


Culture and Emotion: The Integration of Biological and Cultural Contributions*

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Abstract

In this article, the authors integrate the seemingly disparate literature on culture and emotion by offering a biocultural model of emotion that offers three premises heretofore not introduced in the literature: (1) emotions need to be distinguished from other affective phenomena, (2) different types of emotions exist, and (3) within any emotion different domains can be studied. Previous controversies have occurred because writers have called all affective states “emotion” without regard to the type or domain of emotion sampled. The authors argue that not all affective states should be called emotion, that emotions that may be biologically innate are different than those that are not, and that different domains of emotion are more relatively influenced by biology or culture. The authors offer researchers a terminology—biological versus cultural emotions, Priming Reactions, Subjective Experience, and Emotional Meanings—provide hypotheses concerning the relative contributions of biology and culture, review the available literature that supports those hypotheses, and argue that the literature can be somewhat neatly integrated into a cohesive whole. The authors contend that the relative contribution of biological and cultural factors to emotion depends on what emotion is being studied and the specific domain of emotion assessed. While the authors acknowledge that their delineations are not the only or the best delineations that can or should be used, they contend that *some* kind of delineations should be made and can help to synthesize and integrate a large and seemingly disparate, contradictory literature. The authors offer theirs as a first step in this effort.

Keywords

culture, emotion, nonverbal behaviors, worldviews, subjective experience

The study of emotion across cultures has a long history and has made many significant contributions to psychology. Previous reviews on this topic have led to substantial insights. Mesquita and Frijda (1992) concluded that emotion was both universal and culture-specific and that biological or cultural determinants can be evaluated by understanding the emotion process. Mesquita (2003) took this a step further, by suggesting that emotional experience varies greatly across cultures

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and that cultural models are necessary to understand and predict these variations. Shweder, Haidt, Horton, and Joseph (2008) made similar claims concerning emotional meanings, suggesting that such meanings could only be understood within a cultural context. Van Hemert, Poortinga, and van de Vijver (2007) conducted a meta-analysis of cross-cultural studies on emotion, examining the contribution of substantive and methodological factors to cultural differences, and the country characteristics associated with those differences.

In recent years, studies continue to pepper the literature with evidence supporting both universality and cultural specificity, and biological and cultural determinants. But despite advances in our understanding of the relationship between culture and emotion, disagreements concerning universality versus cultural specificity still exist, as well as concerning the contributions of biology and culture. In this article, we present a framework that goes beyond previous reviews to explain disparate research findings and integrate universality with culture-specificity and biological innateness with cultural construction. To do so, we offer a biocultural model of emotion that introduces three premises to clarify the literature, none of which has been offered previously: (1) emotions should be distinguished from other affective phenomena, (2) different types of emotions exist, and (3) within an emotion different domains of emotion exist, some more influenced by biology and some by culture. We argue that some emotions are biologically resident and products of our evolutionary history, providing the platform for universality in the domain of immediate reactions. Cultures regulate biological emotions to calibrate what we become emotional about and adapt the reactions that occur when elicited. Unique human cognitive abilities including language, memory, and abstract thinking allow cultures to elaborate on human emotions by facilitating the construction of culturally based emotions and their associated meanings. Language also facilitates the self-report of experience, which is also culturally constructed. Thus, questions concerning whether emotions are universal or not, or biologically innate or not, should be replaced by questions concerning the degree of relative contribution of biological and cultural factors. We contend that *the relative contribution of biological and cultural factors to emotion depends on what emotion is being studied and the specific domain of emotion assessed*. Given that previous literature has not made such distinctions, it is no wonder that controversies have existed.

We begin by defining what we mean by emotion, differentiating emotions from other affective phenomena, different types of emotion, and different domains of emotion. We define culture and provide a high-level framework for understanding the relationship between culture and emotion. We then describe the propositions that fall out of our framework and present evidence that supports our claims.

Emotion

A Definition of Emotion

Humans experience a wide range of affective phenomena and much of it is called “emotion” by researchers and laypersons alike. Emotion is an aspect of our lives that all have a lifetime of access to and of contemplation about the proper words to describe nuances of. Thus, it is difficult to arrive at a consensual definition of emotion that encompasses all possible types of emotion and distinguishes it from other affective phenomena. At the same time, researchers need to make explicit their working definitions so they and others can understand what part of the affective world they call emotion. We do so here.

We define *emotion* as “transient, bio-psycho-social reactions to events that have consequences for our welfare and potentially require immediate action.” They are biological because they involve physiological responses from the central and autonomic nervous systems. They

are psychological because they involve specific mental processes required for elicitation and regulation of response, direct mental activities, and incentivize behavior. They are social because they are often elicited by social factors and have social meaning when elicited.

Emotions are rapid information processing systems that help us act with minimal conscious deliberation (Tooby & Cosmides, 2008). Problems associated with birth, battle, death, and seduction have occurred throughout our evolutionary history, and emotions aided in adapting to those problems rapidly and with minimal conscious cognitive intervention. If humans did not have emotions they could not make rapid decisions concerning whether to attack, defend, flee, care for others, reject food, or approach something useful. For instance, drinking spoilt milk or eating rotten eggs has negative consequences for our welfare. Disgust helps us immediately take action by not ingesting them in the first place or vomiting them out. This response is adaptive because it aids in our ultimate survival and allows us to take action immediately without much thinking. In some instances, deliberately thinking about what to do might cost one one's life.

Emotions are elicited as we scan our environments and evaluate (appraise) them for consequences to our welfare (Ekman, 2003; Ellsworth & Scherer, 2003; Frijda, Kuipers, & ter Schure, 1989; Roseman, 1984; Roseman, Dhawan, Rettke, & Naidu, 1995; Scherer, Schorr, & Johnstone, 2001). If events do not have such consequences, we continue scanning; if they do, they trigger emotion in order to prime action and incentivize behavior (Frijda et al., 1989; Tomkins, 1962, 1963). When triggered they orchestrate other systems such as perception, attention, inference, learning, memory, goal choice, motivational priorities, physiological reactions, motor behaviors, and behavioral decision making (Cosmides & Tooby, 2000; Tooby & Cosmides, 2008). They simultaneously activate certain systems and deactivate others in order to prevent the chaos of competing systems operating at the same time, allowing for coordinated responses to environmental stimuli (Levenson, 1999). Emotions initiate a system of components that includes subjective experience (feelings), expressive behaviors, physiological reactions, action tendencies, and cognition; the term *emotion* is a metaphor for these reactions. The key characteristics of emotion in our definition, therefore, is that it is a state not a trait; a mental condition, not just physiological or cognitive; the product of an appraisal process; and involves multiple components including affect, physiological response, mental changes, and expressive behavior.

Premise 1: Emotions or Not?

Studies involving emotions need to distinguish them from other affective phenomena. Doing so requires a definition. Ours is supported by the work by Clore and Ortony (1988, 1991; Clore, Ortony, & Foss, 1987), who showed that emotions refer to internal, mental conditions as opposed to external (e.g., abandoned) or physical conditions (e.g., aroused); are states (i.e., transient) not dispositions and other non-states or borderline examples of states; and have affect as their predominant referential focus as opposed to behavior (e.g., careful) or cognition (e.g., certain). They concluded that while all words in the affective lexicon concern affect in some way, emotions are a subset of those with a predominant rather than a peripheral focus on the experience of affect, with an emphasis on a state not a disposition.

Many studies conflate any affective phenomenon with emotion, probably because our awareness of emotion is represented in affect.¹ But humans experience a broad range of affective phenomena, some of which are emotions, others not (e.g., tiredness, hunger). For example, Kitayama, Markus, and Kurokawa (2000) examined feelings of superiority, being on top of the world, moody, friendly feelings, respect, and calmness. Clearly these are affective phenomena and important mental states, but whether they should be called "emotion" is questionable. If emotions are different from other affective phenomena, then findings about non-emotions may not be generalizable to emotions.

