



# The Case for Mixed Emotions

Jeff T. Larsen<sup>1\*</sup> and A. Peter McGraw<sup>2</sup>

<sup>1</sup>University of Tennessee

<sup>2</sup>University of Colorado

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## Abstract

How do people feel when they experience bittersweet events comprised of pleasant and unpleasant aspects (e.g., good news accompanied by bad)? Just as acids immediately neutralize bases, some have suggested that bittersweet events' pleasant aspects might neutralize their unpleasant aspects, thereby resulting in fairly neutral emotional reactions. Some contemporary theorists also contend that happiness and sadness are mutually exclusive. We review research on the alternative possibility that bittersweet events can elicit pairs of opposite-valence, mixed emotions, with particularly close attention to the growing body of evidence that people can feel happy and sad at the same time while watching films, listening to music, and experiencing meaningful endings. We also review evidence that people sometimes experience other types of mixed emotions, including disgust accompanied by amusement and fear by enjoyment. Taken together, these data indicate that positive and negative affect are separable in experience.

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On June 29, 2009, Kassim Bakari learned that the airliner carrying his daughter, Bahia, had plunged into the Indian Ocean. All aboard were believed to have perished. The next day, Bakari learned that Bahia had managed to survive by clinging to a piece of debris for 12 hours. The story, however, does not have an entirely happy ending for Bakari. His wife had also been aboard the flight and did not survive. A complete understanding of emotion must include an understanding of emotional reactions to events like those faced by Bakari, yet for centuries theorists have disagreed about how such bittersweet events make people feel.

## Mixed Emotions of Happiness and Sadness

We define *mixed emotions* broadly as the co-occurrence of positive and negative affects. Mixed emotions represent a subset of *emotion blends*, which we define as the co-occurrence of any two or more same-valence or opposite-valence emotions (Scherer, 1998). Positive emotions come in any number of fairly discrete varieties (e.g., excitement, hope, happiness), as do negative emotions (e.g., fear, sadness, disgust), which raises the possibility that mixed emotions will also come in any number of varieties. We will cast a wider net later, but we begin with a particularly provocative question that has sparked the sharpest theoretical disputes and has the broadest implications for the nature of emotional experience: Can people feel happy and sad at the same time?

### *The case against mixed emotions of happiness and sadness*

Early psychologists doubted the possibility of mixed emotions. Bain (1859) argued that pleasure and displeasure neutralize one another “as an acid neutralizes an alkali [i.e., base]” (p. 441). Wundt (1896) concurred. He maintained that, “all the partial feelings present at a given moment unite, in every case to form a single total feeling” (p. 187; emphasis in original).

Some contemporary theorists also concur. Most notably, the circumplex model (Russell & Barrett, 1999) conceptualizes valence as a “basic building block of emotional life” (Barrett, 2006, p. 35), a *psychological primitive* (Barrett & Bliss-Moreau, 2009). To say that valence is a psychological primitive is to say that the experience of valence cannot be decomposed into its constituent parts (e.g., some combination of pleasant and unpleasant feelings) any more than a chemical compound can be both an acid and a base. On this view, when good fortune is coupled with misfortune, only the net difference between pleasure and displeasure reaches conscious experience; the underlying pleasures and displeasures themselves are lost along the way. Consequently, the circumplex model contends that happiness and sadness, which anchor the two ends of the valence dimension, are mutually exclusive in experience.

### *The case for mixed emotions of happiness and sadness*

Other scholars have proposed that people can experience a variety of mixed emotions, including happiness and sadness. In Plato’s *Philebus* (trans. 1975), Socrates posited that when people appear to be “midway between the two” states of pleasure and pain, they might actually be experiencing mixed emotions. David Hume (1739/2000) argued that people can experience mixed emotions in response to events with a “mixt nature”. In contrast to Bain’s chemical analogy, Ebbinghaus (1902; cited in Wolgemuth, 1919) put forth a thermal analogy in support of his contention that people can experience mixed emotions: “Just as we may sense cold in our feet and warmth in our hands at the same time, so we may experience the pleasantness of a tasty dish and the unpleasantness of a severe headache side by side” (p. 540). Different analogy, different conclusion.

