Faceted Feelings: An Examination of the Underlying Structure

of Subjective Emotional Experience

by

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ABSTRACT

What does it mean to feel an emotion experience? The nature of emotional experience has often been described in terms overall conscious experience, termed affect. However, even within affective research there are multiple contradicting theories about the nature and structure of affect. I propose that these contradictions are due to methodological issues in the empirical research examining these underlying dimensions. Furthermore, I propose that subjective emotional experience should be examined separately from overall affect. The current study attempts to address past methodological issues by focusing solely on emotional experiences, developing a comprehensive list of emotion items, and including a broad range of emotional experiences. In Study 1, participants were asked to recall an emotional experience and then report their experience of 76 different emotions during that experience. A factor analysis of the emotion ratings revealed a 5-factor categorical structure with categories of Joy, Anger, Sadness, Fear, and Shame/Jealousy. In Study 2, the 76 emotion words from Study 1 were compared in a semantic space derived from a large collection of text samples in an attempt to compare to the results of Study 1. A semantic space derived from a broad range of texts would reflect relationships of emotional concepts. Study 2 revealed a 1-factor structure, drastically different from the structure in Study 1. The implications from Study 2, however, are limited because of the limited range of literature that was used to create the semantic space in which the words were compared. Overall, the results from these studies suggest that subjective emotional experience should be treated as categorical.

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DEDICATION

This project is dedicated of my friends and family. I could never have accomplished

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Experience

Subjective emotional feelings are a pivotal part of emotion responding. The majority

of emotion researchers agree that each emotional response includes a feeling state (Izard,

2010). There is variation in the terminology used to describe emotion feelings within

emotion research (Izard, 2007); to prevent confusion I will refer to the subjective feelings

that accompany an emotion as subjective emotional experience. Subjective emotional

experiences are defined as the uncontrollable feelings elicited by a target in the

environment (Barrett, Ochsner, & Gross, 2007; Ekman, 1992). The nature and underlying

structure of emotional feelings has been debated in emotion research for over 40 years

(Barrett et al., 2006; Cacioppo et al., 2000; Ekman, 1999; Scherer, 2005). Some propose

that subjective emotional experiences should be viewed as categorically discrete entities

(Ekman, 1992; Levenson, 2003) whereas others view subjective emotional experience as

a combination of activation of other feeling dimensions (Bradley & Lang, 2000;

Cacioppo et al., 2000; Russell 2003).

An accurate understanding of the nature of subjective emotional experience is

important when conducting emotion research because subjective feelings are considered a

fundamental part of emotional responding (Barrett et al., 2006; Ekman, 1999; Izard,

2007; Izard, 2010). The theory of emotional experience to which a researcher subscribes

has implications for the aspects of emotion that the researcher chooses to focus on, the

design of experiments investigating emotions, and the interpretation of the results (Izard,

2007). An important question in the current literature is the number of feeling dimensions

or categories necessary to accurately describe the nature of subjective emotional

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experience. Some propose that a two-dimensional model is best (Bradley & Lang, 2000; Russell, 2003, Fontaine et al., 2007; Watson & Tellegen, 1985; Yik, Russell, & Barrett, 1999) whereas others argue this is too simplistic to fully explain the variability in feeling states (Carver & Harmon-Jones, 2009; Christie & Friedman, 2004; Fontaine, et al., 2007; Levenson, 2003; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2007; Scherer, 2005). Some researchers suggest that more emotion dimensions are needed to describe subjective emotional experience (Carver & Harmon-Jones, 2009) whereas others argue that discrete emotion categories best describe the underlying structure of subjective emotional experience (Ekman, 1992; Levenson, 2003; Mauss et al., 2007).

The continuing debate over the number of dimensions that underlie subjective emotional experience is due to several methodological issues in the current emotion dimension literature. First, most of these studies focus on subjective affect and do not examine emotional experiences per se. Affect is the conscious experience of all feelings, whereas a subjective emotional experience is a feeling evoked from an object or situation in the environment (Russell, 2003). Second, many of the studies investigating affective dimensions rely on participants rating the similarity of feeling terms. These similarities may be associated with concepts of emotions and not necessarily actual feelings experienced during an emotional experience. Third, there is little discussion of the methods used to determine the items measured in each study, typically lists of adjectives, that describe different feelings − these items may be chosen based on their representation of the hypothesized dimensions. Finally, there is evidence that factors that are not easily described are discarded. I propose that an examination of the underlying dimensions of subjective emotional experience, rather than subjective affect, with a carefully worded

emotion elicitation and systematically determined comprehensive collection of feeling terms will reveal that two dimensions is not sufficient to accurately describe the underlying structure of subjective emotional experience.

Current Theories of the Nature of Subjective Emotional Experience

A common question in current emotion research is whether subjective emotional experiences should be described and studied as discrete categorical states or a combination of dimensions. This has led to arguments regarding whether subjective emotional experiences should be framed in terms of affect or examined as unique phenomena separate from affect (Ekman, 1999). Colloquially, "affect" and "emotional experience" are often used interchangeably though they have very separate meanings in emotion research (Barrett et al., 2007; Russell, 2003). Affect refers to all conscious feelings; a continual state that is constantly changing and providing feedback about an individual's current state (Panksepp, 2005; Russell, 2003). Affect is the non-directional "raw feeling"(Russell, 2003, p. 148). According to Russell (2003), a subjective emotional experience is a change in affect that is attributed to an object or situation in the environment. Some, like Russell, view emotional experiences as object-directed affective changes but believe that subjective emotional experiences are not necessarily unique phenomena from other affective states (Barrett et al., 2007; Russell, 2003). Others argue that subjective emotional experiences are qualitatively different from other feelings (Ekman, 1999) and that they have evolved to quickly motivate adaptive responses to goal relevant information in the environment (Cosmides & Tooby, 2000). The innate and unbidden quality of emotional feelings separates them from non-emotional affect (Ekman, 1992; 1999).

An accurate theory on the underlying structure of subjective emotional experience is important because the theory to which a researcher subscribes influences the design and interpretation of studies. For example, a researcher who believes that emotional experiences are discrete categorical states will use different methods when creating empirical studies from a researcher who believes emotional experiences are a combination of dimensions. These two different researchers may conduct very different studies when investigating the relationship between emotion and other psychological factors, such as neurological and physiological activation, cognition, and behavior. A view that emotional experiences are best described as categorical entities that vary based on evolutionary function will lead researchers to focus on differences in emotion categories, while not looking for, or de-emphasizing, similarities between emotional experiences with different functions (Barrett, 2006). Conversely, the view that all emotional experiences are a combination of specific feeling dimensions will lead researchers to use stimuli and emotion elicitation that vary along those dimensions but not others. This may cause researchers to miss important differences in emotional experiences that are not easily described by variations in the theorized dimensions (Levenson, 2003). The question of whether subjective emotional experiences should be described and studied as discrete categorical states or a combination of dimensions remains an important, yet unanswered, question in emotion research.

Subjective Emotional Experiences as Categories

Since scientific emotion research began, emotions have long been referenced in terms of discrete emotions like fear and anger, (Darwin, 1872; James, 1889). We intuitively describe and understand emotions and subjective emotional experiences in

terms of categories like fear, anger, sadness, disgust and joy (Barrett, 2006). The discrete

emotion approach focuses on categories or families of emotion based on their function. In

emotion research, emotional episodes are not comprised of merely subjective feelings

alone but are made up of several different factors including appraisals, changes in

attention and memory, physiological changes, facial expressions, behaviors, and

subjective feelings (Izard, 2007). It is important to note that when emotion theorists

discuss 'emotions' they are not necessarily focusing on an individual's subjective

emotional experiences. The discrete emotion perspective focuses on the differences in

expression, behavior, physiology, and feelings based on the function of each emotion

category (Ekman, 1992; Izard, 2007). These theories propose that emotions are unique

from other psychological phenomena (Barrett, 2006; Ekman, 1992; Izard, 2007). Some

discrete emotion theorists view function from an evolutionary perspective − that

emotions provide adaptive responses to fitness related opportunities and threats in the

environment (Ekman, 1992; 1999; Levenson, 1999; Plutchik, 1962). Others discuss

function in terms of appraisals and goal attainment (Lazarus, 1991).

      Tomkins (1962) and Plutchik (1962) were among the first to propose a specific

list of emotion categories. There is substantial overlap but not a consensus about the

number of emotion categories necessary to describe emotion (Ekman, 1992; Izard, 2007).

Tomkins (1962) discussed differences in facial expressions as evidence of different

emotion categories. He proposed that there were eight emotions: joy, excitement,

surprise, anger, disgust, distress, fear, and shame. Plutchik (1962) also proposed eight

slightly different emotion categories: anger, sadness, disgust, anticipation, trust, and joy.

Plutchik stated that these were 'basic' emotions in that they were evolutionarily derived,

biologically innate, and universally present. According to Plutchik, these basic emotions could combine to make different emotional experiences. Later theories proposed five basic emotions: happiness, sadness, fear, anger, and disgust (Johnson-Laird & Oatley, 1989). These theories proposed that all emotional experiences could be described in terms of these five categories. Others, like Izard (1977) proposed ten basic emotions: interest, excitement, startle, distress, rage, disgust, contempt, fear, shame and guilt. Similar to Izard, Ekman (1992) proposed that there are at least six basic emotions: fear, sadness, anger, disgust, enjoyment, surprise and possibly others, like shame, awe, guilt, contempt, and embarrassment. To Ekman (1999), emotions are distinguished from other affective phenomena, and there are no non-basic emotions.

Discrete emotion perspective is useful for emotion research because it is "a convenient way to collect a set of components and characteristics into a useful bundle" (Izard, 2007, p. 267). People tend to describe their emotions in terms of categories, not in terms of dimensions, appraisals, behavior, or physiology. Therefore, relating these other aspects to easily understood categories allows researchers to determine the likely reactions and implications of an individual that reports that they are feeling happy, sad, or angry (Izard, 2007). However, there is very little research from the discrete emotions perspective that focuses directly on subjective emotional experiences (Izard, 2007). The discrete emotions theory of emotion is typically focused on determining the situations that cause emotional experience, the resulting intentions, and communication of those intentions, particularly through facial expressions (Izard, 2007). These theories often focus on the communicative properties of emotion (Ekman, 1999; Izard, 2007). For example, basic emotion theorists often refer to research by Ekman (1993) that shows

individuals associate specific static facial expressions with basic emotions as evidence for the existence of basic emotion categories (Izard, 2007). However, this research focuses on recognition, and there is very little research supporting the idea that subjective emotional experiences are discrete (Barrett, 2006).

There are those that argue that discrete theories categorize emotions based on "nothing more than their causes" (Barrett et al., 2007, p. 374) and do not accurately describe the mechanisms that produce subjective emotional experience. They contend that the description of subjective emotional experiences as categories arose from "folk theory" (Russell, 2003, p. 145) and that "our perceptual processes lead us to aggregate emotional processing into categories that do not necessarily reveal the causal structure of emotional processing" (Barrett, 2006, p.29). These researchers suggest that a categorical structure of subjective emotional experience is not supported by empirical evidence (Barrett, 2007).

Subjective Emotional Experience as Dimensions

Some theorists propose that emotions are best described in terms of " elemental building bocks" (Russell, 2003, p.146). Subjective emotional experiences are produced from a combination of aspects, termed dimensions, and the varying combinations of activation on each dimension produce the differences in subjective feelings (Bradley & Lang, 2000; Russell, 2003; Watson & Tellegen, 1985). Dimensional theorists focus on functions of dimensions and how variations of activation along each dimension combine to create different experiences (Barrett, 2006). These theorists view all affect as the combination of activation of these continuous dimensions. Wundt (1905) was the first to suggest that subjective emotional experiences could be described in terms of dimensions

instead of discrete categories. He proposed that subjective emotional experiences could be described in terms of valence (pleasantness), arousal, and tension. This theory laid the theoretical foundation for subsequent dimensional theories of experience (Izard, 2007). In contrast to discrete theories of emotional experience, dimensional theories do not consider emotional experience to be unique from other affects (Barrett, 2006; Russell, 2003). Rather, these theorists believe that the subjective emotional experience is simply a change in affect elicited by an object or situation in the environment (Barrett et al., 2006; Russell, 2003). Because of this view, dimensional researchers focus on affect as a whole instead of strictly emotional subjective experiences.

Several different affective dimensional theories have been proposed (Bradley & Lang, 2000; Fontaine et al., 2007; Russell, 2003; Watson & Tellegen, 1985; Yik, Russell, & Barrett, 1999). Watson and Tellegen (1985) proposed that there were dimensions of positive and negative affect − that emotions could be described as a combination of "high or low positive affect" and "high or low negative affect". Thayer (1989) proposed two dimensions of tense and energetic arousal. The tense arousal dimension varied from tension to calmness and the dimension of energy varied from energetic to tired. Russell (1980) proposed a circumplex model of valence and arousal. Valence varied from pleasantness to misery, and arousal varied from arousal to sleepiness. Larsen and Diener (1992) proposed a similar model of two dimensions of pleasantness and activation.

Yik, Russell, and Barrett (1999) suggested that these four models describe, "the same space, just differently labeled and contextualized" (p. 601). Yik et al. argued that Russell's circumplex model and Larsen & Diener's model were essentially equivalent. They also suggested that arousal was implicit in Watson & Tellegen's model. "High and

low affect" could be interpreted as high and low levels of arousal. Yik et al. also argued that Thayer's concepts of energy and calmness can be interpreted as positive in valence and Thayer's concepts of tension and tiredness can be interpreted as negative in valence. Yik et al. found that when the scales used to determine each of these four models were administered simultaneously, there was significant overlap between each of the scales. In addition, they found that the axes of Watson & Tellegen's model of valence dimensions and Thayer's model of arousal dimensions corresponded to the diagonals of the Russell's circumplex model. Russell's circumplex model was not significantly different from a 45 degree rotation of both Thayer's and Watson & Tellegen's models.

Models of subjective affect are constructed in several ways. One method is to ask participants to rate their current subjective affect experience by rating how much a list of emotion adjectives, like "joyful" or "grumpy," describe their current experience (Russell, 1980; Watson & Tellegen, 1985; Yik et al., 1999). Another method asks participants to rate the likelihood of experiencing emotion-related adjectives (e.g. relentless, energetic, powerful, positive, at ease) when experiencing a specific easily understood emotion, like anger or fear (Fontaine et al., 2007). A similar method asks participants to categorize 28 "words or phrases that people use to describe their moods, feelings, temporary states, affect, or emotions"(p. 1164) into 4, 7, 10, or 13 different groups so that the words in each group "were most similar" (p.1168). The similarity of each pair of words was determined by how often each pair of words was placed in the same group. Multidimensional scaling was then used to show a geometric representation of similarity of all 28 words (Russell, 1980).

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The scope and number of subjective emotional experience words used in each of these studies varies greatly between studies. The subjective affect terms used are meant to represent the wide variety of feelings experienced during a subjective experience – like distressed, happy, fearful, hostile, restless, or placid (Fontaine et al., 2007; Russell, 1980; Watson & Tellegen, 1985). There is very little discussion of the method used to select the specific words used in each study (Russell, 1980; Scherer, 2005; Watson, Clark, & Tellegen, 1988). For example, in a study by Russell (1980) examining the circumplex model, Russell describes that "a list of 28 words were chosen to represent the domain of affect" (Russell, 1980, p. 1164) but there is no further discussion about how these words were determined to be representative of affect. The ratings gathered are analyzed using factor analysis to determine the most probable number of underlying factors. The terms used to describe these factors – like valence, arousal, or activation – are determined subjectively based on the adjectives that load on each factor (Bradley & Lang, 1994; Bradley & Lang, 2000; Fontaine et al., 2007; Russell, 1980; Russell, Lewicka, & Niit, 1989; Scherer, 2005; Watson, Clark, & Tellegen, 1988).

Methodological Issues in the Current Literature

There are four methodological issues in the current dimension literature that lead one to question the validity of the two-dimensional models discussed above.

