Psychology of Human Emotion

Psychology of Human Emotion

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AFFORDABLE COURSE TRANSFORMATION: PENNSYLVANIA STATE UNIVERSITY

Contents

Chapter 3: Basic Emotion Theory and Social Constructivist Theory

Chapter 4: Cognitive Appraisal Theory

Chapter 5: Dimensional Models

Chapter 6: Measuring and Manipulating Emotions

Chapter 7: Physiological Measures of Emotion

Chapter 8: Fear, Anxiety, and Stress

Chapter 9: Anger

Chapter 10: Disgust

Chapter 11: Negative Self-Conscious Emotions

Chapter 12: Pride - A Positive Self-Conscious Emotion

Chapter 13: Positive Emotions

Chapter 14 - Emotion Regulation

Sandbox

Foreward

Introduction

Human Emotion is one of my favorite psychology courses to teach. After teaching this course for several years, and fluctuating between assigning textbook and journal article readings to my students, I decided to jump in and write my own textbook for the course. My goals in writing this textbook were to:

1. Share my fascination for human emotion with other students and faculty.
2. Provide every student equal access and opportunity to learn about human emotion.
3. Create an interactive textbook that helps students to test their knowledge and apply concepts to real-life situations.
4. Teach students to interpret visual displays of findings in tables and figures.
5. Encourage students to determine and defend their own perspective of human emotion.

This textbook centers on four main emotion perspectives: basic emotion, social constructivism, cognitive appraisal, and dimensional models. I strived to provide a clear analysis of each perspective, while pointing out the contributions and limitations of each perspective. All four perspectives continue to influence each other and to advance our understanding of human emotion.

Acknowledgements

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conjunction with Penn State's University Libraries and Department of Teaching and Learning with Technology (TLT).

Particular thanks go to Bradley Antill and Sara Davis who edited and reviewed my book, put my ideas into interactive web activities, helped me to achieve accessibility guidelines, and generally provided encouragement and support through the two-year process. Thank you also to the other TLT team members who held workshops, provided suggestions, and answered questions. Thank you to my many undergraduate and graduate students who spent time editing my textbook, clarifying material, and providing suggestions. These teaching assistants include: Katie Saylor, Mitch Dobbs, Qinyuhui Chen, Elise Haynes, Nikki Hedgcoth, Amber Benson, and Miranda Thompson. Thank you to all the students who have taken my class, provided their anonymous feedback on my textbook, and generally expanded my knowledge and understanding of emotion through their ideas and questions. Finally, thank you to my family and friends, who provided emotional support and encouragement throughout my writing. But mostly, to my parents, for inspiring my love of learning.

Feedback

I value any feedback or thoughts you would like to share regarding this textbook. Feedback helps me to improve my understanding of the field of human emotion and makes me a better teacher. If you have suggestions, questions, and yes even criticisms, please reach out to me via email at: mxg925@psu.edu. I look forward to hearing from you!

Instructor Resources

If you are teaching a human emotion course, I am happy to share Power Point slides, activities, and ideas. Please email me at mxg925@psu.edu with your name, university, department, and the course number and title.

Author Biography

Dr. Michelle Guthrie Yarwood, Ph.D., is an Associate Teaching Professor in the Department of Psychology at Penn State-University Park. Dr. Guthrie Yarwood received her Ph.D. in Experimental

Psychology, with a specialization in social psychology, from Texas Tech University. Her teaching interests are focused in the area of social and personality psychology, including human emotion, personality psychology, interpersonal relationships, and social psychology generally. Dr. Guthrie Yarwood continues to conduct research with her undergraduate students in areas that parallel her own research, including on emotions such as nostalgia, missing, schadenfreude, and contempt.

CHAPTER 1: WHAT IS AN EMOTION?

Chapter 1 Learning Objectives

- What is the definition of an emotion?
- What are the components of an emotion?
- How do emotions differ from moods and traits?

Defining an Emotion

Is it an emotion?

Below are two interactive activities that require you to drag a "Yes" or a "No" into the drop boxes next to terms that may or may not be an emotion. If you think the term next to the drop box is an emotion, drag the "Yes" label into the box. If you do not think the term is an emotion, drag the "No" label into the corresponding drop box.

Below are two H5P activities that require the user to drag a yes or no label into the drop box corresponding with the term next to it to answer the question "Is this an emotion"? The drop boxes are labeled with the term in the name for easy identification. For example: the drop box for the term "feeling pleasant" is labeled "Feeling pleasant drop box". "feeling pleasant" is the term the user is to assess as an emotion or not. drag the yes text box or the no text box into the "feeling pleasant" drop box to answer.

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How is an emotion defined?

Keltner and Gross (1999, p. 468) define an emotion as an "episodic, relatively short-term, biologically-based patterns of perception, experience, physiology, action, and communication that occur in response to specific physical and social challenges and opportunities." Let's break this definition down.

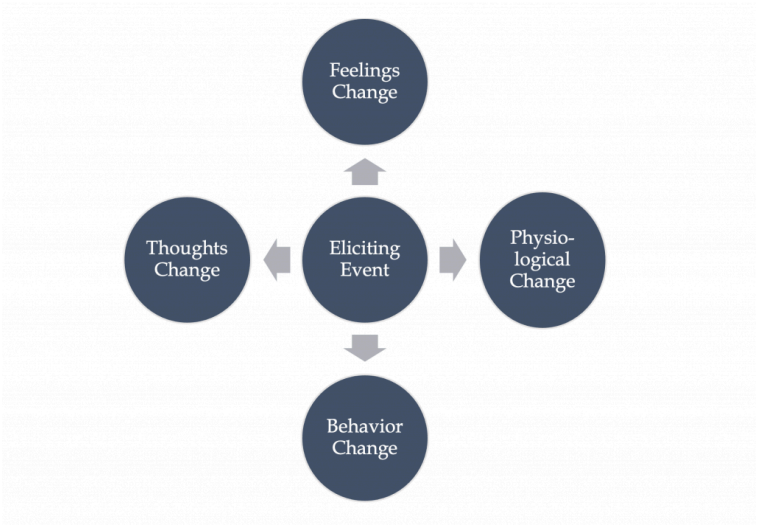
An emotion is comprised of four components, as displayed in Figure 1. As identified by Keltner and Gross (1999), The four components are behaviors ("action" and "communication"), subjective feelings ("experience"), thoughts ("perception"), and physiology ("physiology"). These four components change after an eliciting event occurs. An eliciting event is the situational cause that activates changes in these four components. An eliciting event could be external to the self, such as when the presence of a bear in our environment would cause fear. The eliciting event could be internal to the self, such as when we experience a drop in self-esteem because we lied to our friend, thus causing the emotion guilt.

It is important to note that Keltner and Gross' (1999) definition suggests that emotions are evolutionarily adaptive ("occur in response to physical and social challenges and opportunities"). This means that the emotion helps us to solve adaptive problems (the "challenges and opportunities") and thus increases the survival of genes. For instance, the emotion disgust helps us to solve the adaptive problem of consuming poisonous food. Thus, disgust would be the adaptation that developed such that when we experience disgust we avoid the food that elicited the disgust. As we will discuss later, some researchers believe that emotions are adaptive, whereas others believe they are not adaptive.

Human emotion is a sub-field of social psychology. Social psychology is a field of psychology that focuses on situational causes of behaviors, thoughts, and feelings. Thus, from a social psychology perspective, the eliciting event is the situational influence that causes the emotion. When the situation or eliciting event changes, we experience these 4 subsequent changes, which comprise the emotion.

Figure 1

Representation of the relationship between the eliciting events and four emotions components



A diagram showing 4 different changes based on an eliciting event.

Behavior changes are defined as any change in observable behavior during the emotion episode. Behavior changes include facial expressions, approach/avoidance behavior, and changes in vocal tone. Subjective feelings are conscious, self-reported feelings. How are you feeling right now? Bored? Angry? Joyful? These are your subjective feelings. Physiological changes include any changes in sympathetic nervous system (SNS) activity, changes in parasympathetic nervous system (PNS) activity, changes in brain activity, and changes in hormone and neurotransmitter levels. For instance, when we experience fear, our heart rate increases, a change in our physiology. Finally, the term we used to describe our thoughts about the eliciting event and our thoughts about our

emotional experiences is cognitive appraisals. Cognitive appraisals represent any change in thoughts, perceptions, and interpretations. Specifically, cognitive appraisals may include interpretation of the eliciting event (i.e. what caused the emotion?), and interpretations of other component changes (why is our heart beating? Why are we running away?). Later in the course, we will discuss a variety of cognitive appraisal dimensions. Some of these are:

- Do we feel unpleasant or pleasant?
- Is the eliciting event expected or novel and unexpected?
- Do we perceive that someone violated a moral?
- Do we perceive whether our self-esteem dropped? or increased?

Emotions researchers generally agree that an emotion comprises these four component changes and that these components change after an eliciting event occurs. Although, some disagree over whether two components are required – behavior changes and cognitive appraisals (those highlighted circles in Figure 1 above). Often, emotion researchers focus their research area on a specific component area. For example, some researchers focus on cognitive appraisals, whereas others may focus on physiological changes.

Re-Try 'Is it an emotion?' Activity

Below are two interactive activities that require you to drag a "Yes" or a "No" into the drop boxes next to terms that may or may not be an emotion. If you think the term next to the drop box is

an emotion, drag the "Yes" label into the box. If you do not think the term is an emotion, drag the "No" label into the corresponding drop box. You can look at your previous answers by clicking here

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Differentiating Emotions from Other Constructs

Another way to understand an emotion is to compare an emotion to other psychological constructs that may seem similar, but are actually different. Emotions are different from the following constructs (Ekman, 1994; although emotions may be included in the definition of these constructs):

- Drives (e.g., hunger)
- Moods (e.g., cranky)
- Affective Disorders (e.g., depression)
- Attitudes ("I hate Ohio State")
- Personality Traits (e.g., Extraversion)

Drive

A drive is a motivational state that occurs when someone's physical body or psychological condition is in a negative state of tension. A negative state of tension could be hunger, thirst, sexual deprivation, or mental exhaustion. Hunger, thirst, and other examples are considered "negative states" because the physical/mental body is lacking something such as food, water, sexual intercourse, or sleep. Drives motivate us to engage in behaviors that restore balance. For instance, hunger would motivate us to seek out and approach food. One reason a drive is different from an emotion is that drives are not caused by a change in the environment. In addition, drives are not always accompanied by cognitive appraisals. Now, an emotion could accompany a drive. For instance, when people are hungry, they often report feeling "hangry" or angry. Thus, this drive of hunger could be the eliciting event that causes us to experience the emotion anger.

Attitudes

Attitudes, sometimes called sentiments, are people's favorable or unfavorable attitudes toward an attitude object. The attitude object could be anything – relationship partner, a brand such as McDonald's, or even a snow shovel. An attitude is our stable evaluation of an attitude object. Thus, a major difference between an attitude and emotion is that an attitude tends to be more stable overtime, whereas an emotion lasts for a small period of time. Attitudes are comprised of three types of attitudes – cognitive, affective, and behavioral. Although these three components sound similar to the emotion components, they are different. A cognitive attitude represents the advantages and disadvantages of the attitude object. For instance, what are the pros and cons of Starbucks coffee? A pro could be that it is delicious, but a con could be that it is expensive! A behavioral attitude is our how our past behavior can inform our current attitudes. For instance, when we think about our past behavior, do we typically purchase Starbucks or Dunkin coffee? If Starbucks, then I may hold a favorable attitude toward Starbucks, but unfavorable attitude toward Dunkin. Finally, an affective attitude is defined as the emotions elicited when we think about or utilize the attitude object. For instance, drinking a cup of Starbucks could make me feel positive emotions such as joy and contentment, negative emotions such as guilt (maybe for spending too much money!), or even both positive and negative emotions – content and guilt at the same time! Thus, an attitude object can elicit certain emotions, but attitudes and emotions are separate constructs. A final difference is that a specific eliciting event is not causing this attitude. Attitudes are typically learned or acquired through our environments such as our upbringing and relationship experiences, and again, tend to remain stable over time.

Attitudes and emotions do hold similarities. Both include a cognitive component, which requires conscious or automatic evaluation of the attitude object or interpretation of the emotional

eliciting event. Both attitudes and emotions can cause behavior change. If we hold a favorable attitude toward Starbucks, we would approach and purchase a cup of coffee. If we hold an unfavorable attitude toward Starbucks, we would avoid purchasing or drinking a Starbucks coffee.

As we progress through the course, we will learn about constructs that some researchers believe are attitudes, while others believe are emotions. For example, some (Hendrick, & Hendrick, 1986) believe love is a favorable attitude toward a romantic partner. Conversely, some emotions researchers believe love is an emotion that is elicited by a romantic partner – but only for a brief period of time (Fredrickson, 2013). Different perspectives are present for hate – some view this as an unfavorable attitude toward another person, while others view hate as an emotion (Sternberg, 2003).

Personality Trait

Personality traits are feelings, thoughts, and behaviors that are stable over time and across situations. Unlike attitudes, personality traits have a strong genetic and biological component. Two universal personality models are the Five Factor Model (FFM), which includes the traits of Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism and the HEXACO model, which includes the traits of Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness. Unlike emotions, personality traits are not caused by the situation and should not vary with the situation. For instance, an individual high in Agreeableness should get along well with others in different situations – at work, at home, during a conflict, during a cooperative game, etc. An emotional perspective would state that most people's emotions would differ across these situations – the conflict situation would elicit anger, while the cooperative game might elicit compassion. So, personality psychologists are interested in the way thoughts, feelings, and behaviors do NOT change over time.

Whereas, emotions researchers and social psychologists are interested in the way different situations cause different emotions. Another difference is that personality traits last over a longer period of time, while emotions lasts for a short period of time. Because personality traits are stable over time, we would expect a 4-year old high in Extraversion to still be high in Extraversion at age 50.

An emotion could be viewed as a sub-component of a personality trait. For instance, an individual high on Extraversion tends to experience positive emotions over time and across situations. Whereas an individual high in Neuroticism tends to experience negative emotions across situations and over time. Thus, our personality traits could cause the AMOUNT of an emotion we experience or HOW FREQUENTLY we experience an emotion. Another way to view the relationship between a personality trait and an emotion is to consider how the personality traits lowers the threshold to experience certain emotions (Frijda, 1994). For instance, someone high in Neuroticism has a lower threshold for negative emotions, which means when an eliciting event occurs, such as a bad grade, it's going to be easier for them to experience negative emotions. Conversely, an Extravert would have a low threshold for positive emotions, such that when an eliciting event occurs, such as a good grade, it's going to be easier for them to experience positive emotions. Keep in mind Extraverts and Neurotics are not going around constantly experiencing positive or negative emotions. An event still has to cause the experience of the emotions.

Moods

A mood is a generalized feeling state that lasts for a long period of time (i.e., hours, days, weeks). The eliciting event of the mood is unidentifiable. Many researchers believe moods are caused by physiological cycles and drives or environmental changes that occur at a nonconscious level (meaning people are not aware that these

changes cause a mood). People can identify the eliciting event of their emotion, but cannot identify the eliciting event of their mood. Moods are not accompanied by changes in behavior, such as changes in facial expression, vocal tone, or approach/avoidance behavior. In contrast, basic emotions researchers believe that emotions are accompanied by specific and clear changes in the face, in the voice, and in approach/avoidance behavior. These behaviors changes are unique to an emotion (the facial change for anger would look different than the facial change for fear). Moods appear to be a general or global feeling, whereas emotions represent a more specific feeling. For instance, people describe moods in broad terms such as "irritated, cranky, or feeling down." Whereas, people use specific emotion terms to describe their emotional states, such as "anger, sadness, and disgust." Thus, people may have greater difficulty identifying the feelings associated with a mood, possibly because the eliciting event of the mood is unclear.

Moods may cause emotions

Although moods and emotions are separate constructs, they still may have a causal relationship with each other. Similar to personality traits (see below), moods can make it easier to experience an emotion that is similar to the valence (positivity or negativity) of the mood. For instance, if we are in a good mood, we might be more likely to experience positive emotions such as joy and contentment. Similarly, if we are in a bad mood, we might be more likely to experience negative emotions such as anger or sadness. Because the mood changes our baseline to positive or negative, this mood essentially lowers the threshold to experience emotions similar in valence. In this same vein, experiencing a prolonged mood could make it harder for people to regulate or control their emotions. For instance, an individual in an irritable mood would have more difficulty suppressing or hiding sad facial expressions toward a friend who lost her dog.

Emotions may cause moods

In turn, experiencing the same emotion in quick succession could cause a prolonged mood. Dense emotional experiences occur when an eliciting event continues to elicit a specific emotion at very high levels of arousal with little time in between the eliciting events. In a dense emotional episode, people experience an intense emotion repeatedly, which in turn causes a positive or negative mood. For instance, if peers bully a child over and over at recess, these quick insults could cause a prolonged negative mood in the child.

Affective Disorders

A major difference between emotions, moods, and affective disorders is the length of time each construct lasts. Emotions last for seconds up to a few minutes, moods last for hours or days, and affective disorders last for weeks or months.

Identify the Construct!

Below are two interactive activities that require you to drag the appropriate type of construct into the drop boxes next to items that may or may not be an emotion. If you think the item listed is an emotion, drag the text that says "Emotion" into the drop box to the right of the item. Likewise for a personality trait, a mood, an affective disorder, or a drive item listed.

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The Duration of an Emotion

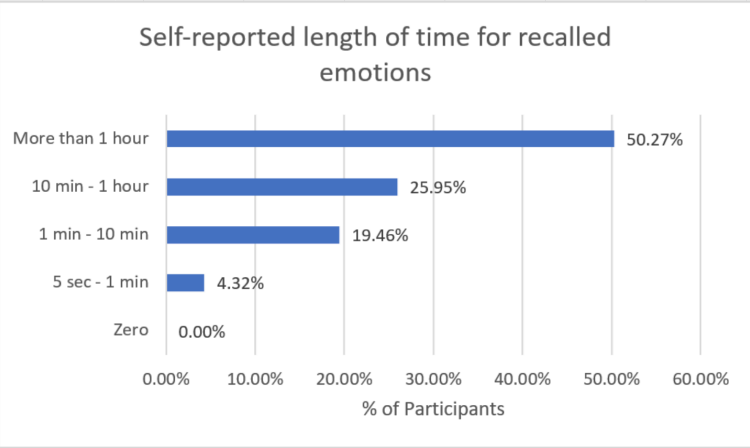
Why do emotions seem to last longer than they really do?