Few contemporary theories hold that *all* positive and negative emotions are mutually exclusive. In fact, the circumplex model contends that only happiness and sadness and other pairs of polar opposite emotions (e.g., relaxed and stressed) are mutually exclusive (Russell & Carroll, 1999). It makes the further contention that highly arousing positive emotions (e.g., excitement) and negative emotions (e.g., stressed) can co-occur. A second leading contemporary model of the structure of affect, Watson and Tellegen’s (1985) model, goes so far as to contend that two broad classes of such high-arousal affective states termed Positive Activation and Negative Activation are largely independent of another in experience, which suggests that intense excitement can occur alongside intense levels of stress. The evaluative space model goes even further by contending that the operation of the positive and negative substrates underlying the valence dimension are separable in experience (Cacioppo & Berntson, 1994; Cacioppo, Larsen, Smith, & Berntson, 2004). This raises the possibility that any pair of opposite-valence emotions can co-occur, even happiness and sadness (Larsen, McGraw, & Cacioppo, 2001). Thus, the circumplex and evaluative space models make competing predictions about mixed emotions of happiness and sadness.<sup>1</sup>

### *Initial empirical tests*

At first blush, testing the circumplex and evaluative space models’ competing hypotheses seems fairly straightforward. If Eratosthenes (c. 276 BCE–c. 195 BCE) had the wherewithal to approximate the earth’s circumference by comparing the length of shadows cast in Alexandria with those cast nearly 1000 km to the south in Syene, contemporary psychologists should have the wherewithal to figure out whether someone is feeling happy and feeling sad. Unfortunately, emotions are hypothetical constructs rather than objective entities, which makes them considerably more difficult to measure than shadows.

Carroll and Russell (1998; cited in Russell & Carroll, 1999) were the first to test the circumplex model's contention that happiness and sadness are mutually exclusive. They asked undergraduates in a classroom setting whether they felt happy and whether they felt sad. Most participants reported feeling happy and some reported feeling sad. Only 10% reported feeling both happy and sad, but it is quite likely that some participants were acquiescent (i.e., they simply responded "yes" to most questions even if they were not experiencing the emotion) or simply responded randomly. With allowance for these and other sources of measurement error that might yield overestimates of the incidence of mixed emotions, Carroll and Russell's findings are consistent with the circumplex model's contention that happiness and sadness are mutually exclusive (Russell & Carroll, 1999). However, sitting in a university classroom filled with other students completing questionnaires is a pallid event. As Russell and Carroll noted, stronger tests of the circumplex and evaluative space models' competing predictions require investigating how people feel in more evocative, bittersweet events containing both pleasant and unpleasant aspects.

Larsen et al. (2001) provided one of the first investigations of how bittersweet situations make people feel by capitalizing on the remarkably evocative film *Life Is Beautiful* (Benigni, 1997). The tragicomedy *Life Is Beautiful* depicts a father's attempts to keep his son unaware of their plight during their imprisonment in a World War II concentration camp. We surveyed moviegoers as they entered the theater to watch *Life Is Beautiful*. Like Carroll and Russell (1998), we simply asked people to indicate whether they were feeling a number of emotions, including happiness and sadness. Not surprisingly, most of these individuals indicated feeling exclusively happy. (A few, perhaps partners who would have preferred to be on their way to watching another film, indicated feeling exclusively sad.) Most important, only 10% reported mixed emotions of happiness and sadness, which represents a conceptual replication of Carroll and Russell's (1998) evidence that happiness and sadness tend to be mutually exclusive.