First, there is the question of whether measuring relationships of emotion variables outside of an emotional experience is a valid method for determining the structure of subjective emotional experience. Multidimensional scaling has been used in several studies to determine or validate proposed models of subjective emotional experience (Russell, 1980). For example, Russell (1980) asked participants to sort

emotion words into 3, 7, 10 or 13 categories, and he then determined the similarities between words by identifying how often they were grouped in the same category. The major issue with these methods is that participants are completing the task based only on the meanings of the words and not comparing the words directly to an emotional experience. For example, two of the words used by Russell (1980) were sad and excited. Individuals in his study did not place sadness and excitement in the same category very often even though research shows there are sad experiences that produce exciting feelings, like extreme grief from the death of a loved one (Kreibig, 2010). While our emotional experiences are shaped by our conceptual knowledge of emotions (Izard, 1992), relying solely on conceptual knowledge in the absence of the context of a specific experience does not provide an accurate account of experiential relationships. There is no way to determine whether participants are categorizing the words based on actual experience or whether they are categorizing based on the prototypical or perceived appropriateness of the meaning of each word. Methods that rely on participants sorting feeling words into groups or methods that ask participants to make direct comparisons about the similarity of feeling words are not valid methods of determining the dimensions of emotional experience because they only measure the structure of overlapping meanings of emotion concepts. There are other factors apart from subjective emotional experience that can determine the similarity or difference in feeling concepts. For example, similarities could be determined based on the social norms that dictate the appropriateness of feelings during differing emotional experiences regardless of whether they are actually felt. For this reason, these comparisons do not necessarily measure the emotional experiences that the words are meant to describe.

Second, in studies that rely on actual emotional experience there is the question of the limited range of the emotional experiences that are measured. Even when studies ask participants to rate emotion terms using current emotional state as a reference there is a limited range of the emotional experiences represented. In many of these studies participants are asked to rate their current emotional state using a list of emotional feelings. The ability to accurately determine the structure of subjective emotional experience is dependent on measuring feelings during a broad range of emotional experiences. Some emotional experiences are more common than others, therefore you cannot expect equal representation of emotional experiences. The range of emotional experiences is especially limited because of the reliance on undergraduate students as the modal sample (Fontaine et al., 2007; Russell, 1980; Watson, Clark, & Tellegen, 1985). The differing emotion-eliciting situations of undergraduates are more homogenous than the general population, which limits the generalizability of results (Gosling, Sandy, John, & Potter, 2010; Heinrich, Heine, & Norenzayan, 2010). In addition, in some studies participants were asked to rate their current experience in a lab or classroom setting (Russell, 1980; Yik et al., 1999). This limits the range of emotions even more, because these are neutral settings, and most individuals in these situations are not likely to be feeling strong emotional experiences. As previously mentioned, many dimensional emotional theorists perceive emotion as continuously changing affect (Barrett et al., 2007; Russell, 2003). According to these theorists there are no non-affective states (Russell, 2003). However, there is evidence for the competing perspective that emotional feelings are not continuously active but are only activated during fitness-relevant situations to provide an adaptive response (Ekman, 1992; Cosmides & Tooby, 2000).

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From this perspective, a study that includes both emotional and non-emotional situations would not provide an accurate depiction of the underlying structure of emotional experience.

Third, there are issues with choosing emotion terms and emotion elicitation techniques based on their representativeness in the hypothesized two-dimensional model. Many of the studies of the structure of emotional experience rely on factor analysis to determine the underlying structure. Dimensions found using factor analysis are dependent on the items that input into the analysis. If the researchers select emotion adjectives that are most prototypical of the hypothesized emotion structure, then they are likely to find only those dimensions in their model. This is evident in the variation of emotion models that have been found in the current literature (Carver & Harmon-Jones, 2007; Bradley & Lang, 1994; Fontaine et al., 2007; Russell, 1980; Scherer, 2005; Watson & Tellegen, 1985; Thayer, 1989). At times, there is little discussion of the methods used to select emotion adjectives used in each study. For example, Russell (1980) validates his circumplex model using 28 emotion terms "chosen to represent the domain of affect" (p. 1164). The selection of these terms is never explained outside the context of fitting with the proposed model of arousal and valence. Watson, Clark, & Tellegan (1985) and Thayer (1967) also use adjective lists that were chosen based on their representativeness of theoretical factors they hypothesized. Watson, Clark, & Tellegan (1985) used a 60-word list of mood descriptors developed by Zevon & Watson (1982). Zevon & Watson determined the words by "selecting three adjectives from each of 20 mood categories derived in a manner designed to ensure broad coverage of the domains of affect as represented in adjective descriptors (p.112)". However, there is no more explanation

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about the manner used to select a broad representation of adjectives. Thayer's activation-deactivation checklist (1967) was a combination of 21 "mood descriptive adjective used by Nowlis (1965)" (p. 665) and 21 activation adjectives. There is no discussion of how the 21 additional adjectives were determined. A systematically-determined comprehensive list of feelings is necessary to accurately determine dimensions using factor analysis.

Fourth, there is evidence that some dimensions that are not easily labeled are excluded from these models with little explanation. Russell (1980) mentions in his discussion of a two-dimension theory of affect that valence and arousal account for the most variation in studies examining dimensions of subjective affect, but "additional dimensions are often obtained, but each accounts for a quite small proportion of variance, and there is little consensus on their interpretation (Russell, 1980, p. 1163)." For example, Christie & Friedman (2007) propose two different two-dimensional models. They propose one model for self-reported subjective emotional experience in response to emotion stimuli and the other model for physiological responses in response to emotional stimuli. The factor analysis for each of these, however, revealed four significant factors. They explain that the other dimensions found "were not interpretable and are not discussed further" (Christie & Friedman, 2007, p. 148).

Hypotheses

I propose that subjective emotional experience should be examined as a combination of feeling dimensions. While there is not a consensus about the structure of underlying dimensions, multiple studies have found similar dimensions of subjective emotional experiences (Fontaine et al., 2007; Russell, 2003; Watson & Tellegen, 1985;

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Yik, Russell, & Barrett, 1999). The methodological issues in past research limit the ability to identify all dimensions that make up subjective affect but they do provide repeated evidence that subjective experience can be described in terms of dimensions. There is evidence that dimensions such as valence and activation are associated with subjective feelings and that a dimensional model can provide important insight about how cognitive, neurological, and physiological factors cause subjective emotional experiences by investigating their relationship to each dimension (Barrett, 2006; Cacioppo et al., 2000; Carver & Harmon-Jones, 2009; Izard, 2007).

Identifying Dimensions. I hypothesize that a factor analysis of a broad range of emotional experiences using a comprehensive list of emotional variables will reveal an underlying structure of bipolar dimensional factors. A dimensional structure will be evident through a clear pattern of cross-loadings and the presence of both positive and negative loadings. In a dimensional structure some variables will load high on multiple factors whereas others will load high on only certain factors. Bipolarity will be evident in the presence of both positive and negative factor loadings. For example, in a three dimensional structure of valence, arousal, and approach motivation we would expect an item like "terror" to have a high negative loading on a factor corresponding to valence because it is an extremely unpleasant feeling. "Terror" would have a high positive factor loading on a factor corresponding to arousal because it is very arousing. "Terror" would have a high negative on a factor corresponding to approach motivation because it provokes a strong withdrawal motivation. In contrast, an item like "contentment" might load moderately on a valence dimension because it is mildly pleasant, load negatively on

arousal because it is relaxing, and would not load at all on approach motivation because it does not motivate approach or withdrawal.

Alternatively, if the underlying structure of emotional experience is best described by categorical factors then there will be few cross-loadings between factors and few negative loadings. Most items would only load high on one factor. Additionally, given that the number of emotion categories suggested in discrete emotion research ranges from 5 to 12 (Izard, 2007) whereas dimensional researchers suggest 2 to 4 affect/emotion dimensions (Fontaine et al., 2007; Yik et al., 1999), we would expect a higher number of factors with a categorical structure compared to a dimensional structure.

Though I hypothesize a dimensional structure, I am deviating from past dimensional emotion research, which emphasizes the study of all affect instead of focusing specifically on emotional experiences. I contend that subjective emotional experiences should be studied as phenomena unique from other affective experiences. Neurological (LeDoux, 2000), cognitive (Bechara, 2004; Gable & Harmon-Jones, 2010), and physiological (Kreibig, 2010) data suggest that there are differences between emotional and non-emotional states. By focusing solely on subjective emotional experiences there is an opportunity to identify dimensions that are unique to those feelings that may not be present in all affect.

I propose that the current studies investigating the structure of subjective emotional experience are not accurate due to methodological issues discussed above and the tendency of these studies to equate emotional experiences to non-emotional experiences. These issues have led to the proposal of models that are too simplistic to fully describe subjective emotional experience. The best candidates for dimensions of

subjective emotional experience are valence, arousal/intensity, and approach/withdrawal motivation. Some studies have found more than three dimensions but excluded factors those that were not easily interpreted (Christie & Friedman, 2007; Russell, 1980), which suggests that there may be other dimensions in addition to the three described above. The argument for each of the three dimension candidates is discussed below.

Valence. Valence refers to the hedonic tone (pleasantness or unpleasantness) of subjective emotional experience (Barrett, et al., 2007; Carver & Harmon-Jones, 2009; Fridja, 2000; Roseman, 2011; Russell, 1980). Feelings of pleasantness and unpleasantness are typically thought to reflect an evaluation of the current situation. According to the feeling-as-information hypothesis, pleasantness is associated with approaching success in pursuit of a goal, whereas unpleasantness is associated with an impending threat to goal achievement (Schwarz & Clore, 2000). According to Tooby and Cosmides (2000), emotional valence corresponds to the varying evolutionary payoffs of one's exchanges with the environment. Payoff refers to the benefits and costs to survival and reproduction. Positive valence is a cue that there will be a high payoff of one's current actions, whereas negative valence is a cue that current actions will likely provide a low payoff and thus a change in action is needed.

Research on language categorization supports the idea that there is hedonic tone (i.e. feelings of pleasantness or unpleasantness) associated with each subjective experience (Barrett, 1998; Barrett, 2006; Fontaine, et al., 2007; Ortony, Clore, & Collins, 1988; Shaver, Schwartz, Kirson, & O'Conner, 1987; Russell, 2003; Watson & Tellegen, 1985; Watson, Wiese, Vaidya, & Tellegen, 1999). Watson and Tellegen (1985) found that a factor analysis using data from seven different studies of self-reported mood

revealed two consistent factors identified as positive and negative affect. Proud, interested, sleepy, and grouchy are examples of some of the mood terms used in the analyses (for a full list see Watson & Tellegen, 1985). Russell's (1980) circumplex model proposed that subjective emotional experience terms could be systematically arranged in a circle over the dimensions of valence and arousal. Self-reported subjective affect during emotion elicitation supports the existence of valence as a dimension of subjective affect (Christie & Friedman, 2004; Russell, 1980; Watson & Tellegen, 1999). Christie & Friedman (2004) asked participants to rate their subjective experience during film clips using "items traditional to discrete emotion models" such as amused, angry, and content, and "items traditional to dimensional models", such as good, calm, excited, or negative (p. 146). They found that valence arose as the largest factor in a factor analysis of self-reported affect during six film clips.

   Arousal. Arousal or intensity refers to the energetic feelings that are a part of subjective affect (Drake & Myers, 2006). The dimension of arousal can be described as "one's sense of mobilization and energy" (Russell, 2003, p. 147). Subjective arousal is thought to be a cue of expected energy needs (Bradley, 2000; Bradley & Lang, 2000; Gomez, Stahel, Danhuser, 2004; Russell, 2003; Tooby & Cosmides, 2008). Levels of arousal correspond to the physical requirements of the adaptive responses related to different emotional experiences (Bradley, 2000; Russell, 2003). The dimension of arousal has been identified in the categorization of subjective affect terms in self-reported affect during emotion elicitation (Cacioppo et al., 2000; Christie & Friedman, 2004). Christie & Friedman (2004) found that arousal was a dimension of emotion when analyzing responses to emotional stimuli. A factor analysis of self-reported subjective affect

(described in valence section above) in response to film clips revealed a factor identified as arousal.

Approach vs. withdrawal. The approach/withdrawal dimension reflects the directional aspect of subjective affect (Bradley, 2000; Carver & Harmon-Jones, 2009; Elliot, 2006; Harmon-Jones, Gable, Peterson, 2010; Roseman, 2008; Watson, Wiese, Vaidya, & Tellegen, 1999). Subjective affect provides a generalized motivation to approach or avoid an emotion-eliciting stimulus (Bradley, 2000; Bradley, Codispoti, Cuthbert, & Lang, 2001; Elliot, 2006). Approach and withdrawal do not motivate specific actions (like punching or hugging or even running) but describe a feeling to move towards or away from a stimulus.

Some of the two-dimensional models of subjective affect suggest that feelings of approach/withdrawal are synonymous with feelings of positive and negative valence (Bradley 2000). Carver and Harmon-Jones (2004) argue that feelings of approach/withdrawal are qualitatively different from valence. Research on specific emotions provides evidence that negative feelings are not always associated with withdrawal motivations and positive emotions are not always associated with approach motivations (Carver & Harmon-Jones, 2009; Gable & Harmon-Jones, 2010). For example, anger is reported as a subjectively negative experience (Harmon-Jones, 2004), but research suggests that anger is associated with a high approach motivation (Harmon-Jones, 2003; Wilkowski & Meier, 2010). There is less of a tendency to conceptualize subjective feelings in terms of approach motivation, and this may have led to a tendency to discard this dimension in analysis due to the inability to interpret the dimension. For example, in the study conducted by Christie & Friedman (2007) a factor analysis of self-

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reported emotional experience and physiological data each revealed four factors. In the analysis of emotional experience two factors were discarded leaving what was interpreted to be factors of valence and arousal. The analysis of physiological data yielded four factors as well, one of which was identified as approach motivation.

Methodological and theoretical issues in the current dimensional affect studies have led to contradicting dimensional models and a lack of consensus of the nature of subjective emotional experience. The goal of the first study is to examine the underlying structure of emotional experience from the perspective that emotional experiences are unique from other affective states. There is criticisms that relying solely on self-report does not provide a complete understanding of emotional experience because individuals are not completely aware of their emotional state and can be biased by cultural conventions (Barrett, 2006). The goal of Study 2 will be to examine the underlying structure of emotional feelings using comparisons of feeling words derived from latent semantic indexing (LSI), a technique that uses a context-sensitive algorithm based on a collection of written works to determine the relatedness of different words (Wolfe & Goldman, 2003). Using these two different methods will give a better understanding of the underlying structure of emotional experience that cannot be accurately inferred from past research because of the previously described methodological issues.

Study 1

Study 1 examined self-reports of emotional experience of various emotional feelings during a specific emotional event. To address methodological issues in past research, I will use systematic methods to ensure a range of emotional experiences and emotional feeling ratings that is broader and more comprehensive than past research. The

study uses an emotion recall procedure that ensures an evenly distributed, extensive range of emotional experiences. The study also includes a wide range of emotion feeling items that has been systematically selected without overt bias toward any specific hypothesized dimensions. I predict that this study will reveal that there are at least three feeling dimensions underlying emotional experience, and that dimensions correspond to valence, arousal, and approach motivation.

Methods

      Participants. A target sample size of 5000 was sought due to the large amount of items, expected missing data, and expected positive skew in the data, all of which lead to an underestimation of factor loadings (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Seven thousand three hundred four participants were recruited from multiple sources including (1) Amazon Mturk, (2) undergraduate psychology classes in exchange for extra credit, (3) introductory psychology courses in exchange for research credit, and through (4) the social networking website Facebook.com. All participants were told that the study would take approximately ten minutes, and that during the study they would write about an experience then answer questions about their feelings during that experience. All samples completed almost identical surveys via Qualtrics online survey host. The only variations between surveys were in the descriptions of any incentives for completing the survey: monetary payment (Mturk), research credit (intro to psych courses), extra credit (undergrad psych courses), or no external incentive (Facebook). Before the data was analyzed, 2,655 participants were excluded from the data set because they did not complete the writing portion and/or the feeling-rating portion of the survey. The remaining 4649 participants included 1944 males, 2687 females, and 18 that did not

report gender. Participants ranged in age from 18 to 77 with a mean age of 31.51 (*SD* = 31.51). The sample was 69.5% Caucasian, 7.3% African-American, 7.9% Asian, 5.7% Latino, 5.9% Mixed (reported 2 or more ethnicities), 1.1% Other, and less than 1% Pacific Islander, Native American, Indian, and Middle Eastern; 19 participants did not report ethnicity.