Researchers need not agree with our definition of emotion. Different definitions may lead to different conclusions about what to include as emotions or not and we encourage such viewpoints. Our point is that it's important to consider that emotions may be different than other affective phenomena, have an explicit working definition of emotion, and evaluate the literature or conduct research accordingly.

Premise 2: Different Types of Emotion

All emotions are not the same; that is, different types of emotions exist and recognizing these differences is necessary for understanding the relationship between culture and emotion. In the past different types of emotions have been proposed including basic emotions (Ekman, 1992, 1999; Izard, 2007), self-conscious emotions (Keltner & Buswell, 1997; Tangney & Fischer, 1995; Tracy & Robins, 2004a), positive emotions (Fredrickson, 2001; Fredrickson & Losada, 2005), prosocial emotions (McCullough, Bono, & Root, 2007), and moral emotions (Haidt, 2001). A comprehensive treatise on a taxonomy of emotions is beyond the scope of this article. For the purposes of this review, we propose a very gross distinction between emotions that evidence indicates are biologically innate (reviewed in more detail later; Buck, 1999; Ekman, 1992, 1999; Izard, 2007; LeDoux & Phelps, 2008; Panksepp, 2007, 2008a) and those for which there is no or not sufficient evidence. We call the former *biological emotions* and the latter *cultural emotions*.

There is strong evidence for emotions such as anger, disgust, fear, joy, sadness, and surprise to be classified as biological emotions (Buck, 1999; Ekman, 1999; Izard, 2007), but there are disagreements about others. And the status for some emotions is unclear; expressive behaviors typically associated with shame, embarrassment, or pride, for example, have been observed in nonhuman animals (De Waal, 1989, 2002), but evidence for their cross-cultural expression, universal physiological signatures, and antecedents and reactions is still lacking. We do not argue for the inclusion of any specific emotion into either category we propose; instead we argue that a classification should exist and may be useful in understanding the literature.² Our propositions below can be understood regardless of what specific emotions are considered biological and cultural. Furthermore, we do not argue that our distinctions are the only available or best. We encourage future theorizing to produce better categorizations and eventually a more accurate taxonomy of emotions.

Premise 3: Different Domains of Emotion

Different domains of emotion exist and have different implications for our understanding of the associated biological and cultural contributions. For example, some studies have examined immediate reactions such as facial expressions, vocal utterances, physiological reactions, or mental changes (Levenson, Ekman, Heider, & Friesen, 1992; Tsai, Levenson, & McCoy, 2006). Others have examined self-reported subjective experiences (Kitayama, Mesquita, & Karasawa, 2006) or the meaning of emotion (via descriptions of different aspects, features, or effects of an emotion; see Uchida & Kitayama, 2009), the pleasantness of the events that elicit emotion (Mesquita & Karasawa, 2002), concerns about emotions (Mesquita, 2001; Mesquita & Karasawa, 2002), or concepts about emotion (Russell, 1990, 1991). All of these were called emotion but actually sampled different domains of emotion.

It is important to distinguish the domain of emotion being studied. These are the specific dependent variables measured in research. We call the immediate responses that occur in reaction to an event stimulus *priming reactions*; these include physiological responses, expressive behavior, and cognitive gating, all of which typically occur within seconds (or fractions thereof) of an

emotion-eliciting event and require precise measurement with quick time resolution. Priming reactions do not require language or much conscious deliberation. We call the self-reported experience *subjective experience*; these require language and some higher order thinking (such as introspection). Finally, we call attitudes, values, beliefs, lay theories, and concepts of emotion *emotion meanings*. These require language and higher order cognition.

Such distinctions are important because different findings can be obtained depending on the specific domain of emotion studied. Later we elaborate on this idea and provide specific hypotheses concerning universality versus cultural specificity and the contributions of biology and culture.

Culture

A Definition of Culture

It is equally important to define culture. Like emotion, writers have attempted to define culture for years and it is difficult to arrive at a consensual definition of it. We offer our working definition so readers can evaluate our interpretations of the literature vis-à-vis our definition. We define *human culture* as “a unique meaning and information system, shared by a group and transmitted across generations” (Matsumoto, 2007; Matsumoto & Juang, 2007). Cultural meanings and information enhance social coordination, allowing for greater differentiations among social groups, institutionalizing cultural practices and customs, and prescribing social norms and expectations for all important aspects of social life such as mating, aggression, and cooperation. Because groups communicate their solutions across generations, each generation need not create entirely new solutions, ensuring efficiency for survival.

Culture is a response to ecological and environmental context (DeKay & Buss, 1992; Georgas, van de Vijver, & Berry, 2004). It is the complex of ways that emerges when groups address ecological problems to meet biological needs and social motives. Culture is a set of time-tested solutions for the problem of how to survive and reproduce. Human cultures are evolved potentials, albeit more recent in evolutionary history than the emotion system. The emergence of human cultures coincides with the evolution of a host of complex cognitive abilities including language (Premack, 2004), self-other knowledge, the ability to know that other people not only are intentional agents but can share intentions (Tomasello, 1999; Tomasello, Carpenter, Call, Behne, & Moll, 2005), and the ability to continually build upon improvements and discoveries (ratcheting; Tomasello, Kruger, & Ratner, 1993). Many of these coincide with the development of the higher cortical areas of the brain and the language areas, compared to the location of the emotion system, which is in the older, subcortical areas.

The Function of Culture in Relation to Emotion

Cultures create norms concerning the regulation of emotion to facilitate social coordination because emotions are primary motivators of behavior (Tomkins, 1962, 1963) and have important social functions (Keltner & Haidt, 1999). Norms are guidelines for expected behaviors, thinking, and feelings derived from the cultural meanings ascribed to contexts, relationships, and events. They identify the range of permissible behavior that allows groups to function effectively. Cultures encourage adherence to norms and create sanctions against infractions, which aids individuals and groups in negotiating the complexity of human social life. By regulating emotions via norms, cultures ensure that behaviors follow culturally prescribed scripts, increasing social coordination and decreasing social chaos.

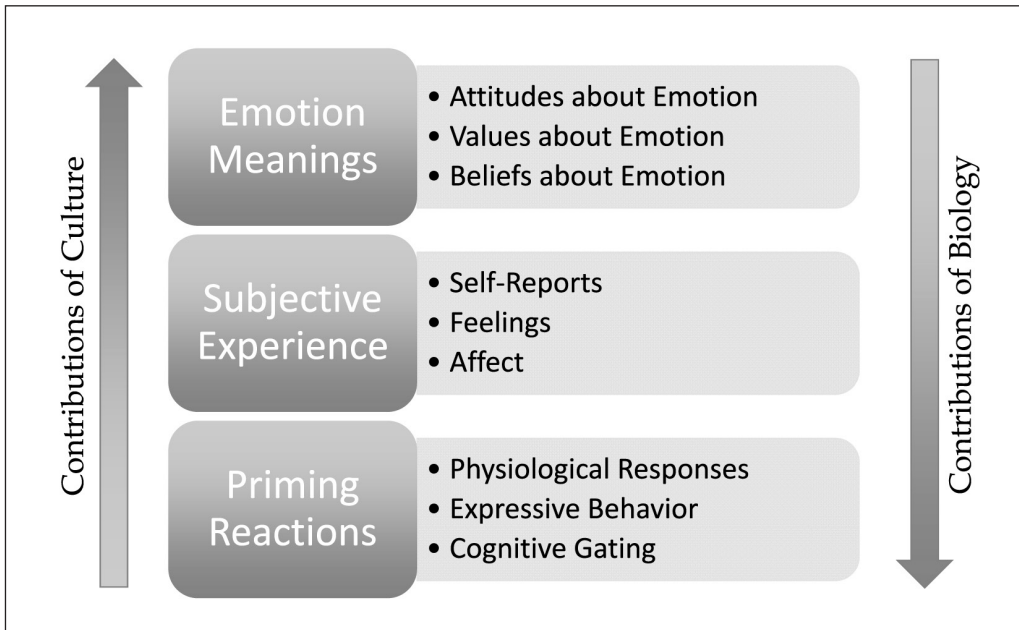


Figure 1. The Relative Contribution of Biology and Culture Depends on the Specific Domain of Emotion Studied

Culturally driven emotion regulation occurs in multiple ways. As discussed more fully later, we assume that humans have a set of biologically innate emotions that are produced by a core emotion system (LeDoux, 2000; LeDoux & Phelps, 2008; Panksepp, 1994, 2008a). Culture regulates the biological emotions by calibrating the core emotion system to culturally available events so that individuals learn what to become emotional about. Culture also regulates priming reactions so that individuals learn what kinds of emotional reactions to have after an emotion is elicited and the range of acceptable behaviors for individuals to engage in after emotions occur.