A common misperception is that emotions can last for hours or days. In a study (Sonnemans, 1990, as cited in Frijda, Mesquita, Sonnemans, & van Goozen, 1991), participants were asked to recall a recent emotional experience. After recalling the emotion episode, participants 1) selected the duration of emotion from a list of time period categories (see Figure 2), and 3) drew a graph to show the onset and length of emotion episode (Figure 3). To determine the length of emotion episode in Figure 3, researchers subtracted the time of emotion onset from the time at which participants' emotion returned to baseline. Figure 2 shows that 50% of participants reported the emotion lasted for longer than 1 hour, whereas 25% of the sample reported the emotion lasted for more than 10 minutes – up to 1 hour. Only a small percentage (4.32%) accurately reported that the emotion was short-lived. Figure 3 demonstrates that when participants are asked to graph the timing of their emotion episode, 68.64% of the sample reported that their emotion dissipated anywhere from 1-3 hours to more than 1 week after the eliciting event occurred! Only a small portion of the sample (11.35%) accurately drew that they returned to baseline in 10 minutes or less.

As mentioned above, emotions are short-lived changes caused by an eliciting event. So, why are people misperceiving the length of an emotion episode?

Figure 2

Self-reported length of time for recalled emotions

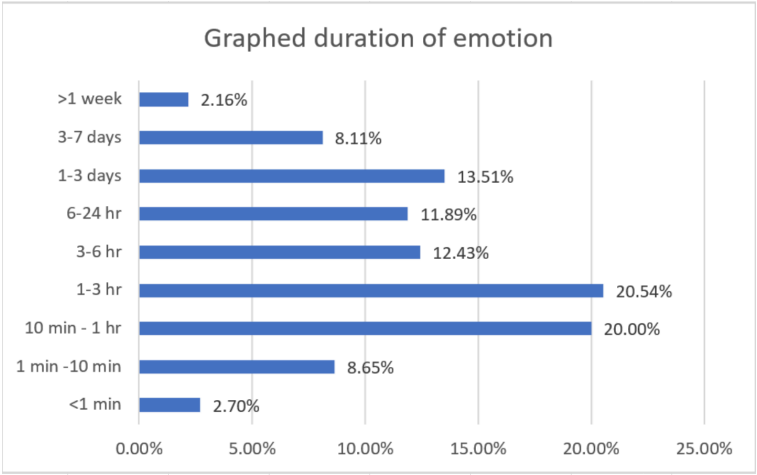


A bar-graph illustrating the findings reported by Frijda, Mesquita, Sonnemans, and van Goozen (1991)

Adapted from "The Duration of Affective Phenomena or Emotions, Sentiments, and Passions," by N.H. Frijda, B. Mesquita, J. Sonnemans, and S. van Goozen, 1991, in K.T. Strongman (Ed.) *International Review of Studies on Emotion*, (Vol. 1, pp. 189). Copyright 1991 by John Wiley & Sons.

Figure 3

Participants' graphed duration of emotion (time at which their emotion returned to baseline minus onset of emotion)



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A recurring emotion episode explains why people think emotions last longer than they do. Figure 4 shows people's perception of the length of an emotion episode. Figure 5 exhibits the actual recurring emotion episode. A recurring emotion episode occurs when we reexperience the eliciting event by recalling the emotion episode multiple times or even by discussing the emotional event with close others. Thus, recalling this event makes it seem like the emotion episode is lasting for hours, as in Figure 4. But, in reality, each time you recall or discuss the eliciting event, you are eliciting the emotion all over again! Hence, the term recurring emotion episodes!

So, each time you recall the eliciting event should be considered a separate emotion episode.

A recurring emotion episode has some interesting characteristics. First, when we experience a recurring emotion episode, the intensity of the emotion, label attributed to the emotion, and the eliciting event change. For instance, let's say your flight is cancelled so you miss an important work function. When you first learn your flight is cancelled (the eliciting event), you experience high levels of rage. So, then an hour later, you call your significant other and recount the eliciting event to them, and experience this same emotion again, although this time your emotion would be less intense and now you might label the emotion anger. Then, the next day you recall the flight cancellation again, and still experience a negative emotion, but this time the emotion is less intense and you now label it annoyance. In total, each time you recall the original eliciting event, the felt intensity of the emotion decreases, the emotion label changes (rage, to anger, to annoyance). In addition, the cause of the emotion changes. In the original episode, you experienced the eliciting event of the flight cancellation. Following this original episode, the eliciting event changed to your conversation, and then your recalled memory. The figure below demonstrates how intensity of the emotion would change as the emotion episode recurs.

Figure 4

People's perception of emotion episode

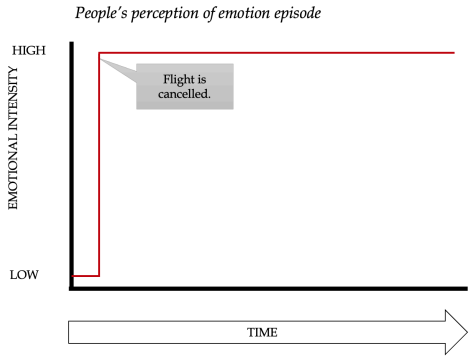

Figure 4: People's Perception of emotion episode

Figure 5

Visual of recurring emotion episode

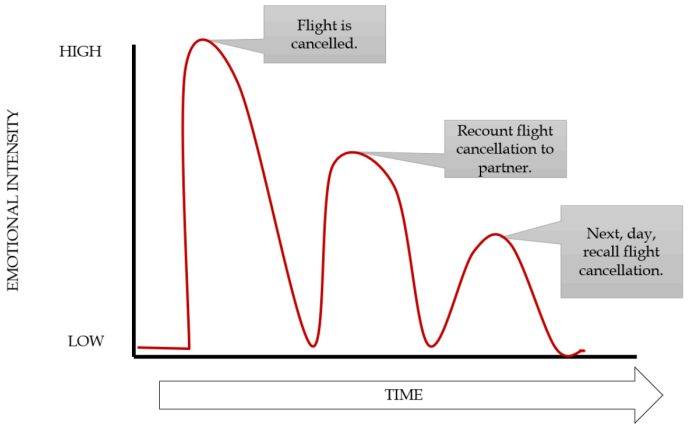

Figure 5: Visual of recurring emotion episode

Summary of an Emotion

An emotion is caused by an eliciting event or the situational cause of the emotion. After the eliciting event occurs, the following four emotion components change: behaviors, cognitive appraisals, subjective feelings, and physiology. Researchers disagree on whether behavior and cognitive appraisals are *required* changes to experience an emotion.

Emotions are different from other psychological concepts. Unlike drives and moods, an eliciting event is required to cause the change in the four emotion components. In general, emotions last for a shorter period of time compared to moods, personality traits, and attitudes. Although emotions and personality are separate constructs, emotions do contribute to our personality traits and attitudes. Finally, although moods and emotions are separate constructs, emotions can cause moods and mood can cause emotions.

Yale Expert Interview: Dr. Lisa Feldman Barrett

Watch from beginning to 9:46

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End of Chapter Activities (Chapter 1)

Is it an emotion?

Below are two interactive activities that require you to drag a "Yes" or a "No" into the drop boxes next to terms that may or may not be an emotion. If you think the term next to the drop box is an emotion, drag the "Yes" label into the box. If you do not think the term is an emotion, drag the "No" label into the corresponding drop box.

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Identify the Construct!

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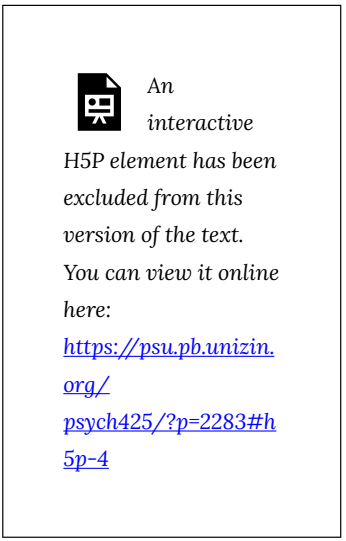

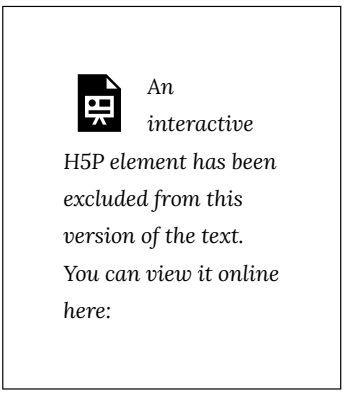

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CHAPTER 2: CLASSICAL THEORIES OF EMOTION

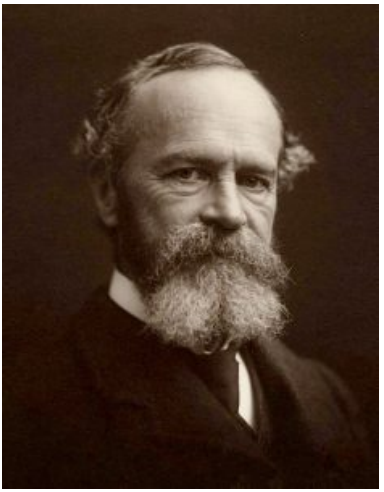
Chapter 2 Learning Objectives

- According to each theory, which components of emotion are most important?
- What are the differences between the following theories: James-Lange, Cannon-Bard, and Schachter-Singer?
- What are the strengths and limitations of each theory?

Chapter 2 Introduction

This chapter will cover older, classic theories of emotion. These theories provide the foundation for the modern perspectives we will discuss in the next chapter. As your read about each theory, think about which of the four emotion components the theories emphasize. For instance, do the theorists believe behavior changes are most important? Cognitive appraisal?

James-Lange Theory

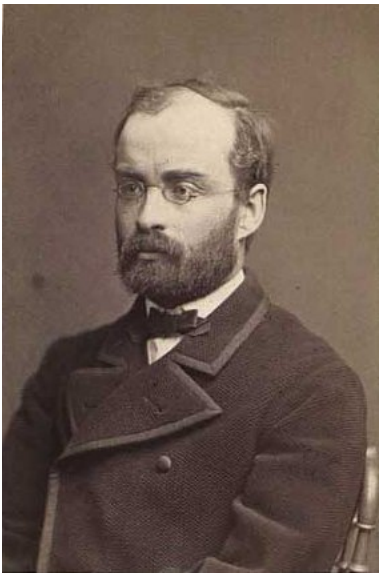


William James
Notman Studios (photographer) – [1] MS Am 1092 (1185), Series II, 23, Houghton Library, Harvard University
William James (January 11, 1842 – August 26, 1910). MS Am 1092 (1185), Series II, 23, Houghton Library, Harvard University Peter Most – Royal Library, Copenhagen

William James and Carl Lange developed two early theories on emotion around the same time. James was born in New York City and received a medical degree but never practiced medicine. Instead, he started teaching university psychology courses and is now considered one of the founders of psychology. James' brother, Henry James, was a novelist and wrote The Portrait of a Lady. For more information on William James', see this link. In 1884, James published an article entitled "What Is an Emotion?" Carl Lange was a Danish medical doctor (who looks like actor Jude Law!). His research focused on neurological complications and eventually in 1885 he published a book called "On Emotions: A Psycho-Physiological Study." James (1884) and Lange (1885) proposed similar theories on the function of an emotion. Eventually, their ideas were combined into one overarching theory called "James-Lange Theory."

The foundation of James-Lange theory is evolutionary theory. Influenced by Darwin, both James and Lange assumed that emotions were developed to solve adaptive problems and thus, emotions function to increase the survival of our genes. James-Lange Theory proposes that emotions are essentially the way our

physical body reacts to an eliciting event. Further, emotion labels (e.g., fear, disgust, anger) are labels that we use to describe the way our body changes after the eliciting event occurs. Specifically, James-Lange posits that we first notice physiological and behavior changes and we use our observation of these changes to label our emotion. According to James-Lange, our subjective feelings, not our cognitive appraisals, represent the perception of the body's behavior and physiological changes. For instance, you might notice your heart rate increase (physiological change) and see yourself attacking (a behavior change), and therefore conclude that you must be angry. A sensation from our muscles or our internal organs is a requirement for an emotion to occur. In fact, James believed that our sensations were positively correlated with the feeling of emotion – such that as our bodily sensations decrease, our emotional experience decreases at the same time. Today, we know this statement is incorrect. Some positive emotions (e.g., contentment) and negative emotions (e.g., sadness) emotions are associated with low levels of sensation or arousal.

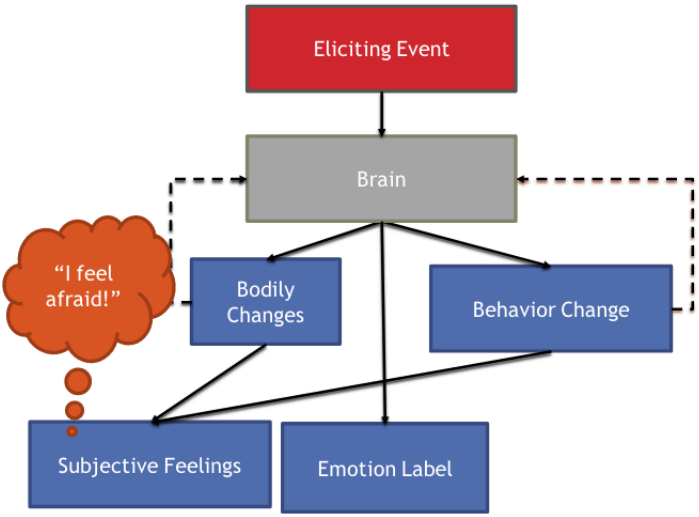


Carl Henrik Lange (1834-1900), *Danish physician and psychologist*
Peter Most – Royal Library, Copenhagen

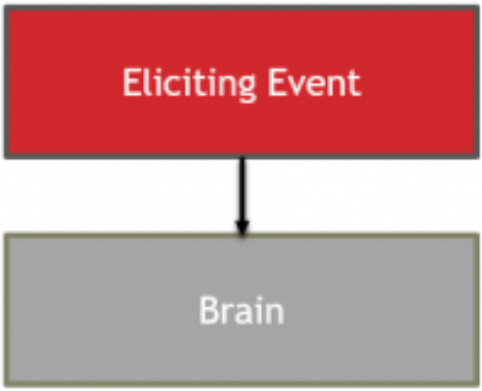
In the following section, we will use the graphical representation in Figure 1 to break-down James-Lange theory. Pay attention to the order of the emotion components as hypothesized by this theory.

Figure 1.

Graphical representation of James-Lange Theory (James, 1884; Lange, 1885)

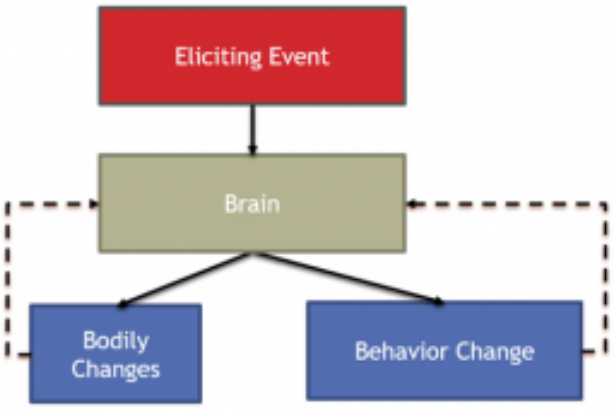


As shown below, when the eliciting events occurs (such as the presence of a bear), the brain quickly and automatically perceives the change in the environment.



Part of the graphical representation explaining James-Lange Theory.

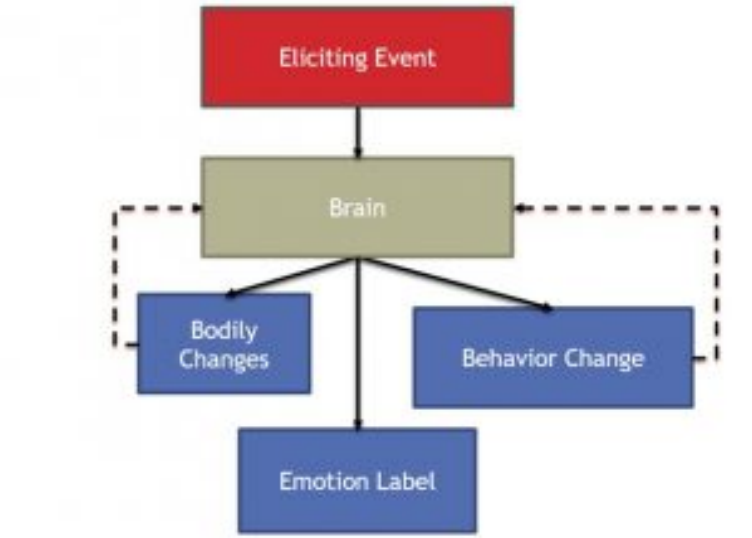
Then, the brain triggers bodily and behavior changes, as shown below. James and Lange used the term "bodily changes" to represent physiological changes, not changes in behavior such as facial expressions and approach/avoidance movements. According to this theory, bodily changes occur within our organs such as the stomach and liver. This is correct – today we would conceptualize these internal changes as changes in our sympathetic and parasympathetic nervous systems. In addition, they hypothesize that behavior changes are automatic and reflex-like — at this point in the emotion episode we do not have time to consciously think about how we should react to the bear.



Part of the graphical representation explaining James-Lange Theory.

In the above figure, feedback loops are represented by the dotted lines. These feedback loops suggest that information about automatic bodily (physiology) and behavior changes is quickly and non-consciously communicated back to the brain. This communication between our body and brain occurs before we can consciously label the emotion.

After the brain receives information on the bodily and behavior changes, then we can consciously label the emotion, as shown below. For James-Lange, the emotion label is caused by our perceptions of our body's responses (both physiological and behavioral) to the event. One of the major tenets of this theory is that emotions are labels we give to the way the body (both physiologically and behaviorally) reacts to certain situations. For example, you notice yourself sweating and running away, and eventually you consciously think, "I'm sweating and running away, so my emotion must be fear."

