


2015

Going with your gut: How William James' theory of emotions brings insights to risk perception and decision making research

Katherine Lacasse

Rhode Island College, klacasse@ric.edu

Follow this and additional works at: <https://digitalcommons.ric.edu/facultypublications>

 Part of the [Applied Behavior Analysis Commons](#), [Social Psychology Commons](#), and the [Theory and Philosophy Commons](#)

Citation

Lacasse, Katherine. "Going with Your Gut: How William James' Theory of Emotions Brings Insights to Risk Perception and Decision Making Research." *New Ideas in Psychology*. (2015). Print.

This Article is brought to you for free and open access by Digital Commons @ RIC. It has been accepted for inclusion in Faculty Publications by an authorized administrator of Digital Commons @ RIC. For more information, please contact digitalcommons@ric.edu.

Going with your Gut: How William James' Theory of Emotions Brings Insights to Risk
Perception and Decision Making Research

Katherine Lacasse
Wesleyan University

Reference: Lacasse, K. (2015). Going with your gut: How William James' theory of emotions brings insights to risk perception and decision making research. *New Ideas in Psychology – in press*. doi: 10.1016/j.newideapsych.2015.09.002

Abstract

The basic premise of William James' theory of emotions - that bodily changes lead to emotional feelings - ignited debate about the relative importance of bodily processes and cognitive appraisals in determining emotions. Similarly, theories of risk perception have been expanding to include emotional and physiological processes along with cognitive processes. Taking a closer look at *Principles of Psychology*, this article examines how James' propositions support and extend current research risk perceptions and decision making. Specifically, James (1) described emotional feelings and their related cognitions in ways similar to current dual processing models; (2) defended the proposition that emotions and their expressions serve useful and adaptive functions; (3) suggested that anticipating an emotion can trigger that emotion due to associations learned from past experiences; and (4) highlighted individual differences in emotional experiences that map on well with individual differences risk-related decision making.

Keywords: emotions, risk perception, decision making, individual differences, William James

Going with your Gut: How William James' Theory of Emotions Brings Insights to Risk
Perception and Decision Making Research

1. Introduction

Imagine that you are in a grocery store about to purchase a bag of potato chips for a child's birthday party. Taking a look at the labels, you notice that the ingredient list on one of the bags includes "genetically modified potatoes." Do you sense a small pang of unease in your gut? Do you feel wary or anxious? Do you wonder about the likelihood and severity of possible negative health effects due to the children eating these chips? Do any of these feelings or thoughts influence your ultimate purchasing decision?

This experience at the grocery store highlights some of the responses individuals might experience when faced with a potentially risky object or situation. Some are analytical processes, but others are intuitive feelings. Specifically, bodily sensations that are associated with emotional feelings are often mentioned when we describe our decisions. We "turn our nose up" at the genetically modified chips, decide to "go with our gut," and avoid the food that "just doesn't feel right." One explanation behind why we might do this is because emotional feelings are derived from the sensation of bodily changes, and that these feelings serve to help us make decisions when faced with new, risky, or uncertain stimuli. In his classic text *Principles of Psychology*, William James (1890) presented a theory of emotions that maps on well with this premise, and sparked a century of research and debate regarding the connections between bodily changes, cognitive processes, and emotional feelings (e.g., Cannon, 1927; Laird & Lacasse, 2014; Schachter & Singer, 1962). In more recent decades there has been a growing interest the role of emotional processes and their physiological counterparts in risk perception and decision making (e.g., Damasio, 1994; Dunn et al., 2010; Slovic, Finucane, Peters, & MacGregor, 2007), much of which

has roots in James' theory of emotions. In this article, I will review the some of the specifics of James' theory, and examine how his proposals can provide unique understandings of human reliance on intuitive feelings when presented with potential risks.

1.1 James' Theory of Emotions

James (1890) presented a bold proposal in *Principles of Psychology*, stating that emotions are the sensation of bodily changes, or as he puts it, "the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur IS the emotion" (pg. 449). He therefore suggested that bodily changes occur first, and the conscious experience of feeling an emotion follows. Physiological changes, facial expressions, and bodily movements were all included in the bodily changes that are perceived and interpreted as emotional feeling. He goes on to explain that without the bodily manifestations, there can be no *feeling* of emotion, and all that would remain "would be purely cognitive in form, pale, colorless, destitute of emotional warmth" (p. 450). Through describing emotional feelings in this way, James acknowledged that cognitions co-occur with emotions, but are not a direct part of the experience of an emotional feeling.

James added some additional proposals to his basic premise. For one, he supported the position that emotional feelings serve a useful function. By comparing the bodily and reflexive nature of emotions to instincts, James suggested that emotions and their expression have adaptive value. James also proposed that anticipating an emotion can bring the sensations of that emotion into being. Therefore, emotions that have become associated with a particular experience may be anticipated and triggered when an individual is placed in a similar scenario again. Finally, James also indicated that there are individual differences in emotional feeling, suggesting that individuals differ in what triggers their emotions, and more importantly in what particular bodily changes lead

to a specific emotional feeling. Individuals may display different outward and physiological symptoms while reporting that they are experiencing the same emotion.

James' theory of emotions has garnered support since its inception, but there have also been quite a few who have debated his central premise. Physiologist Walter Cannon (1927) argued that visceral changes were part of a more generalized fight or flight response, and offered a variety of reasons why sensation of those changes could not explain emotional feelings. He demonstrated that inducing visceral arousal does not lead to emotional expression, and that surgically preventing the viscera from providing information to the brain did not halt the emotional behaviors of animals. He also argued that visceral responses were too slow and too undifferentiated to be the sole cause of the experience of emotional feelings. However, Cannon did not consider James' proposal completely. James was most concerned with explaining emotional feelings and conscious emotional experience, which Cannon never examined himself largely because this cannot be measured in the animals that were his regular experimental subjects. Cannon also ignored the role of bodily stimuli besides viscera, such as facial expressions and expressive behaviors, in leading to the experience of emotional feeling.

