologists and philosophers of biology is that group selection does occur; the main debate concerns how strong a force it is in nature. For our purposes here, we need only assume that group selection explana-

tions can be tenable.

Returning to the subject of guilt, our main question here is whether guilt is likely to have been selected for at the individual level, at the group level, or both. Might it be individually advantageous to be guilt prone? Or is guilt proneness similar to a biologically altruistic trait in that it might be biologically disadvantageous for individuals, but good for the group?

One way to advance an answer to this question is through the use of evolutionary game theory. On the evolutionary game theoretical approach, the conditions and strategies for interaction among players are pre-specified as elements of a mathematical model. On the basis of this model, determinate conclusions can be reached with respect to the evolvability of a particular behavioral trait among the players. O'Connor (2016a) and O'Connor (2016b, this issue of *Emotion Researcher*) utilize this approach to determine under what specifiable conditions guilt could evolve at the individual level.

Our explanatory approach here, however, diverges from the game theoretical approach. Rather than specify the conditions under which guilt could evolve at the individual or group level, we begin by querying the clinical, empirical, and legal literatures on guilt in order to arrive an adequate understanding of guilt's motivational profile and the role it plays in human interpersonal contexts. We then consider what can be inferred about the evolutionary function of guilt and whether guilt was favored at the individual level or the group level. Our approach should not be seen standing in opposition to the game theoretical approach; rather, each approach should be viewed as a potential complement to the other.

The Nature of Guilt

Subjects of clinical and empirical studies frequently identify the object of their guilt experiences as a specifiable set of past actions that deviated from or violated accepted social or moral standards, and for which they take responsibility (Barrett, 1995; Harmon-Jones, Amodio, & Zinner, 2007; Lindsay-Hartz, de Rivera, & Mascolo, 1995). The link between guilt experiences and the judgment that one is *responsible for* such transgressions underwrites the conception of guilt as primarily *action-focused*, that is to say, the object or focus of guilt tends to be particular actions or behaviors that an individual identifies as her/his own. This contrasts with the *self-focused* character of other painful emotions, such as shame and embarrassment, where the emotion is directed toward the whole self or a negatively perceived aspect of the self (Barrett, 1995; Baumeister, Stillwell, & Heatherton, 1994; Tangney, Miller, Flicker, & Barrow, 1996).

Guilt thus centers on actions – manifesting as an unpleasant feeling associated with past wrongful actions or the contemplation of anticipated future wrongdoing. Because we wish to know whether guilt was favored by individual-level or group-level selection, we need to understand what the effects of guilt-induced behavior are on the individual who performs them. We can consider these effects within contemporary human social contexts, which could help us to understand why guilt evolved in humans.

Of course, the current adaptive effects of guilt will be imperfect indicators of guilt's origin, but they can suggest hypotheses about past evolutionary pressures. It is also helpful to know whether guilt is more phylogenetically widespread, as this might provide us with some clues about how evolutionarily ancient guilt is. As we shall see, this may help us decide between individual and group level models of selection. Let us begin by considering some recent examples of individual-level selection models.

Individual-Level Selection and Guilt

Two approaches to developing an individual-level account of guilt have been especially popular. One account involves focusing on the way guilt functions as an emotionally painful check on motivations to violate normative standards. Joyce (2006) and James (2011) take this approach, developing what might be called 'self-recrimination' models of guilt. On their view, the experience of guilt functions as a sort of self-punishment for individuals who trans-

gress social norms, and its anticipation can thus dampen motivations to defect or cheat on cooperative ventures governed by such norms. Guilt, then, reinforces cooperative tendencies in individuals, which, on Joyce's and James's view, explains why it was favored by selection at the individual level.

A second common approach to explaining guilt explores how guilt might have solved particular problems individuals faced in organizing and sustaining cooperative arrangements. Frank's (1988) commitment model of the social emotions is perhaps the most familiar and influential of such accounts. On Frank's model, individual selection favored social emotions, including guilt, that enabled individuals to make credible commitments to one another in the organization and execution of cooperative ventures.

He suggests two pathways by which the social emotions would have evolved. First, those who experienced social emotions like guilt would have been disposed to maintain their commitments to cooperative ventures, and would thereby earn positive reputations for having such dispositions and for being reliable partners. Second, guilt and other social emotions are associated with hard-to-fake, largely involuntary facial and physiological expressions. These expressions serve as reliable indicators that an individual experiences social and moral emotions, from which others can infer that the individual is disposed to keep to the terms of cooperative agreements. Along either pathway, the community's preference for individuals who are reliable cooperators and the community's ability to discern who those cooperators are would have increased the selective pressure on the emotions that disposed individuals to cooperate.