Amazon Mturk. Five thousand eight hundred seventy-two participants were recruited online through Amazon Mturk. The HIT (the advertisement for the study) was posted under the title "quick easy survey." The study itself was titled "emotional experiences". Only individuals located in the United States with a HIT completion approval rate of at least 80%, were eligible to participate. Each participant was paid $0.30 for completing the study. One thousand and nine hundred ninety-two participants were excluded because they did not complete the emotion questionnaire. The remaining 3880 participants (2246 female, 1617 male, 17 unreported) ranged in age from 18 to 74 with a mean age of 33.24 (*SD* = 11.82). The Mturk sample was 72.0% Caucasian, 8.2% African-American, 4.9% Latino, 6.1% Asian, 5.2% mixed (reported 2 or more ethnicities), 1.1% Other, and less than 1% Pacific Islander, Native American, Indian, and Middle Eastern; 16 participants did not report ethnicity.

Undergraduate psychology classes (extra credit). One thousand thirty-nine students from two undergraduate psychology classes at Arizona State University participated in the survey in exchange for extra credit. The survey link was posted on the online course website for each class and emailed to the students. Four hundred twenty-three were excluded because they did not complete the emotion questionnaire. The remaining 616 participants (345 female, 270 male, 1 unreported) ranged in age from 18 to

51 with a mean age of 20.03 (SD = 3.16). The undergraduate sample was 53.6%

Caucasian, 2.9% African-American, 11% Latino, 19% Asian, 1.6% Middle Eastern, 9.4%

mixed (reported 2 or more ethnicities), and less than 1% Pacific Islander, Native

American, Indian, or Other; 2 participants did not report ethnicity.

Introductory psychology courses (research credit). One-hundred twenty-six

introductory psychology students were recruited via SONA systems in exchange for

research credit, a requirement of the course. The study was posted under the title

"emotional experience survey". Seventy participants were excluded because they did not

complete the survey. The remaining 56 participants (27 females) ranged in age from 18 to

25 with a mean age of 19.38 (SD = 1.56). The intro psych sample was 50.0% Caucasian,

5.4% Latino, 17.9% Asian, 19.6% mixed (reported 2 or more ethnicities), and 1.8% each

African-American, Pacific Islander, Native American, Indian, Middle Eastern and Other.

Facebook. Two hundred sixty-seven participants were recruited by posting a link

on the social networking site facebook.com. The study was posted under the title

"emotional experience survey" with a brief message explaining that volunteers were

needed to complete a dissertation study. Participants were told that the study would take

approximately ten minutes, and that during the study they would write about an

experience then answer questions about their feelings during that experience. One

hundred seventy participants were excluded because they did not complete the survey.

The remaining 97 participants (69 female) ranged in age from 20 to 77 with a mean age

of 42.45 (SD = 16.51). The Facebook sample was 81.0% Caucasian, 1 % African-

American, 2.1% Middle Eastern, 5.2% mixed (reported 2 or more ethnicities), 1.1%

Other, and 3.1% each Asian, Latino, and Other; 1 participant did not report ethnicity.

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Measures: Feeling Ratings. The feeling rating scale is a comprehensive list of easily recognized emotional feeling words. This list was created by systematically compiling a list of all nouns in the Webster's English Dictionary that fit the dictionary's own definition of an emotion: "An emotional experience is defined as a conscious mental reaction subjectively experienced as a feeling, usually directed toward a specific object and typically accompanied by physiological and behavioral changes in the body" (Merriam-Webster, 2004). Five graduate-level emotion researchers compiled this list of words. Each section of the dictionary was reviewed by at least two researchers. If there was not a consensus on the appropriateness of a word, a third researcher was asked to decide whether they thought the word was an appropriate emotion word. At least two out of the three researchers had to agree that the word represented an emotion for it to be included in the list. This provided a list of 186 nouns whose definition fit that of an emotion. Fifteen undergraduate participants were surveyed to determine whether meaning of each word was easily understood and the extent to which each word described an emotional feeling. Participants were asked to report whether they knew the definition of each feeling word (yes, no, not sure) and to rate the extent to which the word described an emotional feeling on a scale from 0 (not at all) to 5 (extremely) Any word that was not recognized by at least 85% of the sample was removed from the list. This cut-off led to the removal of sixty-one words from the list. Then, any words with a mean rating below 4.00 on "the extent that this word describes an emotional feeling" likert scale were removed. This cut-off removed forty-nine words. The resulting list contained 76 feeling words that are easily understood and relate to emotional feelings (See Appendix B).

Procedure. All surveys were completed online using qualtrics survey software. To ensure a broad and evenly distributed range of emotional experiences, each participant was first randomly assigned to write about an experience in which they felt one of the 76 words from the feeling rating list described above (See Appendix B for complete list of words). An average of 61 participants ($SD = 5.25$) were assigned to each of the 76 feeling recall conditions. Participants were asked to think about a specific event in which they felt the target emotion (e.g. agitation). They were given the following prompt: "Remember a specific event when you felt [randomly assigned target emotion]. Remember all you can about the event, the circumstances surrounding it, and how you felt about it. Please think about this experience for the next minute or two". They were then asked to "write about the event in which you felt [randomly assigned target emotion]. Please write in as much detail as possible. You will have up to ten minutes to write". The survey was programmed so that participants had to remain on the writing screen for at least 2 minutes and they were automatically advanced to the next portion of the study after 10 minutes. Participants wrote for an average of 3.35 minutes ($SD = 2.19$). Participants then rated on a scale from 0 (not at all) to 5 (extremely) the extent to which they felt each of the 76 emotional feeling items during the emotional event they described in the first part of the study. For each item there was also the option to select "I don't know what this word means". For all items less than 8% of the sample reported that they did not know the word.

Analyses. Since there was not an a priori hypothesis about which items will load on each factor or the total number of factors present, an exploratory factor analysis of the emotion ratings was used to analyze the data. The data was analyzed in an MLR

exploratory factor analysis with oblique rotation using Mplus statistical software. MLR uses maximum likelihood parameter estimates with standard errors that are adjusted to be robust to non-normality and missing data. A traditional maximum likelihood (ML) analysis assumes data are normally distributed. Many items in the current data were moderately positively skewed; the items had an average skewness = .61 (SD = .33). There was a large range in the normality of the items with the most skewed item, "Jealousy", having a skew =1.63 and the least skewed item, "Anxiety", having a skew = .009. Adjusted standard errors provided by MLR provided corrections for the non-normal distributions that could lead to underestimates of correlations which artificially lower factor loading estimates in traditional ML (Fabrigar et al., 1999). All oblique rotations tend to produce similar results so there is no specific recommended oblique rotation to use (Costello & Osborne, 2005; Fabrigar et al., 1999). The default oblique rotation in Mplus, Geomin, was used which allowed the factors to correlate and items to load on multiple factors. Using an oblique rotation is recommended over using orthogonal rotation because the latter forces a simple structure that can distort factor loadings (Fabrigar & Wegener, 2011). Oblique rotation allows the factors to correlate but does not force factors to correlate; if the factors are truly orthogonal then that will be evident in the factor loadings when using oblique rotation.

It is recommended in exploratory factor analysis to use multiple criteria when determining the appropriate number of factors to extract (Fabrigar et al., 1999). First, I used a scree plot examination (Cattell, 1966), which involves examining a plot of eigenvalues to identify the point at which there is a change in slope in the line drawn through the eigenvalues. Then, I used a parallel analysis (Horn 1965) to more precisely

determine the number of factors. A parallel analysis involves comparing sample eigenvalues to eigenvalues of randomly generated data with the same number of cases and variables as the observed data. Any eigenvalues that are higher than the 95th percentile of eigenvalues from the randomly generated data are considered appropriate factors to extract. A parallel analysis is one of the most recommended analyses for factor determination (Fabrigar & Wegener, 2011). If there is a discrepancy between the scree test and parallel analysis the appropriate factor extraction will be determined based the interpretability of the factor solutions.

Results

The first ten eigenvalues were 32.70, 12.31, 3.68, 2.05, 1.28, 1.12, 0.95, 0.87, and 0.80. A visual scree test suggested that 4 factors should be extracted (See figure 1). A parallel analysis of the data compared 95th percentile eigenvalues from 1000 simulated datasets revealed that the first 6 eigenvalues of the observed data are higher than the corresponding eigenvalues from the 95th percentile of the simulated data. Because the visual scree test and parallel analysis suggest slightly different number of factors to extract, 4-factor, 5-factor, and 6-factor solutions were extracted and rotated and factor loadings of each examined to determine which is the most appropriate solution (Fabrigar & Wegener, 2011). Costello and Osborne (2005) suggest .3 as the minimum relevant loading for each item because .3 equates to approximately 10% overlapping variance with other items on the factor.

6-factor Solution. A 6-factor solution was extracted using MLR with Geomin oblique rotation. This solution had an RMSEA = .039 and a CFI = .942 both indicating a good fit of the model to the data (Brown & Cudek, 1992; Hu & Bentler, 1999). The first

five factors all have high loadings and are easily interpretable. The 6th factor, however, only has two items that load higher than .3 ("Concern" and "Frustration") and no items that load higher than .5. Additionally, the two items load higher on at least on other factor (See Table 1 for complete list of factor loadings). It is recommended that retained factors have at least three items that load greater than .3 (Fabrigar & Wegener, 2011). This suggests that a six factor solution includes more factors than is needed to describe the data.

5-factor Solution. A 5-factor solution was extracted using MLR with Geomin oblique rotation. This solution had an RMSEA = .041 and a CFI = .931 both indicating a good fit of the model to the data (Brown & Cudek, 1992; Hu & Beltler, 1999). The five factors have similar loadings and interpretability to the first five factors of the 6-factor solution.

The first four factors are easily interpreted as corresponding to four categorical emotions: joy, anger, sadness, and fear. The first factor appears to reflect joy or general positive emotion with the highest loading items being "Joy" (.90), "Cheerfulness" (.90), "Delight" (.89), "Glee" (.89), and "Pleasure" (.89). Two items, "Upset" (-.33) and "Unhappiness" (-.30) loaded negatively on the first factor. The second factor appears to reflect anger with the highest loading items being "Fury" (.90), "Rage" (.88), "Outrage" (.88), "Hostility" (.88), and "Hate" (.84). The third factor appears to reflect sadness with the highest loading items being "Sorrow" (.86), "Sadness" (.81), "Grief" (.78), "Depression" (.70), and "Gloom" (.68). The fourth factor appears to reflect fear with the highest loadings being "Fright" (.89), "Fear" (.87), "Terror" (.81), "Panic" (.80), and "Worry" (.63). The fifth factor has high loadings on negative social emotions; the highest

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loading items are "Embarrassment" (.75), "Humiliation" (.66), "Shame" (.63), "Guilt" (.42), and "Regret" (.35). This factor also includes "Envy" (.34) and "Jealousy" (.33). See Table 2 for a complete list of factor loadings.

4-factor Solution. A 4-factor solution was extracted using MLR with Geomin oblique rotation. This solution had an RMSEA = .045 and a CFI = .913 both indicating a good fit of the model to the data (Brown & Cudek, 1992; Hu & Beltler, 1999). The four factors have similar loadings and interpretability to the first four factors of the 6-factor and 5-factor solution. The first factor appears to reflect joy or general positive emotion, the second factor appears to reflect anger, the third factor appears to reflect sadness and the fourth factor appears to reflect fear. Most of the items that loaded highest on the fifth factor in the 5-factor solution all have loadings above .3 on at least one factor in the 4-factor solution. The item "Humiliation" (.34) loaded highest on the second factor (anger), "Shame" (.50), "Guilt" (.59), "Regret" (.66) and "Jealousy" (.38) all loaded highest on the third factor (sadness). The item "Embarrassment" did not have loadings above .3 for any factor. See Table 3 for a complete list of factor loadings.

2-factor Solution. A 2-factor solution was also examined because there is a large portion of literature that suggests an emotional experience is best described using a 2-dimensional model of valance and arousal. A 2-factor solution was extracted using MLR with Geomin oblique rotation. This solution had an RMSEA = .068 and a CFI = .81 both indicating marginal fit of the model to the data and a worse fit than the 3-factor, 4-factor, or 5-factor solution. There is no indication that the 2-factor solution has factors of valance and arousal. Instead, a 2-factor solution from the current data suggests categorical factors of positive and negative emotions. The first factor has high loadings

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on negative emotion items like "Misery" (.82), "Anguish" (.82), "Agony" (.82), "Despair" (.81), and "Depression" (.79). The second factor has high loadings on positive emotion items like "Cheerfulness" (.89), "Joy" (.89), "Glee" (.89), "Delight" (.88) and "Pleasure" (.88). This model is most comparable to the model of emotional experience proposed by Watson and Tellegen (1985). There is no evidence of dimensions of valance and arousal in the current dataset. While a 2-factor solution is easily interpretable both a visual scree test and a parallel analysis suggest a model with more than 2 factors is better. See Table 4 for complete factor loadings.

Dimensions within Categories. There is the possibility that dimensions of valence and arousal (or other dimensions) are present but qualitatively different for each emotion category. To examine whether a dimensional structure was present within each category, I ran a factor analysis for each category by including only the items that had factor loadings greater than .3. Similar to Study 1, each factor analysis was run using maximum likelihood with robust standard errors on Mplus using the emotion ratings from 4649 participants described in Study 1. There was variation in the number of factors determined within each category but there was no evidence of a dimensional structure. The factor analyses that suggested more than one category showed further categorization instead of a dimensional structure. There were very few cross-loadings and no structure that could be easily interpreted as dimensional.

A factor analysis of the ratings of items loading on the fear factor suggested a one-factor structure. A factor analysis of the ratings of items loading on the sadness factor suggested a two factor structure. The first factor loaded highest on the items "sorrow", "despair", and "misery" and this factor loaded highly (>.6) on all items except

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for "compassion" and "love". The second factor loaded higher than .3 only on the items "compassion" and "love". When these two items were removed from the analysis a one-factor structure was the best fit for sadness. A factor analysis of the ratings of items loading on the Shame/Jealousy factor suggested a two-factor structure. The first factor loaded highly on the shame related words ("shame", "embarrassment", "humiliation", "guilt", and "regret") and the second factor loaded highly only on "jealousy" and "envy". A factor analysis of the ratings of items loading on the Anger factor suggested a two-factor structure. The first factor loaded highest on "hate", "hostility" , and "rage" and loaded higher than .3 on all items except "frustration", "disappointment", "hurt", and "agitation". The second factor loaded higher than .3 on "frustration" "disappointment, "hurt, "agitation", "anger" and negatively on "astonishment". This suggests a general factor of anger and a smaller factor that could be interpreted as more general agitation. A factor analysis of the ratings of items loading on the Joy factor suggested a three-factor structure. The first factor corresponded to a general category of happiness loaded highest on "happiness", "enjoyment", and "delight". This factor loaded highly on all items except "astonishment", "surprise", "love", "compassion", and "desire". The second factor corresponded to a category of awe related emotions and loaded highly on items "amazement", "awe", "surprise", and "astonishment". The third factor corresponded to a category of love related emotions loaded highly on items "hope", "compassion", "passion", and "love". This suggests a general happiness factor and smaller factors for categories of awe and love within the joy factor.