In the following decades, the central premise of James' theory was repeatedly questioned, with many contending that cognitive processing and appraisal of one's situation were necessary to the production of emotional feelings. Duffy's (1941) activation theory proposed that emotions are the awareness of both variations in activity level and understanding of the stimulus situation. Schachter & Singer (1962) proposed a more specific two-factor theory in which individuals first feel arousal, and then cognitively appraise their situation to label the arousal as the proper emotion. Other appraisal theorists argued an appraisal of the stimulus is a necessary first step before any bodily changes or feelings can occur (Lazarus, 1984). To explain how people arrive at different

emotions, Smith and Ellsworth (1985) proposed six different appraisal dimensions (e.g., pleasantness, certainty, self-responsibility), and demonstrated that different emotions have unique appraisal patterns. Over the same time period, researchers in the Jamesian tradition conducted studies demonstrating the impact of facial expressions, expressive behaviors, and physiological changes on emotional feelings, often in situations where cognitive appraisals would not be able to explain the emotional feelings reported (for a review, see Laird & Lacasse, 2014). With both sides presenting convincing ideas backed by supportive data, the debate regarding the role of bodily changes and cognitions in explaining emotional feelings continues, and remains contentious to this day.

While appraisal theories have underscored the role of cognitions in leading to emotional experiences, others researchers have demonstrated how emotions and affect can influence cognitions and judgements (e.g., Forgas, 1995; Schwarz, 2011). Affect, more specifically the positive or negative valence of an experienced feeling, and specific emotions help shape interpersonal and moral judgements (Forgas & George, 2001; Haidt, 2001), and have also been found to play a role in risk perception and decision making under uncertainty (e.g., Lerner & Keltner, 2000; Slovic et al., 2007). Therefore, a similar debate has arisen regarding the relative importance of affective and cognitive processes in the perception of risk.

1.2 Risk Perception & Decision Making

For many years, risk perception and related decision making were theorized to be the result of cost-benefit analyses. People estimated the relative probability and severity of a risk's negative and positive outcomes, and these calculations led to conclusions (for a review, see Yates, 1992). For example, expected utility theory presents risky decision making as an almost entirely cognitive process without indicating a role for affect or emotions (e.g., Barberis, 2013; Harrison & Rutström,

2009). However, there is evidence that people have a more comprehensive conception of risk, and that intuitive and affective processes also influence an individual's risk-related decision making (Kahneman, 2011; Loewenstein, Weber, Hsee, & Welch, 2001; Slovic et al., 2007). For example, research on the affect heuristic demonstrates how people rely on the positive or negative affect associated with objects or events to guide their judgments of risk and benefits (Slovic et al., 2007). Research on prospect theory highlights the power of loss aversion, revealing that fear of a loss has a greater influence on decision making than hope of obtaining an equal-sized gain (Kahneman, 2011). Although less studied in risk perception research, other decision making research finds that similar yet distinct emotions, such as regret and disappointment, lead people to make different assessments and decisions about future choices (Zeelenberg & Pieters, 2006).

Evidence supporting the role of affect along with cognitions in risk perception fits well with dual processing models of thinking and decision making. These models distinguish between the emotionally-driven and intuitive "experiential" route and the analytically-driven and deliberate "rational" route (e.g., Epstein, 1994; Kahneman, 2011; Zajonc, 1980). People tend to rely on the experiential route more often, since it operates quickly without a sense of effort or voluntary control, but it is also common for the two routes to work together (Kahneman, 2011). Dual processing models can help explain why the lay public often understands risk differently than risk experts, who rely more heavily on analytical models (Hornig, 1993; Slovic, 2000). It is true that certain analytical processes are involved in laymen's risk-related decision making, such as reviewing knowledge about the risk, weighing perceived costs and benefits, considering trustworthiness of the actors involved, and determining the fairness surrounding the distribution of risks, costs, and benefits (e.g., Huijts, Molin, & Steg, 2012). However, people often report positive or negative opinions about risks even when they have very little knowledge about the risk,

indicating the role of intuitive processes (Krishnamurti et al., 2012; Scheufele & Lewenstein, 2005). In many instances, intuitive processes proceed and shape cognitive processes. For example, emotions like fear and compassion arouse concepts such as “fairness” and “choice” and bring them into consideration when decision making about a risk (Roeser, 2012). Additionally, strong initial emotional responses limit the influence of new knowledge on people’s attitudes towards a risk (Lee, Scheufele, & Lewenstein, 2005). Other research has found that the automatic associations and images that someone experiences when presented with a potentially risky object, and the affective responses to those images, play a role in shaping that individual’s risk perceptions (Keller, Visschers, & Siegrist, 2012; Truelove, 2012).

If emotional feelings are hypothesized to be the sensation of bodily changes, and if emotions and related intuitive processes play an important role in making decisions about risks, then implications from James’ theory of emotions may lead to new perspectives on risk perception. In the following sections, this article will outline how specific features of James’ emotion theory help inform empirical findings from risk research, and will conclude by suggesting implications and testable predictions that future risk research could examine based upon James’ premises.

2. The Role of Cognitions in Emotional Feelings

A crucial part of James’ theory of emotions in *Principles* is the claim that emotional feelings are quite simply the perception of one’s bodily changes. However, James does make it clear that cognitions occur along with these bodily changes, even though they are not a part of the experience of an emotional feeling itself. He describes this premise through several examples, always pointing out the cognitions that accompany the bodily changes, but deeming them separate from emotional feeling. For example, James states, “What would [grief] be without its tears, its sobs, its suffocation of the heart, its pang in the breast-bone? A feeling-less cognition that certain

circumstances are deplorable, and nothing more” (p. 451). Therefore, James simultaneously claims that a disembodied emotion is a “nonentity” (p. 452) and implies that cognitions are paired with emotional feelings.