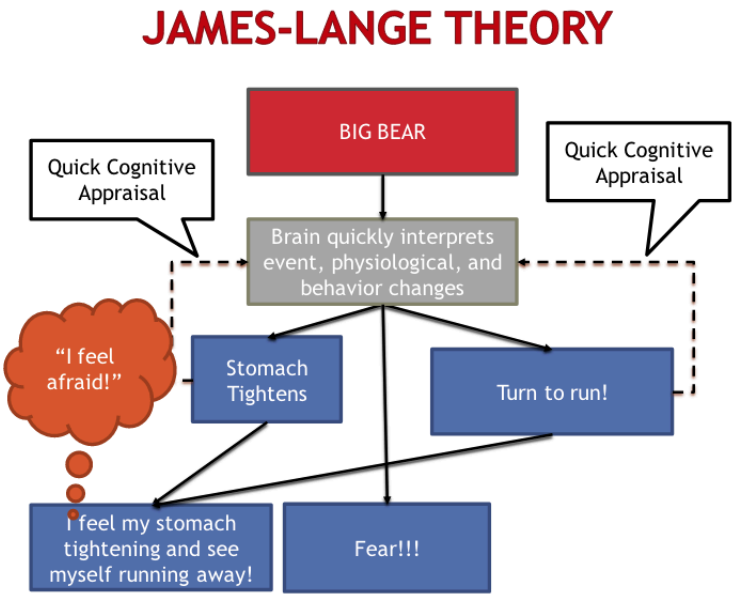


Part of the graphical representation explaining James-Lange Theory.

The figure below provides an example of how James-Lange would describe the presence of a bear causing the emotion fear.So, for James-Lange, to experience an emotion, bodily and behavior changes are required. You might notice that James-Lange did not discuss cognitive appraisals. This was one of the criticisms of their theory. At the time of the theories, people pointed out that the feedback loops sounded like a quick, nonconscious cognitive appraisal. Today, we know that cognitive appraisal can occur at both the automatic and conscious levels

Although, it might be that James' and Lange's definition of perception of bodily and behavior changes is actually a combination

of cognitive appraisals and subjective feelings. Thus, perceiving the bodily and behavior changes might represent cognitive appraisals, whereas the specific emotion label represents subjective feelings. In fact, after receiving criticism, James did revise his theory to suggest that after we self-report on our subjective feelings, we can experience a slow cognitive appraisal.



An eliciting event of seeing a bear explained using James-Lange Theory

Strengths and Weaknesses of James-Lange Theory

An obvious strength is that James and Lange were the first individuals to consider the causes of our emotion labels (although Darwin had already discussed emotions as adaptive in animals). In addition, they were the first to speak of bodily and behavior changes as separate causes of an emotion.

Major critics of James-Lange Theory were Cannon (1927) and Bard (1934). At a similar time in history, they were developing a different theory of emotion. One criticism they posed was that bodily changes (remember those are physiological changes!) occur slower than the conscious feeling experience of an emotion. Cannon and Bard believed physiological and behavior changes could occur after we already have the subjective feeling. Based on this assumption, Cannon and Bard stated that bodily changes in our organs cannot determine the emotion label. Instead, they believed our interpretation or perception of the eliciting event is the stronger determination of the emotion label. Cannon and Bard were the first to suggest that our cognitive appraisal – our interpretation of the eliciting event – is important for understanding our emotional experience. Cannon and Bard also pointed out that specific bodily changes may not match specific emotions. For instance, we might experience our stomach tighten (a physiological change) when we are scared or excited. We might exhibit approach behavior when we love someone and when we are angry toward someone. So, we know today, that we cannot use one physiological or behavior change to identify our emotion.

Another weakness of James-Lange theory is that they confused two of the emotion components – subjective feelings and cognitive appraisals. It was not until after James-Lange Theory was developed, that psychologists discussed these two terms as separate components of emotion.

Cannon-Bard Theory

Walter Cannon
Credit: Portrait of Walter Bradford Cannon, seated, wearing lab coat. Credit: Wellcome Collection. Attribution 4.0 International (CC BY 4.0)

Walter Cannon (1927) and Philip Bard (1934) developed another theory on emotion. In 1900, Walter Cannon received his medical degree from Harvard Medical School. During his time in medical school, Cannon utilized x-rays to enhance his understanding of the digestive system. After medical school, Cannon was hired an in instructor of physiology in the Department of Physiology at Harvard Medical School. He was quickly promoted to an Assistant Professor, and eventually became the chairman of the Department of Physiology in 1906. Cannon is known for discovering homeostasis

and the sympathetic nervous system and for labeling the fear response "fight-or-flight." For more information about Cannon, visit this website.

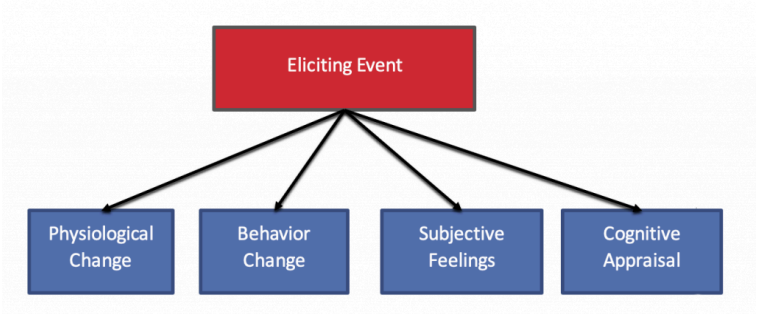
Archibald "Philip" Bard received an undergraduate degree in biology from Princeton University (he had to request an exception to attend the university because married undergraduates were forbidden, and Bard was already married!). After graduating with Honors, he was admitted to a doctoral program in physiology at Harvard Medical School, under the supervision of Cannon. From there, he held professorships at Princeton, Johns Hopkins, and Harvard. Bard was credited with linking the central nervous system to sexual behaviors, for identifying functions of the hypothalamus, and for determining that removing the cerebral cortex in cats increased the cats' tendency to anger, a process he called "sham rage" (Harrison, 1997).

Cannon-Bard Theory began with the work of Cannon. He identified several problems with James-Lange Theory (Cannon, 1927; see prior section on strengths and weaknesses of James-Lange Theory). In his experiments on cats and other animals, Cannon witnessed emotional responses even though the brain could no longer communicate with the body (see Bard's sham rage findings above). These findings directly contradicted James-Lange, who suggested that information about physiological and behavior changes was quickly sent to the brain for processing. Cannon's thesis was that for several different discrete emotions, animals and people show the same bodily changes. For example, when your heart is racing you may be experiencing fear, anger, or joy. This means that the brain cannot use only our bodily change to identify the emotion label – something else must tell us whether we are fearful, angry, or joyful. Together, Cannon and Bard conducted experiments to test their theory. Through their research, Cannon and Bard concluded that the body is not required to experience an emotion. Thus, for Cannon and Bard, changes in physiology, behavior, subjective feelings, and cognitive appraisal occur separately, but

simultaneously. Separate means the presence of each component does not influence the other components. So, an increase in heart rate doesn't influence our subjective feelings. This contrasts with James-Lange who said both physiological and behavior changes determined our subjective feelings. Simultaneous means after the eliciting event occurs, all four components change at the same time. Again, this differs from James-Lange who suggested physiological and behavior changes occurred first, following by quick cognitive appraisals, and then followed by subjective feelings and slow cognitive appraisals.

Figure 2

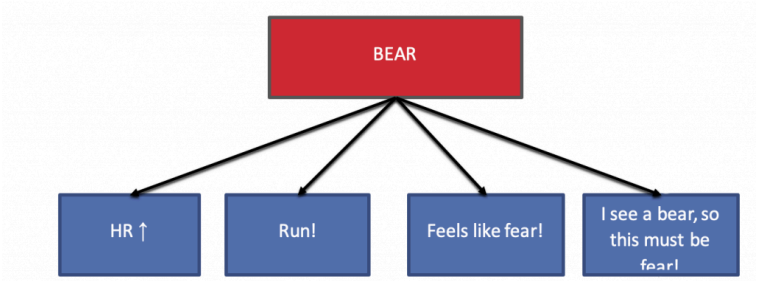
Model of Cannon-Bard Theory



An eliciting event and the four component changes

Figure 3

Model of Cannon-Bard Theory with Bear as Eliciting Event



An eliciting event of seeing a bear, and the four component changes that follow.

Strengths and Weakness of Cannon-Bard Theory

A major strength of Cannon-Bard is that their theory was tested through experiments with animals. A second strength is that Cannon-Bard were the first theorists to clearly identify the importance of cognitive appraisals.

Yet, unlike James-Lange Theory, Cannon-Bard did not discuss the differences between quick and slow cognitive appraisals. They also did not consider whether certain emotion components occur earlier in time – for instance subjective feelings should occur later in the episode because these represent our consciously reported feelings. Finally, a large amount of evidence contradicts Cannon-Bard Theory. Today, we know that a sudden event can quickly elicit physiological and behavior changes before we consciously process emotional experience. For instance, a gunshot would likely quickly increase our heartrate before we can identify the eliciting event or the emotion label.

Schachter-Singer Two-Factor Theory

A black and white photograph of Stanley Schachter.

Stanley Schachter was born in Queens, New York. He attended Yale University for art history, eventually switching to psychology. After his undergraduate years, he received a Master's in Psychology from Yale University and worked closely with Clark Hull (a learning theorist; drive reduction theory). After working for a bit, he attended MIT for a doctoral degree under Kurt Lewin (a Gestalt psychologist and early founder of social psychology). His student peers included other famous social psychologists like Leon Festinger (cognitive dissonance theory), Harold Kelley (covariation model; interdependence theory), and John Thibaut (interdependence theory). When Lewin suddenly died, Festinger took over Lewin's lab and became Schachter's doctoral adviser. Eventually, Festinger moved the doctoral program to the University of Michigan, where Schachter was awarded his doctorate in psychology. Schachter held positions at the University of Minnesota and later returned to his roots at Columbia University.

Jerome Singer was born in the Bronx, New York. Singer attended a doctoral program in psychology at the University of Minnesota

under his adviser – Stanley Schachter! He held professorships at Penn State University (woo hoo!) and the State University of New York's Stony Brook. It is important to note that Schachter and Singer were trained as social psychologists, whereas Cannon and Bard were trained as medical doctors and physiologists. Their early academic programs clearly influenced their views of emotion.

A photograph of Jerome Singer

Schachter and Singer's (1962) Two-Factor Theory of Emotion suggests that physiological arousal determines the strength of the emotion, while cognitive appraisal identifies the emotion label. So, in this theory, the "two-factor" represents physiological change and cognitive appraisal change.

Figure 5

Model of Schachter-Singer's Two-Factor Theory of Emotion

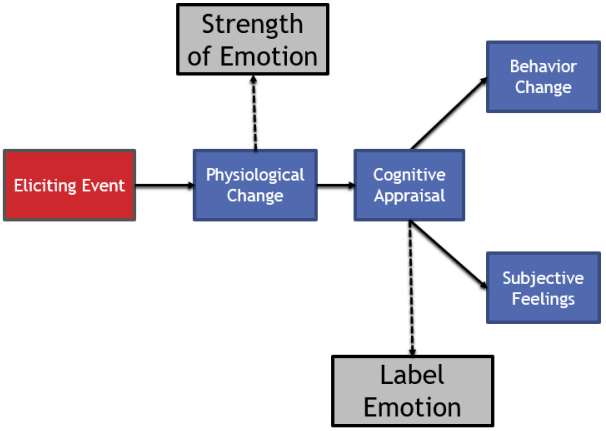
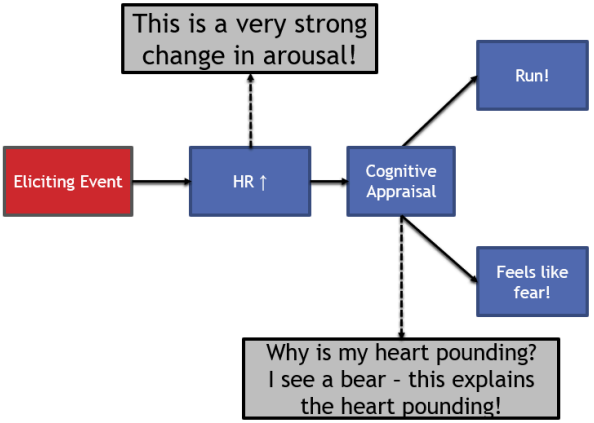
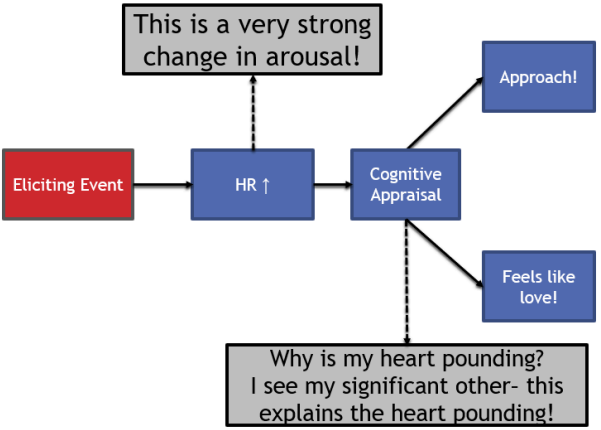


Figure 5. A flowchart representing Schachter-Singer's Two-Factor Theory of Emotion

Figure 5 above shows their theory. The eliciting event causes a change in physiology and a change in cognitive appraisal. According to this theory, physical arousal occurs first and instigates the cognitive appraisal process. Physiological changes tell us how intensely we are experiencing the emotion. High levels of physiological arousal would represent a strong or intense emotion, whereas low levels of physiological arousal represent a weak or less intense level of arousal. According to Schachter and Singer, we cannot determine the emotion label from our arousal level. This is because most emotions evoke similar physiological responses (heart beating, sweating, pupil dilation). Our cognitive appraisal of the event and of our physiological changes determine the label we attach to our emotional experience. This cognitive appraisal could be quick and automatic or slow and conscious. Our cognitive appraisal determines our behavior changes and subjective feelings. In other words, we don't know how to behave or how to consciously label our emotion until we appraise the situation!



The familiar flowchart of the Schachter-Singer theory, with the eliciting event as seeing a bear.



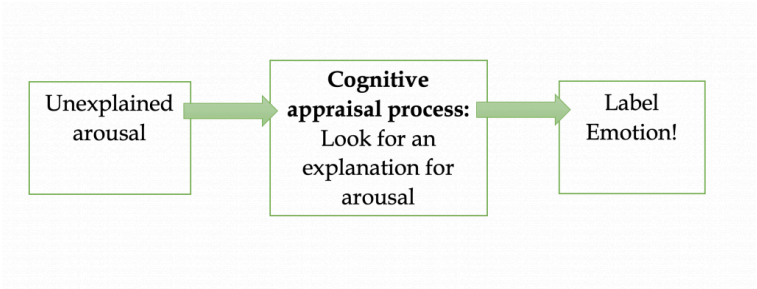
The familiar flowchart of the Schachter-Singer theory, with the eliciting event as seeing a significant other (instead of a bear).

Compare the above two graphical representations of the two-factor theory of emotion. In both figures, the physiological change is the same – our heart rate increases. But, in the top figure, the eliciting event is a bear and in the bottom figure the eliciting event

is a romantic partner. So, to correctly label our emotion, we cannot rely on our heart rate. Schachter and Singer would say we notice our heart beating and look around to determine why our heart is racing. If we see a bear, then we label the emotion as fear, run away, and report subjective feelings of fear. But, if we see our romantic partner, then we label the emotion love, approach our partner, and report subjective feelings of love! This suggests that we could potentially pick the wrong eliciting event and identify our emotion incorrectly.

Schachter-Singer; Unexplained Arousal

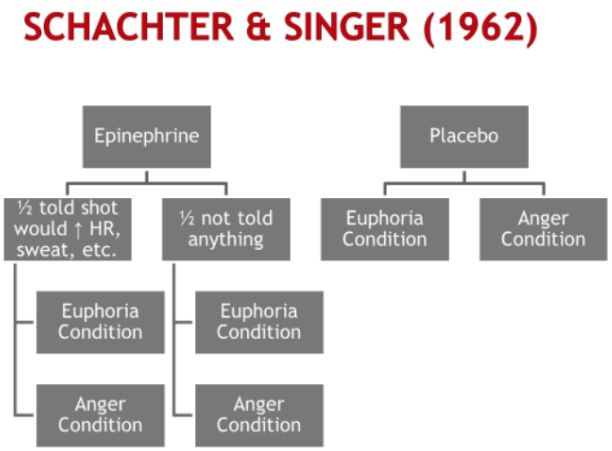
Schachter and Singer called changes in physiological arousal prior to cognitive appraisal processes **unexplained arousa**l. Unexplained arousal is how intensely we experience an emotion before we label the emotion. It's unexplained because the cognitive appraisal has not yet occurred. This concept suggests that we will not engage in cognitive appraisal unless we are experiencing physiological arousal first (see figure below). In their theory, unexplained arousal is important because often people identify the eliciting event incorrectly, and this causes them to mis-label their emotion experience. Schachter and Singer called this **misattribution of arousal**. Misattribution of arousal occurs when we pick the wrong attribution or explanation for our physiological change.



Unexplained Arousal Diagram

Schachter and Singer (1962) conducted a classic study to demonstrate misattribution of unexplained arousal (during Singer's time at Penn State!). Their study included three independent variables (IVs) and one dependent variable (DV). In the first IV, half

of the participants received an epinephrine shot (which increases physiological arousal) or received a placebo shot (which does not change arousal). It is important to note that participants who received the epinephrine shot experienced unexplained arousal. The second IV manipulated participants' expectations of the side effects of the shot. The second IV was only administered to participants in the experimental epinephrine condition. ½ participants were told the shot would increase their arousal – increase heart rate sweating, etc. The other ½ of the experimental participants were told nothing about the side effects. Now, remember all participants received the experimental epinephrine shot, but they don't know what chemicals were in the shot.
The third IV manipulated the eliciting event or situation. Both epinephrine and placebo participants received IV #3. Some of the participants experienced a euphoria condition while others experienced an anger situation. In the euphoria condition, a confederate in the waiting room for the study acted happy and friendly toward participants. In the anger condition, all participants were asked to complete an intrusive survey – during which the confederate became offended by the survey, acted angry, and stormed out of the waiting room. IV #3 is manipulating the eliciting event – how the confederate acts. The figure below graphically represents the three independent variable conditions.