Self-recrimination and commitment models of guilt highlight important roles guilt plays in the social life of individuals. However, these models leave unexplained important aspects of guilt and guilt-induced behavior. First, guilt is associated clinically and empirically with a number of psychologically maladaptive effects (Bybee & Quiles, 1998; Harder, 1995; Lindsay-Hartz, de Rivera, & Mascolo, 1995; Luyten, Fontaine, & Corveleyn, 2002), and it induces a number of behaviors that could be costly to the individual, including confession to violations of social norms, acceptance of external punishment, and self-penance (Katchadourian 2010; Radzik 2009). Moreover, there is evidence that psychopaths, who are thought either to have an attenuated capacity for guilt or to lack that capacity altogether, are more successful at obtaining conditional release from prison sentences (Porter et al., 2009), despite psychopathy being a reliable predictor of recidivism (Leistico, Salekin, DeCoster, & Rogers, 2008). This is likely due to the fact that they can be more strategic in their appeals because they do not have guilty feelings encroaching on their behavior (Porter et al., 2009). Thus, the putative cost of guilt on individuals may not be limited to the degree of emotional pain one experiences, but may also include behaviors that guilt prompts.

Second, the focus on guilt's role as a painful psychological counterweight to motivations to defect on or cheat cooperative ventures does not explain why selective pressures targeted guilt proneness. Recent empirical research in developmental psychology and neuroscience suggest that guilt is costly in terms of the psychological hardware that underwrites it. Developmentally, guilt emerges late in children, concurrent with or after the emergence of capacities to take responsibility for particular actions, to evaluate those actions by normative standards, and to experience empathic concern for others (Ferguson, Stegge, & Damhuis 1997; Harris 1989; Kochanska et al. 2002; Lagattuta &Thompson 2007).

Neuroimaging has shown that experiences of guilt are associated with reduced asymmetry between left- and right-cortical activity, which suggests that guilt experiences involve both withdrawal and approach orientations, motivating complex behavioral sequences involving self-regulation and reparation (Amodio, Devine, & Harmon-Jones 2007). This asymmetry does not appear to obtain during reported experiences of other negative, other-directed emotions (ibid.). While much more can be said with respect to the developmental and cognitive complexity of guilt – for further discussion, see Deem & Ramsey (2016), Section 3 – enough has been said to see that the self-recrimination and commitment models must answer the question of why selection might favor such complexity just to reinforce or augment other, more phylogenetically ancient emotions that already undergird prosocial behavior. Neither model provides a satisfactory answer to this question, leaving the evolutionary puzzle of guilt unsolved.

Guilt in the Legal Arena

Another area of research in which we can find clues for solving the evolutionary puzzle of guilt is the study of guilt in the legal arena. Although the modern legal system is, from an evolutionary time scale, a recent invention, norms and norm violations are much older. By seeing how guilt operates within the current legal milieu, we can cautiously extrapolate to what the consequences of guilt may have been during its evolutionary origin. This will serve as another source of evidence for whether we should take guilt to be good for individuals or bad at the individual level, but good for groups.

The term *guilty* has a dual meaning; it can refer to the fact of having committed a crime (one can be "guilty of a crime" without any negative feelings about it), or it can refer to the emotion (one can feel guilty about a state of affairs). It is thus important not to conflate these two senses. To be as clear as possible, we will only use the word 'guilt' to refer to the emotion and will therefore use phrases like 'committed the crime' instead of 'guilty of the crime'.

With mock trials, it is clear that displays of guilt help convince jurors that a defendant committed the crime (Jehle, Miller, & Kemmelmeier, 2009), especially if guilt is expressed shortly after the crime (Bornstein, Rung, & Miller, 2002). This shows the dangers of displaying guilt after suspected involvement in a crime.

Although displays of guilt can increase the chance of conviction, it generally has an opposite effect on sentencing (Gold & Weiner, 2000; Robinson, Smith-Lovin, & Tsoudis, 1994). Thus, once someone is convicted, if they have not displayed signs of guilt, they will generally receive a harsher punishment (Garvey, 1998). Such individuals are described as "cold-blooded" and are despised for their lack of emotion. This therefore poses a dilemma for those convicted: displaying guilt makes one more likely to be convicted, but if convicted without displaying guilt, a more severe punishment is likely.

Whether or not guilt is good for the convicted individual in such situations will therefore depend on the degree to which a display of guilt increases conviction probabilities and mitigates punishment. Furthermore, the weight of evidence will play a role in whether it is good or bad to exhibit guilt. If the defendant was caught red-handed, then guilt displays will do little to increase their chance of conviction and will generally be a good thing. But if there is little evidence, guilt will have a stronger negative effect on the accused.

In studies of actual court cases, displays of guilt are often linked to mitigated punishments. This is especially true of first-time offenders and those who committed less severe crimes (Harrel, 1981; Eisenberg, Garvey, & Wells, 1998). But why, we should ask, are we inclined to be lenient toward those who display guilt? One possible reason is that experiencing guilt is perceived by others as form of self-punishment, and the more that guilt is experienced, the less externally imposed punishment seems warranted. Another reason may be that those who experience intense guilt will not want to repeat the experience and will thus be less likely to recidivate. While it is clear that guilt can serve as a form of punishment in its own right, is it the case that those who are more guilt prone are less likely to recidivate? Some studies show that genuine guilt feelings do indeed predict lower recidivation rates (Hosser, Windzio, & Greve, 2008).