Importantly, although cognitions may not be integral to *the feeling* of an emotion, James argued that feelings and thoughts work together when people are getting to know an object, and his descriptions map on well to current dual processing models of thinking and decision making (e.g., Kahneman, 2011). In the chapter *The Relation of the Mind to Other Things*, James described the emotional and cognitive processing that occurs when introduced to an object. In his description, feelings occur temporally prior to thoughts, and thoughts build upon information from the feelings. He stated, “Through feelings we become acquainted with things, but only by our thoughts do we know about them. Feelings are the germ and starting point of cognition, thoughts the developed tree” (p.222). He continued on to define feelings as *emotions* and *sensations*, and thoughts as *conceptions* and *judgments*. While not specifically relating his description to risky objects or uncertain events, it certainly applies to these scenarios. James’ description is remarkably similar to the affect heuristic proposed decades later (Slovic et al., 2007): People’s initial introduction to an object is through their positive or negative feelings, and cognitive processing is guided by these feelings, which ultimately forms one’s perception of the object’s risks and benefits.

If emotion is understood via James’ theory, with emotion *being* the sensation of bodily changes that occur after an exciting fact, this adds explanatory power to the ways in which affect and emotions play a role in risk perception. The individual bodily changes that occur with each emotion differ in how quickly they occur. Some of the changes such as facial expression, posture, or other external movements occur quite quickly, and this can help explain why feelings can have an almost immediate impact on an individuals’ risk perception of a given object or event.

Additionally, as was pointed out in Cannon's (1927) criticism of James, visceral changes are slower to take effect. However, visceral changes tend to last longer, and therefore the lingering influence of visceral changes can help explain why the role of emotional processes in risky decision making is not fleeting and still holds influence while cognitive reasoning is occurring. Therefore, James' description of the relationship between emotions and cognitions, as well as his elaboration of the types of bodily changes that trigger feelings, aligns fairly well with the dual processing models supported by risk researchers.

Additionally, adding James' perspective leads to new questions for risk researchers to address. Since each emotion stems from a variety of bodily changes, does each change have an effect on decision making or is the overall emotional feeling itself the influence? Do emotions with similar bodily changes have a similar impact on risk perceptions, regardless of their positive or negative valence? These questions could lead to fruitful research, particularly if focused specifically on emotions that are often aroused when presented with risks, such as differentiating between fear, anxiety, surprise, and excitement.

3. Emotions as Functional

James presented his theory of emotions in contrast to the dualism and rationalism that influenced much of Western thought for centuries. Emotions were often considered animalistic passions that needed to be controlled lest they threaten one's ability for more advanced reasoning and rational thought (Haidt, 2001). James directly responded to this view, opposing the "Platonizers in psychology" who view emotions as base and vile, instead contending that emotions "carry their own inner measure of worth with them" (p. 453). More specifically, James' work drew heavily from Darwin, who emphasized the evolutionary utility of emotions (Degler, 1991). As can be seen in the chapter titled *Instincts*, James placed quite an emphasis on the role of instinct in

explaining a variety of feelings such as sympathy, curiosity, and love. He specifically underscored the similar motivational underpinnings of emotions and instincts. James stated, “Instinctive reactions and emotional expressions thus shade imperceptibly into each other” (p. 442) and indicated that any stimulus that triggered an instinct also led to an emotional response.

Additionally, James’ theory of emotion drew upon Darwin’s notions that the facial expressions associated with certain emotions are similar to expressions displayed by animals and that many expressions served adaptive functions, although also conceding that some expressions seem to have more accidental origins. For example, James classified the behavioral responses of fear as self-preservation instinct, similar to reflex actions that serve to protect our body. Extrapolating from his theory, the comparison of emotions to reflexes is only a small leap. Emotions are the sensation of automatic bodily changes that provide us with valuable information about our potentially dangerous world. In this way, James provided an explanation of emotions that described their adaptive functions in everyday life.

Many contemporary researchers have come to similar conclusions regarding the value of emotional processes in providing important information that impacts decision making about risks. Interestingly, it has been contended that emotional processes lead to better decision making than analytical reasoning alone. Much of this discussion began following evidence of nonoptimal decision making in people with specific types of prefrontal brain damage that interferes with their ability to express emotions and experience feelings (Bechara & Damasio, 2005; Bechara, Damasio, Tranel, & Damasio, 1997). These findings were interpreted in light of Damasio’s (1994) somatic marker hypothesis, which predicts that emotion-based physiological changes called “somatic markers” signal individuals to pursue or avoid certain behaviors. Specifically, an overall positive or negative somatic state forms the “gut feeling” that guides people to endorse or reject different

choices that come to mind, limiting the number of alternatives considered and guiding individuals' final decisions (Bechara & Damasio, 2005). This work led to a wave of excitement, and as other researchers further investigated this topic, many found that emotional processes are often helpful in leading people to make decisions about complex problems or uncertainties that reflect their best interest (Mikels, Maglio, Reed, & Kaplowitz, 2011; Wagar & Dixon, 2006), and in overcoming problematic biases such as the gambler's fallacy (Xue et al., 2011). However, there is certainly some evidence that emotional responses can lead to poor risk-related decision making in some circumstances (Gray, 1999; Shiv, Loewenstein, Bechara, Damasio, & Damasio, 2005). Therefore, many take a middle ground, arguing that emotions are often adaptive and functional in decision making, but that at other times choices directly following from an emotional response can be detrimental (e.g., Baumeister, Vohs, DeWall, & Zhang, 2007; Loewenstein, 1996; Slovic, Finucane, Peters, & MacGregor, 2004). In these ways, it seems that James' perspective on the adaptive usefulness of emotions, particularly their usefulness in making decisions about potentially dangerous or risky situations, foreshadows the findings of risk researchers decades later.

Much of this research focuses on the influence of positive or negatively valenced feelings, but less research has examined the influence of specific emotions on risk perception and decision making. There is some evidence that further investigation into individual emotions would be useful. For example, although both are negatively valenced, fear leads to more pessimistic risk assessments than anger, arguably due to the link between fear and uncertainty appraisals and between anger and certainty appraisals (Lerner & Keltner, 2000; 2001). Other researchers find that both anxious and sad individuals aim to make choices that will make them feel better, leading anxious individuals to prefer a low risk/low reward choice and sad individuals to prefer a high risk/high reward choice (Raghunathan & Pham, 1999). Expanding upon this work will lead to

greater understanding of the more specific patterns of risk assessments and choices each emotion leads to, as well as the relative adaptive value of each emotional feeling.