Culture also regulates emotions by elaborating on subjective experience. Cultures affect the relative intensity of emotional experiences. Cultures also facilitate the emergence of cultural emotions, which are unique to human cultures and require cultural knowledge for elicitation. These emotions may be universal but not necessarily biologically innate and may be somewhat different in different cultures. Shame, guilt, jealousy, and love, for instance, may exist all around the world, but there are likely major cultural differences in what specific cultural events elicit them, their form, function, and meaning. Cultures also elaborate emotions by creating emotional meanings, which are attitudes, values, and beliefs about emotions requiring higher level cognitive skills including abstract thinking, memory, and language, guiding how individuals should think about emotions. All of these are more highly influenced by culture.

To summarize, we propose that it is necessary to distinguish among different types (e.g., biological vs. cultural emotions) and domains (e.g., priming reactions, subjective experience, and emotion meanings) of emotion in understanding the literature on culture and emotion. Based on these delineations, we hypothesize that the relative contributions of biology are greatest (and the relative contributions of culture are least) when priming reactions of biological emotions are studied. When emotion meanings are studied, the relative contributions of culture are greatest (while the contributions of biology are least). Studies of subjective experience should occupy an intermediary position, with the dual contribution of biology and culture (Figure 1). Later, we describe in more detail the specific propositions and hypotheses that flow from this analysis and research that supports this framework.

Priming Reactions

The Biological Bases of Priming Reactions

The Proposition. We propose the existence of a biologically innate processing system that activates some emotional states (Cosmides & Tooby, 2000; Ekman, 1992; Lazarus, 1991; Tomkins, 1962). Levenson (1999) called this the “core emotion system” and suggested that it evolved to deal with species-constant problems related to survival in a time-tested, predictable, and automatic fashion. These problems could occur in interactions with nature or with other humans. The core emotion system is hard-wired, fairly impermeable to modification by experience, and relatively unchanged throughout the lifespan.

Cross-cultural research documenting the universality of facial expressions and physiological responses has provided support for these claims. A set of facial expressions of emotions are universally produced (Matsumoto, Keltner, Shiota, Frank, & O'Sullivan, 2008; Matsumoto & Willingham, 2006) and recognized (Elfenbein & Ambady, 2002; Matsumoto, 2001).³ The same facial musculature related to emotion signaling that exists in adult humans exists in newborn infants and is fully functional at birth (Ekman & Oster, 1979). Some universal expressions exist at birth (Oster, 2005), while others emerge according to a maturational timetable (Camras, Oster, Campos, & Bakeman, 2003; Izard, 1991; Izard & Malatesta, 1987; Oster, 2005; Tronick, 1989). When emotions are aroused and facial expressions are used as markers of those emotions, discrete physiological signatures occur in both the autonomic and central nervous systems (Davidson, 2003; Ekman, Davidson, & Friesen, 1990; Ekman, Levenson, & Friesen, 1983; Levenson, Carstensen, Friesen, & Ekman, 1991; Levenson & Ekman, 2002; Levenson, Ekman, & Friesen, 1990; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005; Rainville, Bechara, Naqvi, & Damasio, 2006; Tsai & Levenson, 1997). These patterns exist in people from cultures as widely divergent as the United States and the Minangkabau of West Sumatra, Indonesia (Levenson et al., 1992).⁴

In the past “universality” was associated with “biologically innate”; we, however, do not make that assumption because universality can occur for non-biological reasons such as culture-constant learning. Thus, one must look elsewhere to find evidence for the biological sources of universality. One type of evidence comes from cross-species research on expressions. For years ethologists have noted the morphological similarities between human and nonhuman primate expressions (Chevalier-Skolnikoff, 1973; Geen, 1992; Hauser, 1993; Liebal, Pika, & Tomasello, 2004; Redican, 1982; Snowdon, 2003; Ueno, Ueno, & Tomonaga, 2004; Van Hoof, 1972). Chimpanzees have the same facial musculature used for emotion signaling as humans (Burrows, Waller, Parr, & Bonar, 2006) and use the same facial muscles when placed in emotionally evocative situations (Parr, Waller, Vick, & Bard, 2007; Vick, Waller, Parr, Pasqualini, & Bard, 2007). Chimpanzees can also categorize different facial expressions of emotion (Parr, Waller, & Heintz, 2008).

Another source of evidence for biological innateness is studies of the facial expressions of blind individuals. Early observational studies suggested that congenitally blind individuals showed the same facial expressions of emotion as sighted individuals, both spontaneously (Charlesworth & Kreutzer, 1973; Dumas, 1932; Eibl-Eibesfeldt, 1973; Freedman, 1964; Goodenough, 1932; Thompson, 1941) and posed (Fulcher, 1942). Studies involving actual facial measurement have also shown that there are no differences in the spontaneous (Ortega, Iglesias, Fernandez, & Corraliza, 1983) or posed (Galati, Scherer, & Ricci-Bitti, 1997) expressions of emotion between blind and sighted individuals. Because congenitally blind individuals could not have possibly learned the expressions visibly, they must be biologically resident.

The core emotion system resides in the subcortical areas of the brain in and around the amygdala (LaBar & LeDoux, 2003; LeDoux & Phelps, 2008; Panksepp, 2008a, 2008b). Our proposition concerning the existence of biological emotions leads to the hypothesis that when examining priming reactions (e.g., expressions, physiology, cognitive gating) of biological emotions, we expect relatively less contribution of culture and greater contribution of biology, thus producing universality in response, consistent with the literature reviewed in this section.

Recent Evidence. Recent cross-cultural research continues to provide support for this hypothesis. For instance, the immediate facial expressions of emotion of athletes in medal matches at the Olympic Games differentiated winners from losers and there were no cultural differences (Matsumoto & Willingham, 2006). A subsequent study of blind athletes at the Paralympic Games in the same sport demonstrated near-perfect concordance between the expressions of the blind and sighted athletes (Matsumoto & Willingham, 2009). Both studies were notable because they examined spontaneously produced facial expressions of individuals from many different cultures in a real-life setting.

Support for the hypothesis also comes from recent studies testing different ethnic groups in the United States. Soto, Levenson, and Ebling (2005) reported no ethnic differences on either expressive behavior or physiological reactions of Chinese American and Mexican American participants reacting to an acoustic startle stimulus. Tsai, Chentsova-Dutton, Freire-Bebeau, and Pryzmus (2002) reported no differences in physiology or emotional expressive behavior among Hmong Americans and European Americans as they relived previous emotional episodes. (They did report differences on social smiles, but these are not emotional expressions.)