A flowchart showing different emotional responses to an experiment conducted by Schachter and

After participants completed their assigned conditions, they reported how much happiness and how much anger they were feeling. These self-reports represent participants' conscious, subjective feelings of happiness (what we call joy today) and anger. Schachter and Singer converted their self-reported emotions into a happiness : anger ratio and this ratio represented the dependent variable.

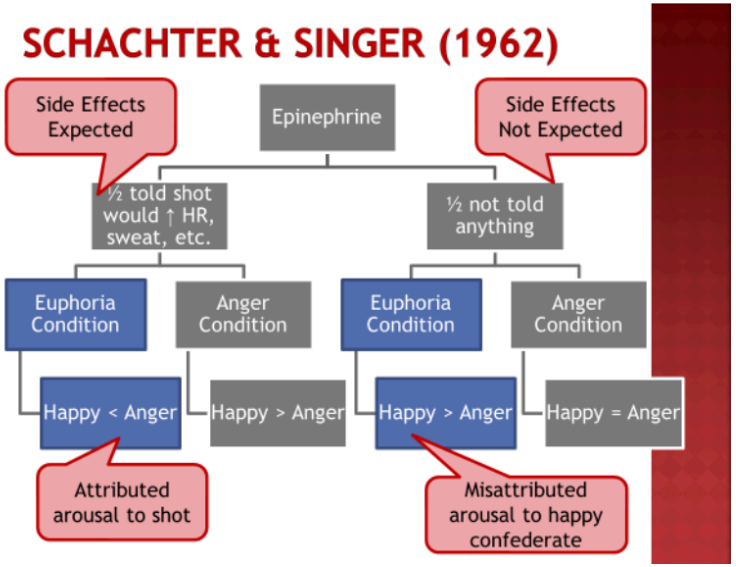
The first finding is about participants in the placebo condition – those who received a placebo shot. Placebo participants in the euphoric and anger conditions did not significantly differ in their happiness : anger feelings. This suggests that the euphoric and anger conditions did not change people emotions. This also confirms that when given the epinephrine shot, it was the epinephrine that changed arousal, not the euphoric versus anger conditions.

The more important results come from participants in the epinephrine condition.

First, let's compare participants in the euphoria condition (highlighted in blue in the figure below).

In the euphoria – side effects not expected group, participants reported more happiness than anger. Remember, participants in this group are experiencing physiological arousal, but since they do not know what was in the shot, they misattribute their arousal to the euphoric condition (the happy confederate), instead of attributing their arousal to the shot. Participants in this group might be thinking "My heart is beating. Why is my heart beating? Oh, it's because of that happy participant! I must be happy," and so they report more happiness than anger.

In the euphoria – side effects expected group, participants reported more anger than happiness. Now, participants in this group are also experiencing physiological arousal, but they were told the shot would increase their arousal. So, they correctly attribute their unexplained arousal to the shot, and not to the euphoric confederate. These participants might be thinking "My heart is beating because of the shot. So, my heart can't be beating because of the happy confederate. So, I am not really happy" and they reported low levels of happiness.



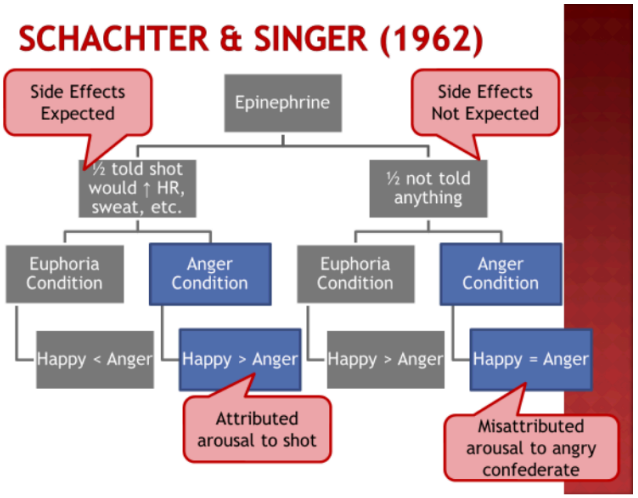
A flowchart of another experiment by Schachter & Singer, but focusing on Epinephrine distribution to patients and what they are told, when the epinephrine is administered.

Now, let's compare participants in the anger condition (highlighted in blue in the figure below)

In the anger – side effects not expected group, participants did not expect the shot to increase their arousal. So, they misattributed the side effects of the shot to the angry confederate. This group should have reported more anger than happiness, but they actually reported equal levels of anger and happiness. Participants in this group might be thinking "My heart is beating. Why is my heart beating? Oh, it's because of that angry participant! I must be angry," and they should have reported more anger than happiness.

In the anger – side effects expected group, participants did

expect arousal to be caused by the shot. So, these participants correctly attributed their change in arousal to the shot and not to the angry confederate. These participants reported more happiness than anger because they were thinking "My heart is beating because of the shot. So, my heart can't be beating because of the angry confederate. So, I am not really angry" and they reported low levels of anger.



Overall, Schachter and Singer's (1962) study demonstrated that people can experience misattribution of arousal because their cognitive appraisals identified the wrong eliciting event (it's the confederate, not the shot, that is causing my arousal!). Their work shows that emotion labels are determined by our interpretation of the situation and not by our physiological arousal. Further their work shows that when we experience physiological first, we then look to the situation to identify the cause of the arousal and to

label our emotion. Finally, their theory shows that our environment includes several situational variables, and these variables may interrupt the cognitive appraisal process, such that the type of emotion people report changes.

Some criticisms of this early study exist. First, the ratio of happy : angry feelings is confusing. Today, we would measure happiness and anger as separate dimensions. Second, baseline measures of arousal were not included. Epinephrine could change people's physiology in different amounts. This study focused on slow, cognitive appraisals – participants had the time to think about why they felt aroused and to consciously determine the emotion label. Today, we know that quick, automatic appraisal are important as well.

Real-Life Extension of Schachter and Singer (1962)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=170#oembed-1

Dutton and Aron (1974) conducted a study to evaluate how misattribution of arousal would operate in the real-world. Watch the below video that explains the study. While watching the video, consider the following questions:

1. **How did the males mis-attribute their emotional experiences?**

2. **Which eliciting event actually caused their arousal?**

3. **Which eliciting event did the males think**

caused their arousal?

Photo – Capilano Suspension Bridge in Vancouver

In study 1, Dutton and Aron (1974) included one quasi-independent variable. In this study, the quasi-IV was whether men were walking across a low bridge or across the high bridge in the picture above. This is a quasi-IV because Dutton and Aron could not randomly assign men to walk across the high or low bridge. It is important to note that Dutton and Aron assumed the males on the high bridge experienced more physiological arousal than males on the low bridge. They did not actually measure participants' arousal levels. While walking across the bridge, an attractive female experimenter stopped the males to ask them to participate in a study and to answer questions about how nature affects creative expression. At the end of this "fake" creativity study, the female experimenter provided her phone number to the male participants. The outcome

measure was the percentage of men who called the female experimenter in the days after the study ended.

In the low bridge condition, only 9% of the males called the female experimenter. In the high bridge condition, 39% of the males called the female experimenter – a significantly greater proportion! Dutton and Aron concluded that males in the high bridge condition misattributed their arousal to the attractive female experimenter, labeled their arousal as love or attraction, and thus called the female experimenter later (an approach behavior!). In reality, Dutton and Aron concluded, males in the high bridge condition were actually aroused because of fear due to the high bridge. So, males in the high bridge condition engaged in the cognitive appraisal process and identified the wrong eliciting event. Males in the low bridge condition probably did not experience arousal, so they may not have engaged in the cognitive appraisal process at all. Dutton and Aron's (1974) study might explain why people fall in love with each other after a traumatic event (a plot story of soooo many movies!). People misattribute their arousal from the traumatic event as caused by the romantic partner. But, in reality, it's not love – it's fear! Finally, if you wanted someone to fall in love with you, you could use this theory. Take your love interest to a high-arousal event (haunted house, scary movie) and hopefully they will attribute their arousal to love and not to fear!

Dutton and Aron (1974) supports Schachter and Singer's (1962) theory. When people experience arousal, they interpret the environment so they can label their emotion. But, a lot of the time, we probably don't have the introspective ability to accurately identify our true emotion! There's just too many variables to consider!

Summary of Classical Theories of Emotion

In this chapter, we discussed three classic theories of emotion: 1) James-Lange, 2) Cannon-Bard, and 3) Schachter and Singer. Each of these theories agree that an eliciting event activates changes in some or all of the emotion components. James-Lange focused on physiological and behavior changes as a cause of the emotion, later extending their work to discuss quick and slow cognitive appraisals. Cannon-Bard stated all four components occur separately, but simultaneously. Although Cannon-Bard did not emphasize one factor as more important, they were the first to clearly identify cognitive appraisals as an important and separate component from behavior, physiology, and subjective feelings. Schachter and Singer suggested two factors were important in labeling the emotion – unexplained physiological arousal and our attributions or appraisals of the emotion episode.

As mentioned above, Cannon-Bard has been refuted and today we only talk about this theory in a historical context. James-Lange Theory, derived from evolutionary theory, is the foundation for the modern perspective Basic Emotion Theory. Schachter-Singer provided the foundation for the modern Cognitive Appraisal Theory.

James-Lange Theory

Key Points:

- Evolutionary Perspective
- Bodily and behavior changes determine emotion
- Cognitive appraisal occurs quickly through unconscious processes in the brain.

Schachter-Singer Theory

Key Points:

- Cognitive Appraisal Theory
- Body determines strength, not label
- Unexplained arousal leads to cognitive appraisal
- Slower cognitive appraisal

Chapter 2 References

References

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CHAPTER 3: BASIC EMOTION THEORY AND SOCIAL CONSTRUCTIVIST THEORY

Chapter 3 Learning Objectives

- What is the categorical approach? [Note: categorical approach is the same concept as discrete emotions and distinct emotions.]
- From which classical theory was the categorical approach derived?
- What is the difference between a basic and distinct emotion?
- What support exists for basic emotions?
- What are some limitations of the basic emotion perspective?
- What are the differences in the basic emotion and social constructivist perspectives?
- What cross-cultural and gender/sex differences in emotion exist?
- Do the study findings on the four emotion components support basic emotion theory or social constructivist theory? Why?

Chapter 3 Introduction

Four Modern Perspectives on Emotion

Currently, four modern perspectives guide research in emotions. These four perspectives are:

1. Basic Emotion
2. Social Constructivist
3. Cognitive Appraisal
4. The Dimensional Approach.

Basic Emotion Theory views emotions as biological, universal, and adaptive. Conversely, **the social constructivist** approach views emotions as learned and culturally constructed. **Cognitive appraisal theory** highlights the importance of our cognitive appraisals or interpretations in determining our emotions. Finally, **the dimensional approach** emphasizes conscious, subjective feelings as determinants of emotions.

These four theories are intertwined. For instance, cognitive appraisal and dimensional theorists may ascribe to the basic emotion or social constructivist perspective. In other words, cognitive appraisal theorists might believe appraisals are culturally constructed or universal.

We will discuss each of these theories in-depth, and in later chapters discuss how each perspective views specific emotions such as anger, fear, and disgust.

Basic Emotion Perspective

Basic Emotion Perspective

Basic Emotion Theory: A Categorical Approach

The basic emotion approach uses a categorical approach to understand emotions. A categorical approach means that the goal is to identify separate groups or categories of emotions. Within basic emotions, the term discrete emotion (or distinct emotion) means that this emotion represents its own category. For example, basic theorists view fear, anger, and disgust as three separate discrete emotions. Rage, annoyance, and anger would be feelings that could be categorized within the discrete emotion anger. It is important to note that discrete/distinct emotions can be either universal and basic or socially constructed.

According to basic emotion theory, humans and animals experience discrete categories of each emotion because each emotion is an adaptation that developed to solve an adaptive problem. For instance, over time via evolution, the discrete emotion of fear developed as a mechanism to avoid danger and enhance the survival of our genes. According to basic emotion theories, *each* discrete emotion solves a *unique* adaptive problem. Table 1 below provides examples of discrete basic emotions and the adaptive problem the emotion might have evolved to solve.

Table 1

Adaptive Problems Solved by each Discrete Emotion

Discrete Emotion (i.e., the adaptation)	Adaptive Problem
Fear	Avoiding Danger
Disgust	Avoiding or Expelling Poisonous Food
Anger	Managing a Physical Threat in Environment
Guilt	Avoiding rejection from group due to violation of moral/social norms or maintain group membership
Embarrassment	Avoiding Rejection from group due to social conventional violation and communicating awareness of violation
Joy	Seeking valuable mates

Paul Ekman was one of the first psychologists to apply Darwinian theory to human emotion. According to Ekman and Cordaro (2011), two criteria must be met for a construct to be considered a basic emotion. First, the construct must have evolved in our past to solve an adaptive problem. Because people of all cultures would have experienced the same adaptive problems, emotions should be universal. Universal means that for a specific emotion, the four emotion components must change in the same way across all cultures. The second requirement is that the emotions are discrete and categorical. Because each emotion developed to solve a unique adaptive problem, each discrete emotion should be comprised of unique changes in the four components. For instance, the component changes for fear (e.g., screaming, running away) should be different from the component changes for anger (e.g., insulting someone, attacking, approaching).

Yale Expert Interview: Paul Ekman

*The below video is an interview conducted with Paul Ekman. In the beginning of the video he discussed how he came up with his ideas on measuring facial expression of emotion and how he and Friesen developed the FACS. Around 17:00 minutes, he discussed his theory on the universality of emotion and his work with the Fore tribe of New Guinea.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=183#oembed-1

Darwin's Evolutionary Theory of Emotions

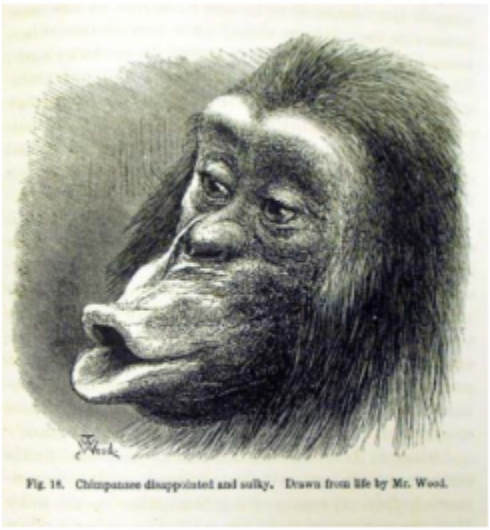
In 1872, Darwin published *The expression of the emotions in man and animals.* (See images below for photographic excerpts from his book). Darwin (1872) was the first person to discuss how emotions might be evolutionary adaptations. In his work, Darwin identified three principles to explain how emotions developed. Using the discrete emotion disgust, we are going to focus on one of his principles called the Principle of Serviceable Associated Habits. In certain situations, Darwin believed animals, including humans, engaged in controlled, voluntary movements because the movements helped them to solve a problem. Using disgust, this voluntary movement may be spitting out food or sticking one's

tongue out after tasting rotten food. At this point, Darwin emphasized the behavior changes were voluntary and thus not yet automatic and not yet considered an adaptation. He said all people who passed down their genes would experience these same behavior changes in the same situation – the situation of eating rotten food. Over a looong period of time, Darwin explained, as people continue to exhibit the voluntary behaviors to rotten food, the behavior changes become an automatic habit. Darwin's term habit is the same thing as an evolutionary adaptation. These habits or adaptations are genetically passed on to our offspring. Now, today, when we experience the emotion disgust we are motivated to automatically behave according to this learned habit. Remember, basic emotion theorists are looking for discrete, universal emotions. This means the behaviors, thoughts, and feelings subsumed within each emotion category should be different from other emotion categories because each emotion developed to solve a unique adaptive problem. In fact, Darwin himself believed humans and animals showed unique facial expression changes for each emotion.

For instance, in his book Darwin (Figure 1 below) shows a drawing of a disappointment facial expression in a chimpanzee. Figure 2 shows the human facial muscles Darwin identified as involved in an emotional expression. Finally, remember that James and Lange were heavily influenced by Darwin, and thus would have agreed with his theory of emotion.

Figure 1

Disappointment Facial Expression in Chimpanzee



An engraving of a sulking chimpanzee (Fig. 18) by Thomas William Wood (fl. 1855-1872)

Reproduced from *The Expression of the Emotions in Man and Animals* by C. Darwin, 1872, (https://www.gla.ac.uk/myglasgow/library/files/special/exhibns/month/nov2009.html). Copyright 1872 John Murray.

Figure 2

Human Facial Muscles Involved in Emotional Expression

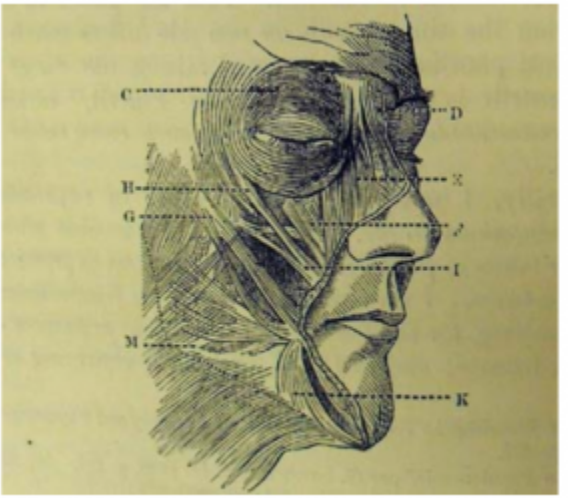
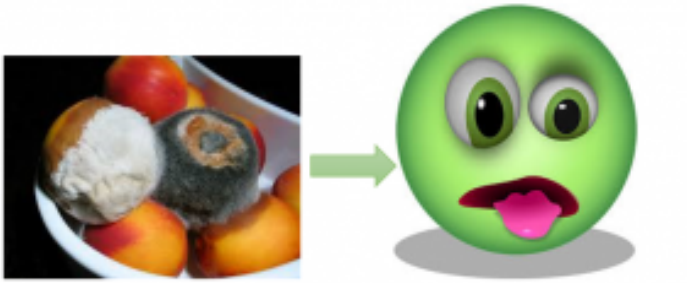


Diagram of facial muscles (Fig. 2), taken by Darwin from an 1858 work on the topic by Jacob Henle (1809-1885)

Reproduced from *The Expression of the Emotions in Man and Animals* by C. Darwin, 1872, (https://www.gla.ac.uk/myglasgow/library/files/special/exhibns/month/nov2009.html). Copyright 1872 John Murray.