4. Anticipating Emotions

Since James' theory countered many lay theories of emotion, he addressed likely disagreements head on. For one, it certainly seems that emotional feelings precede bodily changes, at least on some occasions. James proposed that anticipation of an emotion can explain this experience, since anticipation can trigger the emotion's bodily symptoms. This process occurs due to the emotional associations one has created with past experiences. For example, "One who has already fainted at the sight of blood may witness the preparations for a surgical operation with uncontrollable heart-sinking and anxiety" (p. 458). Therefore, when encountering an object or scenario (or even just thinking about it), people may anticipate the emotions that they have associated with a similar experience, triggering those same bodily and emotional responses.

More recent research findings bring some support to this claim, albeit inconsistently. Some find similar neural networks involved in the anticipation and actual exposure to viewing positive or negative images (Nitschke, Sarinopoulos, Mackiewicz, Schaefer, & Davidson, 2006; Ueda et al., 2003), and involved in the anticipation or actual experience of regret (Coricelli et al., 2005). However, others find distinct neural processing of emotional anticipation and emotional perception (Berpohl et al., 2006). Research on physiological responses has also been mixed. The startle reflex as measured by blink magnitude and skin conductance is similar for the anticipation and perception of negative stimuli, but differs for positive stimuli (Bradley & Lang, 2007; Sabatinelli, Bradley, & Lang, 2001).

Even if the current support for this proposition is mixed, the research does demonstrate that anticipation of an emotion leads to some neural and physiological changes, and these changes are

likely relevant in understanding risk perception. Interestingly, the more recently proposed feedback theory of emotions builds upon the basic explanation of anticipation presented by James, claiming that anticipation of emotions helps people make better decisions (Baumeister et al., 2007). It is theorized that an emotional response follows a triggering event or behavior so that people will learn to associate that emotion with that event or behavior. The emotional response can be thought of as feedback, teaching people what feelings to anticipate in similar future situations. For example, the function of an unpleasant emotion such as fear is to create negative associations, so that those feelings might be anticipated in future similar circumstances and lead people to avoid those situations or behaviors.

There is a fair amount of evidence that anticipated emotions play a role in risk perception and decision making. Specifically, anticipated regret is found to increase perceptions of risk and to reduce risky behaviors (Lagerkvist, Okello, & Karanja, 2015; Nordgren, van der Pligt, & van Harreveld, 2007; Ziarnowski, Brewer, & Weber, 2009) while anticipation of positive feelings leads to greater risk seeking and less risk aversion (Mellers & McGraw, 2001; Mellers, Schwartz, Ho, & Ritov, 1997). In these ways, it does seem that anticipating emotional feelings can lead to decision making strategies that are at least seemingly adaptive. However, more research is needed to examine the differences in risk-related decision making between those feeling emotions triggered by the current risk experience and those feeling emotions triggered by anticipation from previous experiences. Additionally, more work is needed to examine how the emotional and cognitive responses to a particular risk develop over time, before and after exposure to the risky object or situation.

5. Individual Differences

One of James' most interesting contentions is that there are quite a number of individual differences in emotional experiences. First, he proposed that the objects that lead an individual to a particular emotional experience differ widely, and there are few who would debate this. Although there is evidence that people are more likely to develop a fear response to stimuli that would have been a survival threat during the evolution of mammals (e.g., Öhman & Mineka, 2001), personal experiences explain much of an individual's emotional response to any object or event. Personal experience is similarly an important predictor of risk perception. For example, people who have personally experienced extreme weather events or unseasonably warm weather display greater concern about climate change (Spence, Poortinga, Butler, & Pidgeon, 2011; Zaval, Keenan, Johnson, & Weber, 2014). On the other hand, personal familiarity with a product or service is likely to reduce perceived risk and to increase perceived benefits (Fischer & Frewer, 2009; Weber, Siebenmorgen, & Weber, 2005).

James also suggested that individuals vary in the set of bodily changes that lead them to feel what they would describe as the same emotion. This claim is rather difficult to support within the theory as James has laid it out. If emotional feelings are the sensation of bodily changes, it is not clear why individuals would associate a different set of sensations with same emotional feeling. A slight alteration to James' proposal is a bit easier to support: Since emotions involve a number of different bodily changes, one subset of them may be *sufficient* for a feeling of emotion in one person, while not suffice for another. For example, a scowl may be *necessary* to the feeling of anger for some, while physiological changes may be *sufficient* for others. Although this proposition is not specifically stated by James, he does indicate that, "Now the moment the genesis of an emotion is accounted for, as the arousal by an object of a lot of reflex acts which are forthwith felt,

we immediately see why there is no limit to the number of possible different emotions which may exist, and why the emotions of different individuals may vary indefinitely” (p. 454).

From this description, it might be helpful to think of each bodily change as a cue used in combination by the individual to determine which emotion is being felt, much in the same way that occlusion, texture gradient, motion parallax, and other cues are used in visual perception of depth (Laird & Lacasse, 2014). Therefore, each individual may rely more or less on particular body changes depending upon the magnitude of each bodily change in a particular situation, upon their proprioceptive ability – to sense the relative position of parts of the body including movement of facial or bodily expressions, and upon their interoceptive ability – to sense the physiological condition of the organs in his or her body including skin and viscera.

Individuals do differ noticeably in their own interoceptive ability, and this individual difference has been linked to variability in perceived arousal (Barrett, Quigley, Bliss-Moreau, & Aronson, 2004; Dunn et al., 2010), emotional awareness (Craig, 2004), and emotional intensity (Herbert, Pollatos, & Schandry, 2007). Similarly, a body of work on the self-perception of emotions has found differences in whether individuals rely more on bodily cues or on cues from the surrounding situation to determine their emotional feelings (for a review, see Laird, 2007). This difference is defined by variations in specific proprioceptive ability: Those whose emotional feelings are influenced by their facial expressions and bodily postures do not rely on situational cues as much as those who are unresponsive to these changes. However, those who rely on bodily cues may have stronger interoceptive ability as well. For example, those who rely on bodily cues to determine their emotional feelings are also likely to feel greater symptoms of premenstrual syndrome (Schnall, Abrahamson, & Laird, 2002). This work demonstrates that individual differences in these perceptive abilities can influence the way people experience emotions, and

that James' proposition about unique individual experiences of emotions has merit. Due to these variations, it follows that individuals would differ in how much they rely upon bodily cues or situational cues when determining their emotional feeling.