We also collected data from moviegoers on their way out of the theater, just after they had watched *Life Is Beautiful*. These data painted a very different picture. Many respondents reported feeling exclusively happy, and many others felt exclusively sad, but some 44% reported mixed emotions of happiness and sadness.<sup>2</sup> The finding that moviegoers were four times more likely to report mixed emotions of happiness and sadness after the film than before is inconsistent with the circumplex model's contention that polar opposite emotions such as happiness and sadness are mutually exclusive but consistent with the evaluative space model's contention that happiness and sadness can co-occur in bittersweet situations.

### *Addressing alternative interpretations*

At first blush, Larsen et al.'s (2001) findings might seem to lie to rest a question about the experience of emotion that had vexed scholars for centuries. It has become clear that the *Life Is Beautiful* study failed to address any number of alternative interpretations. It did provide evidence against at least one alternative interpretation, though. Specifically, one possibility is that moviegoers were simply more acquiescent after the film than before. Perhaps they quickly and thoughtlessly said "yes" to most questions because they were eager to finish the survey and get on with their evenings. If moviegoers were simply more acquiescent after the film, we would expect them to be more likely to report experiencing other pairs of polar opposite emotions than those who completed the survey before the film, but this was not the case. They were no more likely to report feeling both calm and tense, excited and depressed, or other pairs of polar opposite emotions. These data provide evidence against the possibility that acquiescence can account for our evidence for mixed emotions, but others remained.

*Reactive measurement.* Eratosthenes' measurement of shadows had no influence on the length of those shadows, but psychologists' measurement of emotions may very well influence those emotions. When we asked people whether they felt happy, we may have inadvertently elicited happiness by prompting them to recall pleasant scenes (e.g., the boy's reunion with his mother). Similarly, when we asked people whether they felt sad, we may have inadvertently elicited sadness by prompting them to recall unpleasant scenes (e.g., the father's death). According to this *reactive measurement hypothesis*, our participants only experienced mixed emotions because we put words in their mouths by asking them whether they felt happy and whether they felt sad.

We tested the reactive measurement hypothesis by showing undergraduates a 20-min clip from the English-subtitled version of *Life Is Beautiful* in the context of a study that they were led to believe dealt with foreign language comprehension (Larsen & McGraw, 2011; Study 4). After watching a clip containing bittersweet scenes from the film, participants wrote (or rather, typed) about the emotions they were feeling. The prompt did not mention happiness or sadness; some 24% of the participants wrote that they felt both happy and sad. In contrast, not one in a group of people who had watched a clip that began with unambiguously pleasant scenes and ended with unambiguously unpleasant scenes wrote that they felt both happy and sad. These findings provided evidence against the reactive measurement hypothesis. People sometimes report mixed emotions of happiness and sadness even if they have not been asked whether they feel happy and whether they feel sad.

*Demand characteristics.* The shadows that Eratosthenes measured were indifferent to any hypothesis that he may have had about their length, but people sometimes tell psychologists what they think the psychologists want to hear. To address the possibility that such *demand characteristics* (Orne, 1962) lead participants to report mixed emotions (Schimmack, 2005), we conducted another experiment in which participants completed open-ended measure of emotions after watching the bittersweet clip from *Life Is Beautiful* (Larsen & McGraw, 2011; Study 5). Some participants then read that we had "predicted that people CANNOT feel both happy and sad at the same time" and completed a measure of the time course of their emotional reactions. These participants were just as likely to report mixed emotions as a group who watched the bittersweet clip and were told nothing about our hypothesis. Moreover, both groups were more likely to report simultaneously mixed emotions than a third group who had watched the control clip. These findings suggest that people did not tell us what they thought we wanted to hear; they did their best to tell us how they actually felt.