Discussion

Study 1 suggests that subjective emotional experience is best described by a 5-factor categorical structure. There were very few cross-loadings across factors which is indicative of a categorical instead of dimensional structure. Each factor is easily interpretable as an emotion category (Joy, Anger, Sadness, Fear, and Shame/Jealousy). The first four categories correspond nicely to 4 of the 5 basic emotion categories described by Ekman (1991): Joy, Fear, Anger, and Sadness. The fifth category includes social emotions (i.e. emotions that are experienced in response to changes in social relationships); these include feelings of shame, regret, and jealousy. Given the importance of social interactions it is not surprising that particularly social emotions are categorized as being unique from other types of emotions (Tracy, 2014; Nesse, 2014). The current study suggests that a categorical emotions perspective is better when examining subjective emotional experience.

Study 2

Study 1 provides evidence that two factors is not sufficient to accurately describe the underlying structure of emotional experience and a 5-factor categorical view of emotion better describes the relationship between subjective emotional experiences. Some emotion theorists argue that relying solely on self-report does not provide an accurate representation of the relationship between different emotional experiences because individuals vary in their ability to recognize and describe their own emotional experiences (Barrett, 2006). These theorists also argue that self-reports often rely on culturally derived emotional concepts instead of reporting their actual feelings. For this reason, Study 2 uses Latent Semantic Indexing (LSI) to examine the underlying structure

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of emotional concepts. LSI uses a large collection of written texts to create a semantic space. The relationships between emotion items in this semantic space are derived from the entire conceptual representation of each emotion item. If the factor structure for Study 2 is similar to Study 1, it would suggest that participants are relying on emotional concepts instead of accurately reporting their subjective feelings.

LSI is "a computational model of human knowledge representation that approximates semantic relatedness judgments" (Wolfe & Goldman, 2003, p. 22). LSI assumes that relatedness of words can be determined by examining their relationship in written texts. This method creates co-occurrence matrices of words in a collection of written works and then uses a computation procedure similar to factor analysis called *singular value decomposition* (Landauer & Dumais, 1997; Landauer, Foltz, & Laham, 1998) to determine relatedness of terms and documents. Deerwester and colleagues describe that, "Singular-value decomposition allows the arrangement of the space to reflect the major associative patterns in the data, and ignore the smaller, less important influences" (Deerwester, Dumais, Furnas, & Landauer, 1990, p. 391). LSI can provide comparisons of terms to other terms, to documents, or comparisons of documents to other documents. This method is typically used as computational method to as an automatic indexing method (Wolfe & Goldman, 2003).

Methods

Term-term LSI Matrix. For Study 2, the term-term LSI matrix was created using the 76 easily recognized emotion words used Study 1 (See Appendix D). This matrix was created using the term-term matrix calculator on a website developed by Darrell Laham and the SALSA lab at the University of Colorado

(http://lsa.colorado.edu/). The relatedness of terms in this matrix was determined using a collection of approximately 37,000 English-language written works derived from textbooks (Dennis, 2007). Study 1 was limited in the amount of feeling items that could be examined by the amount of subjects and additional time that would be required to examine more than 76 items. Unlike in Study 1, the amount of items is not limited in LSI. So in addition to analyzing the 76 word LSI matrix, a factor analysis was conducted using a more comprehensive word list containing 125 easily understood words (see Appendix D for word list). This 125 word list was obtained using the pilot data from Study 1. All words that were understood by at least 85% (13 out of 15) of the raters were included in the 125 word list. The LSI term-term matrices will be treated as a correlation matrix for the purposes of this study.

      Analysis. Both matrices were analyzed with a maximum likelihood (ML) factor analysis with Geomin oblique rotation using Mplus statistical software. Using an LSI matrix in a factor analysis is a novel approach. The most appropriate sample size using this method is simply the number of items in the matrix. Thus the n for the 76 word LSI matrix and the 125 word LSI matrix will be 76 and 125 respectively.

Results

      LSI (76 words). The first ten eigenvalues were 23.10, 4.36, 3.18, 2.61, 2,51, 2.06, 1.63. A visual scree test suggests that one factor should be extracted (See figure 3). A parallel analysis of the data with an n of 76 compared 95th percentile eigenvalues from 1000 simulated datasets revealed that 2 eigenvalues of the observed data are higher than the corresponding eigenvalues from the 95th percentile of the simulated data. Both a 1-

factor and 2-factor solution will be examined to determine the most interpretable solution.

1-factor Solution. A 1-factor solution was extracted using ML with Geomin oblique rotation. This solution had an RMSEA < .0001 and a CFI > 0.999 both indicating excellent fit of the model to the data. In a 1-factor solution, the highest loading items were "Despair", Horror", "Fear", "Joy", "Greif", and "Rage". The lowest loading items were "Jubilation", "Euphoria", "Contentment", "Depression", "Gladness", and "Glee". The highest loading item (Despair) a loading of .771 and the lowest loading item (Jubilation) had a loading of .2. See Table 5 for complete list of factor loadings.

2-factor Solution. A 2-factor solution was extracted using ML with Geomin oblique rotation. This solution had an RMSEA < .0001 and a CFI > 0.999 both indicating excellent fit of the model to the data. The highest loading items on the first factor were "Horror", "Terror", "Astonishment", "Gloom", and "Delight". The highest loading items on the second factor were "Anxiety", "Frustration", "Guilt", "Discomfort", "Anger", and "Happiness". See Table 6 for complete list of factor loadings.

While both 1-factor and 2-factor structures have excellent fit to the data, the interpretation of a 2-factor model is unclear. For this reason, a 1-factor solution is suggested as the best description of the data.

LSI (125 words). The first ten eigenvalues were 30.59, 5.80, 3.95, 3.52, 3.27, 2.94, 2.27, 2.17, and 2.09. A scree test suggested a 1-factor, 2-factor, or 3-factor solution (see Figure 3). A parallel analysis of the data compared to 1000 simulated datasets with an n of 125 revealed that the first 3 observed eigenvalues of the observed data are higher than the corresponding eigenvalues from the 95th percentile of the simulated data.

1-factor Solution. A 1-factor solution was extracted using ML with Geomin oblique rotation. This solution had an RMSEA = .013 and a CFI = .963 both indicating excellent fit of the model to the data. The highest factor loadings were similar to the 76 item LSI matrix; the highest loading items were "Joy", Horror", "Passion", "Fear", "Greif", and "Melancholy". The lowest loading items were "Coziness", "Peacefulness", "Condolence", "Detestation", "Entrancing", and "Warm Fuzzies". The highest loading item (Joy) a loading of .734 and the lowest loading item (Jubilation) had a loading of .005. All items present in both analyses (76 item matrix and 125 item matrix) had similar factor loadings (the differences between factor loading were all less than .03 with a mean difference of .009). See Table 7 for complete list of loadings.

2-factor Solution. A 2-factor solution was extracted using ML with Geomin oblique rotation. This solution had an RMSEA < .001 and a CFI > .999 both indicating an excellent fit of the model to the data. In the 2-factor model, the first factor seems to be best interpreted as dramatic words like "Terror" "Longing" and "Gloom". The second factor corresponds to correspond to more straightforward scientific words like "Discomfort", "Unhappiness", and "Pleasure". The highest loading items for the first factor were "Horror", "Delight", "Longing", "Pity", and "Passion". The highest loading items for the second factor were "Anxiety", "Frustration", "Guilt", "Discomfort", and "Anger". Twenty-five items did not have loadings above .3 on either factor. See Table 8 for complete list of factor loadings.

3-factor Solution. A 3-factor solution was extracted using ML with Geomin oblique rotation. This solution had an RMSEA < .001 and a CFI > .999 both indicating an excellent fit of the model to the data. In the 3-factor model, the first two factors are

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similar to the 2-factor structure. The third factor is seems to correspond words that are associated with social and romantic relationships with an emphasis on positively valenced words. It includes items like "Love", "Delight" and "Passion" but also words like "Jealousy". The highest loading items for the first factor were "Horror", "Terror", "Rage", "Fury", and "Astonishment". The highest loading items on the second factor are "Anxiety", "Frustration", "Guilt", "Discomfort", and "Anger". This second factor also included positive items such as "Caring", "Affection", and "Love". The third factor loaded highest on the items "Pleasure", "Love", "Delight", "Happiness" and "Affection". Thirty-four items did not have loadings above .3 for any factor. See Table 9 for complete factor loadings.

Fit indices suggest that a 2-factor or 3-factor solution describe the data equally well. Because all of the factors in the 3-factor model are interpretable and all have at least 3 high loading items it can be assumed that the 3-factor model best describes the data. Interestingly, the 125 LSI matrix produced a structure most interpretable as dimensional. A large number of cross-loadings in the factor structure suggest a dimensional structure. The absence of high negative factor loadings suggests, however, that those dimensions are unipolar. This is analogous to Watson & Tellegen (1985) positive and negative affect dimensions. The interpretation of the 125 LSI matrix factor structure seems indicative of writing style instead of subjective emotional experience.

Discussion

It is clear that the underlying structure of the LSI matrix is completely different from the structure derived from self-report experiential data in Study 1. This provides some support that participants in Study 1 were relying on emotional experience instead of

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simply relying on emotional concepts. There are limitations, however, to the inferences that can be made by Study 2 because of the nature of the types of texts used to create the semantic space. While there was a large amount of texts sampled (~37,000), all of these text samples were taken from textbooks. One could argue that the semantic space derived from textbooks is limited and that a large collection of texts from a broader range of literature may produce a very different factor structure.

General Discussion

My hypothesis that the structure of subjective emotional experience is a combination of multiple bipolar dimensions was not supported. Study 1 suggests that different subjective emotional experiences are organized into emotional categories of Joy, Fear, Sadness, Anger, and Shame/Jealousy. Even when examining the structure within each emotion category there was no evidence of dimensions like valence, arousal, or approach motivation. The drastically different structure found in Study 2 (using an LSI matrix) compared to Study 1 might provide evidence that participants in Study 1 were not relying solely on emotional concepts when rating their emotional experiences in Study 1. However, the implications that can be made from the comparison of the structures in Study 1 and Study 2 are limited because on the type of texts used to create the semantic space in Study 2.

The current research provides some of the first empirical evidence that subjective emotional experience should be viewed as discrete categories. With the exception that there was no evidence of a disgust category in Study 1, the categorical structure is strikingly similar to the basic emotion categories suggested by Ekman (1991) and other discrete emotion theorists (Johnson-Laird & Oatley, 1989; Levenson, 2003). These

results have implications for the design and interpretation of empirical studies involving emotional experience. Empirical research that focuses on dimensions like arousal and valence could be missing important differences in the experience of emotions that are similar in arousal and/or valence, like anger and fear. The elicitation techniques used in these studies would not actively differentiate between these emotional states. For example, anger, fear and some experiences of sadness (like extreme grief) would all be described in an arousal and valence model as high arousal and negative valence. The current study suggests, however, that the *experience* of each of these emotions is qualitatively different and should not be equated. More effort should be taken in emotion and affective research to identify which discrete emotions are being elicited by general arousal and valence elicitations.

It is important to recognize that the current study was designed to determine the underlying structure of subjective emotional feelings. There are many aspects that comprise an 'emotion' including: feelings, physiological and neurological activations, cognitive effects, and behaviors/action tendencies (Izard, 2010). Additionally, there are many different types of feelings that are not emotional in nature (Ekman, 1992; Russell, 2003; Russell & Barrett, 1999). Study 1 strongly suggested that the categorical perspective is more appropriate than a dimensional structure when examining subjective emotional feelings. We cannot, however, make any conclusions about the validity of a categorical or dimensional perspective in regards to any other aspect of an emotion or in regards to any other type of affect based on the results of studies described in this paper.

Discrete and dimensional theories of emotion are too often described as all-encompassing perspectives that apply to all aspects of an emotional experience. However

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the evidence for each perspective varies across different aspects of emotion. This suggests that these perspectives should be seen as complimentary instead of contradictory (Izard, 2007; Nesse, 2014). Nesse (2014) argued that there is no simple theory of emotion that will explain all of these aspects because of the inherently complex nature of emotion. Emotion researchers need to spend more time examining each aspect of emotional responding *separately*. The evidence for discrete categories in one aspect of emotion should not imply that all aspects of emotions should be described in terms of discrete categories. Emotion research should focus on how each of these perspectives applies to different aspects of an emotion, like emotional experience, instead of attempting to prove that all aspects of emotions are either dimensional or discrete.

The results of Study 1 were drastically different compared to past subjective affect research that has repeatedly found a dimensional structure when focusing on the broader notion of affect (Bradley & Lang, 2000; Larsen & Deiner, 1992; Russell, 1980; Watson & Tellegen, 1985). What caused the structure found in Study 1 to be so different from the structure found in research examining affect? There are two possible explanations; either subjective emotional experience should be viewed as unique from other types of subjective affect or the methodological issues in previous studies resulted in interpreting a structure for affect that is not indicative of the true nature of affect. I will examine each possibility and the conclusions that can be drawn about each and the implications for future emotion research.

Subjective Emotional Experiences are Unique

The current studies were intentionally limited to examine only *emotional* feelings (using the dictionary definition of emotion) and only studied in the context of explicitly

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emotional events. This design was chosen based on the view that emotional experiences are unique from other experiences (Ekman, 1992). The study of specifically emotional feelings has been surprisingly underrepresented in empirical emotion literature. Emotional feelings are often studied in terms of broad affect (Bradley & Lang, 2000; Yik et al., 1999) or studied along with other aspects of emotion like physiological responses or behavior (Christie & Friedman, 2004; Fontaine et al., 2007). The fact that the results of Study 1 were so divergent from a dimensional affect model suggests that emotional experience should, at the least, be viewed as unique from other types of affect (given the structure of affect described in the literature).

Emotions have evolved in response to particular evolutionarily relevant challenges (Cosmides & Tooby, 2000; Izard, 2007; Nesse, 2014). Emotional feelings motivate adaptive responses to threats and opportunities in the environment. They are unique because they provide flexibility in these adaptive responses by incorporating a conscious element. By including a conscious emotional experience individuals can incorporate past experience and the context of the current emotion-eliciting situation to determine the best actions to take (Cosmides & Tooby, 2000; Nesse, 1991). From this perspective, the categorical structure found in Study 1 is not surprising. Each category corresponds to the types of situations in which those feelings occur.

The first factor in Study 1 included all positive emotions, like Joy and Happiness. Positive emotions are theoretically associated with opportunities in the environment and provide information about progress toward goal attainment (Cosmides & Tooby, 2000; Schwarz & Clore, 2000; Nesse, 2013). The second factor included items most associated with anger, like Rage and Hate. Anger is associated with a blocked goal that needs to be

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overcome (Carver & Harmon-Jones, 2009). The third factor included items most associated with sadness, like Sorrow and Melancholy. Sadness is associated with a personal loss and motivates conservation of resources and withdrawal from the environment, which is assumed to aid in preventing additional losses (Nesse, 2013). The fourth factor includes items associated with fear, like Terror and Dread. Fear is associated with an immanent threat in the environment (Cosmides & Tooby, 2000).

Finally, the fifth factor in Study 1 is associated with emotions (primarily negative emotions) that are particularly relevant to social relationships, like Shame and Jealousy. We are a highly social species; interactions with others are very important in terms of survival and fitness. It makes sense that especially social emotional experiences are categorized separately from other emotional experiences. Items like Jealousy and Envy are associated with perceiving characteristics in a rival that threaten one's status or relationship with another (Dijkstra & Buunk, 1998; Keltner & Gross, 1999) while items like Shame and Regret are associated with interpersonal transgression towards another individual (Baumeister, Stillwell, & Heatherton, 1994). Both of these categories of emotions indicate a relational threat. Unfortunately, there were no items corresponding to positive relational emotions, like Pride, in the word lists used in Study 1 and Study 2. Future studies should include pride-related emotion words to determine if this fifth factor is limited to negative social emotions or would include both positive and negative social words.

Is Affect Dimensional?