A follow up question is: Do these individual differences in perceptive abilities and reliance on unique cues influence the way people perceive risk and make related decisions? Some work has begun to find that interoceptive ability can help explain differences in risk-related decision making. In a gambling task, those who can more accurately perceive their own bodily changes make decisions influenced by this information, and this can either help or hinder decision making depending upon what outcomes the bodily signals favor (Dunn et al., 2010; Werner, Jung, Duschek, & Schandry, 2009). Additionally, among those with greater interoceptive ability, electrodermal response to an unfair proposal led participants to reject the proposal, while this effect was not found among those with less interoceptive ability (Dunn, Evans, Makarova, White, & Clark, 2012). Building from James' propositions, this work demonstrates the link between bodily changes related to emotional processing and decision making, as well as individual differences in whether certain bodily changes influence those decisions. What is still left to be investigated is how an emotional feeling given the same label, but constructed from a different set of cues, impacts risk perceptions for different individuals.

6. Discussion & Future Directions

Reexamining James' *Principles of Psychology* has highlighted some unique aspects of his theory of emotions that resonate well with current theories and empirical evidence from emotions research and risk research. It provides insight into the roots of some contemporary theories, and offers some suggestions for future research directions. James proposed that cognitions co-occur with bodily changes during the experience of an emotion, although they do not cause emotional

feelings, and that feelings precede thoughts when getting to know an object. These ideas align with research findings regarding the processes by which affect and emotions interact with analytical processes when people are faced with risky objects or situations. James contended that emotions can serve a valuable function, and like instincts, provide us with information about the world around us. It is notable that mainstream risk research has also more recently been emphasizing the value of intuitive and emotional processes in helping people make decisions in risky or uncertain situations. James also suggested that anticipation of an emotion can bring those same feelings forth, and while the research demonstrating the neural and physiological similarities between the experience and anticipation of an emotion has been mixed, risk researchers have documented that people avoid taking risks they anticipate will cause them regret, and are optimistic about risks they anticipate will bring positive feelings.

Importantly, James pointed out that there are individual differences in people's emotional expressions and feelings. Researchers have demonstrated individual differences in proprioceptive and interoceptive ability, and that these can alter the ways people perceive their own emotional feelings. This key element from James' proposal as well as recent research findings can assist in addressing the decades' long debate surrounding James' theory of emotions. Rather than discussing whether or not emotions can be explained by bodily changes alone, perhaps we should focus more on learning to what extent and among which people are emotional feelings and decision making linked to bodily changes and cognitive appraisals.

This has the potential to reconcile some of different findings presented by Jamesian and appraisal emotion researchers. For example, Schachter and Singer (1962) as well as other researchers have demonstrated that people feeling arousal for non-emotional reasons, such as from exercising or from receiving an injection of epinephrine, may misattribute their arousal to feelings

of aggression or romantic attraction (White, Fishbein, & Rutsein, 1981; White & Kight, 1984; Zillmann, Johnson, & Day, 1974). This work demonstrates that bodily changes can serve as an emotional cue as James would predict, but that situational circumstances also matter. One explanation might be that when participants with moderate to strong interoceptive abilities sense bodily changes that are similar but not exactly the same as the full set of changes that lead to particular emotion, this sensation along with situational cues could be sufficient for some to experience a specific emotional feeling. It is also possible that participants with weak interoceptive ability rely even more heavily on the situational cues, and that the reactions from both types of participants combine to create the main effects found in this body of research.

This is only speculation, but empirical investigations with research questions of this sort may help start to resolve long-standing emotion debate. For example, if individual differences were to be tested in a variety of emotion studies, we might find predictable differences in the degree to which participants rely on bodily or situational cues. Linking this work with risk research, it would also be important to investigate how those with the same emotional feeling, but that came to it from different cues, are influenced by an emotion when making decisions about a risk. For example, if a group of individuals report feeling fear, does this fear influence decision making in the same way for individuals among whom the fear is comprised of more situational cues rather than bodily cues?

Another interesting direction suggested by the work of James and subsequent research would be to examine the nature of the bodily changes that most directly impact risk perceptions. Much work has examined the role of general positive or negative affect in risky decision making, but less has focused on specific emotional responses, with some exceptions (e.g., Lerner & Keltner, 2001; Raghunathan & Pham, 1999). Additionally, the influence of emotions cannot be simplified

by examining only emotional valence or emotional arousal, since neither of these factors can be used to consistently predict risk seeking or avoidance (Pham, 2007). Research that measures both bodily changes and self-reported emotional feelings when investigating how specific emotions (e.g., fear, anxiety, surprise, excitement) impact risk perception and decision making would be a productive next step. This would also likely lead to a greater understanding of the adaptive function of emotions, by linking feelings, physiological changes, and expressive behaviors, to the types of choices people make in risky situations. It would allow for further investigation into the ways specific bodily changes influence decision making, and may shed light on why particular emotional feelings are linked to the specific physiological and expressive changes that they are.