Research of the last two decades has provided strong evidence for the cross-cultural recognition and expression of contempt (Ekman & Friesen, 1986; Matsumoto, 1992; Matsumoto & Ekman, 2004), and some evidence for shame (Tracy & Matsumoto, 2008), pride (Tracy & Matsumoto, 2008; Tracy & Robins, 2004b, 2008), and embarrassment (Keltner, 1995; Keltner & Buswell, 1997). But the number of cultures sampled in these studies is still considerably less than those studied for emotions commonly accepted into the category of biological emotions such as anger, disgust, or fear. And there is no evidence demonstrating unique physiological signatures for these emotions across cultures, emergence during development, or cross-species homologues or analogues. If such evidence is produced in the future for these or other emotions, they might be considered biological and we would hypothesize a minimal contribution of culture and greater contribution of biology when examining priming reactions of these as well.

The Cultural Calibration of the Core Emotion System

Front-End Cultural Calibration of Eliciting Events

The proposition. One way for cultures to influence biological emotions is via front-end calibration of the emotion system to culturally available events (Figure 2). Human cultural lives are replete with culture-specific events that require appropriate behavioral responses for adaptation but that need to be learned. Cultures ascribe meanings that are drawn from the collective pool of cultural wisdom to those events; those meanings facilitate the triggering of emotions.

In the United States, for example, driving a car is associated with cultural worldviews concerning independence, freedom, mobility, and affluence. Driving at an early age is a desired goal and normative method of achieving mobility, seen like a rite of passage. Many Americans thus have the goal to drive and if they achieve the goal will derive enjoyment from such goal attainment. Enjoyment could not have occurred without the cultural meanings ascribed to driving and its positive connotations and the attainment of the goal to achieve that ability. These are learned meanings, not inherently part of the car and driving itself, but ones that members of a culture

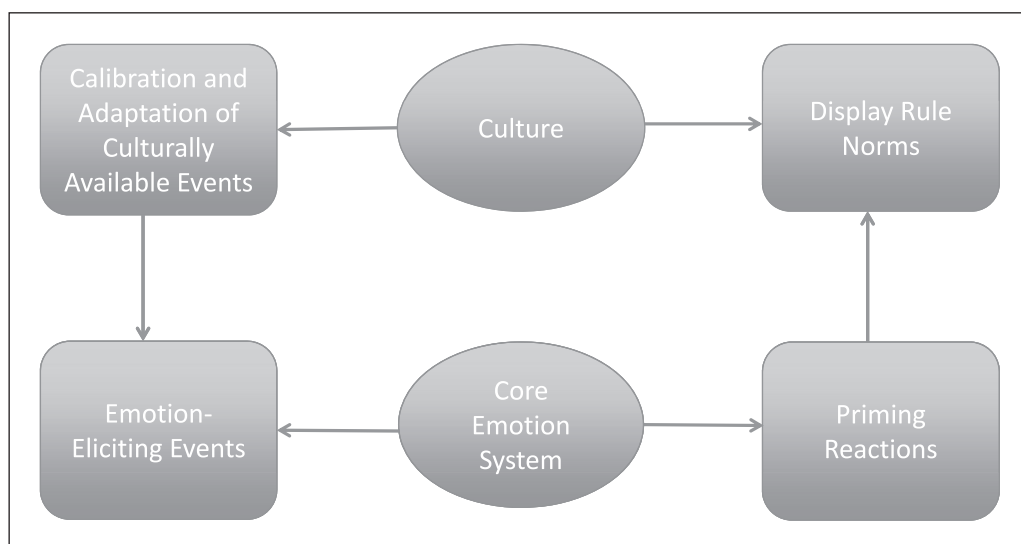


Figure 2. Cultural Influences on the Core Emotion System

come to associate with driving. Restricting one's mobility by others cutting oneself off in a lane can be associated with anger because one's goals are obstructed. Anger could not occur without having learned the culturally derived meanings of movement, cars, driving, obeying the law, etc.⁵

Cultural calibration of the emotion system can result in both universality and culture-specificity, consistent with previous conclusions of this aspect of emotion (Mesquita & Frijda, 1992). Because biological emotions are universal and have the same intra- and interpersonal functions, emotions such as anger and disgust are potentially destructive emotions in any culture (Rozin, Lowery, Imada, & Haidt, 1999). For these reasons, people of all cultures minimize the expression of these emotions toward higher status others or to ingroup members (Matsumoto et al., 2006). Similarly, a gun is not something that existed in our evolutionary history. Yet during enculturation people of many cultures learn to associate the same meanings to guns involving death, harm, crime, and threat to safety and well-being. Thus, a gun can be encoded with the same psychological themes across cultures, producing universal but learned responses to the same stimulus event.

Cultural differences arise when culture-specific meanings are attributed to events and situations, which is consistent with previous reviews of this aspect of emotion (Shweder et al., 2008). For instance, while the minimization of destructive emotions toward higher status others may be universal, exactly who is a higher status person and how those emotions are minimized may be culturally variable. In many cultures, age is a status marker; in other cultures, it can be wealth, occupation, or gender. Death rituals are associated with vastly different meanings across cultures, from celebrations of life to events of grieving and mourning (Mead, 1943). Different cultural meanings of these events become associated with different emotion-eliciting themes and produce different culturally based emotional reactions to the same event. Cultural differences can also occur by limitations of culturally available events. That is, if an event occurs in one culture but not another, then it cannot be an event to which emotions are elicited in the culture in which it does not exist. If a gun does not exist in a culture, it is likely that it will not elicit an emotional reaction.⁶

Thus, we hypothesize universality in the events and underlying themes that trigger biological emotions but cultural differences in the relative frequencies of these events, and in the ability of culture-specific events to trigger emotions.

The evidence. Data support the contention that many of the same types of events trigger biological emotions across cultures. The most prominent work is that of Scherer et al., who conducted a number of studies assessing the quality and nature of emotional experiences in many different cultures. One study involved approximately 3,000 participants in 37 countries on five continents (Scherer, 1997a, 1997b). Respondents reported about situations that elicited anger, disgust, fear, joy, sadness, shame, and guilt.⁷ The situations were coded into general categories such as good news and bad news, temporary and permanent separation, and success and failure in achievement situations. The resulting events included both events that are found in nature (death) and those that are culturally learned (watching television news). No culture-specific antecedent category was necessary, indicating that all categories of events generally occurred in all cultures to produce the emotions studied. In addition, there were many similarities across cultures in the relative frequency with which each of the events elicited emotions. For example, the most frequent elicitors of happiness across cultures were “relationships with friends,” “temporary meetings with friends,” and “achievement situations.” The most frequent elicitors of anger were “relationships” and “injustice.” The most frequent elicitors of sadness were “relationships” and “death.”

Cultural differences occurred in the *relative frequencies* of different events to trigger emotion and many of these were related to cultural limitations in the available events or in the meanings of those events. In Matsumoto, Kudoh, Scherer, and Wallbott's (1988) study based on the same data set, world news was a more frequent trigger of sadness for Europeans and Americans than for the Japanese; problems in relationships, however, produced more sadness for the Japanese than for Americans or Europeans. Strangers and achievement-related situations elicited more fear for Americans, whereas novel situations, traffic, and relationships were more frequent elicitors of fear for the Japanese. In Japan, crime is relatively low and it is not uncommon for women and children to walk outside safely at night; thus, walking in the dark would elicit less fear there than in the United States. Finally, situations involving strangers were more frequent elicitors of anger for the Japanese than for the Americans or Europeans. Situations involving relationships brought about more anger for Americans than for Japanese.

These data support the idea that the same types of events and the same underlying themes in all cultures elicit the biological emotions. The data also suggest that there are cultural differences in the relative frequencies of events that trigger emotions and the existence of culture-specific triggers. Thus, eating a dog may be a luxury in one culture resulting in joy, but a revolting thing in another eliciting disgust.