*Lay theories of mixed emotions.* Shadows hold no beliefs about how long they are, but people have lay theories about how emotions work, and these lay theories can be inaccurate (e.g., Barrett, Robin, Pietromonaco, & Eyssell, 1998). Most people think that people can feel happy and sad at the same time (Larsen & McGraw, 2000, February), which may lead them to think they are experiencing simultaneously mixed emotions even when they are not (E. Harmon-Jones, personal communication; April, 2004). To address this possibility, we identified students who we termed *non-endorsers*: people who did *not* think that (or did not know whether) people can feel happy and sad at the same time (Larsen & McGraw, 2011; Study 6). Later in the semester, open-ended measures revealed that these students were just as likely to report mixed emotions of happiness and sadness as other students who watched the bittersweet clip. More important, they were more likely to report mixed emotions than other students who had watched our control clip from *Life Is Beautiful*. These findings suggest that people report mixed emotions not because they erroneously think they can simultaneously feel happy and sad but because they actually simultaneously felt happy and sad.

*Vacillation.* The shadows cast by the sun did not change in the course of the time that it took Eratosthenes to measure them. In contrast, emotions can come and go in less than a second (Ekman, 1992). Such instability raises what is perhaps the thorniest alternative explanation for initial evidence for mixed emotions. Even when asked to indicate how they feel “right now, at this very moment” (Larsen et al., 2001; p. 688), people may simply summarize the emotions they had experienced during the previous few seconds or even minutes (Barrett & Bliss-Moreau, 2009; Barrett et al., 2010; Larsen, McGraw, Mellers, & Cacioppo, 2004). If so, people may report mixed emotions of happiness and sadness even when they merely vacillated between happiness and sadness.

Carrera and Oceja (2007) addressed this vacillation hypothesis by asking undergraduates to draw one curve to chart how their happiness had changed moment-to-moment over the course of a bittersweet 6-min film and another curve to chart how their sadness had changed. The floor of the chart represented the absence of the emotion, and the ceiling represented maximum intensity. Carrera and Oceja identified those who had experienced mixed emotions as those whose curves both cleared the floor at any one point in time. The finding that these participants were nearly twice as likely to report mixed emotions (47%) as those who watched a control clip (25%) provides evidence against the vacillation hypothesis.

Carrera and Oceja’s (2007) measures require participants to recall the emotions they had experienced over the course of an evocative event, but recalling emotions can be difficult (Thomas & Diener, 1990), and recalling mixed emotions can be especially difficult (Aaker, Drolet, & Griffin, 2008). We have asked participants to report moment-to-moment changes in their emotions as they watched scenes from *Life Is Beautiful* (Larsen & McGraw, 2011; Study 1a). Specifically, we handed them a computer mouse and asked them to press the left button whenever they felt happy, the right button whenever they felt sad, neither button if they felt neither happy nor sad, and both buttons if they felt both happy and sad. Participants who watched the bittersweet clip were several times more likely to spend some amount of time simultaneously pressing both buttons (67%) than another group of participants who watched the control clip (18%). Additional studies with moment-to-moment measures revealed that both (a) people who had been told that we did not think that people can feel happy and sad at the same time and (b) people who had earlier indicated that they did not think or did not know whether people could feel happy and sad at the same time reported more mixed emotions during the bittersweet clip than did people who watched the control clip. In another study, the instructions for the button press measures made no mention of happiness and sadness, and participants were only prompted to report whether they felt happy and whether they felt sad on one occasion (Larsen & Green, 2013). Participants who were prompted to report their emotions during bittersweet scenes, as opposed to unambiguously unpleasant scenes, spent more time reporting simultaneously mixed emotions. All of these studies provide evidence against the hypothesis that people in earlier studies simply vacillated quickly between happiness and sadness.

*Summary.* Popper (1927/1999) noted that, “The theory ‘All ravens are black’ rules out the existence of white ravens; and observation of a white raven refutes the theory” (p. 19). The occurrence of mixed emotions of happiness and sadness represents one of psychology’s few white ravens. Indeed, few psychological theories preclude the very existence of a phenomenon, which makes Russell and Carroll’s (1999) contention that happiness and sadness cannot co-occur especially remarkable. With the broad question of whether the experience of valence is a psychological primitive at stake, the narrow question of whether people can feel happy and sad at the same time is hardly an idle quest for a mere curiosity. Numerous studies including our own suggest that happiness and sadness rarely co-occur.