More generally, guilt-prone individuals exhibit fewer offenses and less delinquent behavior (Cohen, Wolf, Panter, & Insko, 2011; Cohen, Panter, & Turan, 2012). They tend to be more prosocial, compliant, altruistic, and are more apt to perform reparative behaviors (Malti & Krettenauer, 2013; Silfver, 2007; Regan, 1971; Carlsmith & Gross, 1969). Guilt-prone individuals also tend to be recognized by themselves and others as better leaders – they more frequently are chosen or volunteer for leadership positions (Schaumberg & Flynn, 2012).

Evolutionary Scenarios for the Emergence of Guilt: Too Early To Tell?

Does the evidence presented above point us toward an individual or group selection account of guilt? Intuitively, evidence that guilt-prone individuals exhibit less delinquent and more cooperative behavior, and that they are more apt to offer themselves for – and to be selected for – leadership positions supports both individual and group-level accounts. Being less counterproductive will tend to be good for individual actors and will tend to make for efficient groups. Assuming that being a leader is advantageous to the individual, and that groups tend to benefit from having

guilt-prone leaders, this aspect of guilt proneness is clearly adaptive for individuals and groups.

Other consequences of guilt proneness, on the other hand, have fairly obvious benefits for the groups to which the individuals belong, but it is less certain that they are advantageous for the individual. For example, we have seen that manifesting guilt in legal trials can both help and hinder defendants. We also noted that the psychological discomfort of guilt experiences and the reparative and confessional behaviors that guilt motivates increase the chance that one's transgressions will be discovered.

Finally, while it is good for group harmony to have individuals deterred from committing offenses, it may be better for individuals to lack a general deterrence from committing offenses so that they can strategically commit them when there will be no or little repercussion. While these situations do not directly point to a group selection scenario for guilt, they present difficulties for individual-level accounts of guilt. At the very least, this suggests we should remain open to group selection models.

To sum up, the main accounts of the origin of guilt, like those of Joyce (2006), James (2011), and Frank (1988), focus on showing how guilt can be good for the individual. Although some aspects of guilt proneness seem to support an individual-level selection account of guilt, we've seen that some key features of guilt proneness may well be maladaptive for individuals. What we would like to conclude here is that we should take the group selection scenario seriously. We should not simply assume that guilt is individually adaptive, and that the sole task of giving an evolutionary account is to show how this is possible.

If we are right that we should take the group-level account seriously, how, then, might we decide between them? First of all, we should not think that the evolutionary story has to be one of either group or individual selection. It is quite possible that both levels of selection operated on guilt, and both promoted its evolution.

Evidence on the timing of the emergence of guilt can help us decide which evolutionary scenario is the most probable. The reason for this is that if guilt emerged preceding the origin of complex communication and cognitive abilities like reputation tracking, then bad reputations would not have been a negative factor for individuals. Individuals could take advantage of others without fear of eroding their reputation, and thus guilt would be a hindrance for individuals. In the absence of social traits like reputation, however, guilt proneness remains good at the group level: groups filled with individuals taking advantage of one another will not flourish and produce more groups than groups lacking such individuals. This is nothing more than Darwin's (1871) insight about brave warriors discussed above.

A key source of information about the timing of the origins of guilt is the literature on whether nonhuman primates or other mammals exhibit guilt. If guilt is widespread, then this points to an early origin. Some primatologists and anthropologists contend that there is evidence that nonhuman primates are capable of experiencing at least a proto-form of guilt. For example, de Waal (1996) suggests that some nonhuman primates are capable of internalizing social rules, and that the submission behaviors that subordinates perform before dominant conspecifics after violating those rules may be evidence of the phylogenetic starting point of guilt. A well-known example of such behaviors is exhibited in Coe and Rosenblum's (1984) study of mating behaviors of male macaques. Subordinate males exhibited mating behaviors toward females in the absence of the dominant male, but would later perform submission behaviors when the latter returned. Similarly, Fessler and Gervais (2010) suggest that a guilt-like mechanism might best explain the reconciliation behaviors exhibited among nonhuman primates after intragroup conflicts.

Other researchers, however, are not confident that such submission and reconciliation behaviors constitute evidence of guilt in other primates. Drawing from his extensive fieldwork with chimpanzees in Gombe, Boehm (2012) contends that these behaviors are better explained in terms of fear of discovery and punishment subsequent to violation of social rules.

The current primatological data, then, appear inconclusive with respect to determining whether guilt or proto-guilt is present in nonhuman primates. Thus, in contrast to Joyce (2006), who maintains that there is no evidence of guilt in nonhuman primates, we keep open the possibility that guilt has a deeper phylogenetic origin than the hominin li-

neage.