Back-End Cultural Regulation of Emotional Reactions

The proposition. Culture calibrates the emotion system at the back end via display rules, which are norms to help manage and modify emotional reactions to what is appropriate in specific situational contexts (Figure 2). Display rules may amplify, deamplify, neutralize, qualify, or conceal an emotional response (Ekman & Friesen, 1969), creating a complex and elaborate range of expressive behavior when emotions are aroused. Individuals can also simulate emotions when they are not elicited.

Because people of all cultures must deal with the same problems of social coordination and generate much the same meanings for the same social relationships, some display rules should be universal. For example, because mothers and fathers play much of the same roles across cultures with regard to childbirth, childrearing, and family dynamics (Georgas, Berry, Van de Vijver,

Kagitcibasi, & Poortinga, 2006), there may be some meanings of self-father and self-mother relationships that are universal and thus lead to similar display rules across cultures. Likewise, family and close friends likely have very similar meanings across cultures, producing cultural similarities in display rules toward these relationships.

At the same time, cultural differences in the meanings ascribed to context, events, social roles, and relationships may produce different display rules. For example, while the social role “mother” and “father” exist in all cultures, in some cultures the father may be seen as a revered authority figure; other cultures may view mothers and fathers as equal partners. “Being a good research participant” may mean “to be yourself, and to act as if you were alone” in some cultures or to “maintain a good impression regardless of how you truly feel” in others. The social role of “being a good daughter-in-law” may require a woman in certain contexts to endure snide comments or to be dealt with as a second-class citizen. In order to enact this social role correctly, women need to regulate their emotions and behaviors in those situations.

Display rules aid this process because they provide a way of behaving that is consonant with the normative behaviors within a social role. They serve a vitally important function in culture by helping to regulate emotional expressions, which aids social coordination and group survival. Thus, we hypothesize that display rules will produce universality in priming reactions of biological emotions when there is cross-cultural consistency in the meaning of context, events, or social roles, but cultural differences when there is cultural variation in those meanings.

The evidence. Friesen’s (1972) classic study of Americans and Japanese viewing stressful films when alone and subsequently with an experimenter was the first to document cultural differences in expressive displays as a function of context. In that study, Japanese smiled more than Americans when with the experimenter, despite the fact that they showed the same negative expressions when they were alone. The Japanese presumably did so because they had a display rule to mask their negative feelings with higher status individuals whereas the Americans did not. These differences likely occurred because of cultural differences in the social roles associated with being a research participant and in the status relationship between the participant and experimenter.

Other studies have also demonstrated cultural differences in expressive behavior, likely due to cultural differences in the meaning of context. Matsumoto and Kupperbusch (2001) showed that allocentric participants masked their negative feelings to a higher status experimenter while idiocentric individuals did not, replicating Friesen’s (1972) findings. Allocentric participants masked positive feelings as well, suggesting the existence of display rules that prescribed the suppression of all emotions, not just negative ones. This finding is consistent with recent findings that collectivistic cultures are associated with a display rule norm of less expressivity overall than individualistic cultures (Matsumoto et al., 2008), suggesting that expressive regulation for all emotions is central to the preservation of social order in these cultures. Tsai, Levenson, and McCoy (2006) demonstrated that European American dating couples produced more positive and less negative emotional behaviors when conversing about conflicts in their relationships than did Chinese American couples, despite the fact that there were no differences in emotional experience or autonomic reactivity.

Consistent with our hypothesis, several studies also showed cultural similarities in expressive behaviors in different contexts. In Matsumoto and Willingham’s (2006) study of Olympic medalists, for instance, silver medalists did not smile at all immediately at the completion of their final match, but they smiled during the subsequent medal ceremonies, regardless of their culture and despite some of them having strong feelings to the contrary just minutes before. Presumably the athletes all had a display rule to be a good loser in public. People around the world have a universal display rule to express more positive emotions when with family and close friends, but to suppress their negative emotions with strangers (Matsumoto, Yoo et al.,

2008). These display rules correspond to what has been found in studies of actual spontaneous expressive behavior (Buck, Losow, Murphy, & Costanzo, 1992; Fridlund, 1991; Fridlund, Kenworthy, & Jaffey, 1992; Matsumoto & Kupperbusch, 2001; Wagner & Smith, 1991). These universal display rules can be produced by cross-cultural similarities in the meaning of social contexts and social roles.

The latest work in this area has shown that emotional expressions can be both universal and culture-specific for the same person in the same context, if displays are examined *in sequence across time*. This possibility exists especially when intense emotions are aroused in a context where individuals need to regulate their emotional behaviors. When emotions are aroused, impulses emanating from subcortical areas of the brain initiate the emotion response system, including expressive behavior (LeDoux, 2000; Panksepp, 2008a). At the same time, the facial nerve receives stimulation from cortical areas under voluntary control (Matsumoto & Lee, 1993; Rinn, 1991), which would be associated with display rules. Thus, the *initial and immediate* emotional responses (originating from the subcortex) may be universal and appear first because their neural connections are lower and closer to the facial nerve. Culturally influenced emotional displays may occur subsequently because of the additional neural work necessary for regulatory needs to drive expressive behavior from the cortex. Matsumoto, Willingham, and Ollide (2009) provided evidence for this in a reanalysis of the expressions of Olympic athletes, whose first, immediate facial reactions upon match completion were universal (Matsumoto & Willingham, 2006). Their subsequent expressions, however, were culturally variable. Athletes from urban, individualistic cultures expressed their emotions more while athletes from less urban, more collectivistic cultures masked their emotions more. The subsequent, culturally moderated expressions typically happened within 1 s of the initial expression.⁸

Summary

The cultural calibration of the core emotion system allows for a multiplicity of uses. Cultures calibrate the emotion system by linking emotion with culturally available events, allowing for emotions to be elicited in a wide range of situations, ensuring that culturally relevant stimuli get a response. When cultural events are identified as worthy of an emotional response, cultural calibration influences the reactions produced, linking emotions with specific repertoires of behavior that each culture deems appropriate and necessary for social coordination. This calibration allows for a complex interplay between evolved biology and cultural learning on priming reactions that is moderated by context (Figure 3). While the “press” of culture may influence priming reactions, they are also influenced by the “push” of biology. In some contexts, the biological push will be greater than the cultural press, allowing for greater pancultural similarity in response; in other contexts, the cultural press will be greater than the biological push, allowing for cultural influences.

The Cultural Elaboration of Emotional Experience

The Proposition

Subjective experience is created by a host of factors that increase in cultural origin. (Mesquita, 2003, made a similar point about emotional experience but did not make the differentiations we do here.) At its most elemental level, it begins with an awareness of sensations that occur because of the physiological changes associated with emotion, and perhaps even the appraisal process by which an emotion eliciting event is evaluated (Ellsworth & Scherer, 2003). These sensations go through an interpretation and labeling process, which is likely influenced by cultural