Additionally, more studies should be conducted examining the timing and interplay of emotional and cognitive processes when people are in naturalistic risk settings. Specifically, experiments have demonstrated that affective processes can guide cognitive processing of risk, and also that cognitive processes can influence feelings surrounding the risk (Slovic et al., 2004). However, much of this work has either been conducted in studies in which participants have been asked to perform a regulated risky task in a controlled settings (e.g., The Iowa Gambling Task in Bechara et al. 1997 and Xue et al., 2011), or participants are given multiple questionnaires in one sitting to report their feelings and cognitions regarding a societal risk such as different energy technologies (Truelove, 2012) or vaccine use (Renner & Reuter, 2012). One notable exception is a study by Kobbeltved and colleagues (2005) in which they measured worry, emotional distress, and risk several times while a group of military sailors were on a mission, allowing the researchers to analyze how these measures and at one time point influenced a later time point. More longitudinal, ecologically valid studies that include a variety of measures will present a clearer picture of the interactions between affective and cognitive processes when presented with a range

of different risks. They could also provide insight into the role of anticipatory and experienced emotions in changing risk perceptions over time, and if these two types of emotional experiences lead to different decision making strategies.

Risk research is an evolving interdisciplinary field, and since the world does not cease producing new risks, there will be a continuous need to investigate how people respond to them. Whether examining perceptions of climate change, the housing market, or genetically modified foods, gaining a fuller understanding of the variety of ways individuals process these risks will allow corporations, policy makers, and community organizations to find better ways to address the public about these potential problems. Emotional and affective processes are clearly involved in determining risk perceptions, and therefore delving into the details of emotion theories such as that proposed by the innovative mind of William James can provide new ideas about what is really going on when people decide to “go with their gut.”

References

- Barberis, N. C. (2013). Thirty years of prospect theory in economics: A review and assessment. *Journal of Economic Perspectives*, *27*, 173-196.
<http://dx.doi.org/10.1257/jep.27.1.173>
- Barrett, L. F., Quigley, K. S., Bliss-Moreau, E., & Aronson, K. R. (2004). Interoceptive sensitivity and self-reports of emotional experience. *Journal of Personality and Social Psychology*, *87*, 684-697. <http://dx.doi.org/10.1037/0022-3514.87.5.684>
- Baumeister, R. F., Vohs, K. D., DeWall, C. N., & Zhang, L. (2007). How emotion shapes behavior: Feedback, anticipation, and reflection, rather than direct causation. *Personality and Social Psychology Review*, *11*, 167-203. <http://dx.doi.org/10.1177/1088868307301033>
- Bechara, A., Damasio, H., Tranel, D., & Damasio, A.R. (1997). Deciding advantageously before knowing the advantageous strategy. *Science*, *275*, 1293-1295.
<http://dx.doi.org/10.1126/science.275.5304.1293>
- Bermpohl, F., Pascual-Leone, A., Amedi, A., Merabet, L.B., Fregni, F., Gaab, N.,...Northoff, G. (2006). Dissociable networks for the expectancy and perception of emotional stimuli in the human brain. *NeuroImage* *30*, 588-600. <http://dx.doi.org/10.1016/j.neuroimage.2005.09.040>
- Bradley, M. M. & Lang, P. J. (2007). Motivation and emotion. In J.T. Cacioppo, L. G. Tassinary, and G. Berntson (Eds.) *Handbook of psychophysiology, 3rd Edition* (pp. 581-607). New York: Cambridge University Press.
- Cannon, W. B. (1927). The James-Lange theory of emotions: A critical examination and an alternative theory. *The American Journal of Psychology*, *39*, 106-124.
<http://dx.doi.org/10.2307/1415404>

Coricelli, G., Critchley, H. D., Joffily, M., O'Doherty, J. P., Sirigu, A., & Dolan, R. J. (2005).

Regret and its avoidance: A neuroimaging study of choice behavior. *Nature Neuroscience*, 8, 1255-1262. <http://dx.doi.org/10.1038/nn1514>

Craig, A. D. (2004). Human feelings: Why are some more aware than others? *Trends in*

Cognitive Sciences, 8, 239-241. <http://dx.doi.org/10.1016/j.tics.2004.04.004>

Degler, C. N. (1991). *In search of human nature: The decline and revival of Darwinism in*

American social thought. Oxford: Oxford University Press.

Duffy, E. (1941). An explanation of "emotional" phenomena without the use of the concept

"emotion". *The Journal of General Psychology*, 25, 283-293.

<http://dx.doi.org/10.1080/00221309.1941.10544400>

Dunn, B. D., Evans, D., Makarova, D., White, J., & Clark, L. (2012). Gut feelings and the

reaction to perceived inequity: The interplay between bodily responses, regulation, and perception shapes the rejection of unfair offers on the ultimatum game. *Cognitive, Affective, & Behavioral Neuroscience*, 12, 419-429. <http://dx.doi.org/10.3758/s13415-012-0092-z>

Dunn, B. D., Galton, H. C., Morgan, R., Evans, D., Oliver, C., Meyer, M.,...Dalglish, T.

(2010). Listening to your heart. How interoception shapes emotion experience and intuitive decision making. *Psychological Science*, 21, 1835-1844.

<http://dx.doi.org/10.1177/0956797610389191>

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American*

Psychologist, 49, 709-724. <http://dx.doi.org/10.1037/0003-066X.49.8.709>

Fischer, A. R., & Frewer, L. J. (2009). Consumer familiarity with foods and the perception of

risks and benefits. *Food Quality and Preference*, 20, 576-585.

<http://dx.doi.org/10.1016/j.foodqual.2009.06.008>

- Forgas, J. P. (1995). Mood and judgment: The affect infusion model (AIM). *Psychological Bulletin*, *117*, 39-66. <http://dx.doi.org/10.1037/0033-2909.117.1.39>
- Forgas, J. P., & George, J. M. (2001). Affective influences on judgments and behavior in organizations: An information processing perspective. *Organizational Behavior and Human Decision Processes*, *86*, 3-34. <http://dx.doi.org/10.1006/obhd.2001.2971>
- Gray, J. R. (1999). A bias toward short-term thinking in threat-related negative emotional state. *Personality and Social Psychology Bulletin*, *25*, 65-75.
<http://dx.doi.org/10.1177/0146167299025001006>
- Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, *108*, 814-834. <http://dx.doi.org/10.1037/0033-295X.108.4.814>
- Harrison, G. W., & Rutström, E. E. (2009). Expected utility theory and prospect theory: One wedding and a decent funeral. *Experimental Economics*, *12*, 133-158.
<http://dx.doi.org/10.1007/s10683-008-9203-7>
- Herbert, B. M., Pollatos, O., & Schandry, R. (2007). Interoceptive sensitivity and emotion processing: An EEG study. *International Journal of Psychophysiology*, *65*, 214-227.
<http://dx.doi.org/10.1016/j.ijpsycho.2007.04.007>
- Hornig, S. (1993). Reading risk: Public response to print media accounts of technological risk. *Public Understanding of Science*, *2*, 95-109. <http://dx.doi.org/10.1088/0963-6625/2/2/001>
- Huijts, N., Molin, E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and Sustainable Energy Reviews*, *16*, 525-531. <http://dx.doi.org/10.1016/j.rser.2011.08.018>

James, W. (1890). *Principles of psychology*. New York: Holt. Retrieved from:

<http://psychclassics.yorku.ca/James/Principles/>

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.