This leads us to offer a provisional conclusion on the individual-level or group-level origins of guilt. We can frame this in terms of a pair of conditionals: If it turns out that guilt has a deep evolutionary history, then it likely evolved via group selection. If, on the other hand, guilt emerged relatively recently within our lineage, then the individual-selection account is tenable. This conclusion points to the central importance of data on the timing of the origin of guilt, and suggests how these data should lead us to favor one evolutionary scenario over another. Let's now consider how we can we move beyond these conditionals, and get closer to finding a solution to the evolutionary puzzle of guilt.

Future Directions in Research on the Evolution of Guilt

We have seen that the timing of the origins of guilt are of central importance to resolving the question of how guilt evolved. One vital area of research will involve work on how to identify guilt in nonhuman animals. How can we move beyond behaviors associated with guilt – such as the avoidance of future punishment – to identify the emotion of guilt in particular? This might involve reinterpreting existing behavioral data, generating new data, and further developing criteria for distinguishing genuine expressions of guilt.

In addition to further work on the identification of guilt, more work is needed in fleshing out and modeling evolutionary scenarios. For example, how strong could the group-selection pressure have been? If it is proposed as the primary factor underlying the emergence of the emotion, could it have been a sufficient cause of the emergence and maintenance of the emotion? What models of individual selection are capable of selecting for guilt proneness? And how much cognitive sophistication is really needed for guilt proneness to be individually adaptive?

Raising these important questions here helps to show what is needed in order to establish a clear evolutionary picture of guilt. The difficult task of answering them, we suspect, will require more collaboration and fruitful interchange between philosophers, biologists, and psychologists.

Acknowledgments

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Are Positive Emotions Always Good for You?

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May 2016 – Emotions are an essential ingredient of what makes us human. But surprisingly, there are still a lot of mysteries as to what emotions are and how we can harness them to improve mental health outcomes and enhance well-being. A number of age-old assumptions stand in the way of theoretical progress. The assumption we tackle in the Positive Emotion and Psychopathology Laboratory that I direct at the University of Colorado Boulder is that positive emotions are always good for you. On the contrary, across a variety of studies, and as synthesized in my forthcoming book *Positive Emotion and Psychopathology* (Oxford University Press), I have argued that experiencing positive emotions at particular intensities, in particular contexts, or when driven by particular types of processes can actually be detrimental.

In particular, I study the disruptive effects of positive emotions in patients diagnosed with severe psychiatric disorders such as bipolar disorder. Studying clinical populations not only provides a window into understanding the origin and maintenance of emotion-related disturbances, but also provides a clue into normative positive emotion functioning more generally by studying the upper boundaries or extremes of positive emotional processes. This emerging wave of research on positive emotions and psychopathology suggests that positive emotionality is also related to a range of poor health outcomes both cross-sectionally and longitudinally, particularly when the magnitude and duration of positive emotions are inappropriate to the context. Below I describe some of this work, focusing on why positive emotions are important, highlighting several key themes in the study of positive emotion disturbances, and concluding with a discussion of future directions.

Why Positive Emotions are Important

Positive emotions are commonly construed as pleasant or positively valenced states that motivate an individual to pursue goal-directed behavior in service of one's needs or desires (e.g.., Carver, 2003; Fredrickson, 1998). It has long been assumed that positive emotionality is wholly adaptive. This view is based in part on a robust tradition of work revealing a range of cognitive, social and physical health benefits associated with positive emotions. For example, positive emotions foster greater relationship satisfaction and commitment (Gonzaga et al., 2010; Harker & Keltner; 2001; Impett et al., 2010), prosocial behavior (e.g., Isen, 1970), and have been linked to improved physical health outcomes such as increased physical immunity to stressors (for review, see Gruber & Moskowitz, 2014) and ability to undo the negative cardiovascular effects of negative emotionality (Fredrickson & Levenson, 1998). As a result, less attention has been devoted to understanding the ways in which positive emotions might also be a source of dysfunction.

How to Frame the Problem of Dysfunction for Positive Emotions

Recent work has began to study the ways positive emotions might *not* always be adaptive or good for psychological health. Our laboratory has been at the forefront of this new approach to studying positive emotion disturbances, an approach motivated in part by initial inquiries into the study of positive emotion and clinical investigations of patients with a history of mania (i.e., bipolar disorder; Gruber, 2011).

To shed light on the dynfunctional side of positive emotions it is important to study individually a variety of dimensions of variation. Specifically, we have developed a research paradigm that investigates the functional or dysfunctional aspects of: *size* or magnitude of positive emotion response, *situation* or context in which positive emotions

unfold, *specificity* of which positive emotions are experienced, *spice* or diversity of positive and negative emotions represented, *self–regulation* of one's positive feelings, *stability* or degree positive emotions dynamically change over time, and *striving* or the degree to which one exerts effort in pursuing or attaining positive feelings.