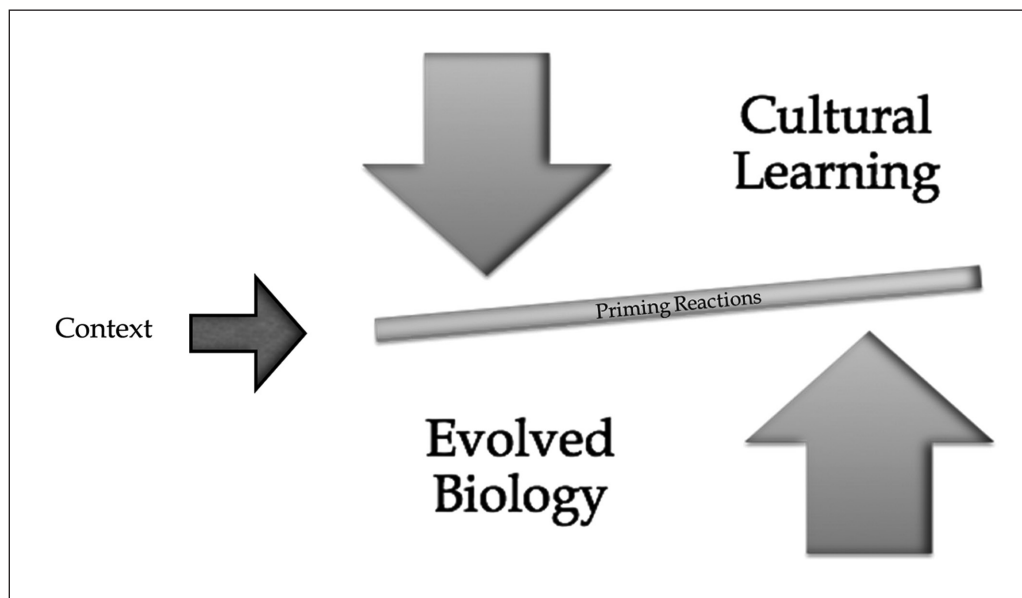


Figure 3. The Relative Contribution of Culture and Biology on Priming Reactions is Moderated by Context

knowledge and the context in which the emotions are experienced. Cultural worldviews, for instance, may influence how one's sensations in the context are interpreted and labeled. Culture-specific meanings about relationships and events are also likely to influence the interpretation and labeling process (and the sensation awareness itself; see Kohler, 1929). Self-reports reflect the verbal output of this process and it, too, is influenced by cultural factors such as social desirability and response sets (see Figure 4). Thus, self-reports of emotional experience are acts that reflect combinations of biological and cultural processes.

This process is likely moderated by the type of emotion elicited and its intensity. Biological emotions are associated with unique physiological signatures and universal appraisal processes; their sensations should be somewhat discrete and self-reports of those emotions should be somewhat cross-culturally similar, especially if the emotion aroused is intense. Cultural emotions, however, may not necessarily be associated with unique physiological signatures; their sensations may be more diffuse and culturally variable.

This process is also likely moderated by the time lag between the occurrence of the emotion eliciting event and the self-report because the sooner introspections are made about an experienced event the more accurate they are (Block, 2007). Some studies assess emotions online and in real-time or relatively close to it; others assess experience of events that have occurred in the past. Cultural influences on report are therefore likely to be larger because of the close relationship between culture and memory (Wang & Ross, 2007).

For these reasons, we propose that subjective experience occupies an intermediary position regarding the relative contribution of biological and cultural factors, and depends on the emotion in question and context in which it is elicited and reports obtained. We hypothesize that self-reports of biological emotions are more likely to be universal, especially in terms of their structure and if obtained in real time. Self-reports of cultural emotions, however, are more likely to be culturally variable, especially if recalled from previous experiences from memory.

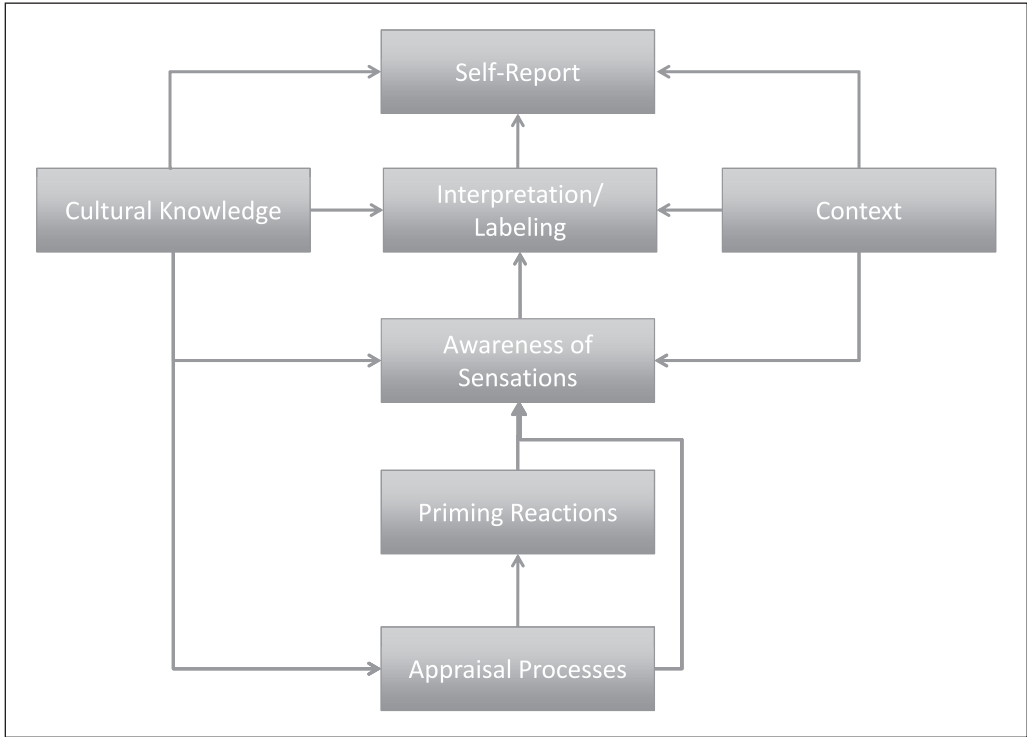


Figure 4. The Cultural Construction of Self-Report

The Evidence

As predicted, there is universality in subjective experiences produced when emotions are aroused. In their large-scale study, Scherer and Wallbott (1994) demonstrated strong cross-cultural similarities in the self-report profiles of the emotions they sampled. In a reanalysis of the Scherer data set, Matsumoto, Nezlek, and Koopmann (2007) demonstrated that between 95% and 99% of the variability in self-reported emotional intensity was attributable to within-, not between-, country factors, and there were no reliable associations with ecological level cultural dimensions. Similarly, no differences in self-reported emotions were reported by Tsai et al. in two studies examining ethnic differences in biological emotions assessed in real time (Tsai et al., 2002; Tsai, Levenson et al., 2006).

Also consistent with our hypothesis, there appears to be universality in the structure of emotional experience. Kuppens, Ceulmans, Timmerman, Diener, and Kim-Prieto (2006) sampled emotional experiences from 9,300 participants in 48 nations and showed that positive and negative affect emerged as universal dimensions. Similar findings were obtained by Scollon, Diener, Oishi, and Biswas-Diener (2005). Fontaine et al. (2006) reported cross-cultural similarity in emotional reactions of shame and guilt in Belgium, Hungary, and Peru, and Oishi, Diener, Scollon, and Biswas-Diener (2004) reported cultural invariance in the cross-situational consistency of affective experiences.

But a number of studies have reported cultural differences in absolute mean levels of emotional experiences for both biological and cultural emotions (Kuppens et al., 2006; Matsumoto et al., 1988; Scherer, Matsumoto, Wallbott, & Kudoh, 1988; Scherer & Wallbott, 1994; Scollon, Diener, Oishi, & Biswas-Diener, 2004; Scollon et al., 2005; Tsai, Knutson, &

Fung, 2006). As predicted, cultures play a larger role in the construction of emotional experience of cultural emotions, which are associated with self-construals (Nezlek, Kafetsios, & Smith, 2008; Nezlek, Sorrentino et al., 2008; Singelis, Bond, Sharkey, & Lai, 1999; Singelis & Sharkey, 1995). Kitayama et al. (Kitayama et al., 2000; Kitayama et al., 2006; Kitayama, Park, Sevincer, Karasawa, & Uskull, 2009; Uchida & Kitayama, 2009), for instance, have shown that people in collectivistic cultures report experiencing *socially engaging emotions*, such as friendliness, respect, and sympathy, more than *socially disengaging emotions*, such as pride, self-esteem, sulkiness, or frustration. Members of individualistic cultures, however, tend to experience more socially disengaging emotions than engaging emotions. Chentsova-Dutton and Tsai (2010) extended these findings by demonstrating that attention to individual aspects of the self amplified emotional experience for European Americans while attention to relational aspects of the self amplified experience for Asian Americans.