The results from Study 1 differ drastically from structures found in past affect studies. It is possible that emotion experience has a similar structure to affect; that

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methodological issues in past research misrepresent the true nature of the structure of affect. Unfortunately, it is impossible to assert from Study 1 or Study 2 that the categorical structure of emotional experience would be present when examining all affect. The studies described in this paper were designed specifically to measure emotional experiences during emotional situations so we cannot make conclusions about the structure of all affect. However, there are still multiple methodological issues in past subjective affect studies. Affect research has relied on studies that measure affect during a limited range of experiences, limit items to those that best correspond with the hypothesized dimensions, rely on statistical analyses that don't include unique variance, and that dismiss factors that do not fit with the hypothesized model. All of these can limit or distort the factor structure produced by the data (Fabrigar & Wegener, 2011). These limitations might explain the different, sometimes contradictory, findings between different studies that examine the nature of affect (Bradley & Lang, 2000; Larsen & Deiner, 1992; Russell, 1980; Watson & Tellegen, 1985). The structure found in past affect studies might not be indicative of the true underlying nature of affect. Future studies should re-examine the structure of subjective affect in a more exploratory manner while addressing the limitations present in past affect studies.

The methods in Study 1 could be used to study the structure of affect to determine if it is best described as dimensions or categories. This would involve determining a reasonable definition of affect (i.e. any conscious feeling) and selecting all nouns in the dictionary that fit this definition. This is a much larger endeavor than the current study considering the larger number of items that correspond to "affect" and the larger range of experiences (i.e. both emotional and non-emotional experiences). Although it would be

difficult, the results of such a study would be invaluable in understanding the nature of affect. By using the same method as Study 1 this would also allow for a more precise comparison of emotional experiences to affect as a whole.

Despite the limited conclusions that can be made about structure of affect, the current study compellingly demonstrates that emotional experience is not structured in the way affect has been described thus far (i.e. a 2-dimensional model of valance and arousal). The stark differences in the structure of emotional experience and affect call into question the reliance on a 2-dimensional model for examining experiences and situations that are considered distinctly 'emotional'. One reason a two dimensional structure has persevered as the modus operandi in emotion research is because of the simplicity of this model and the access to established induction methods, like the IAPS (Lang, Bradley, & Cuthbert, 1999). Two by two research designs of valence and arousal provide straightforward, easily interpretable results. However, the results from these simple designs are only valid if a two-dimensional structure is a valid structure for the phenomenon being measured.

The results of Study 1 emphasize the importance of choosing an appropriate research design for the specific aspects of emotion one is interested in studying (like emotional experience). This study also emphasizes that studying affect, as it has been studied thus far, cannot be assumed to provide the same insights as studying distinctly emotional experiences. The difference in structure in emotional experience compared to affect also emphasizes the importance of examining the underlying structure of different emotional aspects separately (within a broad range of emotional contexts). Researchers

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cannot assume an affective 2-dimensional model that can be applied equally to all aspects of emotion.

Emotional Concepts and Emotional Experience

Some argue that studies that use self-reports of emotional experience reveal more about learned emotional concepts than the nature of emotional experience (Barrett, 2006). I would partially agree with those theorists in that we should ensure that participants are describing their *own* emotional experiences. Participants should not be reporting based on a societal norm that does not reflect their true feelings. However, I question whether it is appropriate or even possible to separate emotional experience completely from our conceptual knowledge of emotions.

Emotional experiences are colored by our past experiences and conceptual knowledge (Ellis, 1991; Izard, 1992). Emotional feelings evolved to motivate adaptive responses to specific "adaptive challenges" in the environment (Nesse, 2013, p.321). These feelings evolved to activate in response to similar types of situations. Therefore, it is adaptive to learn and incorporate information from past situations when interpreting our current emotional experience (Cosmides & Tooby, 2000; Izard, 1992). Our emotional concepts can be thought of as the collective knowledge of our own emotional experiences and the most successful past responses. This allows us to incorporate information about many different aspects of the environment in deciding the best response. The conceptual knowledge of each emotion category can be thought of as a toolbox of appropriate responses based on past experience. Our feelings let us know which toolbox to search; our past experience lets us know which tool will be best based on the current situation.

Trying to study emotional experiences completely separate from emotional concepts is not valid or necessary. The two are adaptively intertwined.

Experience Recall vs. Current Experience

It is not necessary to separate emotional experience completely from conceptual knowledge of emotions. However, we should ensure that participants are not reporting in a way that is inconsistent with their true experience of emotional feelings. A major limitation of Study 1 is the reliance on recall of a past experience instead of measuring current emotional experience. There is evidence that when thinking about a past emotional experience individuals are more likely to rely on emotional concepts than when reporting about a current emotional experience (Robinson & Clore, 2002). Study 1 relied on emotion recall because the range and intensity of emotion experienced in a lab setting is limited (Fontaine et al., 2007). Using emotion recall with 76 recall prompts allowed for comparison of feelings during an extensive range of emotion experiences. Future studies should attempt to replicate the findings from Study 1 using relived emotion tasks, or other emotion elicitation techniques, and ratings of *current* emotional experience.

The purpose of comparing the factor structure in Study 1 to the structure in Study 2 was to examine the extent to which participants were relying on emotional concepts. The reasoning being that a semantic space derived from a large collection of English language texts would include information about emotional concepts. A comparison of emotion items within that space would be indicative of the underlying structure of emotional concepts. If the structure derived from emotional experience ratings (Study 1) differs from the structure derived from a semantic space of literature (Study 2) then we

can assume that the ratings from Study 1 were not based solely on pre-existing emotional concepts. The strength of the implications that can be made from this comparison, however, are very limited. This is because the semantic space from Study 2 was created from a collection of textbook excerpts that were chosen based on grade level readability and probably does not include an account of a broad range of emotional experiences (Laudauer et al., 1998). For a valid comparison, an LSI matrix should be derived from a semantic space that includes a broader range of texts from difference types of literature.

In addition to limitations of the semantic space, using an LSI matrix in this manner is completely novel compared to the usual purpose of this type of matrix. The LSI matrix was run using an exploratory factor analysis because that was the type of analysis used in Study 1. It was considered best to use the same analysis to directly compare the structures from Study 1 and Study 2. However, because a latent semantic analysis itself is analogous to a factor analysis (Laudauer et al., 1998), it is unclear whether it is statistically valid to run an exploratory factor analysis on a LSI matrix. The LSI matrix was treated as a correlation matrix but might be more valid as a covariance matrix because, with the appropriate semantic space, the LSI matrix uses the semantic space to remove "unimportant influences", i.e. error variance (Deerwester, Dumais, Furnas, & Landauer, 1990, p.391).

There are many limitations in Study 2 because of the way LSI was used. If utilized properly, latent semantic analysis may still provide useful insight into the underlying structure of experience in future studies. For example, the emotional recall essays from Study 1 could be used to create an emotional experience semantic space. The relationship of the 76 emotion items could be measured within this space to

determine if there is a structure similar to emotional experience (i.e. the structure found in Study 1).

Cultural and Individual Differences in Emotional Experience

A major strength of Study 1 is the use of Amazon Mturk and other online resources. This enabled me to gather a broad range of participants across the US with a wide range of ages and backgrounds. This led to a more heterogeneous sample compared to a college undergraduate sample recruited from one university (a common sample in emotion research). When using factor analysis, relying on a sample that is more homogenous than your population (like an undergraduate student sample) can lead to under-factoring (Fabrigar & Wegener, 2011).

Is the structure of emotional experience found in Study 1 universal? If emotional feelings are evolved we should find similar structures of emotional experience across cultures (Cosmides & Tooby, 2000). Because I only included individuals from the United States in Study 1, it is not possible to make inferences about the universality of the structure of emotional experience based on this study. It is known that aspects of our emotional concepts are culturally derived (Russell, 1991). For example, there are words in other languages like *schadenfreude* (i.e. the pleasure derived from another's misfortune) that do not have a direct English translation. Additionally, there is argument about the extent to which emotional experiences are universal or whether cultures differ in their subjective emotional experiences (Ekman & Friesen, 1971; Russell, 1991; Wallbott & Scherer, 1986). There could be additional factors or different structures of emotional experience in other cultures.

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Gathering a sample from multiple countries was not feasible in Study 1 given the complexity and exploratory nature of the analysis. A very large sample size (approximately 5,000 participants) was necessary to ensure that the data were not under-factored. To collect data in multiple cultures, it would have been necessary to collect an exponentially larger sample size. This was not feasible given the available resources and time period of the current studies. Relying on a US sample, however, limits the inferences that can be made about the universality or cultural specificity of the categorical structure emotional experience.

By replicating Study 1 in different cultures, using different languages we can gain better insight into the universality or cultural specificity of the categorical structure of emotional experience. These replications require collecting new comprehensive word lists in each language. This would involve having multiple trained native speakers use the same systematic methods as Study 1 to create an emotional feeling word list for each culture. Like the emotion word list in Study 1, each list should contain a comprehensive selection of easily understood emotion words.

The current study determined an underlying structure of emotional experience that can be applied to a broad range of individuals within the US. Future studies should determine if there are differences between groups within this sample based on geographical region, gender, age, political affiliation, or other individual differences. There is evidence of differences in emotional experience based on gender (Fujita, Deiner, Sandvik, 1991), and differences in emotional experience across the lifespan (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Larsen, Moneta, Richards, & Wilson, 2003). These are often framed in terms of dimensions of valence and arousal. Investigating

emotional experiences of different groups within a categorical framework would provide insight into the variability of emotional experience between individuals.

Research on individual differences in emotion experience of those with mood disorders and other pathological conditions would provide useful insight. By definition, emotional experience differs for those with mood disorders like depression or anxiety (Clark & Watson, 1991; Watson, Clark, & Carey, 1988). However, mood disorders are also typically studied in terms of valence or arousal or limited to certain emotions that like worry or sadness (Rottenberg, Gross, & Gotlib, 2005; Watson, Clark, & Carey, 1988). By comparing a factor structure from sample of individuals with a mood disorder to the general structure of emotional experience we can determine if and how emotional experiences differ for individuals with mood disorders compared to a healthy sample.

The Relationship of Emotional Experience to Other Aspects of Emotions

It is important to have empirical research that examines emotional aspects separately. It is equally important to examine the relationship between different aspects of emotional experience. Emotions activate and coordinate multiple systems in order to provide a swift cohesive adaptive response (Cosmides & Tooby, 2000). The different aspects of emotion evolved to work together. An understanding of the relationship between each aspect is integral to the understanding of emotions.

The method used in Study 1 could be adapted to examine the relationship between different aspects of emotional experience. By using an identical recall method but having participants report about physiological experiences or behaviors (or action tendencies) we could determine the relationship between emotional experience and different aspects of emotion. The basic method used to create the list of emotional feeling words in Study 1

could be applied to other emotional phenomena. For example, researchers could identify every word in a dictionary or medical reference book that fits the definition of a physical sensation (a mental condition or physical feeling resulting from stimulation of a sense organ or from internal bodily change, such as cold or pain - dictionary.com/sensation).

By using the same recall words as Study 1 but replacing the ratings with ratings of physiological sensations we could gain more detailed insight into the relationship into the relationship between emotional feelings and physiological sensations. Conversely, participants could describe an event in which they experience a specific physiological experience and then rate their experience on the 76 emotional feelings. The same methods could be used to examine behaviors or thoughts associated with an emotion as well.

Most studies examining the relationship between different aspects of emotional responding rely on a limited range of emotional experiences (Fontaine at al., 2007). In addition, many of these studies focus on dimensions like valence and arousal (Mauss et al., 2005). Both of these types studies show contradicting results about the nature of relationship between different elements of emotional responding. This may be due to the limited range of emotional experiences studied. Exploratory studies examining the relationship between different aspects of emotion (using methods similar to those in Study 1) can provide valuable insights into the nature of these relationships.

Conclusion

Emotional experience is a combination of emotion categories. At least five categories (Joy, Fear, Sadness, Anger, and Shame/Jealousy) are needed to describe the relationship between different emotional experiences. There is a stark difference between

the structures found in these studies compared to previous studies. This suggests that emotional experience should be treated as unique from affect (as it is currently conceptualized). It also emphasizes the importance of proper exploratory methods and statistical techniques when examining the nature of psychological phenomena like emotional experience. The methods of Study 1 should be adapted to examine emotional experience in different cultures, to examine the nature of subjective affect, to examine other aspects of emotion separately, and to examine the relationship between different aspects of emotion.

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Table 1
Study 1 Items and factor loadings for the 6-factor solution

Items	Factor 1 (Joy)	Factor 2 (Anger)	Factor 3 (Sadness)	Factor 4 (Fear)	Factor 5 (Shame)	Factor 6 (Concern)
Glee	**0.87**	0.009	-0.022	0.005	0.009	-0.048
Enthusiasm	**0.869**	-0.014	-0.034	-0.022	0.013	-0.022
Joy	**0.867**	-0.047	-0.027	-0.018	-0.02	-0.082
Cheerfulness	**0.864**	-0.041	-0.018	-0.019	-0.008	-0.09
Pleasure	**0.863**	-0.028	-0.014	-0.04	0.003	-0.076
Delight	**0.857**	-0.039	-0.03	-0.022	-0.011	-0.092
Gladness	**0.856**	-0.049	-0.01	-0.019	-0.022	-0.07
Excitement	**0.856**	-0.017	-0.094	0.055	-0.022	-0.009
Enjoy	**0.85**	-0.038	-0.031	-0.03	-0.011	-0.105
Bliss	**0.85**	0.003	0.01	-0.016	0.013	-0.062
Happiness	**0.847**	-0.077	-0.019	-0.025	-0.026	-0.092
Jubilation	**0.847**	0.01	-0.016	0.017	0.013	-0.026
Euphoria	**0.84**	0.02	-0.007	0.023	0.025	-0.018
Satisfaction	**0.836**	-0.018	-0.048	-0.022	-0.026	-0.064
Gratitude	**0.831**	-0.089	0.089	0.005	-0.026	0.026
Ecstasy	**0.823**	0.036	0.002	0.022	0.053	-0.018
Exhilaration	**0.821**	0.052	-0.088	0.077	0.025	0.009
Amaze	**0.798**	0.206	-0.091	-0.018	-0.001	0.144
Hope	**0.791**	-0.133	0.115	0.078	-0.061	0.132
Passion	**0.772**	0.108	0.113	-0.043	-0.009	0.107
Awe	**0.762**	0.112	0.026	0.034	0.024	0.096
Amusement	**0.756**	0.063	-0.06	-0.028	0.093	-0.044
Contentment	**0.749**	0.031	0.018	-0.031	0.023	-0.082
Love	**0.721**	-0.204	**0.362**	-0.009	-0.126	0.028
Desire	**0.689**	0.003	0.168	-0.041	0.127	0.114
Compassion	**0.651**	-0.142	**0.394**	-0.016	-0.123	0.116
Astonishment	**0.612**	**0.363**	-0.071	0.05	0.013	0.273
Surprise	**0.54**	0.205	-0.071	0.135	0.027	0.238
Fury	0.022	**0.899**	0.006	0.074	-0.096	0.012
Outrage	-0.014	**0.885**	0.005	0.036	-0.092	0.084
Rage	0	**0.881**	0	0.087	-0.073	-0.013
Hostility	0.011	**0.878**	-0.034	0.058	-0.021	-0.029
Hate	-0.008	**0.834**	0.013	0.074	0.01	-0.136
Anger	-0.089	**0.806**	0.057	0.004	-0.053	0.133
Spite	0.066	**0.743**	0.023	-0.002	0.114	-0.069
Disgust	-0.064	**0.735**	-0.021	0.011	0.125	0.042
Loathing	0.024	**0.723**	0.091	0.011	0.085	-0.07
Disdain	-0.004	**0.683**	0.106	0.001	0.085	-0.009
Resentment	-0.034	**0.679**	0.134	-0.1	0.153	0.054
Contempt	0.177	**0.663**	0.073	-0.058	0.052	-0.024
Agitation	-0.061	**0.543**	0.055	0.116	0.038	0.246
Frustration	-0.147	**0.453**	0.193	0.013	0.027	**0.321**
Disappointment	-0.133	**0.319**	**0.368**	-0.138	0.187	0.244