In Larsen and McGraw's (2011) button press study described above, the median participant spent precisely 0 sec reporting mixed emotions during the control clip and only 24 sec reporting mixed emotions during the bittersweet clip even though it was nearly 20 min long. Nonetheless, the data also reveal that people are more likely to report feeling happy and sad in response to bittersweet scenes from films than during other scenes. This pattern is obtained whether emotions are measured with closed- or open-ended measures and at a single point in time or continuously over time. Taken together, the data provide evidence against the circumplex model's contention that valence is a psychological primitive (Bain, 1859; Russell & Carroll, 1999; Wundt, 1896) and for those that contend that the positive and negative affective bases underlying valence are separable in experience (e.g., Cacioppo & Berntson, 1994; Hume 1739/2000; Ebbinghaus, 1902, cited in Wolgemuth, 1919). Chemical compounds cannot be both acidic and basic, but it appears that they can experience the distinct pleasures and displeasures associated with bittersweet events.

### **Beyond *Life Is Beautiful***

Films such as *Life Is Beautiful* provide strong tests of nuanced alternative interpretations for questions about whether people can feel happy and sad at the same time. The evidence indicates that *Life is Beautiful* represents a white raven, and more recent research indicates that it may not be the only white raven.

Different structural elements of music reliably elicit different emotional reactions. Whereas fast tempos typically elicit happiness, slow tempos elicit sadness (e.g., Webster & Weir, 2005). Other elements have more subtle influence on emotion. Even though most non-musicians have difficulty distinguishing the patterns of pitch changes that distinguish major from minor modes (Leaver & Halpern, 2004), major modes typically elicit happiness, and minor modes elicit sadness (Webster & Weir, 2005). Many songs feature *conflicting cues* (Schellenberg & von Scheve, 2012) comprising fast tempos but minor modes or slow tempos but major modes, which raises the question of whether songs with conflicting cues elicit mixed emotions of happiness and sadness. Hunter, Schellenberg, and Schimmack (2008) had listeners indicate both how happy and how sad they felt after each of a series of songs that varied in tempo and mode. As predicted, they found that songs with conflicting cues elicited more mixed emotions than songs with consistent cues (see also, Hunter, Schellenberg, & Schimmack, 2010; Ladinig & Schellenberg, 2012). A subsequent study involving moment-to-moment measures (i.e., Larsen & McGraw's, 2011, button press measures) also revealed that songs with conflicting cues elicited more simultaneously mixed emotions (Larsen & Stastny, 2011). A closer look at these findings indicates that even slow minor songs elicit considerable levels of mixed emotions, presumably because their sad cues were accompanied by the array of cues (e.g., consonance, rhythm; see Juslin & Laukka, 2004) that make music pleasant (Larsen, Hershfield, Stastny, & Hester, 2014). Additional evidence indicates that songs that elicit feelings of nostalgia, presumably even those with no sad cues, can also elicit mixed emotions (Barrett et al., 2010). Taken together, these findings indicate that music, like *Life Is Beautiful*, represents another white raven in that it can elicit mixed emotions of happiness and sadness.

### **Beyond Aesthetic Emotions**

Films and music have provided great insight into whether people can feel happy and sad at the same time, but their utility is limited somewhat by the fact that they involve *aesthetic emotions* (i.e., emotions elicited by works of art rather than real events). Some scholars have challenged the very idea that aesthetic emotions are actual emotions (see Walters, 1989).

At the very least, the idea that art can elicit emotions is perplexing (e.g., Ellsworth & Scherer, 2003; Frijda, 1988; Walters, 1989). All this raises the concern that mixed emotions of happiness and sadness can only co-occur in the confines of the laboratory even though our real objective is to understand the emotions elicited by real events in the real world.