There are also interesting cultural differences in *emotional complexity*—the co-occurrence of both pleasant and unpleasant emotions. Early research showed that this co-occurrence is more prevalent in East Asian than in Western cultures (Bagozzi, Wong, & Yi, 1999; Schimmack, Oishi, & Diener, 2002). European Americans who tend to experience positive emotions more frequently or intensely also tend to experience negative emotions less frequently or intensely, while East Asians are more likely to experience the co-occurrence of positive and negative emotions. But Scollon et al. (2005) indicated that pleasant and unpleasant feelings are rarely experienced at the same time across cultures, and Leu et al. (2010) indicated that cultural differences in dialectical emotions may occur more frequently in positive situations only. Among Western-East Asian bicultural individuals, dialectical emotions are more likely to be experienced when the individual identifies with Asian culture or interacts in an Asian language; when the same individual identifies with Western culture or speaks a non-Asian language, dialectical emotions occur less (Perunovic, Heller, & Rafaeli, 2007).

Different types of cultural knowledge have been proposed to account for cultural differences in emotional experience. Kuppens et al. (2006) suggested that cultural differences in experience were related to nation-level life satisfaction, individualism, and the cultural appropriateness of experiencing emotions. Tsai et al. (2006) reported that the cultural differences they observed were due to cultural differences in “ideal affect.” Eid and Diener (2001) reported that cultural norms for experiencing emotions affected experiences across cultures. Kitayama et al. have suggested that emotional experiences are a set of “socially shared scripts” composed of physiological, behavioral, and subjective components (Kitayama & Markus, 1994; Kitayama, Markus, & Matsumoto, 1995). Regardless of the precise mechanism, these studies are consistent with our notion that cultural knowledge influences emotional experience and this influence is larger for cultural emotions.

The Cultural Elaboration of Emotion Meanings

The Proposition

One aspect of emotion that is uniquely human concerns the fact that we create meanings about emotion via concepts, attitudes, values, and beliefs about emotion. Concepts, attitudes, values, and beliefs are constructions that occur only because of memory, language, self-other knowledge, and abstract thinking. Because these cognitive abilities are intimately related to culture, these mental phenomena are more highly constructed by culture than are immediate priming reactions or subjective experience. For this reason, we propose that emotion meanings are relatively more cross-culturally variable precisely because they are based on cultural constructions. (Shweder et al., 2008, made a similar point about emotional meanings but did not make

the same differentiations we do here.) Universality is still possible because emotion itself is a universal phenomenon and some emotions are biological. Thus, we hypothesize that biological emotions provide a platform for universal representations of emotional states in language, but that cultures construct specific categories of emotion terms represented in a language, and specific attitudes, values, beliefs, and lay theories about emotion.

The Evidence

Concepts of emotion. Most cultures of the world have a word for the concept of emotion, and most words for emotion across languages likely overlap in semantic space (cf., Brandt & Boucher, 1985). Yet not all cultures have a word for emotion, such as Tahitians (Levy, 1973, 1983) or the Ifaluks of Micronesia (Lutz, 1982). And even if a culture has a word for emotion, that culture's word may have different connotations than in English.

Many emotion terms in one language may not have an equivalent in another. The typical example of this is the German word *Schadenfreude*, a term that does not exist in English that refers to joy in another person's misfortunes. But just because a culture does not have a word for an emotion does not mean that that emotion does not occur in the culture without the term (as many English speakers derive joy in other's misfortunes). The fact that some emotion words exist in some cultures but not others says something important about how different cultures slice up their affective worlds. The fact that German culture contains the word *Schadenfreude* must mean that that feeling state or situation has some importance in that language and culture that it does not have in English. But it does not mean that the phenomenon of *Schadenfreude* does not exist. Many other such examples exist, such as the Korean concepts of *dapdaphada* and *uulhada*, which have no translation equivalents in English or German (Schmidt-Atzert & Park, 1999).

Another way in which cultures construct different meanings about emotion is in what the term refers to. In American English "emotion" refers to an internal state that focuses on affect (cf., Clore et al., 1987). In some cultures, emotions are statements about relationships among people or between people and events (Gerber, 1975; Myers, 1979; Riesman, 1977; White, 1980). Cultures also differ in where they locate emotions, such as the heart in the United States, the gut in Japan, the liver for the Chewong of Malay (Howell, 1981), the intestines for Tahitians (Levy, 1973), or "the insides" for the Ifaluk (Lutz, 1982). Locating emotions in the heart is convenient and important for American culture as it speaks to the importance of feelings as something unique to oneself that no one else can share, and by identifying emotion with an important organ. The fact that other cultures identify and locate emotions outside the body, such as in social relationships with others, speaks to the ideological importance of relationships in those cultures.

Studies examining the structure of the emotion lexicon across cultures are also relevant. Shaver, Schwartz, Kirson, and O'Connor (1987) performed a cluster analysis on emotion terms in American English and indicated that the terms clustered into five basic-level emotion categories (love, happiness, anger, anxiety/fear, and sadness), two superordinate categories (positive and negative), and 24 subordinate categories. Shaver then examined the structure of the emotion lexicon in Indonesia (Shaver, Murdaya, & Fraley, 2001) and reported the same five basic-level categories and two superordinate categories, but 31 subordinate categories. Church et al. also reported cross-cultural similarity in the basic and superordinate categories in their comparison of the English and Filipino emotion lexicons (Church, Katigbak, & Reyes, 1998; Church, Katigbak, Reyes, & Jensen, 1999).

Wierzbicka (1999) examined emotion concepts across languages and proposed 11 hypotheses that could account for both universality and cultural specificity in emotion lexicons. For example, she proposed that all languages have a word for the term "feel," and in all languages some feelings can be described as good and some as bad; some may be viewed as neither good nor bad.

Her system allows for a mapping of the affective space with the emotion lexicon in any culture, producing universality, but also for different cultures to produce different numbers of words in any area of that space, which allows for cultural differences. Research on languages such as Native American East Cree has supported Wierzbicka's claims (Junker & Blacksmith, 2006).

These studies suggest that the gross structure of representations of the emotion domain across languages is likely similar worldwide but that different cultures make fine-grained distinctions and emphasize different subordinate-level emotion concepts. This conclusion is consistent with our proposition that biological emotions provide a platform for universal representations of emotional states in language, but that cultures construct specific meanings and categories of emotion terms represented in a language. Different cultures may *hypercognize* emotions, in which many variations of emotions are identified and words are created for these variations; or they can be *hypocognized*, in which relatively fewer variations of emotions exist (Levy, 1973). The type of words that different cultures use to identify and label the emotion worlds of their members is a product of cultural construction.

Attitudes, values, and beliefs about emotions. Consistent with our hypothesis, cross-cultural research on attitudes, values, and beliefs related to emotion typically report more cultural variability. For instance, some high-level cultural value dimensions are based on emotion, such as Hofstede's (2001) Uncertainty Avoidance or Schwartz's (2004) Affective Autonomy, and there are large cultural differences on both. Cultural values about how people want to feel—ideal affect—are different than how people actually feel—actual affect (Tsai, 2007; Tsai, Knutson et al., 2006); European and Asian Americans value more high arousal positive affect such as excitement more than do Hong Kong Chinese, who value more low arousal positive affect such as being calm. But the cultural construction of values about emotion does not necessarily correspond to the emotions people actually have; temperament and personality traits predict actual affect better than cultural values whereas cultural values predict ideal affect better (Tsai, Knutson et al., 2006), consistent with our delineations concerning different domains of emotion.