Understanding how each dimension of positive emotionality ranges form normal to abnormal functioning is critical for figuring out whether or not positive emotions are good for us. Our "divide and conquer' research strategy has also allowed us to harness advances in neuroimaging and cognitive science to answer new questions. In what follows, I will highlight some of our recent results and discoveries.

Size: **Is more positive emotion really better?** Aristotelian definitions of emotional health argue that positive emotions are beneficial up to a moderate degree, but can incur costs when experienced too intensely. Several empirical examples illustrate that a heightened positivity may be associated with negative psychological health outcomes. For instance, people with extremely high positive emotion levels are inclined to engage in riskier behaviors, such as alcohol consumption, binge eating, and drug use. Heightened and persistent positive emotions have also been associated with psychopathology, such as a clinical diagnosis of bipolar disorder as well as self-reported risk for mania (Gruber, 2011).

Heightened and persistent positive emotions in bipolar disorder undermine the ability to experience negative emotions in threatening or risky contexts and predict a more severe illness course, and greater relapse rates. Current longitudinal studies with young adults at high risk for the development of bipolar disorder are underway in our laboraotry to isolate whether these patterns of heightened and persistent positive emotionality are a cause or a consequence of bipolar disorder. These initial studies suggest that a greater magnitude of positive emotion is not always better, and may be associated with undesirable and unintended outcomes when it exceeds a certain threshold (Gruber, Mauss, & Tamir, 2011). We have developed these insights into an evolutionary model and investigated the conditions under which positive emotionality adversely affects one's vigilance to threats in the environment and becomes maladaptive (Gruber & Bekoff, in press).

Situation: **A time and place to feel good?** As humans, we are built with the capacity to experience a wide range of emotions to help us readily adapt to new circumstances, challenges, and opportunities. Anger mobilizes us to overcome challenges; fear alerts us to danger and engages our fight-or-flight coping system; and sadness signals loss of an important object, person, or place. The functions of these emotions are suited to help us meet particular needs in specific contexts. Just as we would not want every situation to make us feel angry or sad, we should not want to indiscriminately experience positive emotion in every situation. Indeed, one study found that people in a positive mood performed worse on competitive computer game task as compared to those in an angry mood (e.g., Tamir, Mitchell, & Gross, 2008).

Another study demonstrated that individuals who experience or perceive positive feelings during incongruent negative contexts – such as watching sad films, listening to a stranger share time of personal loss such as the death of a family member, or even while having an online conversation with a distressed romantic partner, were more likely to be at risk for developing mania as measured by a validated questionnaire (Devlin, Ong Zaki, & Gruber, 2016; Dutra et al., 2014; Gruber, Johnson, Oveis, & Keltner, 2008). Current work in our laboratory is investigating whether such context-inappropriate positive emotions are a cause or a consequence of mania risk. In sum, positive emotion has a proper contextual timing, and is not always suited for every situation.

Specificity: **Not all positive emotions are created equal.** Positive emotion is often referred to as a singular term, but in practice it is much more heterogeneous. There are a variety of different types of positive emotions that differ on dimensions of arousal or energy level, and can even reflect the degree of social connectedness or engagement (e.g., Shiota, Keltner & John, 2006). Many forms of happiness are associated with adaptive and prosocial outcomes, such as fostering connection to others, altruistic acts, and generosity.

But, importantly, not all specific types of positive emotions appear to promote beneficial outcomes. For example, pride is a self-focused pleasant state associated with achievement and elevated social rank. Although pride is adap-

tive in certain forms, such as winning a challenging competition or receiving a job promotion it is also associated with negative social outcomes when experienced in the absence of appropriate merits, including aggressiveness towards others, antisocial behavior, and even increased risk for the onset of mania (e.g., Gruber & Johnson, 2009). Thus certain kinds of positive emotions – such as those that are too self-focused – may at times hinder our ability to adaptively connect with other people.

Spice: **Diversity of emotions is important.** Much like biodiversity is critical to the healthy survival of a biological ecosystem by fostering resistance to disease and invasive species, emotional diversity (or "emodiversity") is an equally important component for the human internal emotional ecosystem. Emodiversity refers to the variety and relative abundance of the emotions humans experience (Quoidbach, Gruber, Mikolajczak, Kogan, Kotsou, & Norton, 2014), which is constituted by both the richness and number of specific emotions an individual experiences as well as the evenness or extent to which positive and negative emotions are experienced in the same proportion.This project sampled self-reported emotions from over 37,000 adult respondents and found that a greater diversity of emotions – that is, experiencing a variety of positive *and* negative emotions – predicts increased positive mental health outcomes as well as decreased negative medical health issues.