Subsequent research indicates that people can feel happy and sad at the same time in response to real world events. Ersner-Hershfield, Mikels, Sullivan, and Carstensen (2008) speculated that meaningful endings can elicit poignant mixed emotions of happiness and sadness. Initial evidence came from our evidence that undergraduates were more likely to feel mixed emotions of happiness and sadness upon turning in the keys to their dorm rooms at the end of their freshman year and upon their own graduation day at the end of their senior year than during typical days on campus (Larsen et al., 2001). Ersner-Hershfield et al. investigated the role of meaningful endings more directly by reminding some Stanford students on the day of their graduation that “today is the last day that you will be a student at Stanford”. As predicted, they found that these students subsequently reported more intense mixed emotions than did other graduates who received no such reminder. Thus, meaningful endings represent one real world event that can elicit mixed emotions of happiness and sadness.

### **Beyond Happiness and Sadness**

The evidence that people can feel happy and sad at the same time provides a context for thinking about mixed emotions more broadly. If such polar opposite emotions as happiness and sadness happiness and sadness can co-occur, we can expect that a wide array of opposite-valence emotions can also co-occur.

#### *High-arousal mixed emotions*

As we mentioned above, all dimensional models allow for at least some types of mixed emotions. Russell and Carroll (1999) did contend that polar opposite emotions (e.g., happiness & sadness) are mutually exclusive, but they stressed that all other pairs of opposite-valence emotions can co-occur and that some will co-occur more often than others. For instance, they shared Watson and Tellegen’s (1985) contention that high-arousal positive and negative emotions co-occur regularly. Evidence that the Positive and Negative Affect Schedule’s (i.e., PANAS, Watson, Clark, & Tellegen, 1988) measures of high-arousal positive emotions (i.e., Positive Activation) and high-arousal negative emotions (i.e., Negative Activation) tend to be uncorrelated or only weakly negatively correlated has been treated as evidence for their co-occurrence, but logical considerations (Diener & Iran-Nejad, 1986; Russell & Carroll, 1999; Schimmack, 2001) and empirical evidence (Larsen et al., 2014) have made it abundantly clear that correlation coefficients are poorly suited for indexing mixed emotions. Fortunately, the ready availability of more suitable measures of mixed emotions (e.g., Schimmack, 2001) has allowed more insight into the co-occurrence of high-arousal positive and negative emotions.

Types of experience known as *guilty pleasures* may be one source of high-arousal mixed emotions. Mukhopadhyay and Johar (2007) investigated mixed emotional responses to impulse purchases. They asked students to consider a scenario in which they happened upon a sale on attractive computer software that they had not intended to buy. Participants who indicated that they would succumb to temptation and buy the software subsequently reported that they would feel happier than those who would resist temptation, but they also reported that they would feel guiltier. In another study, Ramanathan and Williams (2007) gave people a subtle opportunity to take some cookies without actually inviting them to

do so. The majority of participants succumbed to temptation and were rewarded in the short run with positive affect but punished in the long run by feelings of guilt.

Some temptations are more problematic than impulsively purchasing software or surreptitiously helping oneself to a cookie. Though laws against pornography indicate that many people have negative emotional reactions to pornography, the finding that as many as 13% of web searches involve erotic content (Ogas & Gaddam, 2011) is a sobering indication that many have positive emotional reactions to it. Pornography involves a primary reinforcer that is both socially charged (Zillmann, 1992) and physiologically arousing (Carvalho, Leite, Galdo-Álvarez, & Gonçalves, 2011), so any such mixed emotions likely include highly arousing positive and negative emotions. Peterson and Janssen (2007) found that most participants reported experiencing at least one of four positive emotions and one of seven negative emotions to at least some degree after viewing various types of erotic films (see also Byrne, Fisher, Lamberth, & Mitchell, 1974). Staley and Prause (2013) focused specifically on the effects of pornography on high-arousal positive and negative emotions. Their change scores revealed that nearly half of men and women alike showed increases in both Positive Activation and Negative Activation scores after watching erotic films.