Similarly, Mesquita and Karasawa (2002) reported that emotional experiences of Japanese were predicted by interdependent concerns, but the experiences of Americans were predicted by both independent and interdependent concerns. In a related study, Mesquita (2001) asked Dutch, Surinamese, and Turkish respondents to rate social worth, appraisals, source of appraisals, action readiness, social sharing of emotions, and belief changes. Surinamese and Turkish respondents perceived their emotions as relational phenomena, grounded their ratings in assessments of social worth, and reflected more of a subjective reality; Dutch respondents perceived their emotions as much less reflective of the social environment, focused more on the inner world of the individual, and blended objective and subjective reality. These all tap emotional meaning and thus are culturally variable.

Uchida, Townsend, Markus, and Bergsieker (2009) reported four studies in which they demonstrated cultural differences in lay theories about emotional expression and inference, suggesting that emotions are understood as phenomena that occur between people in Japan, whereas they are understood as within people in the United States. In our view, assessing understandings about other people's emotions is a cognitive task that is highly influenced by culture (as opposed to assessing priming reactions produced by individuals when emotions are actually elicited). Thus, it makes sense that such understandings are more culturally variable.

The literature is peppered with numerous other studies documenting cultural differences in emotional meanings, including cultural differences in the meaning of and narratives related to emotions such as shame, guilt, or embarrassment (Bedford, 2004; Bierbrauer, 1992; Ho, Fu, & Ng, 2004; Hong, 2004; Lebra, 1983; Liem, 1997); the social sharing of emotions (Singh-Manoux & Finkenauer, 2001); comfort in expressing emotions (Stephan, Stephan, Saito, & Barnett, 1998); folk theories of emotion and expression (Ye, 2004); beliefs about verbal

expressions about emotions (Wilkins & Gareis, 2006); beliefs about self and other emotions (Johnson, 2007); and desires for emotions (Diener & Lucas, 2004). These cultural differences occur because the dependent variables in these studies were ratings of attitudes, values, beliefs, or lay theories about emotion, sampling emotional meanings. Because emotional meanings are culturally constructed in the first place, it is no wonder that major cultural differences occur when they are studied.

Conclusion

We have tried to integrate the seemingly disparate literature on culture and emotion by suggesting that the literature can be understood in a cohesive manner by distinguishing emotions from other affective phenomena, among different types of emotion, and the specific domain of emotions assessed. We contend that previous controversies in the literature on culture and emotion have occurred because writers have called all affective states “emotion” without regard for the type or domain of emotion sampled. If there are differences between emotion and other affective phenomena, between different types of emotions, and between different domains of emotion, then it is no wonder that previous controversies have existed. Instead our biocultural model of emotion suggests that not all affective states should be called emotion, that different types of emotions exist, and that different domains of emotion are more relatively influenced by biology or culture. If these premises are accepted, then universality and cultural differences can be somewhat neatly integrated into a cohesive whole, and questions can focus on the relative contributions of biology and culture. Our position is that the type of emotion examined and the specific domain of emotion assessed should moderate effect sizes associated with cultural differences.

To be sure, we do not argue about the specific boundaries between emotions and other affective phenomena, or biological versus cultural emotions. And we acknowledge that the distinctions we have drawn are somewhat artificial because there is likely no emotion that is entirely biologically driven without cultural influence, and no emotion that is entirely culturally driven without biological influence. Clearly, more research and theorizing is needed in order to make better delineations concerning which affective phenomena are emotional and which are not, and which emotions are part of a biologically innate set and which are not. Furthermore, we acknowledge that our delineations are not the only or the best delineations that can or should be used. What we contend is that *some* kind of delineations should be made and can help to synthesize and integrate a large and seemingly disparate, contradictory literature. We offer ours as a first step in this effort.

In the future, we recommend that researchers make clear their working definitions of emotion, identifying that the constructs they are studying at least match their definitions of emotion. They should know the potential bases for the emotions they study, especially concerning evidence about their possible biological versus cultural bases. And researchers can distinguish exactly what domain of emotion they are assessing. While we offer future researchers a terminology—biological versus cultural emotions, priming reactions, subjective experience, and emotional meanings—whether future researchers use these classifications or not is irrelevant. Future work can clearly make better, more precise distinctions. We argue that such distinctions should be made and if so will clarify the existing literature and help guide future research efforts in this area.

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Notes

1. But also see the work on unconscious emotions (Winkielman & Berridge, 2004).
2. We acknowledge that there is controversy concerning whether or not any emotions are biologically innate (interested readers are referred to Barrett, Mesquita, Ochsner, & Gross, 2007; Feldman Barrett, 2006a, 2006b).
3. There have been a handful of studies that have concluded that expressions do not occur when emotion is aroused, and these studies are often cited to refute claims concerning emotion-expression linkage (Fernandez-Dols & Ruiz-Belda, 1995; Fernandez-Dols, Sanchez, Carrera, & Ruiz-Belda, 1997; Kraut & Johnson, 1979; Ruiz-Belda, Fernandez-Dols, Carrera, & Barchard, 2003). These studies have been criticized on methodological grounds and interested readers are referred elsewhere for a detailed discussion (Matsumoto, Keltner et al., 2008).
4. Research examining the production of physiological signatures related to emotion has not always produced consistent findings. Some studies (Brown & Schwartz, 1980; Cacioppo, Martzke, Petty, & Tassinari, 1988) demonstrated only low correlations between expression and physiological response, and some even no relationships (Buck, 1977; Mauss, Wilhelm, & Gross, 2004). We believe these negative findings are the result of several methodological factors: (1) defining emotion by the attempt to manipulate it instead of the independent confirmation of its elicitation; (2) the type of emotion elicited; (3) the nature of the measures of emotional responding used; (4) the temporal resolution of the measurement (Mauss et al., 2005; Rosenberg & Ekman, 1994); (5) the fact that the laboratory may not be the optimal context in which to elicit physiological responses associated with the behaviors emotions enable us to perform when dealing with real-life situations; and (6) the difference between between- and within-subjects designs. The Mauss et al. (2005) study highlights the importance of the last issue. They measured facial behaviors, emotional experience, and three types of physiological response (skin conductance, cardiovascular activation, and somatic activity) with second-by-second precision while participants watched films designed to elicit amusement and sadness. The results indicated clear, moderately sized, within-individual correlations between facial behavior and the various physiological response components.
5. Interestingly, restricting movement is a technique that has been used to elicit angry responses in infants in different cultures (Camras, Oster, Campos, Miyake, & Bradshaw, 1992). But in this case the restriction in mobility is achieved by restraining the infant's arms, which can occur in nature, without language, and minimal learning. Restricting movement by being cut off while driving is learned, and the core emotion system needs to be calibrated to that cultural event.
6. When Ekman conducted his seminal research in the highlands of New Guinea, he was able to take photographs of the tribe members as they went about their daily business. They had no embarrassment to the camera because they did not know what a camera was (Ekman, 2003).
7. Their study included shame and guilt, which we do not consider biological emotions. But we do believe that many cultural emotions are also universal and share the same eliciting circumstances.
8. This may explain why beliefs about the pervasiveness of cultural differences in expression exist. When intense emotions are aroused, attention is often drawn to the stimulus event and *not* the expressive behaviors of the individuals, during which immediate universal reactions occur but are missed. When attention returns to the individuals, they are already beginning to engage in culturally regulated behavior. Such a process may perpetuate beliefs about the cultural variability of expressive behavior. Because we

tend to believe our experiences, it is easier to believe the existence of cultural differences in expressive behavior, because that's what we often see.

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