Note. Factor loadings greater than .3 are bolded

Table 1 (cont.)
Study 1 Items and factor loadings for the 6-factor solution

Items	Factor 1 (Joy)	Factor 2 (Anger)	Factor 3 (Sadness)	Factor 4 (Fear)	Factor 5 (Shame)	Factor 6
Upset	-0.232	**0.311**	**0.345**	0.057	-0.024	0.266
Hurt	-0.04	**0.303**	**0.546**	-0.026	0.04	0.065
Sorrow	-0.008	-0.013	**0.838**	0.059	0.004	-0.008
Grief	-0.005	0.027	**0.778**	0.147	-0.05	-0.081
Sadness	-0.081	0.029	**0.774**	-0.01	0.001	0.108
Depression	-0.009	0.078	**0.694**	0.11	0.075	-0.039
Melancholy	0.148	0.011	**0.667**	-0.045	0.118	-0.02
Gloom	-0.039	0.049	**0.665**	0.177	0.02	0.01
Woe	0.051	0.04	**0.638**	0.162	0.039	0.01
Despair	-0.039	0.079	**0.611**	0.244	0.025	-0.001
Misery	-0.064	0.162	**0.555**	0.23	0.051	-0.05
Anguish	0.019	0.177	**0.532**	0.249	-0.001	0.032
Agony	0.021	0.149	**0.522**	**0.323**	0.004	-0.081
Regret	-0.048	-0.052	**0.489**	0.08	**0.358**	0.023
Unhappiness	-0.226	0.25	**0.452**	0.03	0.008	0.184
Guilt	0.041	-0.128	**0.401**	0.165	**0.424**	-0.001
Dismay	-0.058	0.245	**0.374**	0.136	0.052	0.177
Fright	0.014	-0.019	-0.024	**0.894**	0.016	-0.011
Terror	-0.001	0.073	-0.015	**0.864**	-0.001	-0.127
Fear	0.016	-0.04	0.026	**0.847**	-0.001	0.079
Panic	-0.001	0.028	0.017	**0.76**	0.065	0.109
Horror	0.006	0.21	0.078	**0.656**	0.005	-0.115
Worry	-0.023	-0.08	0.198	**0.56**	0.03	0.295
Anxiety	-0.024	0.027	0.107	**0.513**	0.063	0.286
Dread	-0.063	0.071	0.258	**0.496**	0.062	0.071
Concern	0.036	-0.031	0.225	**0.426**	-0.047	**0.356**
Distress	-0.141	0.162	0.273	**0.351**	-0.011	0.213
Discomfort	-0.176	0.119	0.158	**0.325**	0.156	0.205
Embarrassment	-0.024	0.042	-0.049	0.128	**0.765**	0.095
Humiliation	-0.005	0.159	0.023	0.109	**0.668**	0.053
Shame	-0.022	-0.022	0.228	0.131	**0.638**	-0.009
Envy	0.23	0.216	0.2	-0.026	**0.341**	-0.058
Jealousy	0.187	0.271	0.229	-0.067	**0.329**	-0.066

Note. Factor loadings greater than .3 are bolded

Table 2
Study 1 Items and factor loadings for the 5-factor solution

Items	Factor 1 (Joy)	Factor 2 (Anger)	Factor 3 (Sadness)	Factor 4 (Fear)	Factor 5 (Shame)
Joy	**0.9**	-0.041	-0.036	-0.031	-0.016
Cheerfulness	**0.899**	-0.035	-0.027	-0.035	-0.004
Delight	**0.893**	-0.033	-0.041	-0.037	-0.007
Pleasure	**0.892**	-0.022	-0.023	-0.051	0.007
Glee	**0.892**	0.013	-0.026	0.002	0.011
Enjoyment	**0.89**	-0.031	-0.044	-0.048	-0.006
Gladness	**0.885**	-0.043	-0.016	-0.03	-0.018
Happiness	**0.883**	-0.07	-0.029	-0.042	-0.021
Enthusiasm	**0.881**	-0.011	-0.034	-0.016	0.014
Bliss	**0.875**	0.008	0.004	-0.024	0.016
Excitement	**0.867**	-0.014	-0.091	0.065	-0.021
Satisfaction	**0.862**	-0.013	-0.054	-0.03	-0.022
Jubilation	**0.861**	0.013	-0.016	0.021	0.015
Euphoria	**0.852**	0.023	-0.005	0.029	0.026
Ecstasy	**0.834**	0.039	0.003	0.028	0.053
Gratitude	**0.827**	-0.088	0.102	0.015	-0.026
Exhilaration	**0.825**	0.054	-0.083	0.093	0.025
Contentment	**0.78**	0.037	0.009	-0.046	0.028
Amusement	**0.774**	0.066	-0.065	-0.024	0.094
Hopeful	**0.752**	-0.137	0.146	0.113	-0.065
Amazement	**0.747**	0.198	-0.062	0.03	-0.008
Passion	**0.732**	0.103	0.138	-0.013	-0.012
Awe	**0.73**	0.108	0.05	0.065	0.021
Love	**0.713**	-0.204	**0.384**	-0.021	-0.124
Desire	**0.648**	-0.001	0.192	-0.003	0.121
Compassion	**0.611**	-0.146	**0.432**	-0.008	-0.123
Astonishment	**0.514**	**0.348**	-0.02	0.131	0.001
Surprise	**0.462**	0.194	-0.026	0.208	0.016
Upset	**-0.334**	**0.296**	**0.39**	0.111	-0.031
Unhappiness	**-0.3**	0.24	**0.487**	0.058	0.002
Fury	0.004	**0.897**	0.004	0.065	-0.091
Rage	-0.008	**0.88**	-0.006	0.073	-0.068
Outrage	-0.058	**0.879**	0.016	0.048	-0.09
Hostility	0.008	**0.878**	-0.043	0.044	-0.016
Hate	0.027	**0.836**	-0.013	0.03	0.019
Anger	-0.152	**0.796**	0.075	0.03	-0.054
Spite	0.077	**0.745**	0.006	-0.019	0.118
Disgust	-0.092	**0.731**	-0.021	0.026	0.124
Loathing	0.036	**0.726**	0.077	-0.014	0.089
Disdain	-0.014	**0.683**	0.102	-0.006	0.086
Resentment	-0.071	**0.674**	0.138	-0.086	0.151

Note. Factor loadings above .3 are bolded

Table 2 (cont.)
Study 1 Items and factor loadings for the 5-factor solution

Items	Factor 1 (Joy)	Factor 2 (Anger)	Factor 3 (Sadness)	Factor 4 (Fear)	Factor 5 (Shame)
Contempt	0.171	**0.664**	0.068	-0.069	0.054
Agitation	-0.153	**0.529**	0.093	0.181	0.028
Frustration	-0.269	**0.432**	0.245	0.095	0.016
Disappointment	-0.235	**0.305**	**0.407**	-0.075	0.173
Hurt	-0.076	**0.3**	**0.566**	-0.035	0.039
Sorrow	-0.013	-0.011	**0.855**	0.015	0.007
Sadness	-0.129	0.023	**0.81**	-0.02	-0.001
Grief	0.019	0.034	**0.779**	0.083	-0.041
Depression	0	0.082	**0.699**	0.071	0.077
Gloom	-0.044	0.051	**0.68**	0.148	0.02
Melancholy	0.146	0.014	**0.678**	-0.076	0.119
Woe	0.047	0.042	**0.655**	0.135	0.04
Despair	-0.037	0.083	**0.623**	0.215	0.026
Misery	-0.047	0.168	**0.554**	0.192	0.055
Anguish	0.009	0.179	**0.549**	0.231	-0.001
Agony	0.053	0.157	**0.517**	0.275	0.01
Regret	-0.057	-0.052	**0.497**	0.085	**0.353**
Dismay	-0.123	0.237	**0.41**	0.168	0.044
Guilt	0.047	-0.126	**0.405**	0.172	**0.419**
Distress	-0.208	0.155	**0.313**	**0.395**	-0.019
Fright	0.057	-0.01	-0.018	**0.887**	0.016
Fear	0.025	-0.036	0.044	**0.868**	-0.005
Terror	0.079	0.088	-0.021	**0.812**	0.006
Panic	-0.008	0.03	0.036	**0.796**	0.058
Worry	-0.104	-0.087	0.253	**0.632**	0.017
Horror	0.07	0.222	0.069	**0.609**	0.012
Anxiety	-0.104	0.019	0.158	**0.591**	0.048
Dread	-0.071	0.072	0.276	**0.508**	0.057
Concern	-0.074	-0.042	0.292	**0.507**	-0.06
Discomfort	-0.238	0.112	0.192	**0.382**	0.144
Embarrassment	-0.05	0.04	-0.047	0.207	**0.746**
Humiliation	-0.021	0.158	0.019	0.166	**0.655**
Shame	-0.014	-0.019	0.22	0.159	**0.629**
Jealousy	0.202	0.274	0.218	-0.077	**0.329**
Envy	0.245	0.219	0.19	-0.031	**0.34**

Note. Factor loadings above .3 are bolded

Table 3

Study 1 Items and factor loadings for the 4-factor solution

Items	Factor 1 (Joy)	Factor 2 (Anger)	Factor 3 (Sadness)	Factor 4 (Fear)
Cheerful	**0.895**	-0.04	-0.036	-0.035
Joy	**0.894**	-0.049	-0.051	-0.031
Pleasure	**0.89**	-0.024	-0.025	-0.052
Delight	**0.889**	-0.038	-0.051	-0.037
Glee	**0.889**	0.011	-0.026	0.001
Enjoy	**0.886**	-0.035	-0.054	-0.049
Gladness	**0.879**	-0.053	-0.031	-0.029
Enthusiasm	**0.879**	-0.011	-0.033	-0.018
Happiness	**0.878**	-0.079	-0.046	-0.041
Blissful	**0.873**	0.006	0.007	-0.026
Excitement	**0.861**	-0.021	-0.109	0.065
Jubilation	**0.859**	0.011	-0.014	0.02
Satisfaction	**0.856**	-0.022	-0.072	-0.03
Euphoria	**0.851**	0.023	0.003	0.027
Ecstasy	**0.837**	0.047	0.024	0.026
Exhilaration	**0.825**	0.059	-0.079	0.092
Gratitude	**0.818**	-0.107	0.085	0.016
Amusement	**0.783**	0.091	-0.026	-0.029
Contentment	**0.779**	0.039	0.018	-0.048
Amazement	**0.74**	0.191	-0.068	0.032
Hope	**0.738**	-0.17	0.112	0.116
Awe	**0.727**	0.103	0.057	0.065
Passion	**0.723**	0.084	0.133	-0.012
Love	**0.687**	-0.266	**0.324**	-0.013
Desire	**0.659**	0.016	0.252	-0.009
Compassion	**0.583**	-0.212	**0.374**	0
Astonishment	**0.506**	**0.337**	-0.017	0.133
Surprise	**0.459**	0.191	-0.02	0.209
Upset	**-0.349**	0.255	**0.392**	0.116
Unhappiness	**-0.312**	0.204	**0.507**	0.06
Hostility	-0.007	**0.862**	-0.041	0.051
Fury	-0.023	**0.85**	-0.025	0.078
Rage	-0.032	**0.841**	-0.026	0.084
Outrage	-0.084	**0.831**	-0.012	0.06
Hate	0.017	**0.829**	0.006	0.036
Spite	0.081	**0.766**	0.071	-0.02
Anger	-0.173	**0.759**	0.064	0.04
Disgust	-0.086	**0.756**	0.046	0.025
Loathing	0.035	**0.735**	0.131	-0.014
Resentment	-0.063	**0.698**	0.222	-0.089
Disdain	-0.014	**0.691**	0.155	-0.007

Note. Factor loadings above .3 are bolded

Table 3 (cont.)
Study 1 Items and factor loadings for the 4-factor solution

Items	Factor 1 (Joy)	Factor 2 (Anger)	Factor 3 (Sadness)	Factor 4 (Fear)
Contempt	0.167	**0.664**	0.105	-0.069
Agitation	-0.159	**0.521**	0.119	0.183
Frustration	-0.277	**0.412**	0.269	0.096
Jealousy	0.237	**0.349**	**0.379**	-0.09
Humiliation	0.061	**0.34**	**0.319**	0.136
Disappointment	-0.223	**0.324**	**0.505**	-0.082
Envy	0.283	**0.299**	**0.355**	-0.045
Sorrow	-0.029	-0.066	**0.874**	0.02
Sadness	-0.146	-0.032	**0.828**	-0.016
Grief	-0.004	-0.03	**0.774**	0.09
Depression	-0.004	0.054	**0.756**	0.069
Melancholy	0.149	0.001	**0.754**	-0.083
Gloom	-0.055	0.008	**0.709**	0.148
Woe	0.039	0.006	**0.692**	0.134
Regret	-0.019	0.023	**0.663**	0.073
Despair	-0.048	0.044	**0.653**	0.216
Hurt	-0.087	0.267	**0.604**	-0.033
Misery	-0.053	0.14	**0.598**	0.192
Guilt	0.095	-0.024	**0.592**	0.158
Anguish	-0.006	0.136	**0.565**	0.234
Agony	0.041	0.118	**0.537**	0.278
Shame	0.062	0.155	**0.497**	0.136
Dismay	-0.129	0.217	**0.447**	0.167
Distress	-0.218	0.122	**0.317**	**0.398**
Dread	-0.071	0.065	**0.309**	**0.509**
Concern	-0.088	-0.082	0.268	**0.513**
Discomfort	-0.224	0.137	0.267	**0.377**
Worry	-0.107	-0.103	0.264	**0.635**
Anxiety	-0.102	0.017	0.185	**0.591**
Horror	0.063	0.213	0.071	**0.617**
Panic	-0.004	0.037	0.059	**0.799**
Fear	0.021	-0.047	0.034	**0.877**
Terror	0.076	0.084	-0.028	**0.822**
Fright	0.056	-0.01	-0.021	**0.896**
Embarrassment	0.047	0.258	0.29	0.17

Note. Factor loadings above .3 are bolded

Table 4
Items and factor loadings for the 2-factor solution

Items	Factor 1 (Negative)	Factor 2 (Positive)
Misery	**0.823**	-0.05
Anguish	**0.823**	0.001
Agony	**0.816**	0.049
Despair	**0.808**	-0.05
Depression	**0.785**	-0.022
Gloom	**0.771**	-0.066
Fury	**0.764**	0.015
Rage	**0.76**	0.006
Dread	**0.756**	-0.039
Horror	**0.749**	0.113
Hurt	**0.749**	-0.097
Sorrow	**0.747**	-0.06
Outrage	**0.747**	-0.048
Woe	**0.744**	0.028
Grief	**0.744**	-0.025
Anger	**0.74**	-0.141
Panic	**0.739**	0.055
Hostility	**0.739**	0.029
Hate	**0.738**	0.048
Loathing	**0.736**	0.058
Dismay	**0.734**	-0.118
Disdain	**0.729**	0.008
Resentment	**0.728**	-0.048
Distress	**0.724**	-0.19
Terror	**0.714**	0.138
Disgust	**0.713**	-0.054
Agitation	**0.712**	-0.124
Sadness	**0.708**	-0.174
Fear	**0.704**	0.082
Humiliation	**0.703**	0.079
Shame	**0.703**	0.067
Spite	**0.702**	0.105
Fright	**0.7**	0.119
Unhappiness	**0.689**	**-0.312**
Regret	**0.685**	-0.03
Frustration	**0.684**	-0.257
Discomfort	**0.678**	-0.193
Disappointment	**0.676**	-0.228
Upset	**0.675**	**-0.34**
Worry	**0.674**	-0.069

Table 4(Cont.)