Self-regulation: **Unable to harness positive emotions?** The ability to adaptively regulate emotion – whether it is increasing or decreasing the intensity of a positive emotion, or shaping how it is expressed — has been linked to favorable health outcomes, including greater well-being and social adjustment (Tamir, John, Srivastava, & Gross, 2007) and may sustain, or even improve, mental health outcomes (e.g., Folkman & Moskowitz, 2000; Tugade & Fredrickson, 2004). Emerging work generally suggests that controllability over positive emotions – measured both as actively generating or increasing positive emotions as well as decreasing or dampening positive emotions – is associated with beneficial mental health outcomes.

Inappropriately managed positive emotions can incur significant costs on a personal level and within broader social contexts. By contrast, individuals with depression have difficulty effectively increasing or up-regulating positive emotions and manifest a decreased ability to sustain and promote positive emotions. Current work is exploring the role positive emotion misregulation plays in the etiology and and course of depression. When positive emotions are not properly regulated – either too much or too little – the beneficial effects commonly associated with them disappear.

Stability: **Positive emotions best kept stable?** A complete understanding of positive emotion requires exploring not just the mean levels experienced, but also how the intensity of positive emotion fluctuates over time. For example, greater variability (as measured by intra-individual standard deviations in positive emotion intensity) has been associated with worse psychological health (Gruber, Kogan, Quoidbach, & Mauss, 2013), including lower well-being and life satisfaction and greater depression and anxiety. These findings are consistent with ancient Buddhist texts that underscore the importance of attaining greater emotional stability as part of overall well-being. Specifically, too much variability and not enough stability in one's positive feelings can be a harbinger of poor mental health outcomes.

Striving: **Seeking positive emotions may lead to decreased well-being.** By striving, we refer to the meta-cognitive value or premium placed on experiencing and attaining positive emotional experiences. Work has recently supported the paradoxical finding that striving for positive emotions may actually cause more harm than good (e.g., Mauss, Tamir, Anderson, & Savino, 2011). Specifically work by Mauss and colleagues reports that individuals who self-report striving for, and highly valuing, happiness are more likely to report less self-reported happiness when watching happy films for example. These findings suggest that the pursuit of happiness may lead to maladaptive outcomes because it sets people up for disappointment. Recent work with our colleagues links problematic clinical health outcomes with increased pursuit of happiness, which has also been associated with greater depressive symptoms in a healthy adult sample as well as greater levels among adults with a clinical history of depression and bipolar disorder compared to a healthy non-psychiatric control group (Ford, Shallcross, Mauss, Floerke, & Gruber, 2014; Ford, Mauss & Gruber, 2015). Such findings hint at the possibility that the more people pursue happiness, the *less* likely they are able to obtain it.

Where Do We Go Next?

Our next step is asking *why* positive emotion disturbance occurs. For example, research is needed to identify mechanisms associated with the generation and maintenance of positive emotion, and in particular, overly heightened and persistent positive mood states that lead to risk-taking, substance abuse and severe psychopathology such as bipolar disorder. One example we have recently focused on is the role of attentional biases in giving rise to positive emotional experiences. Indeed we know that emotions filter how we visually see the world, literally shaping how we attend to information (i.e., attentional biases). Some of our work suggests that trait levels of happiness shape attention towards positive stimuli in healthy adults (e.g., Raila, Scholl & Gruber, 2015). Work is now underway to extend this finding to an examination of whether there are distinct patterns of attentional bias towards positive stimuli (and perhaps away from negative stimuli) that may give rise to the heightened positive emotionality observed in adults at risk for mania.

We are also unpacking neural mechanisms of sustained positive affectivity among adults with bipolar disorder in response to rewards as well as standardized emotional images. We believe it to be critical to further unpack neurophysiological mechanisms underlying heightened positive affectiity focused on activation within, and connectivity between, reward relevant striatal regions in both healthy and bipolar adults (e.g., Dutra, Kober, Cunningham & Gruber, 2015), psychophysiological assessments of positive affectivity including cardiac vagal tone (e.g., Kogan et al., 2014), and psychoneuroendocrine assays of theoretically relevant hormone profiles such as increased testosterone and decreased cortisol (e.g., Welker, Gruber, & Mehta, 2015).

The overarching goal of this work is not only to identify cognitive and neural processes underlying positive emotionality, but also to muster convincing evidence that they play an important role in the vulnerability to clinical health outcomes. Ultimately these scientific efforts are aimed towards unpacking the landscape of positive emotion disturbances to better understand what function our emotions serve, but also to develop protocols for early detection and effective treatment of those for whom positive emotions are not always good.

Check out below June's popular Experts in Emotion Series!