Horror films also elicit high-arousal emotions (Hewig, Hagemann, Seifert, Gollwitzer, Naumann, & Bartussek, 2005) and are acclaimed by some but reviled by others, all of which raises the possibility that they represent another source of high-arousal mixed emotions. Andrade and Cohen's (2007) moment-to-moment measures of emotion provide an unsurprising explanation for why some people avoid horror films: non-fans experienced a great deal of fear during horror films but little happiness. More interestingly, horror fans experienced simultaneously mixed emotions of fear accompanied by happiness. The fact that horror fans seek out horror films represents an example of the curious phenomenon of *benign masochism* (Rozin, Guillot, Fincher, Rozin, & Tsukayama, 2013), which involves seeking out aversive stimuli. Andrade and Cohen's findings suggest that fans spend time and money being afraid in the safe confines of the movie theater because such fear also makes them happy (Andrade & Cohen, 2007).

Humor is often associated with high-arousal positive emotions (Dienstbier, 1995), but Socrates' speculation that humor can come at the expense of another's misfortune suggests that it might also be associated with high-arousal negative emotions. Not surprisingly, a scene from *Pink Flamingos* in which a character eats dog feces elicits high-arousal emotions in general and disgust in particular (Hewig et al., 2005). A closer investigation by Hemenover and Schimmack (2007), however, indicated that this disgust is accompanied by feelings of amusement (Hemenover & Schimmack, 2007). Moreover, participants who had been encouraged to view the scene from the perspective of a dispassionate observer found it particularly amusing. That finding fits nicely with McGraw and Warren's (2010) *benign violation hypothesis*, which holds that people find humorous those events that they construct as being both wrong and not wrong. Eating feces is a clear violation, but viewing the action from the perspective of a dispassionate observer helps make the violation benign. More direct evidence for the benign violation hypothesis comes from McGraw and Warren's finding that nearly every participant in their study found a hypothetical scenario in which a man has sexual contact with a kitten disgusting, but many also found it amusing if the kitten seemed to enjoy the contact (McGraw & Warren, 2010). Frottage with a kitten is a violation, but frottage that does no harm the kitten brings mixed emotions to people who construe it as a benign violation.

### *Low-arousal mixed emotions*

In addition to contending that high-arousal opposite-valence emotions regularly co-occur, another implication of Watson and Tellegen's (1985) model and the circumplex model

(Russell & Barrett, 1999) is that low-arousal opposite-valence emotions (e.g., tired and relaxed) should co-occur. This possibility remains to be tested, but there is some suggestive evidence. As would be expected, the average long-distance male runner in one study reported feeling more tired at the end of a 20-km race than he had at the beginning (Hollandsworth & Jones, 1979). Despite being more tired, the average runner also felt more relaxed after the race. Unfortunately, no measures of mixed emotions were reported, so it is unclear whether the runners who felt tired after the race also felt relaxed. Thus, despite considerable evidence for dimensional theorists' (e.g., Russell & Barrett, 1999; Watson & Tellegen, 1985) claim that high-arousal positive and negative emotions can co-occur, there is little evidence bearing on the co-occurrence of low-arousal positive and negative emotions.

*Future directions.* Though the evidence that people can feel happy and sad (Larsen & McGraw, 2011) challenges the circumplex model's strong claim that polar opposite emotions are mutually exclusive (Russell & Carroll, 1999), both the circumplex and the Watson and Tellegen (1985) models make broader claims that some opposite-valence emotions are more likely to co-occur than others. The evidence that a variety of high-arousal opposite-valence emotions (e.g., Positive Activation & Negative Activation) can co-occur is consistent with these broader claims. Though our own evidence that happiness and sadness co-occur only occasionally is suggestive, however, we are aware of no direct evidence bearing on the critical contention that non-polar opposite emotions co-occur more frequently than polar opposite emotions. One reason is that researchers have generally focused on a single pair of emotions (e.g., happiness & sadness; Larsen & McGraw, 2011; happiness & fear; Andrade & Cohen, 2007) or averaged across several emotions (e.g., Peterson & Janssen, 2007). Studies in which multiple opposite-valence emotions are assessed will allow greater insight into whether some opposite-valence emotions (e.g., high-arousal emotions) co-occur more frequently than polar opposite emotions.