Items and factor loadings for the 2-factor solution

Items	Factor 1 (Negative)	Factor 2 (Positive)
Anxiety	**0.672**	-0.058
Guilt	**0.649**	0.089
Embarrassment	**0.635**	0.067
Melancholy	**0.616**	0.119
Contempt	**0.608**	0.185
Concern	**0.597**	-0.058
Jealous	**0.572**	0.233
Envy	**0.545**	0.282
Astonishment	**0.386**	**0.532**
Surprise	**0.319**	**0.483**
Cheerful	-0.102	**0.89**
Joy	-0.12	**0.889**
Glee	-0.017	**0.889**
Delight	-0.116	**0.883**
Pleasure	-0.092	**0.883**
Enjoy	-0.126	**0.88**
Enthusiasm	-0.059	**0.877**
Gladness	-0.105	**0.873**
Happiness	-0.151	**0.869**
Bliss	-0.014	**0.869**
Excitement	-0.067	**0.867**
Jubilation	0.01	**0.86**
Satisfaction	-0.114	**0.853**
Euphoria	0.042	**0.852**
Ecstasy	0.08	**0.839**
Exhilaration	0.053	**0.836**
Gratitude	-0.008	**0.809**
Amusement	0.028	**0.784**
Contentment	0.005	**0.774**
Amazement	0.127	**0.752**
Awe	0.193	**0.733**
Hope	0.045	**0.733**
Passion	0.18	**0.72**
Love	0.046	**0.66**
Desire	0.235	**0.651**
Compassion	0.151	**0.56**

Note. Factor Loadings above .3 are bolded

Table 5

Study 2 Items and factor loadings
for the 1-factor solution (76 items)

Items	Factor 1
Despair	**0.771**
Horror	**0.743**
Fear	**0.734**
Joy	**0.719**
Grief	**0.711**
Rage	**0.704**
Anguish	**0.701**
Passion	**0.699**
Terror	**0.691**
Misery	**0.687**
Pleasure	**0.681**
Melancholy	**0.678**
Happiness	**0.677**
Sorrow	**0.669**
Disappointment	**0.663**
Hope	**0.663**
Delight	**0.658**
Shame	**0.652**
Agony	**0.651**
Love	**0.645**
Contempt	**0.639**
Distress	**0.634**
Anger	**0.633**
Dread	**0.633**
Desire	**0.632**
Excitement	**0.62**
Sadness	**0.616**
Disgust	**0.603**
Gloom	**0.6**
Regret	**0.589**
Astonishment	**0.586**
Gratitude	**0.586**
Spite	**0.572**
Fury	**0.554**
Awe	**0.549**
Surprise	**0.545**
Envy	**0.536**
Hate	**0.533**
Amazement	**0.532**

Note. Factor Loadings above .3 are bolded

Table 5 (cont.)

Study 2 Items and factor loadings
for the 1-factor solution (76 items)

Items	Factor 1
Enthusiasm	**0.529**
Resentment	**0.51**
Jealousy	**0.503**
Ecstasy	**0.494**
Embarrassment	**0.492**
Compassion	**0.491**
Fright	**0.486**
Dismay	**0.471**
Unhappiness	**0.47**
Frustration	**0.469**
Anxiety	**0.467**
Guilt	**0.456**
Agitation	**0.45**
Cheerfulness	**0.45**
Woe	**0.441**
Bliss	**0.438**
Humiliation	**0.434**
Hurt	**0.431**
Panic	**0.431**
Upset	**0.43**
Loathing	**0.398**
Satisfaction	**0.395**
Worry	**0.395**
Hostility	**0.391**
Discomfort	**0.383**
Disdain	**0.379**
Concern	**0.375**
Amusement	**0.368**
Outrage	**0.348**
Enjoyment	**0.324**
Exhilaration	0.29
Glee	0.285
Gladness	0.281
Depression	0.276
Contentment	0.269
Euphoria	0.206
Jubilation	0.200

Note. Factor Loadings above .3 are bolded

Table 6
Study 2 Items and factor loadings for the 2-factor solution (76 word LSI matrix)

Items	Factor 1	Factor 2
Horror	**0.843**	-0.114
Terror	**0.758**	-0.067
Astonishment	**0.75**	-0.218
Gloom	**0.745**	-0.19
Delight	**0.745**	-0.111
Joy	**0.729**	0.01
Melancholy	**0.723**	-0.045
Rage	**0.72**	0.011
Despair	**0.714**	0.11
Passion	**0.711**	0.002
Fury	**0.684**	-0.166
Sorrow	**0.673**	0.015
Amazement	**0.671**	-0.185
Shame	**0.658**	0.013
Hope	**0.657**	0.026
Misery	**0.656**	0.066
Agony	**0.65**	0.028
Dread	**0.645**	0.009
Anguish	**0.64**	0.123
Gratitude	**0.62**	-0.034
Awe	**0.61**	-0.072
Contempt	**0.6**	0.078
Regret	**0.59**	0.013
Ecstasy	**0.574**	-0.101
Excitement	**0.573**	0.094
Grief	**0.569**	0.24
Surprise	**0.566**	-0.013
Disappointment	**0.562**	0.172
Dismay	**0.546**	-0.096
Woe	**0.516**	-0.096
Cheerfulness	**0.514**	-0.085
Disgust	**0.504**	0.171
Spite	**0.501**	0.121
Agitation	**0.483**	-0.034
Pleasure	**0.461**	**0.35**
Fright	**0.459**	0.062
Happiness	**0.454**	**0.351**
Enthusiasm	**0.451**	0.124
Compassion	**0.444**	0.085

Table 6 (cont.)
Study 2 Items and factor loadings for the 2-factor solution (76 word LSI matrix)

Items	Factor 1	Factor 2
Hate	**0.441**	0.152
Loathing	**0.433**	-0.036
Desire	**0.429**	**0.319**
Amusement	**0.426**	-0.077
Love	**0.419**	**0.356**
Fear	**0.417**	**0.512**
Panic	**0.394**	0.074
Distress	**0.382**	**0.404**
Embarrassment	**0.381**	0.184
Bliss	**0.38**	0.104
Disdain	**0.377**	0.012
Sadness	**0.356**	**0.416**
Hurt	**0.344**	0.146
Envy	**0.336**	**0.311**
Outrage	**0.329**	0.039
Gladness	**0.319**	-0.047
Worry	**0.311**	0.137
Glee	**0.309**	-0.025
Anxiety	-0.082	**0.852**
Frustration	-0.004	**0.733**
Guilt	0.013	**0.688**
Discomfort	-0.024	**0.63**
Anger	0.246	**0.612**
Unhappiness	0.137	**0.518**
Upset	0.108	**0.497**
Hostility	0.074	**0.489**
Jealousy	0.205	**0.462**
Depression	-0.008	**0.435**
Satisfaction	0.116	**0.428**
Euphoria	-0.041	**0.38**
Resentment	0.277	**0.363**
Concern	0.143	**0.353**
Humiliation	0.228	**0.322**
Enjoyment	0.149	0.268
Exhilaration	0.126	0.258
Contentment	0.129	0.213
Jubilation	0.204	0.002

Note. Factor Loadings above .3 are bolded

Table 7

Study 2 Items and factor loadings for the 1-factor solution (125 items)

Items	Factor 1
Joy	**0.734**
Horror	**0.73**
Passion	**0.715**
Fear	**0.713**
Grief	**0.703**
Melancholy	**0.7**
Pity	**0.697**
Pleasure	**0.695**
Rage	**0.694**
Anguish	**0.689**
Delight	**0.685**
Longing	**0.683**
Happiness	**0.682**
Sorrow	**0.682**
Misery	**0.681**
Terror	**0.667**
Shame	**0.663**
Love	**0.657**
Disappointment	**0.656**
Hope	**0.656**
Affection	**0.649**
Madness	**0.644**
Wonder	**0.64**
Contempt	**0.639**
Agony	**0.638**
Admiration	**0.633**
Distress	**0.628**
Comfort	**0.622**
Excitement	**0.62**
Sadness	**0.618**
Anger	**0.616**
Dread	**0.615**
Gloom	**0.608**
Gratitude	**0.605**
Regret	**0.6**
Disgust	**0.597**
Astonishment	**0.596**
Spite	**0.574**
Awe	**0.559**
Fury	**0.551**
Tenderness	**0.551**
Surprise	**0.546**

Table 7 (cont.)

Study 2 Items and factor loadings for the 1-factor solution (125 items)

Items	Factor 1
Envy	**0.541**
Amazement	**0.534**
Hate	**0.529**
Enthusiasm	**0.528**
Scorn	**0.525**
Devotion	**0.523**
Mourning	**0.516**
Jealousy	**0.505**
Dislike	**0.504**
Torment	**0.501**
Compassion	**0.5**
Resentment	**0.498**
Embarrassment	**0.497**
Ecstasy	**0.49**
Bitterness	**0.485**
Dismay	**0.478**
Malice	**0.478**
Fright	**0.475**
Unhappiness	**0.462**
Apprehension	**0.458**
Agitation	**0.455**
Cheerfulness	**0.452**
Frustration	**0.451**
Anxiety	**0.451**
Guilt	**0.444**
Bliss	**0.443**
Woe	**0.442**
Anticipation	**0.441**
Giddy	**0.436**
Merriment	**0.426**
Humiliation	**0.422**
Hurt	**0.422**
Displeasure	**0.422**
Enchantment	**0.422**
Upset	**0.418**
Jovial	**0.411**
Panic	**0.405**
Fondness	**0.401**
Satisfaction	**0.398**
Worry	**0.393**
Loathing	**0.391**
Amusement	**0.388**

Note. Factor Loadings above .3 are bolded

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Table 7 (cont.)
Study 2 Items and factor loadings for the 1-factor solution (125 items)

Items	Factor 1
Disdain	**0.382**
Fascination	**0.382**
Discomfort	**0.381**
Concern	**0.374**
Desolation	**0.366**
Pain	**0.363**
Mistrust	**0.36**
Adoration	**0.357**
Caring	**0.349**
Outrage	**0.347**
Suspense	**0.34**
Enjoyment	**0.339**
Serenity	**0.337**
Alarm	**0.313**
Animosity	**0.306**
Gladness	**0.3**
Annoyance	**0.3**
Glee	0.292
Exhilaration	0.289
Calmness	0.269
Exasperation	0.267
Contentment	0.265
Unrest	0.264
Aversion	0.26
Mania	0.26
Low Spirited	0.259
Depression	0.257
Discouragement	0.255
Discontent	0.235
Unease	0.233
Glum	0.208
Malevolence	0.206
Dissatisfaction	0.2
Euphoria	0.194
Jubilation	0.186
Warm Fuzzies	0.166
Entrancing	0.162
Detestation	0.161
Condolence	0.105
Peacefulness	0.075
Coziness	0.005

Note. Factor Loadings above .3 are bolded

Table 8
Study 2 Items and factor loadings for the 2-factor solution (125 word LSI matrix)

Items	Factor 1	Factor 2
Horror	**0.767**	-0.015
Delight	**0.764**	-0.08
Longing	**0.756**	-0.067
Pity	**0.756**	-0.048
Passion	**0.735**	0.008
Melancholy	**0.731**	-0.008
Joy	**0.728**	0.05
Astonishment	**0.715**	-0.142
Gloom	**0.702**	-0.105
Madness	**0.697**	-0.043
Admiration	**0.687**	-0.047
Wonder	**0.677**	-0.023
Sorrow	**0.676**	0.045
Terror	**0.665**	0.039
Shame	**0.665**	0.034
Rage	**0.662**	0.087
Amazement	**0.637**	-0.121
Fury	**0.636**	-0.093
Gratitude	**0.633**	-0.009
Hope	**0.629**	0.069
Misery	**0.614**	0.129
Awe	**0.601**	-0.032
Agony	**0.589**	0.107
Regret	**0.589**	0.044
Contempt	**0.586**	0.11
Anguish	**0.583**	0.195
Dread	**0.57**	0.098
Scorn	**0.559**	-0.024
Ecstasy	**0.542**	-0.05
Excitement	**0.537**	0.155
Torment	**0.535**	-0.025
Woe	**0.527**	-0.098
Grief	**0.526**	**0.299**
Disappointment	**0.525**	0.226
Surprise	**0.524**	0.059
Merriment	**0.522**	-0.117
Dismay	**0.518**	-0.036
Comfort	**0.517**	0.184
Enchantment	**0.516**	-0.117
Malice	**0.507**	-0.017
Cheerfulness	**0.491**	-0.037
Mourning	**0.478**	0.083
Pleasure	**0.477**	**0.358**
Devotion	**0.473**	0.096
Agitation	**0.47**	-0.001
Spite	**0.463**	0.187

Note. Factor Loadings above .3 are bolded

Table 8(cont.)
Study 2 Items and factor loadings for the 2-factor solution (125 word LSI matrix)

Items	Factor 1	Factor 2
Happiness	**0.46**	**0.36**
Disgust	**0.458**	0.236
Love	**0.445**	**0.346**
Compassion	**0.445**	0.105
Hate	**0.434**	0.165
Enthusiasm	**0.43**	0.165
Amusement	**0.422**	-0.032
Bitterness	**0.418**	0.119
Desolation	**0.41**	-0.046
Fright	**0.402**	0.133
Tenderness	**0.397**	0.257
Loathing	**0.395**	0.015
Giddy	**0.384**	0.103
Jovial	**0.375**	0.073
Disdain	**0.371**	0.034
Envy	**0.365**	0.284
Embarrassment	**0.364**	0.225
Bliss	**0.362**	0.142
Fear	**0.356**	**0.569**
Adoration	**0.356**	0.02
Affection	**0.353**	**0.469**
Distress	**0.346**	**0.452**
Gladness	**0.341**	-0.044
Sadness	**0.336**	**0.452**
Fondness	**0.332**	0.122
Displeasure	**0.323**	0.168
Fascination	**0.315**	0.117
Glee	**0.314**	-0.018
Panic	**0.31**	0.159
Outrage	**0.309**	0.073
Suspense	**0.301**	0.073
Anxiety	-0.107	**0.855**
Frustration	-0.04	**0.752**
Guilt	-0.002	**0.686**
Discomfort	-0.058	**0.669**
Anger	0.202	**0.649**
Unhappiness	0.115	**0.537**
Upset	0.073	**0.529**
Caring	0.005	**0.525**
Aversion	-0.065	**0.496**
Dissatisfaction	-0.116	**0.475**
Mistrust	0.066	**0.45**
Depression	-0.039	**0.45**
Jealousy	0.228	**0.437**
Dislike	0.224	**0.436**
Satisfaction	0.119	**0.431**
Resentment	0.237	**0.406**

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Table 8 (cont.)
Study 2 Items and factor loadings for the 2-factor solution
(125 word LSI matrix)

Items	Factor 1	Factor 2
Euphoria	-0.059	**0.385**
Concern	0.129	**0.376**
Discouragement	0.015	**0.37**
Apprehension	0.228	**0.368**
Humiliation	0.192	**0.358**
Pain	0.144	**0.342**
Anticipation	0.248	**0.31**
Exhilaration	0.11	0.279
Enjoyment	0.161	0.277
Discontent	0.065	0.257
Serenity	0.191	0.232
Unrest	0.126	0.212
Hurt	0.292	0.211
Contentment	0.144	0.191
Animosity	0.186	0.188
Worry	0.283	0.179
Mania	0.159	0.162
Calmness	0.175	0.153
Peacefulness	-0.022	0.145
Annoyance	0.213	0.142
Low Spirited	0.189	0.115
Alarm	0.278	0.068
Glum	0.187	0.038
Jubilation	0.169	0.033
Detestation	0.148	0.026
Warm Fuzzies	0.159	0.018
Unease	0.244	-0.002
Malevolence	0.217	-0.004
Exasperation	0.283	-0.011
Coziness	0.034	-0.043
Condolence	0.168	-0.089
Entrancing	0.279	-0.16

Note. Factor Loadings above .3 are bolded

Table 9
Study 2 Items and factor loadings for the 3-factor solution (125 word LSI matrix)