Figure 3

Moldy Nectarines Elicit Facial Expressions of Disgust



Moldy Nectarines Reproduced from "Moldy Nectarines," 2006. Open Access. *GNU Free Documentation License*.. Retrieved from: https://commons.wikimedia.org/wiki/File:Moldy_nectarines.jpghttps://www.flickr.com/photos/tim_uk/8135755109/

Disgusting Emoji Reproduced from "14 Free Vector Graphics of Disgusting" by Pixabay. Free from: https://pixabay.com/vectors/search/disgusting/

Today, basic emotion theory accepts evolutionary theory as the cause for emotions. In the past, the adaptive problem (eating rotten food) designed the emotion construct (disgust). Today, the adaptive problem (eating rotten food) elicits the emotion disgust. Basic emotion theory suggests that the adaptive emotion increased our gene survival by dealing with threats to reproduction (e.g., disgust helps us to avoid death) or by enhancing reproductive opportunities (e.g., joy encourages people to explore and meet new potential mates).

Four Criteria for a Basic Emotion

Four criteria must be met for a construct to be considered a basic emotion. All of these criteria are derived from the assumption that emotions evolved to solve adaptive problems.

1. All people and animals experience the same universal, discrete basic emotions.
2. The emotion must lead to the same universal component changes in all people and animals. When experiencing an emotion, all humans and animals must show the same changes in behaviors and physiology. Further, all humans must report the same cognitive appraisals and subjective feelings. Further, the same eliciting event should cause the same emotion for all humans and animals.
3. Humans and animals should express the emotion early in life because the emotion is inherited.
4. Each emotion should cause a *unique* pattern of component changes in the emotion components because each emotion was designed to solve a *unique* adaptive problem. Further, if two separate emotions show the same change in component, then this would suggest those two separate emotions are actually the same basic emotion. For instance, some work has found that shame and guilt show the same changes in cognitive appraisals and physiology – which would suggest that shame and guilt might represent the same basic emotion!

Social Constructivist Perspective

The social constructivist perspective views emotions as learned constructs. Broadly, this view believes emotions are caused by the culture in which we are raised. But, more specifically, environmental causes of emotions could be our parents' rearing strategies, relationship experiences, gender roles, and even the media.

Video on Differences in Emotion Expression in Eastern and Western Cultures

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=187#oembed-1

Social constructivists highlight the fact that languages include a varying number of emotion words. For instance, the English language contains about 500 to 2,000 emotions words, whereas the Ifaluk (Western Pacific) language contains only 50 emotions words. Further, languages include different words to describe emotional experiences that are not translatable to other languages (see Table 2 below).

Table 2

Definitions of Emotion Words According to Each Language

Language	Emotion Word	
Czech	Litost	a state of torment created b
Danish	Hygge	an intimate feeling associat
German	Sehnsucht	a desire for alternative state
German	Waldeinsamkeit	the feeling of solitude, being
Greek	Nikhedonia	positive feeling when antici
Inuit	Iktsuarpok	the anticipation you feel wh check if they have arrived)
Japanese	Wabi-sabi	a "dark, desolate sublimity"
Russian	Tocka	a great spiritual anguish, oft
Scottish (old)	Misslie	alone, lonely, and/or solitar
Tagalog	Gigil	the irresistible urge to pinch
Thai	Greng-jai	the uneasy feeling you get w

Note. definitions derived from online dictionaries, such as this one, and this one

For more cross-cultural differences in emotions words, check out these two British of Psychological Society (BPS) articles:

- The first article can be found here
- And this article from the British Psychological Society reviews a 2019 study in Science.

The final evidence from language is that over time, some emotion words have been removed from languages all together, suggesting the emotions are not adaptive but instead are no longer felt! For example, in the 13th century, the English language included a term "accidie," which was an emotion experienced when men believed they disappointed God.

Comparing Eastern and Western Cultures

Much of the work supporting the social constructivist perspective compares the experiences of emotions between participants raised in Western Cultures to those of participants raised in Eastern Cultures. Eastern cultures emphasize relationship interdependence, hierarchy and status, whereas Western cultures emphasize individual uniqueness and equality. Based on these cultural differences, Easterners would be expected to experience more emotions related to hierarchy, violations of group norms, and maintaining group harmony. Conversely, Westerners would be expected to experience emotions related to violations of an individual's rights and to individual successes. Another differences between these two cultures is the experience of mixed emotions. Mixed emotions occur when we experience two different emotions at the same time, such as joy and sadness. Westerns seek to optimize positive emotions and minimize negative emotions. Conversely, Easterners are more comfortable balancing positive and negative emotions, and thus tend to experience mixed emotions more often and for a longer period of time.

Facial Expressions: Basic Emotions Theory

Basic Emotion or Socially Constructed Emotion?
In this section, we will look at cultural and universal findings for each of the four emotion component changes. As we progress through each section think about which perspective(s) these findings support.

Facial Expression Matching

Below are seven individuals displaying seven different emotions. There are also blank spaces below the seven pictures appropriately labeled 1-7. Using the numbers shown for each of the individuals, match an emotion to each of the displayed facial expressions.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=192#h5p-6

Now, answer the below two questions:

- Which emotions did you identify first?

- Which emotion did you identify last?

The above activity demonstrates a methodological approach used by Paul Ekman and colleagues (Ekman himself is in photo 2). Across many cultures, Ekman has found that participants can match each emotion to the correct facial expression at beyond chance levels. These findings have been replicated in Western and Eastern cultures. To Ekman, these findings demonstrated that basic emotions are universally identified by people of all cultures. In turn, this universal identification of facial expression suggests that all people in all cultures express emotions in the same way.

Test Your Knowledge!

Visit this website to test your ability to identify emotional expressions in the Fore tribe!

But, it could be possible that people in Western and Eastern cultures learn to show these same facial expressions, especially due to the greater flexibility with traveling in the 20th century and exposure to media. So, Ekman decided to recruit participants from small tribes who have had little exposure to other cultures. He replicated his work with members of the Fore Tribe in Papua New Guinea and the Sadong group from Borneo. In Ekman's classic study (Ekman, Sorenson, & Friesen, 1969) participants selected one word from a list of six emotions words that matched the facial expression in 30 different still photos. Each photo was displayed one at a time for 20 seconds. The photos displayed posed facial expressions for

1 of 6 emotions: happiness, surprise, fear, anger, disgust-contempt, and sadness. These labels were translated into appropriate languages. Some of the isolated cultures did not have words for disgust or surprise, so these participants were given an example that would elicit the emotion ("looking at something that stinks" for disgust, and "looking at something new" for surprise, p. 87). The individuals in the included photos were Caucasian males and females and included children and adults, actors, non-actors, college students, and individuals diagnosed with mental illnesses. Participants were from the United States, Brazil, Japan, Papua New Guinea, and Borneo. Table 3 displays the percentage of each sample who correctly identified the facial expression in the still photo. A majority of the participants from industrialized countries (USA, Brazil, Japan) correctly identified the facial expressions for all 6 emotions. The highest recognition rates were for happiness and the lowest were for anger and sadness (depending on the country). Participants living in isolated cultures showed high recognition rates for happiness and the majority of participants correctly identified sadness and anger, although these percentages were much smaller compared to the samples from the industrialized countries. Ekman and colleagues suggested the preliterate cultures showed lower recognition rates due to language barriers and a lack of experience completing similar tasks.

Table 3

Recognition Rates for Six Emotions Across Five Cultures

A table showing cross-cultural rates of recognition for a variety of emotion words.

Emotion Displayed on Face	United States	Brazil	Japan	Fore Tribe of New Guinea – Pidgin Language	Fore Tribe of New Guinea – Fore Language	Sadong Tribe of Borneo
Happy (H)	97 H	97 H	87 H	99 H	82 H	92 H
Fear (F)	88 F	77 F	71 F 26 Su	46 F 31 A	54 F 25 A	40 F 33 Su
Disgust-contempt (D)	82 D	86 D	82 D	29 D 23 A	44 D 30 A	26 Sa 23 H
Anger (A)	69 A 29 D	82 A	63 A 14 D	56 A 22 F	50 A 25 F	64 A
Surprise (Su)	91 Su	82 Su	87 Su	38 Su 30 F	45 F 19 A	36 Su 23 F
Sadness (Sa)	73 Sa	82 Sa	74 Sa	55 Sa 23 A	56 A	52 Sa

Reproduced from "Pan-cultural Elements in Facial Displays of Emotion," by P. Ekman, E.R. E.R. Sorenson, and W.V. Friesen, 1969, *Science*, *164*(3875), *p.* 87, (https://doi: 10.1126/science.164.3875.86). Copyright Note. For the Fore tribe, some words were in Pidgin language, others in Fore language.

In a later study (Ekman & Friesen, 1971), Fore tribe participants (adults and children) were told a story (see Table 4) and then shown a set of three faces. Participants were then asked to select the face that matched the emotion described in the story. Table 4 and Table

5 display results from adult and child participants, respectively. The majority of adult participants selected the correct photos for all six emotions. Yet, participants experienced some difficulty discriminating fear among faces showing surprise and happiness and surprise and sadness. Children seemed to actually do better than adults! Ekman and Friesen (1971) changed the methodology from prior studies because it was possible that isolated tribes might recognize facial expressions in Caucasians due to exposure to media and film from the Westernized world. Thus, these results provide support for basic emotion theory. In addition, the overwhelming recognition rates demonstrated by children further supports evolutionary theory – which suggests emotions are biological adaptations and thus should be expressed in young children.

Table 4

Emotion Stories from Ekman and Friesen (1971)

Correct Facial Expression	Emotional Story
Happiness	His (her) friends have come and he (she) is happy.
Sadness	His (her) child (mother) has died, and he (she) feels very sad.
Anger	He (she) is angry; or he (she) is angry, about to fight.
Surprise	He (she) is just now looking at something new and unexpected.
Disgust	He (she) is looking at something he (she) dislikes; or He (she) is looking at something which smells bad.
Fear	He (she) is sitting in his (her) house all alone, and there is no one else in the village. There is no knife, axe, or bow and arrow in the house. A widl pig is standing in the door of the house and the man (women)is looking at the pig and is very afraid of it. The pig has been standing in the doorway for a few minutes, and the person is looking at it very afraid and the pig won't move away from the door, and he (she) is afraid the pig will bite him (her).

Adapted from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, *Journal of Personality and Social Psychology*, 17(2), *p. 126*, (https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association.

The tables listed below have an emotion that is described in the story listed above them.

Table 5

Results for Adult Participants (Ekman & Friesen, 1971)

Happiness Story

Emotion Shown in the three photographs	# Participants	% Choosing correct face
Happiness, Surprise, disgust	62	90%
Happiness, Surprise, sadness	57	93%
Happiness, Fear, anger	63	86%
Happiness, Disgust, anger	36	100%

Anger Story

Emotion Shown in the three photographs	# Participants	% Choosing correct face
Anger, Sadness, surprise	66	82%
Anger, Disgust, surprise	31	87%
Anger, Fear, sadness	31	87%

Sadness Story

Emotion Shown in the three photographs	# Participants	% Choosing correct face
Anger, fear	64	81%
Anger, surprise	26	81%
Anger, happiness	31	87%
Anger, disgust	35	69%
Disgust, surprise	35	77%

Disgust (smell story)

Emotion Shown in the three photographs	# Participants	% Choosing correct face
Disgust, Sadness, surprise	65	77%

Disgust (Dislike story)

Emotion Shown in three photographs	# Participants	% Choosing correct face
Disgust, Sadness, surprise	36	89%

Surprise Story

Emotion Shown in three photographs	# Participants	% Choosing correct face
Surprise, Fear, disgust	31	71%
Surprise, Happiness, anger	31	65%

Fear Story

Emotion Shown in the two incorrect photographs	# Participants	% Choosing correct face
Fear, Anger, disgust	92	64%
Fear, Sadness, disgust	31	87%
Fear, Anger, happiness	35	86%
Fear, Disgust, happiness	26	85%
Fear, Surprise, happiness	65	48%
Fear, Surprise, disgust	31	52%
Fear, Surprise, sadness	57	28%

Table 6

Results for Child Participants (*Ekman & Friesen*, 1971)

Happiness Story

Emotion Shown in the two photographs	# Participants	% Choosing correct face
Happiness, Surprise	116	87%
Happiness, Sadness	23	96%
Happiness, Anger	25	100%
Happiness, Disgust	25	88%

Anger Story

Emotion Shown in the two photographs	# Participants	% Choosing correct face
Anger, Sadness	69	90%

Sadness Story

Emotion Shown in two photographs	# Participants	% Choosing correct face
Sadness, Anger	60	85%
Sadness, Surprise	33	76%
Sadness, Disgust	27	89%
Sadness, Fear	25	76%

Disgust (smell story)

Emotion Shown in two photographs	# Participants	% Choosing correct face
Disgust, Sadness	19	95%

Disgust (dislike story)

Emotion Shown in two photographs	# Participants	% Choosing correct face
Disgust, Sadness	27	78%

Surprise Story

Emotion Shown in two photographs	# Participants	% Choosing correct face
Surprise, Happiness	14	100%
Surprise, Disgust	14	100%
Surprise, Fear	19	95%

Fear Story

Emotion Shown in two photographs	# Participants	% Choosing correct face
Fear, Sadness	25	92%
Fear, Anger	25	88%
Fear, Disgust	14	100%

Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, *Journal of Personality and Social Psychology*, 17(2), *p. 127*, (https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association.

In a third attempt to replicate his basic emotion findings, Ekman and colleagues (1987) recruited participants from 10 cultures: Estonia, Germany, Greece, Hong Kong, Italy, Japan, Scotland, Mingangkabu in Sumatra, Turkey, and the United States. Similar to prior studies, participants were instructed to match emotion words in their language to facial expressions. In this study, facial expressions were photos of posed expressions, spontaneous expressions, and models contracting certain facial measures (as in the facial feedback hypothesis). The six emotions were: anger, disgust, fear, happiness, sadness, and surprise. The seven emotion word labels were the six aforementioned emotions and contempt.

Participants viewed each of the 6 emotions in three different expressions. All photos were of Caucasian males and females aged 30 to 40. Participants completed two separate tasks. In the single-emotion judgment task, participants viewed each photo for 10

seconds and checked ONLY ONE of the seven emotion words that represented the facial expression. In the multiple-emotion judgment task, participants were shown each photo again for 30 seconds. When viewing each photo, participants indicated how strongly each of the seven emotion labels were present in the facial expression on a 8-point scale (1 = slight; 4 = moderate; 8 = strong). Table 7 shows the single-judgment emotion findings. For all countries, even the isolated Minangkabau, a majority of participants selected the correct emotion label. For the multiple-emotion judgment task, participants in all cultures provided the most intense rating for the emotions predicted in Table 7. For instance, in the single-judgment task, if participants checked happiness for photo A, in the multiple-judgment task for the same photo A they rated happiness as most intensely present out of all seven emotion labels.

Table 7

Single-Judgment Task: Percentage of Correct Labels for Six Emotions Displayed in Photos (Ekman et al., 1987)

Nation	Happiness	Surprise	Sadness	Fear	Disgust	Anger
Estonia	90	94	86	91	71	67
Germany	93	87	83	86	61	71
Greece	93	91	80	74	77	77
Hong Kong	92	91	91	84	65	73
Italy	97	92	81	82	89	72
Japan	90	94	87	65	60	67
Scotland	98	88	86	86	79	84
Sumatra	69	78	91	70	70	70
Turkey	87	90	76	76	74	79
United States	95	92	92	84	86	81

Adapted from "Universals and Cultural Differences in the Judgments of Facial Expressions of Emotion," by P. Ekman, W.V.

Friesen, M. O'Sullivan, A. Chan, I. Diacoyanni-Tarlatzis, K. Heider, R. Krause, W.A. LeCompte, T. Pitcairn, P.E. Ricci-Bitti, K. Scherer, M. Tomita, and A. Tzavaras, 1987, *Journal of Personality and Social Psychology*, 53(4), *p.* 714 (https://doi: 10.1037/0022-3514.53.4.71). Copyright 2016 by the American Psychological Association.

Here is a timeline that shows Dr. Ekman's work.

People have pointed out that although replicated across cultures, other limitations with this methodology exist. For instance, identifying emotions in still photos is much easier than identifying emotions in real life, where non-verbal and verbal behavior is quickly changing. A second problem is that participants can use a process of elimination to increase the chances of identifying the correct answer. For instance, when completing this activity in-class, many students state they identify disgust first and contempt last.

Ekman and Friesen's (1978) Facial Action Coding System (FACS)

Ekman and Friesen (1978) developed a method for researchers and criminologists to identify emotions using facial expression changes. In this method, observers are looking for changes in people's microexpressions, which can be broken down into action units. Microexpressions are changes in facial expressions that last from 1/15 to 1/25 of a second. Microexpressions are nonconscious and cannot be voluntarily controlled by the individual. Ekman believes that microexpressions convey our true emotion, but these microexpressions can quickly be masked by a macroexpression. A macroexpression is a change in facial expressions that lasts between ½ a second and 5 seconds.

Macroexpressions tend to parallel the words and tone of voice, but may not necessarily match our true emotion.

To see animated examples of macroexpressions and microexpressions, scroll to the bottom of this website.

When using FACS to identify an individual's emotional experience, the observer looks for action unit changes in the microexpression. Each action unit maps onto a specific facial muscle. Each identifiable emotion is a combination of several action units.

This website includes animated examples of action unit changes. Scroll to the very bottom of this website to see how action units are combined to categorize emotions. For example, the emotion joy is a combination of two action units – 6 (cheek lip raiser) and 12 (lip corner puller). The emotion disgust includes 3 action unit changes – AU9 + AU15 + AU16. Remember, basic emotion theory posits that changes should be unique to each emotion. So, every emotion should have a unique combination of action unit changes!

Video: Yale Expert Interview with Paul Ekman [for basic emotions]

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=192#oembed-1

Facial Expressions: Social Constructivist Perspective

Lisa Feldman Barrett and colleagues (Gendron, Roberson, van der Vyver, & Barrett, 2014b) noticed the limitations with Ekman's methodology. She sought to replicate Ekman's work by recruiting participants from the Himba tribe in Namibia. In her study, she used a methodology that differed from Ekman's. She did not provide emotion labels to participants as Ekman did in his research. Instead, participants grouped similar facial expressions into six piles. In addition, she added a neutral/no emotion facial expression category. By making these changes, participants could no longer use process of elimination when completing the task.