A list of video lectures can be found here: https://www.youtube.com/playlist?list=PLh9mgdi4rNew731mjIZn43G_Y5otqKzJA

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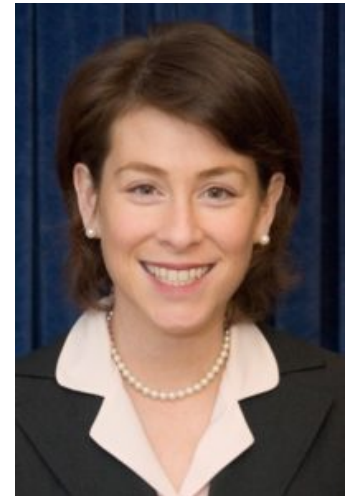
Where did you grow up? What did your parents do? What were you like as a child? Do you remember what your career dreams were as a young woman, and how you eventually decided to become a psychologist?

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.

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

Baby Jenn

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.
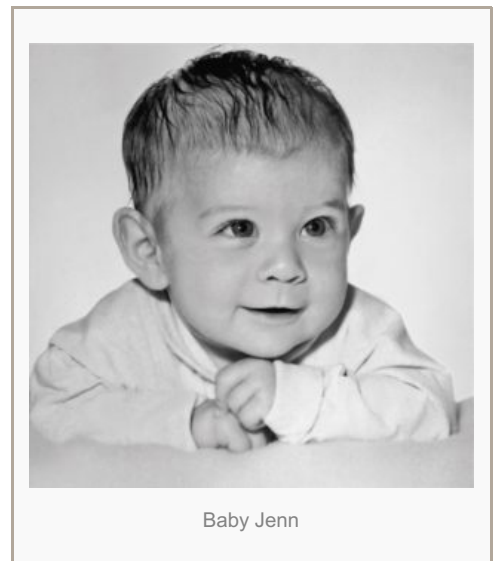
In high school I wasn't an especially devoted student. But I did figure out that I wanted to become a psychologist – an occupation I understood at the time to mean learning how the mind works and helping people with problems. This career goal arose in part because I had been greatly helped by my high 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 as a young, enthusiastic eater

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.

Jenn with her sister, Liz

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?

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.

Jenn in elementary school

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 multidimensional 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 dog, Chatham, during graduate school

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

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

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 institu-

tions 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.

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.

Carnegie Mellon, Pittsburgh

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.

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 re-construct 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 em-otional experience and effects. From functional theories of emo-tion, I borrowed the idea that emotions serve an impressive coor-dination 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 im-portance, 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 & Co-smides, 1990).

Jenn with her daughter, Siena (1 year old)

Drawing on evidence that each specific emotion (a) is defined by a set of central dimensions and (b) directs cogni-tion to address specific problems or opportunities, I hypothesized that each emotion activates a cognitive predisposi-tion 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 emo-tions 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 em-otions of the same valence but differing appraisals – anger and fear – would relate in different ways to risk percep-tion.

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 con-trol. 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 re-

lated 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.
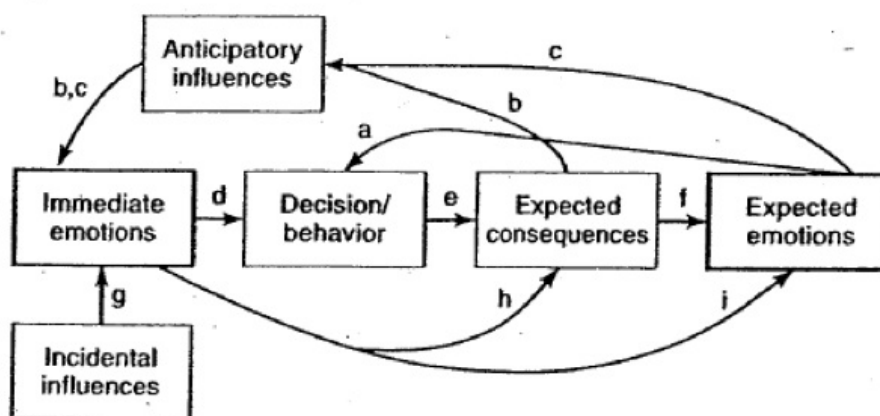
Figure 31.1 Determinants and consequences of immediate and expected emotions.

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!).

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.n 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 in-

tegral 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

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

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

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).