Items	Factor 1	Factor 2	Factor 3
Horror	**0.935**	-0.075	-0.173
Terror	**0.875**	-0.023	-0.242
Rage	**0.808**	0.045	-0.16
Fury	**0.78**	-0.141	-0.157
Astonishment	**0.749**	-0.173	-0.001
Gloom	**0.733**	-0.136	0.009
Dread	**0.732**	0.047	-0.186
Agony	**0.711**	0.063	-0.13
Anguish	**0.692**	0.154	-0.109
Amazement	**0.655**	-0.143	0.014
Pity	**0.647**	-0.043	0.193
Hope	**0.601**	0.06	0.067
Shame	**0.586**	0.039	0.139
Misery	**0.576**	0.121	0.089
Longing	**0.565**	-0.046	**0.308**
Joy	**0.565**	0.069	0.27
Panic	**0.563**	0.1	-0.337
Wonder	**0.56**	-0.014	0.197
Fright	**0.555**	0.096	-0.195
Madness	**0.55**	-0.035	0.253
Surprise	**0.542**	0.047	-0.005
Dismay	**0.537**	-0.057	0.005
Ecstasy	**0.529**	-0.067	0.06
Grief	**0.526**	0.29	0.026
Excitement	**0.507**	0.146	0.071
Awe	**0.497**	-0.031	0.189
Woe	**0.49**	-0.1	0.083
Torment	**0.488**	-0.03	0.102
Melancholy	**0.485**	0.014	**0.401**
Disappointment	**0.483**	0.219	0.087
Disgust	**0.479**	0.22	-0.002
Desolation	**0.465**	-0.075	-0.041
Hurt	**0.464**	0.186	-0.244
Contempt	**0.458**	0.117	0.217
Malice	**0.457**	-0.027	0.104
Sorrow	**0.456**	0.073	**0.354**
Loathing	**0.455**	-0.011	-0.06
Fear	**0.453**	**0.55**	-0.122
Passion	**0.451**	0.042	**0.455**
Agitation	**0.451**	-0.019	0.059
Regret	**0.443**	0.055	0.236
Alarm	**0.442**	0.027	-0.214

Note. Factor Loadings above .3 are bolded

Table 9 (cont.)
Study 2 Items and factor loadings for the 3-factor solution (125 word LSI matrix)

Items	Factor 1	Factor 2	Factor 3
Scorn	**0.438**	-0.015	0.2
Admiration	**0.433**	-0.016	**0.397**
Spite	**0.432**	0.178	0.071
Delight	**0.431**	-0.04	**0.529**
Gratitude	**0.415**	0.018	**0.343**
Mourning	**0.403**	0.085	0.132
Hate	**0.396**	0.178	0.059
Comfort	**0.389**	0.201	0.209
Giddy	**0.372**	0.096	0.042
Bitterness	**0.358**	0.115	0.108
Merriment	**0.348**	-0.102	0.286
Distress	**0.348**	**0.434**	0.018
Cheerfulness	**0.339**	-0.024	0.252
Worry	**0.338**	0.173	-0.082
Pain	**0.337**	**0.301**	-0.268
Compassion	**0.326**	0.112	0.198
Outrage	**0.315**	0.06	0.007
Enchantment	**0.306**	-0.092	**0.336**
Bliss	**0.305**	0.138	0.105
Anxiety	-0.079	**0.844**	-0.044
Frustration	-0.037	**0.747**	-0.007
Guilt	-0.025	**0.69**	0.028
Discomfort	0.009	**0.654**	-0.103
Anger	0.249	**0.65**	-0.07
Caring	-0.125	**0.561**	0.171
Affection	0.006	**0.546**	**0.5**
Unhappiness	0.093	**0.539**	0.034
Upset	0.172	**0.524**	-0.161
Jealousy	-0.061	**0.502**	**0.414**
Aversion	-0.062	**0.491**	-0.011
Satisfaction	-0.126	**0.479**	**0.351**
Sadness	0.213	**0.476**	0.185
Mistrust	-0.063	**0.471**	0.184
Dissatisfaction	-0.112	**0.47**	-0.015
Dislike	0.075	**0.463**	0.212
Love	0.079	**0.427**	**0.533**
Happiness	0.114	**0.425**	**0.515**
Pleasure	0.112	**0.424**	**0.547**
Depression	0.074	**0.423**	-0.166
Resentment	0.247	**0.399**	-0.006
Concern	0.02	**0.388**	0.158
Euphoria	0	**0.367**	-0.086

Note. Factor Loadings above .3 are bolded

Table 9 (cont.)
Study 2 Items and factor loadings for the 3-factor solution (125 word LSI matrix)

Items	Factor 1	Factor 2	Factor 3
Discouragement	0.022	**0.361**	-0.007
Humiliation	0.173	**0.354**	0.036
Apprehension	0.259	**0.35**	-0.029
Envy	0.097	**0.334**	**0.395**
Enjoyment	-0.133	**0.334**	**0.428**
Anticipation	0.202	**0.304**	0.083
Devotion	0.251	0.124	**0.346**
Displeasure	0.138	0.196	0.28
Enthusiasm	0.266	0.177	0.259
Fascination	0.165	0.132	0.237
Amusement	0.282	-0.019	0.223
Adoration	0.219	0.041	0.212
Fondness	0.203	0.136	0.207
Unease	0.118	0.017	0.189
Jovial	0.262	0.084	0.185
Tenderness	0.291	0.264	0.177
Gladness	0.24	-0.034	0.165
Entrancing	0.189	-0.156	0.152
Disdain	0.278	0.042	0.151
Mania	0.06	0.173	0.149
Detestation	0.058	0.039	0.133
Contentment	0.056	0.203	0.132
Embarrassment	0.293	0.225	0.117
Serenity	0.133	0.231	0.101
Animosity	0.137	0.193	0.08
Coziness	-0.019	-0.034	0.079
Glee	0.282	-0.024	0.069
Malevolence	0.181	-0.009	0.063
Annoyance	0.173	0.148	0.062
Exhilaration	0.08	0.279	0.052
Suspense	0.284	0.065	0.048
Peacefulness	-0.053	0.149	0.041
Warm Fuzzies	0.148	0.018	0.018
Low Spirited	0.189	0.106	0.01
Condolence	0.265	-0.113	-0.131
Calmness	0.259	0.133	-0.107
Jubilation	0.241	0.018	-0.093
Discontent	0.12	0.242	-0.082
Unrest	0.189	0.189	-0.08
Glum	0.209	0.031	-0.021
Exasperation	0.294	-0.021	-0.003

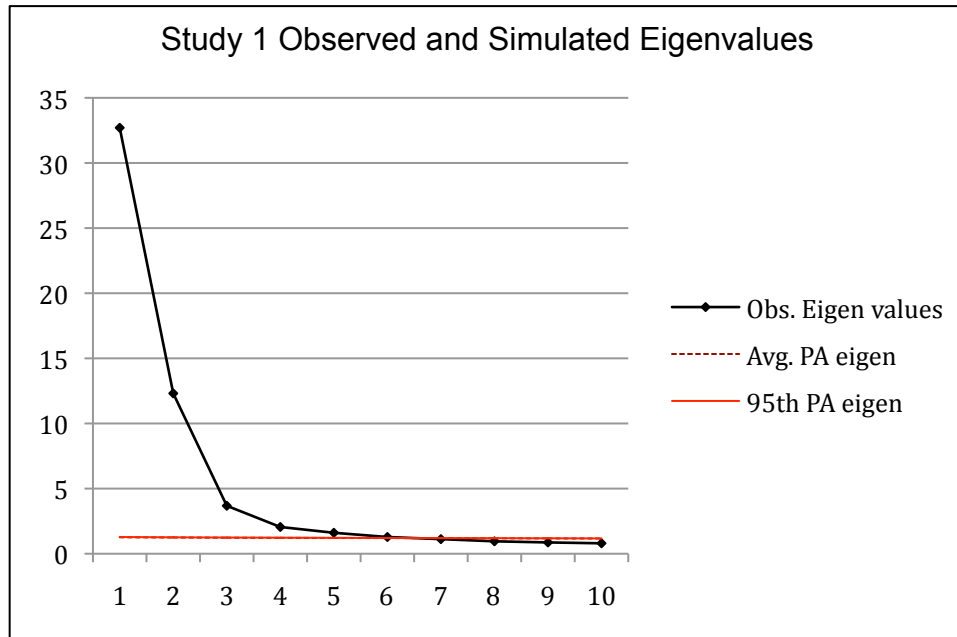*Note.* Factor Loadings above .3 are bolded

Figure 1. Study 1 observed eigenvalues and average and 95th percentile eigenvalues from 1000 randomly generated simulated datasets.
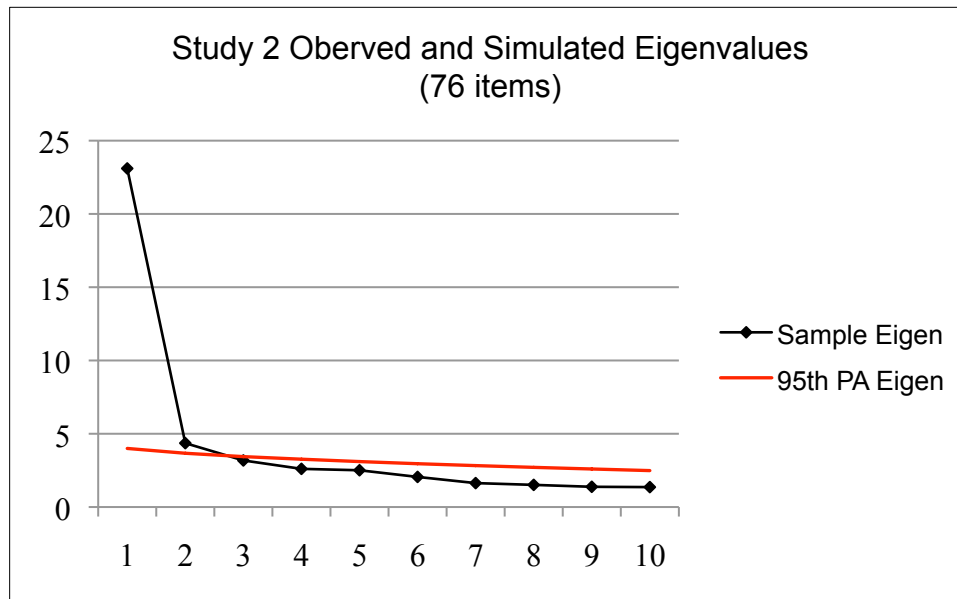
Figure 2. Study 2 observed eigenvalues and 95th percentile eigenvalues from 1000 randomly generated simulated datasets using an LSI matrix of 76 emotion items.
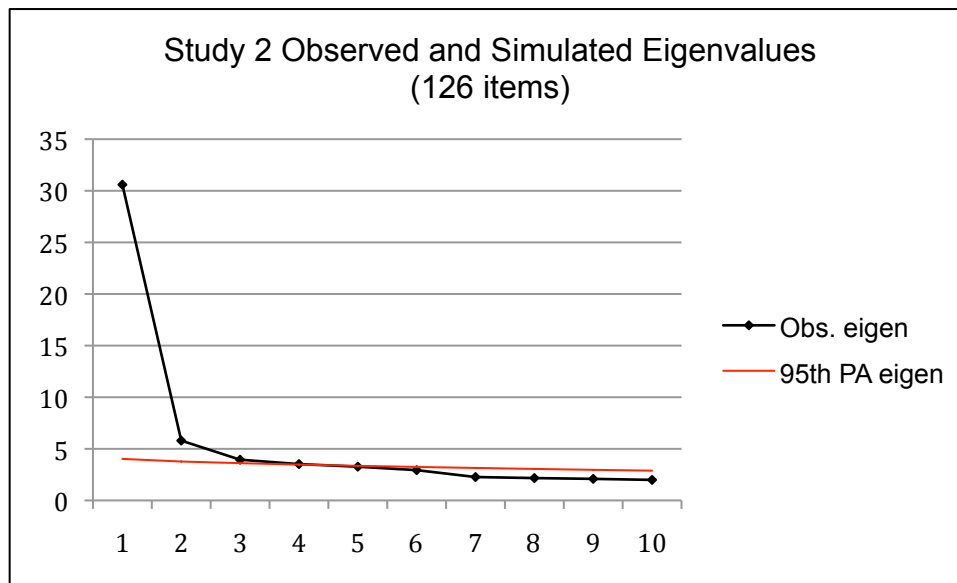
Figure 3. Figure 2. Study 2 observed eigenvalues and 95th percentile eigenvalues from 1000 randomly generated simulated datasets using an LSI matrix of 125 emotion items.

APPENDIX A

RECALLED EMOTION MANIPULATION

Participants viewed the following instructions:

In the first part of this study, we will ask you to remember an event in which you experienced an emotion. Different participants will be asked to remember different kinds of experiences. We will tell you on the next screen what kind of experience we want you to remember.

We will ask you to relive that event, and the emotions you experienced, as vividly and in as much detail as you can.

After spending some time recalling the event and reliving that emotional experience, we will ask you to spend a couple minutes writing about it in as much detail as possible.

Please be honest in your description of the event and your experience of it. Remember: This study is completely anonymous. To ensure anonymity, please do not include your own name, the last name of anyone else, or anything else that might identify you or someone else.

If you're ready to start, please hit '>>'

Then, on the next page participants were given the following specific instructions an essay box to write about their experience:

Please think about a recent time (within the past year) when you felt Agitation*.

Please remember a <u>specific event</u> when you felt AGITATED*. Remember all you can about the event, the circumstances surrounding it, and how you felt about it. Please think about this experience for the next minute or two.

When you are ready, please write about the event in which you felt AGITATED*. Please write in as much detail as possible. You will have up to ten minutes to write. When you are finished reliving and writing about your experience of Agitation, click '>>' to begin the next part of study.

*The feeling word in all caps (i.e. AGITATED) varied for each participant. Participants were randomly assigned to write about one of the 76 words from Appendix B.

APPENDIX B

STUDY 2 LSI EMOTION WORD LIST (76 WORDS)

Agitation	Gladness
Agony	Glee
Amazement	Gloom
Amusement	Gratitude
Anger	Grief
Anguish	Guilt
Anxiety	Happiness
Astonishment	Hate
Awe	Hope
Bliss	Horror
Cheerfulness	Hostility
Compassion	Humiliation
Concern	Hurt
Contempt	Jealousy
Contentment	Joy
Delight	Jubilation
Depression	Loathing
Despair	Love
Disappointment	Melancholy
Discomfort	Misery
Disdain	Outrage
Disgust	Panic
Desire	Passion
Distress	Pleasure
Dismay	Rage
Dread	Regret
Ecstasy	Resentment
Embarrassment	Sadness
Enjoyment	Satisfaction
Enthusiasm	Shame
Euphoria	Sorrow
Envy	Spite
Excitement	Surprise
Exhilaration	Terror
Fear	Unhappiness
Fright	Upset
Frustration	Woe
Fury	Worry

APPENDIX C

STUDY 2 LSI EMOTION WORD LIST (125 WORDS)

Admiration	Distress	Melancholy
Adoration	Dread	Merriment
Affection	Ecstasy	Misery
Agitation	Embarrassment	Mistrust
Agony	Enchantment	Mourning
Alarm	Enjoyment	Outrage
Amazement	Enthusiasm	Pain
Amusement	Entrancing	Panic
Anger	Envy	Passion
Anguish	Euphoria	Peacefulness
Animosity	Exasperation	Pity
Annoyance	Excitement	Pleasure
Anticipation	Exhilaration	Rage
Anxiety	Fascination	Regret
Apprehension	Fear	Resentment
Astonishment	Fondness	Sadness
Aversion	Fright	Satisfaction
Awe	Frustration	Scorn
Bitterness	Fury	Serenity
Bliss	Giddy	Shame
Calmness	Gladness	Sorrow
Caring	Glee	Spite
Cheerfulness	Gloom	Surprise
Comfort	Glum	Suspense
Compassion	Gratitude	Tenderness
Concern	Grief	Terror
Condolence	Guilt	Torment
Contempt	Happiness	Unease
Contentment	Hate	Unhappiness
Coziness	Hope	Unrest
Delight	Horror	Upset
Depression	Humiliation	Warm Fuzzy
Desolation	Hurt	Woe
Detestation	Jealousy	Wonder
Devotion	Jovial	Worry
Disappointment	Joy	
Discomfort	Jubilation	
Discontent	Loathing	
Discouragement	Longing	
Disdain	Love	
Disgust	Low Spirited	
Dislike	Madness	
Dismay	Malevolence	
Displeasure	Malice	
Dissatisfaction	Mania	