Figure 4: Post-doctoral psychology researcher Maria Gendron travelled to Namibia to investigate whether individuals from non-Western cultures recognize the same emotions as Westerners do in facial expressions and vocalizations. Photo courtesy of Maria Gendron.

Barrett found that Himba participants did sort similar emotions in the same groups. Specifically, both American and Himba participants placed smiles into one pile (joy!) and wide-eyes into a second pile (fear!), suggesting these two emotions are universal. Americans placed neutral and scowl (anger!) faces into two separate piles as well. But, Himba participants placed anger (scowl), disgust (grimace), and sad (frowns) expressions into the same pile! And Americans did not create separate piles for pouting (sad) or nose scrunches (disgust) either. These cross-cultural findings suggest that our culture teaches us the categories we use to group emotions and that different cultures have different categories. For the Himba, disgust, sadness, and anger belong in the same category; however, Americans view anger as a separate construct from disgust and sadness. Barrett and her team concluded that people are not born with emotions but learn emotions as they grow up. Because most of the emotions did not exhibit universality, she concluded emotions are not evolutionary adaptations.

For more information about Barrett's work, please read the following article: https://www.bostonmagazine.com/news/2013/06/25/emotions-facial-expressions-not-related/

Yale Expert Interview: Lisa Feldman Barrett.

Start at: 9:45; Stop at: 14:38

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=197#oembed-1

For Ekman's response to Barrett's claims, please read the following article.

Eastern and Western Differences in Facial Expression Interpretation

Other research shows that people raised in Western and Eastern cultures interpret facial expressions differently. Masuda, Ellsworth, Mesquita, Leu, Tanida, & van de Veerdonk (2008) recruited Japanese and American participants. Participants viewed cartoons in which sometimes the central figure's facial expression matched the crowd and in other cartoons the central figure's facial expression did not match the crowd. The emotions expressed in the cartoons included sadness, happiness, or anger. When viewing the cartoon, participants rated the degree of sadness, happiness, and anger felt by the central figure on a scale of 1 to 10.

Figures 5 and 6

Examples of Central Figure's Emotions matched with sad (above) and happy (below) peripheral figures.

Figures 7 and 8

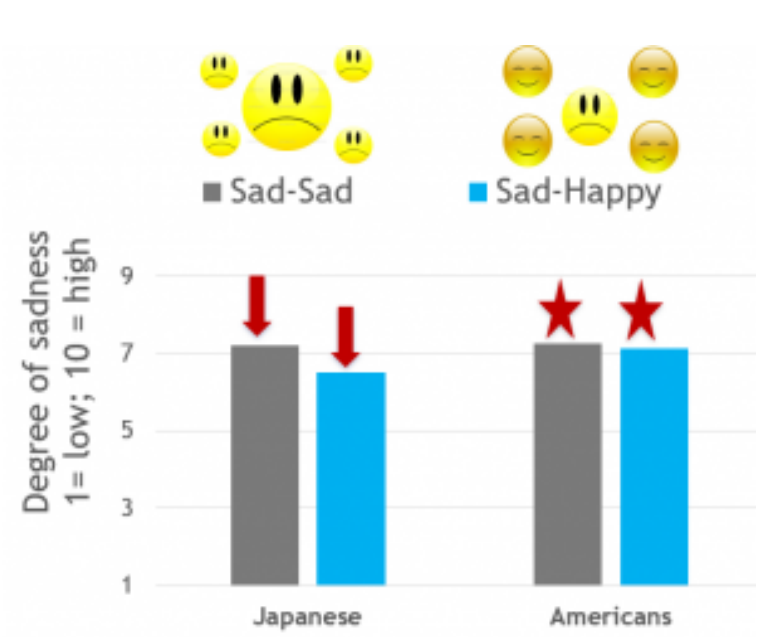
Examples of Central Figure's Emotions mismatched with sad (above) and happy (below) peripheral figures.

From “Placing the face in context: Cultural differences in the perception of facial emotion,” by T. Masuda, P.C. Ellsworth, B. Mesquita, J. Leu, S. Tanida, and E. van de Veerdonk, 2008, Journal of Personality and Social Psychology, 94(3), p. 369 (https://doi.org/10.1037/0022-3514.94.3.36). Copyright 2008 by the American Psychological Association.

Figure 9 displays the findings for the dependent variable ratings of sadness. Japanese participants reported significantly higher levels of sadness when the central figure's expression matched the crowd's expression. But, when Japanese participants saw the central figure and crowd showed different emotions, they reduced the amount of sadness they perceived the central figure to express.

Figure 9

Japanese and American Participants' Self-Reported Sadness

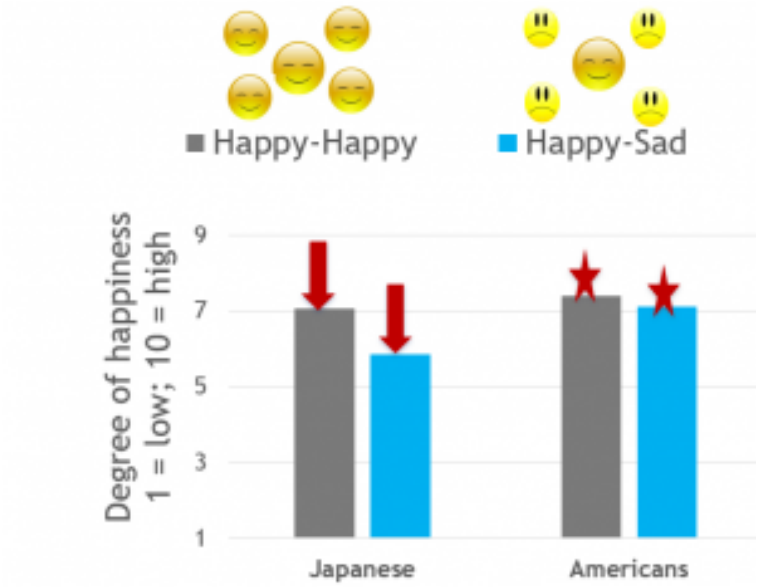


Adapted from "Placing the face in context: Cultural differences in the perception of facial emotion," T. Masuda, P.C. Ellsworth, B. Mesquita, J. Leu, S. Tanida, S. and E. van de Veerdonk, 2008, Journal of Personality and Social Psychology, 94(3), p. 371. (https://doi.org/10.1037/0022-3514.94.3.36). Copyright 2008 by the American Psychological Association.

Now let's look at American participants. American participants did not show differences in the amount of sadness they perceived the central figure to be expressing. For Americans, whether or not the central figure's emotional expression matched the crowd did not influence their perception of the central figure's emotion – Americans perceived the central figure was experiencing equal levels of sadness in both conditions. Researchers think we see these cultural differences in interpretation because Americans focus only on the central figure when interpreting emotions, whereas East Asians focus on the central figure AND the entire context.

Figure 10

Japanese and American Participants' Self-Reported Happiness



The findings for the dependent variable of happiness were the same as the findings for sadness (see Figure 10). The anger findings approached significance (p=.057).

Next, the researchers (Masuda et al., 2008) wanted to know WHY American and Japanese participants perceived the same facial expressions in different ways. So, they conducted a study using the same methodology, but this time used eye-tracking equipment to pinpoint where participants were looking.

Compared to Westerners, Japanese participants spent less time gazing at the central figure for angry, sad, and happy targets. Compared to Westerners, Japanese participants spent more time gazing at the background figures. It is important to note that although the researchers varied the race of the central and background figures, the results did not change.

Researchers also looked at where participants moved their gaze by seconds. At second 1, both Japanese and American participants focused their gaze on the central figure. By second 2, Japanese participants moved their gaze to the background figures, while American participants were still gazing at the central figure! So, when interpreting someone's facial expression, both Japanese and American individuals immediately consider the individual feelings of the central figure, but Japanese quickly consider contextual cues as well.

Another team of researchers (Jack, Blais, Scheepers, Schyns, & Caldara, 2009) conducted an eye-tracking study to investigate the parts of the face that Western and East Asian participants attend to when interpreting facial expressions. In this study, participants viewed 7 emotional expressions created based on Ekman's FACS AU changes. While viewing each emotional expression, participants were asked to pick the emotion label from a list of the seven emotion words (similar to Ekman's methodology).

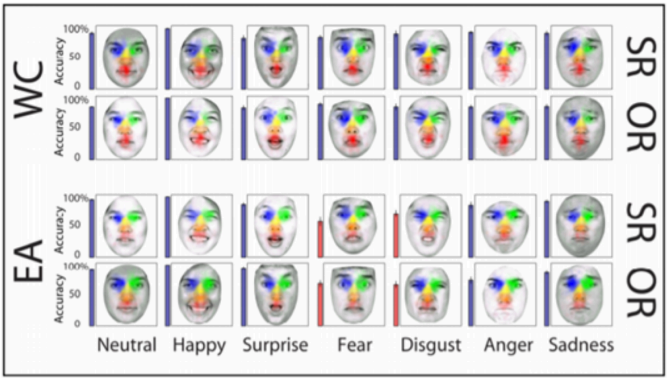
Similar to Masuda et al.'s (2008) findings, results did not differ by race. Figure 11displays the location where Western participants (top two rows) and East Asian participants (bottom 2 rows) were looking. Each column represents the seven emotions. The colors correspond to the part of the face the cultural groups were gazing at – lighter colors mean participants spent less time looking at that part of the face. Figure 12 shows eye patterns collapsed across the seven emotions – which makes it a bit easier to interpret the cultural differences.

East Asian participants focused significantly longer on the left and right eyes compared to the mouth. Westerners fixated on all parts of the face for an equal amount of time. Why are these findings important? Well, they identify another cultural difference in the way emotions are expressed and interpreted. East Asian individuals

use people's eyes to identify their emotion, while Westerners use all parts of the face. So, it is highly possible that East Asian and Westerners could look at the same face and conclude the individual is experiencing two different emotions! In fact, American participants correctly identified the seven emotions, whereas East Asians confused fear with surprise and disgust with anger. Emotions researchers have also suggested that East Asians may not look at the mouth because people raised in East Asian cultures are less likely to move their mouths during an emotional experience. Of course, it's hard to know the causal direction.

Figure 11

Eye-Tracking Results Across Seven Emotions for Western Culture (WC) And East Asian Culture (EA) Participants



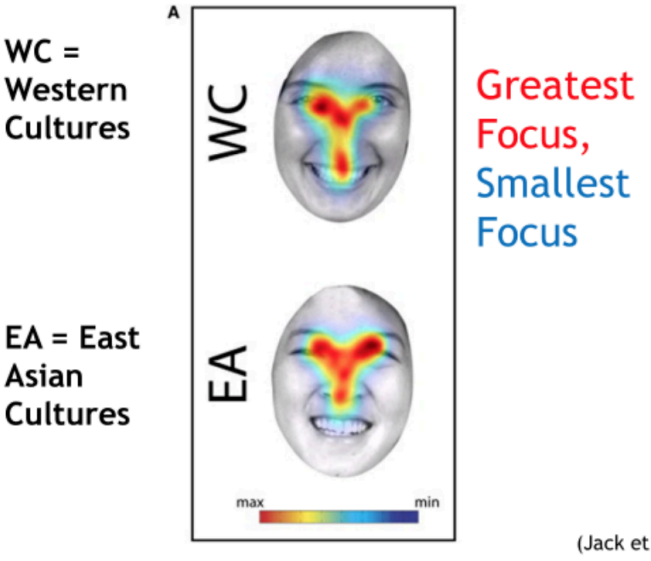
Note. WC = Western Culture; EA = East Asian Culture; SR = Same Race; OR = Other Race.

From "Cultural Confusions Show That Facial Expressions Are Not

Universal," by R.E. Jack, C. Blais, C. Scheepers, P.G. Schyns, and R. Caldara, 2009, Current Biology, 19, Online Supplemental Material (https://www.cell.com/current-biology/supplemental/S0960-9822(09)01477-8) (https://doi.org/10.1016/j.cub.2009.07.051). Copyright 2009 by Elsevier Ltd.

Figure 12

Eye-Tracking Results Collapsed Across Seven Emotions for Western Culture (WC) And East Asian Culture (EA) Participants



From "Cultural Confusions Show That Facial Expressions Are Not Universal," by R.E. Jack, C. Blais, C. Scheepers, P.G. Schyns, and R. Caldara, 2009, Current Biology, 19, p. 1544 (https://doi.org/10.1016/j.cub.2009.07.051). Copyright 2009 by Elsevier Ltd.

Vocal Affect

Vocal affect change is another example of a behavior change. Basic emotions perspective states that each emotion has a unique change in vocal tone, while the social constructivist perspective views vocal affect as varying across cultures. Similarly, the basic emotions perspective would hypothesize that people should be able to identify another person's emotion from their vocal sounds, whereas social constructivists would not accept this claim. Let's look to research evidence from both perspectives.

Vocal Affect: Basic Emotions Theory

Sauter, Eisner, Ekman, and Scott (2010) conducted a cross-cultural study to determine whether people could correctly identify the emotions represented by vocal change. (Note: Ekman, a basic emotions researcher, is one of the authors). Sauter et al. (2010) recruited European English participants and Himba participants (representing the first quasi-IV). Participants listened to an emotional story in their own language. Then, researchers listened to two audio clips of vocal change. Participants were instructed to select the audio clip that matched the emotion in the story. Participants completed this method twice – once when listening to voices from their own culture and a second time when listening to voices from the other culture (IV #2). It is important to note that the sounds were recordings of actors making the vocal sounds. The actors were given a brief scenario and instructed to make the vocalization that they would make if they experienced the emotion in that scenario. The table below shows the emotion story and corresponding correct vocal change.

Table 8

Emotional Stories and Corresponding sounds from Sauter et al. (2010)

Adapted from "Cross-Cultural Recognition of Basic Emotions Through Nonverbal Emotional Vocalizations," by S.A. Sauter, F. Eisner, P. Ekman, and S.K. Scott, 2010, Proceedings of the National Academy of Sciences (PNAS), 107, Online Supplemental Material (https://www.pnas.org/content/pnas/suppl/2010/01/12/0908239106.DCSupplemental/pnas.200908239SI.pdf), (https:// doi.org/10.1073/pnas.0908239106). Copyright 2010 National Academy of Sciences.

Emotion Described in Story	Correct Vocal Sound
Achievement [Pride]	
English Version: Someone gets a phone call and is offered a job that they really want and they feel like they want to celebrate. **Himba Version:** Someone manages to kill a lion by themselves and they feel like they want to celebrate.	Cheers
Amusement Someone is being tickled by a child and finds it very funny	Laughs
Anger Someone is being treated in a rude way deliberately, and is very angry about it.	Growl
Disgust Someone has just eaten rotten food and feels very disgusted.	Retches [vomiting]
Fear Someone is suddenly faced with a dangerous animal and feels very scared.	Screams
Sensual Pleasure Someone is having sex and enjoying it very much.	Moans
Relief Someone has just found their child after it was lost and they feel very relieved.	Sighs
Sadness Someone finds out that a member of their family has died and they feel very sad.	Sobs

Surprise	
Someone sees a bright light in the middle of the night and is very surprised.	Sharp Inhalation

Adapted from "Cross-Cultural Recognition of Basic Emotions Through Nonverbal Emotional Vocalizations," by S.A. Sauter, F. Eisner, P. Ekman, and S.K. Scott, 2010, *Proceedings of the National Academy of Sciences* (PNAS), 107, *Online Supplemental Material* (https://www.pnas.org/content/pnas/suppl/2010/01/12/0908239106.DCSupplemental/pnas.200908239SI.pdf), (https://doi.org/10.1073/pnas.0908239106). Copyright 2010 National Academy of Sciences.

The dependent variable was the mean number of correct responses. For each emotion, participants completed four trials. Sauter et al. (2010) suggested that identifying the correct emotion at beyond chance levels provides evidence of universality. So, we would want to see that participants correctly identified each emotion on more than two out of four trials (that the average was above the red line in the figures below).First, we will consider the within cultures results – when Himba participants listened to Himba voices and English participants listened to English voices. For all nine emotions, the English participants matched the vocal sound to the correct emotion. The Himba matched the vocal sound to the emotion conveyed in the story for all emotions except relief.

Now, let's consider the across cultures results – when Himba participants listened to the English voices and the English participants listened to the Himba voices. Again, English participants matched the correct Himba vocal sound to the emotion story for all nine emotions. Himba participants matched the correct English vocal sound to the emotion story for the following six emotions: anger, disgust, fear, sadness, surprise and amusement. It is interesting to note that for within and across cultures, Himba participants did not reach beyond chance levels for some positive

emotions (e.g., pleasure, achievement/pride) and for mixed emotions (e.g., relief).

In general, these findings provide support for universal changes in vocal affect for some emotions (e.g., anger, disgust, fear, sadness, surprise, amusement), but suggest cross-cultural differences exist for other emotions.

Cordaro, Keltner, and colleagues (2016) conducted a study similar to Sauter et al., (2010). This study compared identification of vocal change across 10 industrialized countries (USA, China, Germany, India, Japan, South Korea, New Zealand, Turkey, Poland, and Pakistan) and Butan, with the same procedure as Sauter et al., (2010). Bhutan is an isolated country located in the Himalayas. This study incorporated 9 positive emotions (see Table 9) and 8 negative emotions (see Table 10). Figure 13 shows the findings across these emotions for Bhutan.