Jenn finding the perfect fear induction while visiting South Carolina

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).
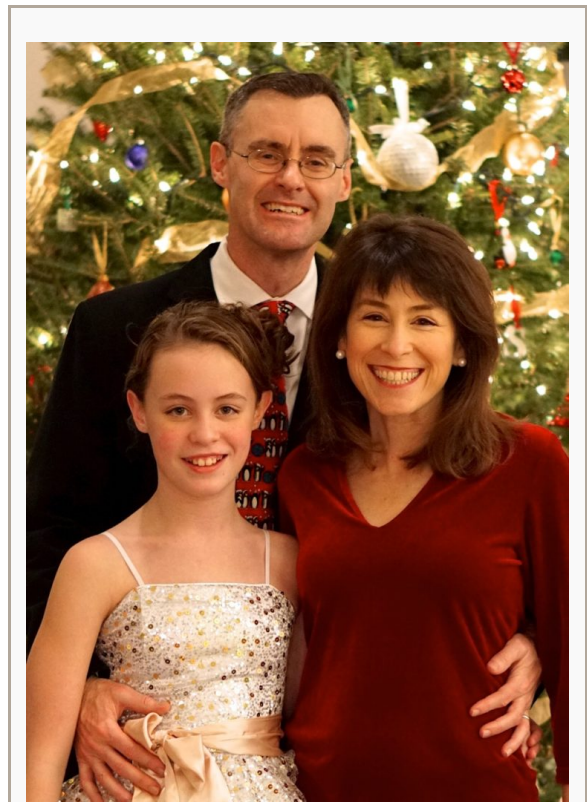
Although this work is in its early stages, it appears that emotion-specific action tendencies map onto appraisal themes. For example, given that anxiety is characterized by the appraisal theme of facing uncertain existential threats (Lazarus, 1991), it accompanies the action tendency to reduce uncertainties (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.

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

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

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.
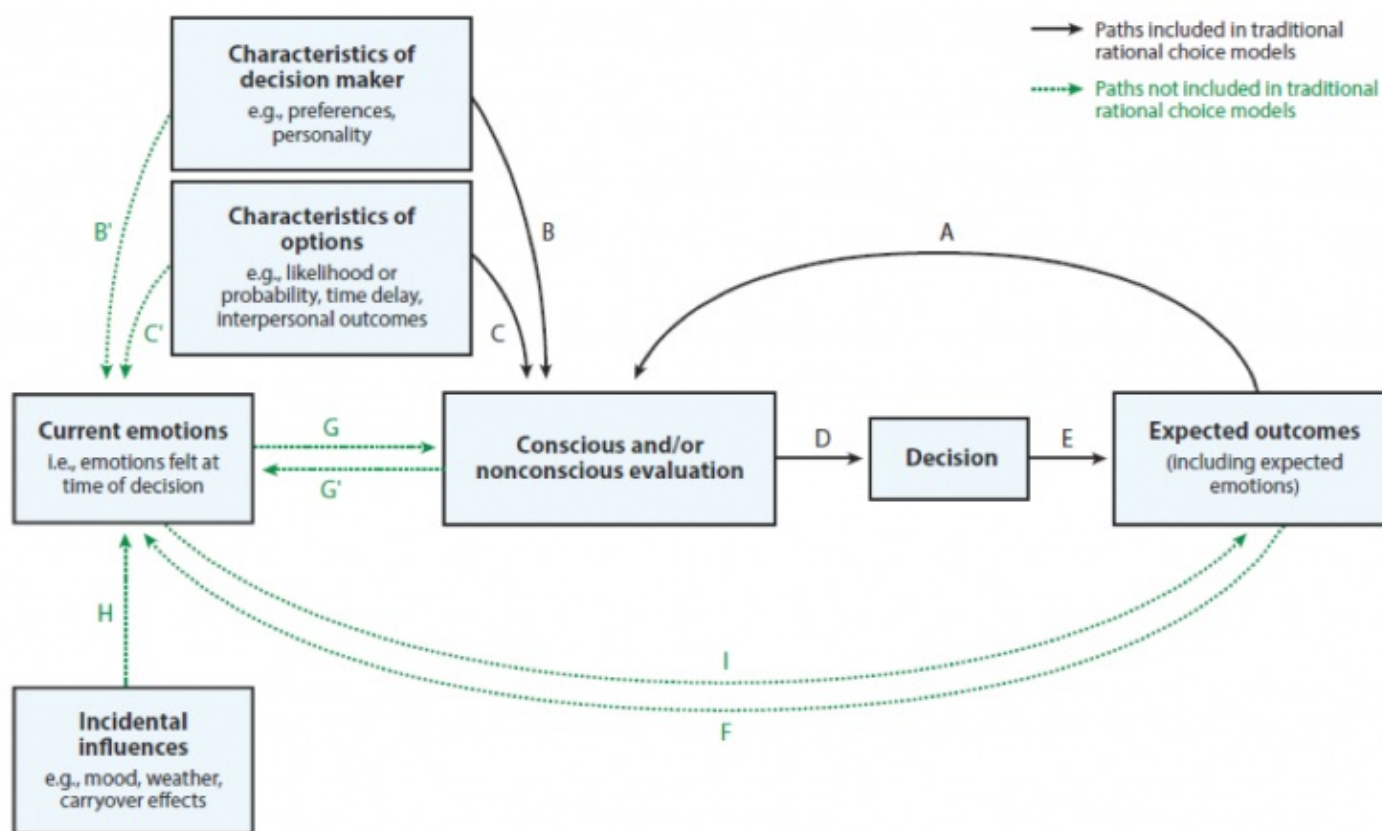
Figure 2

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?

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.

Jenn posing for the cover of the Kennedy School
Magazine

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 decis-

ion 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 pro-

ductive scientific research program early on in one's career?

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

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

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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