Keller, C., Visschers, V., & Siegrist, M. (2012). Affective imagery and acceptance of replacing nuclear power plants. *Risk Analysis*, 32, 464-477. <http://dx.doi.org/10.1111/j.1539-6924.2011.01691.x>

Kobbeltved, T., Brun, W., Johnsen, B. H., & Eid, J. (2005). Risk as feelings or risk and feelings? A cross-lagged panel analysis. *Journal of Risk Research*, 8, 417-437.

<http://dx.doi.org/10.1080/1366987042000315519>

Krishnamurti, T., Schwartz, D., Davis, A., Fischhoff, B., de Bruin, W. B., Lave, L., & Wang, J. (2012). Preparing for Smart Grid technologies: A behavioral decision research approach to understanding consumer expectations about smart meters. *Energy Policy*, 41, 790-797.

<http://dx.doi.org/10.1016/j.enpol.2011.11.047>

Lagerkvist, C. J., Okello, J. J., & Karanja, N. (2015). Consumers' mental model of food safety for fresh vegetables in Nairobi: A field experiment using the Zaltman Metaphor Elicitation Technique. *British Food Journal*, 117, 22-36. <http://dx.doi.org/10.1108/BFJ-09-2013-0280>

Laird, J. D. (2007). *Feelings: The perception of self*. Oxford: Oxford University Press.

Laird, J. D., & Lacasse, K. (2014). Bodily influences on emotional feelings: Accumulating evidence and extensions of William James's theory of emotion. *Emotion Review*, 6, 27-34.

<http://dx.doi.org/10.1177/1754073913494899>

Lazarus, R. S. (1984). On the primacy of cognition. *American Psychologist*, 39, 124-129.

<http://dx.doi.org/10.1037/0003-066X.39.2.124>

- Lee, C. J., Scheufele, D. A., & Lewenstein, B. V. (2005). Public attitudes toward emerging technologies: Examining the interactive effects of cognitions and affect on public attitudes toward nanotechnology. *Science Communication*, 27, 240-267.
<http://dx.doi.org/10.1177/1075547005281474>
- Lerner, J. S., & Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgment and choice. *Cognition & Emotion*, 14, 473-493.
<http://dx.doi.org/10.1080/026999300402763>
- Lerner, J. S., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology*, 81, 146-159. <http://dx.doi.org/10.1037/0022-3514.81.1.146>
- Loewenstein, G. (1996). Out of control: Visceral influences on behavior. *Organizational Behavior and Human Decision Processes*, 65, 272-292.
<http://dx.doi.org/10.1006/obhd.1996.0028>
- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, 127, 267-286. <http://dx.doi.org/10.1037/0033-2909.127.2.267>
- Mellers, B. A., & McGraw, A. P. (2001). Anticipated emotions as guides to choice. *Current Directions in Psychological Science*, 10, 210-214. <http://dx.doi.org/10.1111/1467-8721.00151>
- Mellers, B. A., Schwartz, A., Ho, K., & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science*, 8, 423-429.
<http://dx.doi.org/10.1111/j.1467-9280.1997.tb00455.x>

Mikels, J. A., Maglio, S. J., Reed, A. E., & Kaplowitz, L. J. (2011). Should I go with my gut?

Investigating the benefits of emotion-focused decision making. *Emotion, 11*, 743-753.

<http://dx.doi.org/10.1037/a0023986>

Nitschke, J. B., Sarinopoulos, I., Mackiewicz, K. L., Schaefer, H. S., & Davidson, R. J. (2006).

Functional neuroanatomy of aversion and its anticipation. *NeuroImage, 29*, 106-116.

<http://dx.doi.org/10.1016/j.neuroimage.2005.06.068>

Nordgren, L. F., van der Pligt, J., & van Harreveld, F. (2007). Evaluating Eve: Visceral states

influence the evaluation of impulsive behavior. *Journal of Personality and Social*

Psychology, 93, 75-84. <http://dx.doi.org/10.1037/0022-3514.93.1.75>

Öhman, A., & Mineka, S. (2001). Fears, phobias, and preparedness: Toward an evolved module

of fear and fear learning. *Psychological Review, 108*, 483-522.

<http://dx.doi.org/10.1037/0033-295X.108.3.483>

Pham, M. T. (2007). Emotion and rationality: A critical review and interpretation of empirical

evidence. *Review of General Psychology, 11*, 155-178. <http://dx.doi.org/10.1037/1089->

[2680.11.2.155](http://dx.doi.org/10.1037/1089-2680.11.2.155)

Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational

influences of anxiety and sadness on decision making. *Organizational Behavior and Human*

Decision Processes, 79, 56-77. <http://dx.doi.org/10.1006/obhd.1999.2838>

Renner, B., & Reuter, T. (2012). Predicting vaccination using numerical and affective risk

perceptions: The case of A/H1N1 influenza. *Vaccine, 30*, 7019-7026.