## Conclusion

We opened by describing how Kassim Bakari learned that his daughter had survived the jetliner crash that had killed his wife. Rather than speculating about how Bakari felt, we promptly retreated to safer ground by making allusions to Greek philosophers and white ravens and by detailing abstract theories and concrete data. Psychologists have not been so tactless as to ask Bakari how he felt, but they have asked many other people how they felt in response to a range of other bittersweet events including films, music, and meaningful endings. The resulting body of evidence indicates that mixed emotions of happiness and sadness tend to be rare, albeit less rare than white ravens. Moreover, the evidence suggests that other types of mixed emotions (e.g., amusement accompanied by disgust; McGraw & Warren, 2010) may be fairly common and open the door to further investigations of mixed emotions. To give but one example, Markman and McMullen (2003) suggested that the feelings of relief elicited by narrowly averting misfortune may be accompanied by feelings of dread at the thought of what might have been. They provided one piece of anecdotal evidence from an American Airlines passenger who flew out of Boston's Logan airport on the morning of September 11, 2001. He later told a reporter that, "I felt sick in my stomach knowing I was in the same terminal at Logan airport with these terrorists and feeling how lucky I was to be safely on the ground" (Markman & McMullen, 2003, p. 244). Of course, no prior or future psychological research on mixed emotions will tell us precisely how Bakari felt on that day in June 2009, but it does indicate that whatever joy he felt upon learning that his daughter had survived need not have precluded him from anguishing over the fact that his wife had not been so fortunate.

## Short Biographies

Jeff T. Larsen conducts research on emotion and is an expert on the study of mixed emotions. His research has been published in *Psychological Science*, *Journal of Personality and Social Psychology*, *Emotion*, *Psychophysiology*, and *Cognition and Emotion* and has been funded by the National Institute of Mental Health. He is an Associate Editor at *Emotion* and has served on the editorial boards of *Emotion*, *Cognition and Emotion*, and *Personality and Social Psychology Bulletin*. He recently moved from Texas Tech University to the University of Tennessee, where he is an Associate Professor of Psychology and teaches courses in social psychology and emotion. He holds a BA in Psychology from the University of California at San Diego and an MA and PhD in Psychology from Ohio State University.

A. Peter McGraw, an associate professor at the University of Colorado Boulder, is a leading expert in the interdisciplinary fields of emotion and behavioral decision theory. His research examines the interrelationship of judgment, emotion, and choice. Holding appointments in marketing at the Leeds School of Business and in social psychology in the Department of Psychology and Neuroscience, McGraw teaches courses in decision making, consumer behavior, and advertising. His recent book, *The Humor Code*, documents his global expedition to understand what makes things funny.

## Notes

\* Correspondence: Department of Psychology, University of Tennessee, Knoxville, TN 37996, USA. Email: jeff.larsen@utk.edu

<sup>1</sup> Watson and Tellegen's (1985) model makes the surprising contention that happiness and sadness are perfectly negatively correlated. This prediction might appear to simply be a restatement of Russell and Carroll's (1999) prediction that happiness and sadness are mutually exclusive. To the contrary, it implies that people will experience some amount of sadness unless they feel extremely happy and, by the same token, some amount of happiness unless they feel extremely sad (Russell & Carroll, 1999). The prediction that happiness and sadness are perfectly negatively correlated also implies that people cannot feel neutral (i.e., neither happy nor sad). As we have noted (Larsen & McGraw, 2011), these predictions seem highly unlikely and are inconsistent with a wide variety of data (e.g., Larsen & McGraw, 2011; Larsen et al., 2001; Russell & Carroll, 1998; Schimmack, 2001), so we set aside Watson and Tellegen's treatment of the relationship between happiness and sadness.

<sup>2</sup> All comparisons that we mention were statistically significant.

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