Table 9

Percentage Correctly Matched for 9 Positive Emotions or Feeling States

	Amused	Awe	Content	Desire (food)	Desire (sex)	Interest	Relief	Sympathy	Triumph	Overall accuracy
China $N = 52$	88% (.85)	96% (.95)	76% (.66)	62.5% (.49)	60.5% (.46)	81.5% (.74)	82% (.77)	69.5% (.58)	95% (.92)	79% (.71)
Germany $N = 43$	87% (.81)	90% (.88)	82.5% (.75)	90.5% (.88)	57.5% (.44)	88% (.81)	89.5% (.84)	69.5% (.60)	87% (.81)	82.4% (.76)
India $N = 45$	83% (.76)	84.9% (.79)	65.1% (.61)	64.2% (.53)	71.7% (.61)	76.4% (.67)	77.6% (.70)	75.5% (.67)	97.2% (.97)	77.3% (.70)
Japan $N = 55$	69% (.59)	89.5% (.85)	60.5% (.47)	64% (.47)	51.5% (.34)	76% (.68)	80.5% (.73)	55.5% (.39)	88.5% (.85)	70.6% (.60)
S. Korea $N = 50$	66% (.55)	83% (.76)	65.5% (.54)	40% (.20) (ns)	48% (.31)	76.5% (.68)	79% (.71)	34% (.12) (ns)	86.5% (.81)	64.3% (.52)[a]
New Zealand $N = 11$	87.5% (.88)	100% (1.0)	87.5% (.88)	87.5% (.88)	87.5% (.88)	75% (.76)	75% (.64)	87.5% (.88)	100% (1.0)	87.5% (.87)
Turkey $N = 46$	76% (.68)	92% (.88)	93% (.91)	68% (.57)	77.5% (.71)	59.5% (.45)	75.5% (.68)	75% (.65)	92.5% (.91)	78.8% (.71)
Poland $N = 64$	94% (.91)	96% (.93)	88% (.89)	96% (.93)	87.5% (.89)	89.5% (.89)	94% (.91)	45% (.32)	94.5% (.91)	87.2% (.84)
Pakistan $N = 35$	89% (.85)	84% (.77)	92% (.89)	90% (.85)	56.5% (.43)	85.5% (.81)	95% (.92)	84% (.77)	88.5% (.85)	85% (.79)
U.S. $N = 52$	81% (.74)	86% (.82)	84.5% (.79)	84.5% (.85)	73.5% (.64)	88% (.85)	83.5% (.77)	83% (.77)	85.5% (.82)	83.4% (.78)

Note. Values marked as not significant (ns) represent nonverbal vocal bursts that were not recognized at above-chance rates. Footnotes indicate cultural differences in composite accuracy rating at $p < .01$.

[a] Significant differences in effect sizes were found between Germany > S. Korea (.24), NZ > S. Korea (.35), Poland > S. Korea (.32), Pakistan > S. Korea (.27), U.S. > S. Korea (.26).

Reproduced from D.T., Cordaro, D. Keltner, S. Tshering, D. Wangchuk, and L.M. Flynn, 2016, The voice conveys emotion in ten globalized cultures and one remote village in Bhutan. *Emotion*, 16(1), p. 122 (https://doi.org/10.1037/emo0000100). Copyright 2015 American Psychological Association.

Table 10

Percentage Correctly Matched for 8 Negative Emotions or Feeling States

	Anger	Contempt	Disgust	Embarrassment	Fear	Pain	Sadness	Surprise	Overall accuracy
China $N = 52$	88% (.84)	93% (.90)	85.5% (.79)	87.5% (.82)	90% (.87)	89.5% (.87)	94% (.92)	58% (.44)	85.7% (.81)
Germany $N = 43$	77% (.69)	74.5% (.66)	80.5% (.75)	82.5% (.75)	76.5% (.69)	76% (.69)	85% (.81)	79.5% (.72)	78.9% (.72)
India $N = 45$	55.7% (.41)	92.5% (.91)	67% (.56)	79.3% (.73)	70.8% (.61)	83% (.76)	90.6% (.88)	31% (.11) (ns)	71.2% (.62)[a]
Japan $N = 55$	60% (.47)	75% (.66)	83.5% (.78)	80% (.73)	91% (.88)	68% (.56)	93% (.90)	74% (.64)	78.1% (.70)
S. Korea $N = 50$	66.5% (.55)	75.5% (.68)	81% (.73)	85.5% (.81)	69% (.57)	64.5% (.52)	88% (.84)	63% (.49)	74.1% (.65)
New Zealand $N = 11$	100% (1.0)	50% (.39)	87.5% (.88)	87.5% (.88)	87.5% (.88)	87.5% (.88)	100% (1.0)	75% (.63)	84.4% (.82)
Turkey $N = 46$	79% (.71)	48% (.30)	91% (.88)	83% (.77)	85% (.80)	79% (.71)	90.5% (.88)	59.5% (.45)	76.9% (.69)
Poland $N = 64$	83% (.83)	75% (.72)	100% (1.0)	88% (.93)	95% (.93)	83% (.82)	92.5% (.89)	94% (.91)	88.8% (.87)
Pakistan $N = 35$	76% (.70)	72.5% (.62)	92% (.89)	85.5% (.81)	87% (.81)	81% (.73)	87% (.81)	67.5% (.58)	81.1% (.74)
U.S. $N = 52$	81% (.74)	55.5% (.41)	88.5% (.85)	82% (.77)	87.5% (.82)	78.5% (.72)	85% (.79)	71% (.62)	78.6% (.71)

Note. Values marked as not significant (ns) represent nonverbal vocal bursts that were not recognized at above-chance rates. Footnotes indicate cultural differences in composite accuracy rating at $p < .01$.
[a] Significant differences in effect sizes were found between Poland > India (.25).

Reproduced from D.T., Cordaro, D. Keltner, S. Tshering, D. Wangchuk, and L.M. Flynn, 2016, The voice conveys emotion in ten globalized cultures and one remote village in Bhutan. *Emotion*, 16(1), p. 123 (https://doi.org/10.1037/emo0000100). Copyright 2015 American Psychological Association.

Figure 13

Percentage correct for Bhutanese participants across 17 constructs

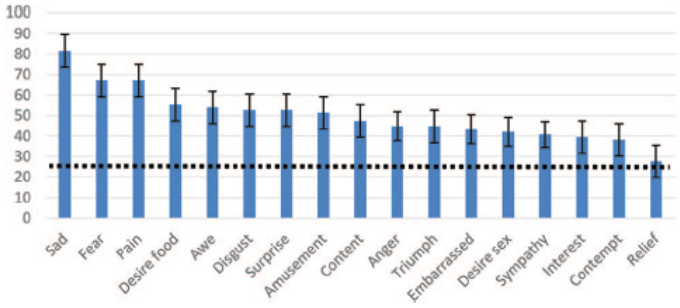


Figure 1. Average recognition rates for remote Bhutanese villagers in the vocal burst recognition task. The hashed line represents chance for the nonparametric *t* test. Error bars are shown at the 95% confidence level. See the online article for the color version of this figure.

Reproduced from D.T., Cordaro, D. Keltner, S. Tshering, D. Wangchuk, and L.M. Flynn, 2016, The voice conveys emotion in ten

globalized cultures and one remote village in Bhutan. *Emotion*, 16(1), p. 124 (https://doi.org/10.1037/emo0000100). Copyright 2015 American Psychological Association.

Taking the three figures together, in general most participants matched the correct vocal sound to the correct emotional story. One exception is South Korea – who did not reach above chance levels for desire (food) and sympathy. In Table 10, we can also see that participants from India did not reach above chance levels for the emotion surprise. Figure 13 shows that Bhutaense participants achieved beyond chance levels for all emotions, although relief barely made the cut!

Vocal Affect: Social Constructivist Perspective

Gendron, Roberson, van der Vyver, and Barrett (2014a) conducted a similar study, but changed the methodology to address limitations with Sauter et al. (2010). (Note: Lisa Barrett, a social constructivist, was an author on this study). Participants were recruited from the Himba tribe and from Boston. Participants listened to vocal sounds from male and female native English speakers, then verbally provided one word or phrase to identify the emotion. Thus, in this study, participants were not provided two choices from which to select. Below are the vocal sounds that represented each emotion.

Table 11

Vocal Sounds and Corresponding Emotion from Gendron et al. (2014a)

Reproduced from "Cultural Relativity In Perceiving Emotion From Vocalizations," by M. Gendron, D. Roberson, J.M. van der Vyver, and L.F. Barrett, 2014a, Psychological Science, 25(4), p. 912, (https://doi: 10.1177/0956797613517239). Copyright 2014 The Authors.

Discrete Emotion Portrayed	Vocalization
Amusement	Giggle, Laughter
Anger	Guttural yell, Growl
Disgust	"Ewww"
Fear	Scream
Relief	Sigh
Sadness	Cry
Sensory Pleasure	"Mm mmm"
Surprise	"Ahhh-ahhh"
Triumph	"Woohoo"

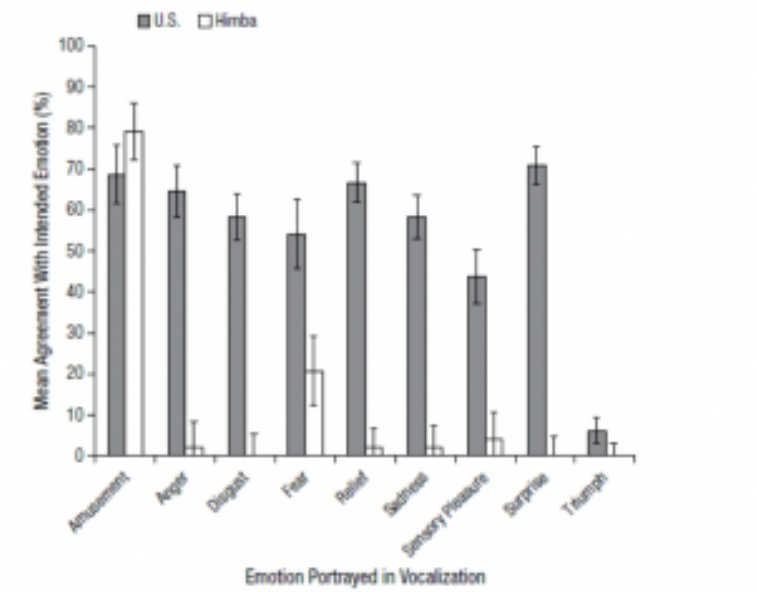
Reproduced from "Cultural Relativity In Perceiving Emotion From Vocalizations," by M. Gendron, D. Roberson, J.M. van der Vyver, and L.F. Barrett, 2014a, *Psychological Science*, 25(4), *p.* 912, (https://doi: 10.1177/0956797613517239). Copyright 2014 The Authors.

Two coders determined whether the participants' emotion label matched the expected emotion conveyed in the vocal sound. The dependent variable was measured as the mean percentage of all trials the Himba and Boston participants got correct. In 69% of the trials and 79% of the trials, the Himba and Boston participants, respectively, labeled laughter as amusement. But, on the remaining emotions, the Himba participants correctly labeled a small number of vocal sounds. Interestingly, further results showed that the Himba and Boston participants correctly identified the valence of most vocal sounds — valence meaning whether the sound represented a positive, negative, or neutral state — although Boston participants were more likely to correctly identify the valence of the sound. Finally, both groups of participants were able to identify the arousal level of most sounds – whether the emotion was high or low in arousal, or a more neutral state. Again, Boston participants were more likely to identify the correct arousal level, particularly because Himba participants often mislabeled low arousal emotions like sadness. Generally, these findings suggest vocal changes for discrete emotions are not universal, but that general changes in arousal or valence may be universal.

Here is an audio clip describing her study.

Figure 14

Mean Percent Of Responses in which Intended Emotion Selected for Corresponding Vocalization



Reproduced from "Cultural Relativity In Perceiving Emotion From Vocalizations," by M. Gendron, D. Roberson, J.M. van der Vyver, and L.F. Barrett, 2014a, *Psychological Science*, *25*(4), *p.* 914, (https://doi: 10.1177/0956797613517239). Copyright 2014 The Authors.

Bodily Movement

A third way to consider behavior changes is by looking at how the entire body moves. As we go through each emotion, we will discuss whether people approach or avoid eliciting events that cause their emotions. Generally, positive emotions cause approach behavior, whereas negative emotions cause avoidance behavior. There are some exceptions. For instance, anger causes us to approach the person who blocked our goal, and some research suggests the emotion guilt may cause us to approach the individual we harmed to apologize. Finally, some emotions may cause freezing behavior (such as fear) or vacillation between approach and avoidance behavior (often mixed emotions – such as relief or happiness/sadness).

Physiological Patterns

Physiological changes can include changes in the sympathetic nervous system (SNS) and/or parasympathetic nervous system (PNS). In this component, we will also include changes in the brain, such as frontal lobe activation and brain structure activity.

Basic emotions researchers would hypothesize that for the same emotion, people should experience the same changes in physiology. Because we have so many ways to measure physiological changes, basic emotions researchers look for physiological patterns for each emotion. They expect that for each emotion, we should see a different pattern of physiological changes. The basic emotions view that each emotion should correspond to a different physiological pattern is called the autonomic specificity hypothesis (Ekman, 1992; Levenson, 1992).

Research has utilized the Directed Facial Action Task (for more information, see Ekman (2007)) to identify physiological patterns associated with distinct emotions. In this task, participants contract their facial muscles according to experimenter instructions. Three common methods are used to provide instructions:

1. A researcher tells participants to show a certain expression on their face. So, "please smile" or "please frown" or "please put your bottom lip down."
2. A research assistant might arrange the participants facial muscles with their hands
3. Participants are instructed to hold a pen with their mouth open (to elicit the emotion joy with by smiling) or with their

mouth closed (to elicit the emotion sadness by frowning).

During these procedures, the experimenter does not tell the participant which emotion they should be feeling or showing on their face. Once the participant is displaying the facial expression, researchers measure physiological changes.

This methodology is based on the facial feedback hypothesis, first proposed by Charles Darwin and then William James! This hypothesis states that the emotions we show on our face cause the emotion we feel. For example, if we are in a neutral state, and then we show a frown on our face, that frown will actually make us feel sadness! So, the Directed Facial Action Task assumes that rearranging facial muscles causes participants to feel the discrete emotion shown on the face.

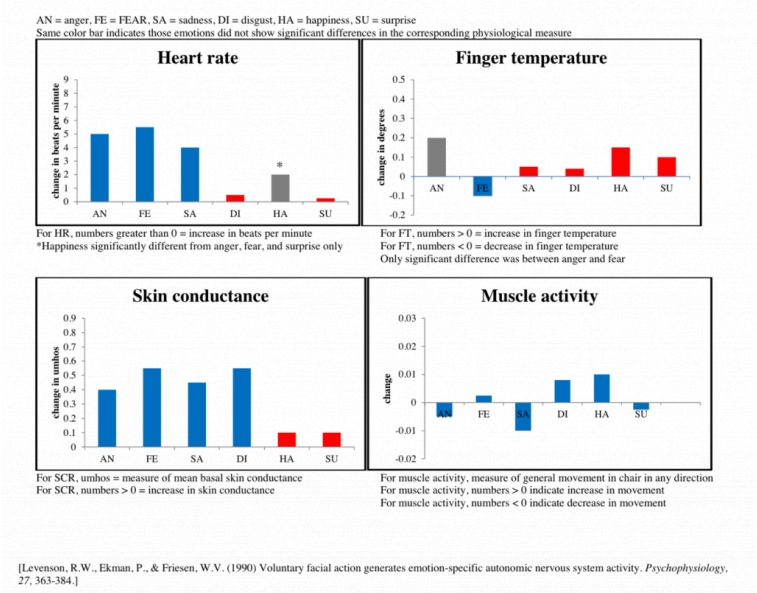
A classic study (Levenson, Ekman, & Friesen, 1990) used the directed facial action task to test the autonomic specificity hypothesis. In this study, participants displayed six different facial expressions: anger, fear, sadness, disgust, happiness, and surprise. After displaying each facial expression, four physiological measures were taken: heart rate, finger temperature, skin conductance, and muscle activity. According to the autonomic specificity hypothesis, each of the six facial expressions should cause a unique pattern of physiological changes.

The figure below demonstrates the results. The x-axis shows the six facial expressions, and the y-axis represents the change in physiology from baseline. Bars of the same color indicates that those emotions did not show significant differences in the corresponding physiological measures. For instance, for heart rate – anger, fear, and sadness resulted in the same increase in heart rate. Bars with different colors represent significant differences

between the emotions. For instance, for heart rate – happiness showed a significantly difference change in heart rate from all other emotions except for sadness (as noted).

Figure 15

Physiological Change from Baseline for Six Discrete Emotions



Adapted from "Voluntary Facial Action Generates Emotion-Specific Autonomic Nervous System Activity," by R.W. Levenson, P. Ekman, and W.V. Friesen, 1990, Psychophysiology, 27(4), p. 369, (https://doi.org/10.1111/j.1469-8986.1990.tb02330.x). Copyright 1990 The Society for Psychophysiological Research, Inc.

Below are the physiological patterns that correspond to each emotion, based on whether physiology increases or decreases from baseline. It is important to note that the pattern for sadness and

anger are similar and for disgust and happiness are similar. Thus, based on these findings, we might have specific physiological patterns for fear and for surprise. In addition, this study does not indicate whether these physiological patterns are universal.

Physiological Patterns for Each Emotion based on Levenson et al. (1990)

- **Anger:** ↑HR, ↑Finger Temp, ↑Skin conductance, ↓Muscle Activity
- **Fear:** ↑HR, ↓Finger Temp, ↑Skin conductance, ↑Muscle Activity
- **Sadness:** ↑HR, ↑Finger Temp, ↑Skin conductance, ↓Muscle Activity
- **Disgust**: ↑HR, ↑Finger Temp, ↑Skin conductance, ↑Muscle Activity
- **Happiness:** ↑HR, ↑Finger Temp, ↑Skin conductance, ↑Muscle Activity
- **Surprise:** 0 HR, ↑Finger Temp, ↑Skin conductance, ↓Muscle Activity

Some other findings to note:

- The six emotions did not show differences in muscle activity.
- Heart rate and finger temperature demonstrated the most differences between emotions.
- Many of the physiological measures are better at distinguishing among negative emotions than positive emotions.

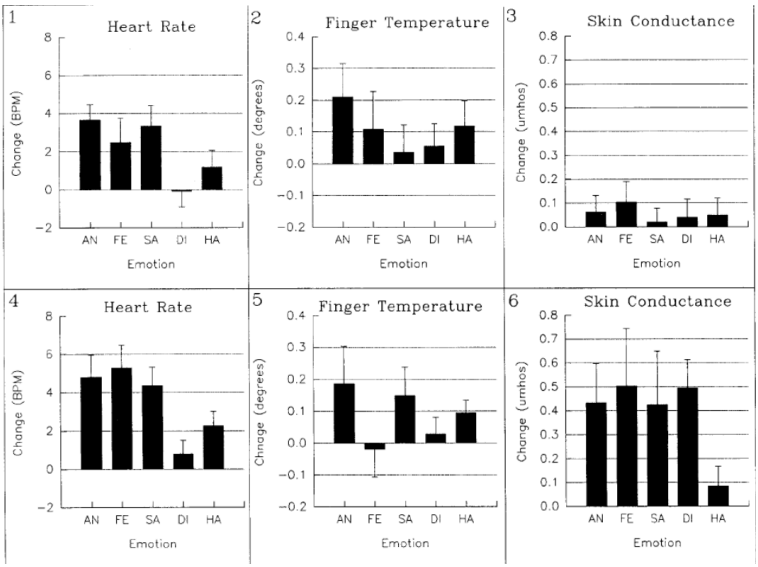
Finally, keep in mind that Schachter and Singer would state that

physiological change only determines our arousal, whereas our cognitive appraisals determine our emotion label.