<http://dx.doi.org/10.1016/j.vaccine.2012.09.064>

- Roeser, S. (2012). Moral emotions as guide to acceptable risk. In S. Roeser, R. Hillerbrand, P. Sandin & M. Peterson (Eds.) *Handbook of risk theory: Epistemology, decision theory, ethics, and social implications of risk* (pp. 819-832). New York, NY: Springer
- Sabatinelli, D., Bradley, M. M., & Lang, P. J. (2001). Affective startle modulation in anticipation and perception. *Psychophysiology*, *38*, 719-722. <http://dx.doi.org/10.1111/1469-8986.3840719>
- Schachter, S., & Singer, J. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review*, *69*, 379-399. <http://dx.doi.org/10.1037/h0046234>
- Scheufele, D. A., & Lewenstein, B. V. (2005). The public and nanotechnology: How citizens make sense of emerging technologies. *Journal of Nanoparticle Research*, *7*, 659-667. <http://dx.doi.org/10.1007/s11051-005-7526-2>
- Schnall, S., Abrahamson, A., & Laird, J. D. (2002). Premenstrual syndrome and misattribution: A self-perception, individual differences perspective. *Basic and Applied Social Psychology*, *24*, 215-228. <http://dx.doi.org/10.1080/02699930302286>
- Schwarz, N. (2011). Feelings-as-information theory. In A. M. van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.) *Handbook of theories of social psychology* (pp. 289-308). Thousand Oaks, CA: SAGE Publications Ltd.
- Shiv, B., Loewenstein, G., Bechara, A., Damasio, H., & Damasio, A. R. (2005). Investment behavior and the negative side of emotion. *Psychological Science*, *16*, 435-439. <http://dx.doi.org/10.1111/j.0956-7976.2005.01553.x>
- Slovic, P. (2000). Rational actors and rational fools: The influence of affect on judgment and decision-making. *Roger Williams University Law Review*, *6*, 163-212.

- Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis*, *24*, 311-322. <http://dx.doi.org/10.1111/j.0272-4332.2004.00433.x>
- Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2007). The affect heuristic. *European Journal of Operational Research*, *177*, 1333-1352. <http://dx.doi.org/10.1016/j.ejor.2005.04.006>
- Smith, C. A., & Ellsworth, P. C. (1985). Patterns of cognitive appraisal in emotion. *Journal of Personality and Social Psychology*, *48*, 813-838. <http://dx.doi.org/10.1037/0022-3514.48.4.813>
- Spence, A., Poortinga, W., Butler, C., & Pidgeon, N. F. (2011). Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change*, *1*, 46-49. <http://dx.doi.org/10.1038/nclimate1059>
- Truelove, H. B. (2012). Energy source perceptions and policy support: Image associations, emotional evaluations, and cognitive beliefs. *Energy Policy*, *45*, 478-489. <http://dx.doi.org/10.1016/j.enpol.2012.02.059>
- Ueda, K., Okamoto, Y., Okada, G., Yamashita, H., Hori, T., & Yamawaki, S. (2003). Brain activity during expectancy of emotional stimuli: An fMRI study. *NeuroReport*, *14*, 51-55. <http://dx.doi.org/10.1097/00001756-200301200-00010>
- Wagar, B. M., & Dixon, M. (2006). Affective guidance in the Iowa gambling task. *Cognitive, Affective, & Behavioral Neuroscience*, *6*, 277-290. <http://dx.doi.org/10.3758/CABN.6.4.277>
- Weber, E. U., Siebenmorgen, N., & Weber, M. (2005). Communicating asset risk: How name recognition and the format of historic volatility information affect risk perception and

- investment decisions. *Risk Analysis*, 25, 597-609. <http://dx.doi.org/10.1111/j.1539-6924.2005.00627.x>
- Werner, N. S., Jung, K., Duschek, S., & Schandry, R. (2009). Enhanced cardiac perception is associated with benefits in decision-making. *Psychophysiology*, 46, 1123-1129. <http://dx.doi.org/10.1111/j.1469-8986.2009.00855.x>
- White, G. L., Fishbein, S., & Rutsein, J. (1981). Passionate love and the misattribution of arousal. *Journal of Personality and Social Psychology*, 41, 56–62. <http://dx.doi.org/10.1037/0022-3514.41.1.56>
- White, G. L., & Kight, T. D. (1984). Misattribution of arousal and attraction: Effects of salience of explanations for arousal. *Journal of Experimental Social Psychology*, 20, 55–64. [http://dx.doi.org/10.1016/0022-1031\(84\)90012-X](http://dx.doi.org/10.1016/0022-1031(84)90012-X)
- Xue, G., He, Q., Lei, X., Chen, C., Liu, Y., Lu, Z. L.,...Bechara, A. (2011). The gambler's fallacy is associated with weak affective decision making but strong cognitive ability. *PloS one*, 7, e47019. <http://dx.doi.org/10.1371/journal.pone.0047019>
- Yates, J. F. (1992). *Risk-taking behavior*. New York: John Wiley & Sons.
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35, 151-175. <http://dx.doi.org/10.1037/0003-066X.35.2.151>
- Zaval, L., Keenan, E. A., Johnson, E. J., & Weber, E. U. (2014). How warm days increase belief in global warming. *Nature Climate Change*, 4, 143-147. <http://dx.doi.org/10.1038/nclimate2093>
- Zeelenberg, M., & Pieters, R. (2006). Feeling is for doing: A pragmatic approach to the study of emotions in economic behavior. In D. DeCremer, M. Zeelenberg & J. K. Murnighan (Eds.), *Social psychology and economics* (pp. 117–137). Mahwah, NJ: Erlbaum.

Ziarnowski, K. L., Brewer, N. T., & Weber, B. (2009). Present choices, future outcomes:

Anticipated regret and HPV vaccination. *Preventive Medicine, 48*, 411-414.

<http://dx.doi.org/10.1016/j.ypmed.2008.10.006>

Zillmann, D., Johnson, R. C., & Day, K. D. (1974). Attribution of apparent arousal and proficiency of recovery from sympathetic activation affecting excitation transfer to aggressive behavior. *Journal of Experimental Social Psychology, 10*, 503–515.

[http://dx.doi.org/10.1016/0022-1031\(74\)90075-4](http://dx.doi.org/10.1016/0022-1031(74)90075-4)