A later study (Levenson, Ekman, Heider, & Friesen, 1992) looked for universality in physiological patterns by recruiting Minangkabau and American participants. Minangkabau is a local tribe located in the Indonesia province of West Sumatera (called Sumatera Beret by locals). Similar to the prior study, participants were instructed to make facial expressions associated with the following distinct emotions: anger, fear, sadness, disgust, and happiness/joy. While holding the facial expression, seven measures of physiology were taken – we will only discuss heart rate, finger temperature, and skin conductance. Results are displayed below. The top row displays the results for Minangkabau participants, while the bottom row displays results for American participants.

Figure 16

Physiological Change from Baseline for Five Discrete Emotions in US and Minangkabau Participants



Note. Top row represents Minangkabu participants; bottom row represents Amiercan particpiants. Reproduced from "Emotion and Autonomic Nervous System Activity in the Minangkabau of West Sumatra," by R.W. Levenson, P. Ekman, K. Heider, and W.V. Friesen, 1992, Journal of Personality and Social Psychology, 62(6), p. 978. Copyright 1992 by the American Psychological Association.

In general, Levenson et al. (1992) concluded that changes in the seven physiological measures were universal for the five emotions. Two additional findings should be highlighted:

1. Cross-cultural differences were greatest for skin conductance. Compared to Minangkabau participants, American participants experienced a larger increase in skin conductance from baseline for anger, fear, sadness, and disgust. In fact, the Minangkabau didn't really show a change in skin conductance for any of the emotions.
2. Findings also showed that the differences in heart rate across

the emotions approached significance, with the American participants showing greater increases in heart rate.

In conclusion, this study provides evidence of both universality and cross-cultural differences in physiological changes. Why do we see these cross-cultural differences? Well, one explanation might be that Minangkabau truly experience smaller changes in physiology during an emotion episode. A second methodological reason might be that the facial feedback methodology is less effective for Minangkabau participants – maybe this method didn't elicit the emotions. Or maybe the Minangkabau don't express emotions as intensely on their faces as Americans do.

Cognitive Appraisals

Researchers also disagree over whether changes in cognitive appraisals are unique and universal for each emotion or whether interpretations vary across cultures. Similar to physiological patterns, we will look for how changes in cognitive appraisal patterns may be similar or different across cultures.

A classic study (Scherer, 1997) investigated how cognitive appraisal dimensions varied according to the emotion experience and to the culture of the participant. In this study, participants from six different world regions recalled a situation in which he or she had recently experienced one of seven strong emotions (this recall technique is a common way to elicit an emotion in the laboratory). While thinking about this situation, participants rated the emotional experience along eight cognitive appraisal dimensions (see the dimensions below). Participants completed this process for all seven emotions.

6 Regions
North/Central Europe
New World
Asia
Mediterranean Basin
Latin America
Africa
Average Example

7 Emotions
Joy
Anger
Fear
Sadness
Disgust
Shame
Guilt

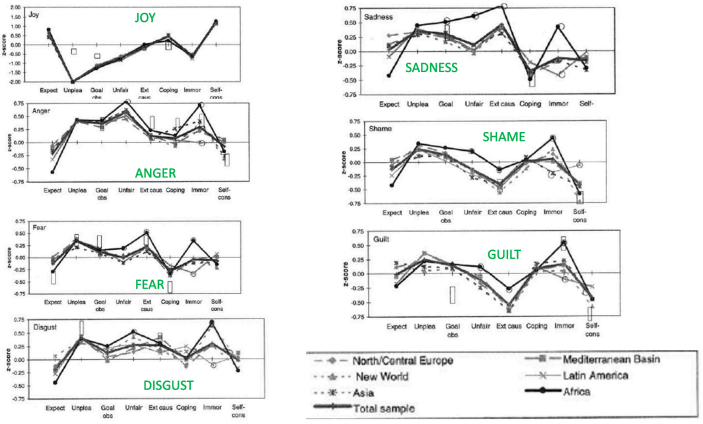
8 Cognitive Appraisals
Novelty
Unpleasantness
Goal Obstruction
Unfairness
External Causation
Coping Ability
Immorality
Self-Consistency

Graphical findings are displayed below. Each box displays the cognitive appraisal changes for a specific emotion. The x-axis corresponds to the cognitive appraisal dimensions. The coding for each appraisal dimension follows the figures and explains the meaning of a positive and negative score. Finally each line represents participants' responses from a specific world region. The "total sample" line represents the average score across all

participants and is located at zero on the y-axis. Because the y-axis scores are z-scores, this means the total sample line represents the average responses across all seven emotions across the six cultural regions. As we discuss a variety of emotions, we will return to this study. When interpreting the data, looking at Table 12 will be helpful. Table 12 shows the questions and corresponding response scales for each cognitive appraisal dimension.

Figure 17

Eight Cognitive Appraisal Ratings for Seven Emotions across Six World Regions



Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 912, (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Table 12

Cognitive Appraisal Dimensions and Corresponding Questions and Response Scales

Cognitive Appraisal Dimension	Question	Response Scale
Expectedness / Novelty	Did you expect this situation to occur?	1 = not at all; 2 = a little; 3 = very much
Unpleasantness	Did you find the event itself pleasant or unpleasant?	1 = pleasant; 2 = neutral; 3 = unpleasant
Goal Obstruction	Did the event help or hinder you to follow your plans or achieve your aims?	1 = it helped; 2 = it didn't matter; 3 = it hindered.
Unfairness	Was the situation unjust or unfair?	1 = not at all; 2 = a little; 3 = very much
External Causation	Who do you think was responsible for the event?	1 = self/internal; 2 = close persons/ external; 3 = other persons/ external; 4 = impersonal agency/external
Coping Ability	How did you evaluate your ability to act on or to cope with the event and its consequences?	1 = powerless; 2 = escape possible; 3 = pretend nothing happened; 4 = no action necessary; 5 = could positively influence event and change consequences
Immorality	Would this behavior itself be judged as improper or immoral by your acquaintances?	1 = not at all; 2 = a little; 3 = very much
Self-Esteem	How did this event affect your self-esteem?	1 = negatively; 2 = not at all; 3 = positively

Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, *Journal of Personality and Social Psychology*, 73(5), p. 905, 911 (https://doi.org/10.1037/

0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

This study revealed some important findings. Joy is the only emotion that shows universality in cognitive appraisals. Across cultures, when people recall a joyful event, they report the following appraisals:

a. Event was expected
b. Event was pleasant
c. Goal was facilitated
d. Event viewed as fair
e. Event neither caused by an internal nor an external event
f. Perceptions that one can cope with event
g. Event was viewed as moral
h. Event increased self-esteem

One main cross-cultural difference occurs for the cognitive appraisal dimension immorality. These cross-cultural differences were mainly driven by African participants reporting emotion events to be highly immoral and Latin American participants reporting emotion events to be highly moral.

As stated above in the physiology sections, basic emotions researchers would expect a unique pattern of cognitive appraisal changes that correspond to each emotion. These findings indicate that the emotions guilt and shame show similar cognitive appraisal patterns as well as anger and disgust. These similarities are interesting, because some people believe guilt and shame represent the same emotion and that anger and disgust represent the same emotion! (more on this later).

Subjective Feelings

Lastly, we want to explore whether changes in subjective feelings are universal or culturally different. In general, studies have identified cross-cultural differences in the experiences of mixed emotions (typically measured as the experience of happiness and sadness at the same time). Typically, studies will compare the following three groups of participants: 1) people born in and living in Eastern cultures 2) people born in an Eastern culture and living in a Western culture and 3) people born in and living in a Western culture. In general, people born in and living in Eastern cultures tend to exhibit a positive correlation between negative and positive emotions, indicating they experience mixed emotions (Perunovic, Heller, & Rafaeli, 2007; Schimmack et al., 2002; Shiota, Campos, Gonzaga, Keltner, & Peng, 2010). People born in and living in a Western culture exhibit a negative correlation between positive and negative emotions, suggesting they experience either positive OR negative emotions. Finally, individuals born in East Asia but living in Western cultures show a pattern similar to Western individuals, but the negative correlation between positive and negative emotions is weaker (in comparison to Western individuals). So, in general we could conclude that East Asians experience mixed emotions, Westerners experience either positive or negative emotions, while individuals born in Asia but living in a Western culture fall in between these two groups. In conclusion, Western linear cultures think of positive and negative emotions as negatively correlated. This means Westerners believe negative and positive emotions cannot occur together. In contrast, dialectical cultures such as those found in East Asia perceive negative emotions and positive emotions to be positively correlated with each other. This may be because East Asian participants consider the entire context when identifying emotions in others and are more aware of positive and negative aspects of the situation. Thus, East Asian participants tend

to report that they are experiencing both positive and negative emotions. In fact, work has found that experiencing negative emotions is not strongly tied to well-being for collectivist cultures (Kuppens et al., 2008). It may be that collectivist cultures are more comfortable experiencing and accepting negative emotions and thus view these negative emotions as separate to their own sense of happiness. One reason for this cultural difference may be that Americans may be less comfortable feeling mixed emotions, so they quickly resolved the mixed emotion episode by moving toward a more negative or more positive feeling. Or as mentioned earlier, Americans' interpretations of the emotion episode might only focus on the positive OR negative part of the context and not both aspects simultaneously.

Beyond cultural differences in self-reported mixed emotions, some evidence shows that people in different cultures experience different types of emotions. Socially disengaged emotions (sometimes called ego-focused emotions) are elicited by events directly related to the self (e.g., pride and anger). Conversely, socially engaged emotions (sometimes called other-focused emotions) are elicited by events related to others or to our relationships with other people (e.g., shame, love, vicarious pride, and embarrassment).

To test cultural differences in these emotions, Kitayama, Mesquita, and Karasawa (2006) recruited Japanese and American participants. At the end of each day for 14 days, participants recalled the "most emotional episode of the day" (Kitayama et al., 2004, p. 893). Then, each day, participants reported how strongly they experienced 27 different emotions during that emotional episode (Table 13 shows examples of these emotions). These 27 emotions were categorized into categories based on whether they are positive/negative and disengaging/engaging.

Table 13

Emotion Categories

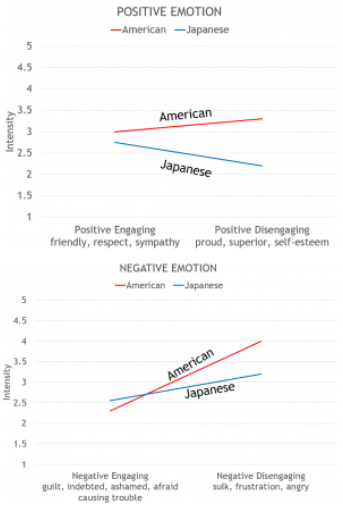
Adapted from "Cultural Affordances and Emotional Experience: Socially Engaging and Disengaging Emotions in Japan and the United States," By. S. Kitayama, B. Mesquite, and M. Karasawa, 2006, Journal of Personality and Social Psychology, 91(5), p. 893. (https://doi. 10.1037/ 0022-3514.91.5.890). Copyright 2006 by the American Psychological Association.

Emotion Type	Emotion
	Friendly Feelings
Positive Engaging	Respect Sympathy
	Proud
Positive Disengaging	Superior Self-esteem
	Guilt
Negative Engaging	Indebted Ashamed Afraid of cuasing trouble on another
	Sulky feelings
Negative Disengaging	Frustration Angry

Adapted from "Cultural Affordances and Emotional Experience: Socially Engaging and Disengaging Emotions in Japan and the United States," By. S. Kitayama, B. Mesquite, and M. Karasawa, 2006, *Journal of Personality and Social Psychology*, 91(5), p. 893. (https://doi. 10.1037/0022-3514.91.5.890). Copyright 2006 by the American Psychological Association.

Figure 18

Differences in Americans' and Japanese self-reported positive engaging and positive disengaging emotions (left) and negative engaging and disengaging emotions (right) over a 14 day period.



Adapted from "Cultural Affordances and Emotional Experience: Socially Engaging and Disengaging Emotions in Japan and the United States," By. S. Kitayama, B. Mesquite, and M. Karasawa, 2006, *Journal of Personality and Social Psychology*, 91(5), p. 894. (https://doi. 10.1037/0022-3514.91.5.890). Copyright 2006 by the American Psychological Association.

Let's look at the left figure in Figure 18 . American participants experienced positive disengaging emotions more intensely than positive engaging emotions. Japanese participants reported the opposite – they experienced positive engaging emotions more intensely than they did positive disengaging emotions. When comparing the two cultures, Americans reported higher intensity for positive disengaging emotions than Japanese, but there were not cultural differences for the positive engaging category.

Now, let's look at the right figure in Figure 18. Both Americans and Japanese reported experiencing negative disengaging emotions more strongly than negative engaging emotions. But, the difference

in intensity between disengaging and engaging emotions was stronger for Americans. Comparing cultures, Americans reported greater intensity for disengaging emotions than Japanese, but again cultural differences did not exist for engaging emotions.

These findings suggest that across a two-week period, American participants (vs. Japanese participants) reported greater intensity for emotions tied directly to the self, a clear cross-cultural finding! But, American and Japanese participants did not report differences in intensity for engaging emotions – a universal finding! Comparing emotions within a culture does provide more evidence for cross-cultural differences – such that Americans experienced their disengaging emotions more intensely, whereas those from Japan experience their engaging emotions more intensely. Of course, one limitation is the emotion friendliness. Friendliness seems to be more representative of another construct – a personality trait!

Another way subjective feelings can be categorized is as powerful emotions or powerless emotions. Powerful emotions are emotions that display one's own status and power. Powerless emotions are those emotions that occur when we blame the self and report low perceived ability to cope. A study (Fischer, Mosquera, & van Vianen, 2004) investigated how gender and culture influenced participants' subjective feelings. Men and women from 37 different countries were recruited. Some participants were from cultures with a high GEM (Gender Empowerment Measure, a construct used to measure gender equality in a given country), whereas other participants were from low GEM cultures. Countries were assigned a high GEM score if the country had equal division of the sexes and if women were heavily involved in positions of power, such as politics, economics, and the workplace. Low GEM countries were those in which men held more power than women. Participants were instructed to recall a time they felt six different emotions, and then to rate the emotion along two dependent variables: 1) self-reported intensity of emotion and 2) presence/absence of anger or

crying facial expressions. The two powerful emotions, typical of the male gender role, were anger and disgust. The powerless emotions, typical of the female gender role, were fear, sadness, shame, and guilt.

First, cultural and gender differences were not found for the intensity of powerful emotions (e.g., anger, disgust). The main finding from this study was that women's self-reported intensity for powerless emotions was not significantly different in low and high GEM cultures. This means that as a country becomes more gender-equal (moves from low to high GEM), women do NOT adopt the male role of low levels of intense powerless emotions. Men living in low GEM countries did report more intense powerless emotions than men living in high GEM countries. This means that as a culture becomes more gender-equal (moves from low to high GEM), men in turn adopt the typical male role of less intense powerless emotions. In other words, men in high GEM countries report less intense fear, sadness, shame and guilt. This finding could be interpreted another way – such that as a culture becomes less gender-equal (moves from high to low GEM) men report more intense powerless emotions. Why? This probably doesn't have to do with gender roles at all! It might be that men in low GEM countries experience many obstacles that could cause powerless emotions, such as war, conflict, and corruption. One final result to look at is the incidences of the anger facial expression. In low GEM countries, women self-reported fewer anger expressions than men. But in high GEM countries, men and women self-reported similar experiences of the anger facial expression. Together, these findings show that as a culture becomes more gender-equal (moves from low to high GEM), women adopt the masculine role by expressing powerful emotions, but men do not adopt the feminine role. Actually, the results showed that in countries with gender inequality men also adopt the feminine role of powerless emotions.

Summary of Basic Emotion and Social Constructivist Theories

In this chapter, we defined the difference between the basic emotion perspective and social constructivist perspective. Basic emotions researchers believe emotions solved adaptive problems, and thus the changes in the emotion components should be universally expressed. Conversely, social constructivists believe emotions are construed by the situation – by culture, by context, and even by gender! Thus, according to social constructivists the emotion components should be expressed differently across cultures.

In our review of the four component changes, we found evidence for both universality and cultural differences. It may be that some emotions (like joy) are consistently expressed in the same way across cultures, whereas more complex emotions show cross-cultural differences.

So, if emotions are basic, then how many basic emotions exist? In general, basic emotions theorists agree that five emotions are basic: joy, sadness, anger, disgust, and fear. Ekman (Ekman & Cordaro, 2011) adds two more to this list – surprise and contempt. But, others believe more than seven exist and label emotions such as awe, love, and pride as basic.

In the video below, Lisa Feldbam Barrett talks about Darwin's view of emotions and questions whether Darwin himself actually took an evolutionary view of emotions.

Watch the Yale Expert Interview from 17:00 – 24:17.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=253#oembed-1

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partner. *Cognition and Emotion*, 24(5), 786–799. https://doi.org/10.1080/02699930902990480

End of Chapter Activities (Chapter 3)

Facial Expression Matching

Below are seven individuals displaying seven different emotions. There are also blank spaces below the seven pictures appropriately labeled 1-7. Using the numbers shown for each of the individuals, match an emotion to each of the displayed facial expressions.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2288#h5p-6

CHAPTER 4: COGNITIVE APPRAISAL THEORY

Chapter 4 Learning Objectives

- What are the two views of cognitive appraisal theory?
- Are appraisals universally or socially constructed?
- How does the Component Process Model view the relationship between cognitive appraisals and emotion?
- Explain each of the appraisal checks and accompanying stimulus evaluation checks (SECs).
- Describe the relationship between cognitive appraisals and other emotion components.
- What are the strengths and weaknesses of cognitive appraisal theory?

Cognitive Appraisal Theory

A cognitive appraisal is our interpretation of the eliciting event and of our bodily reactions to the eliciting event. Remember, cognitive appraisal could occur unconsciously, as James-Lange suggested, or consciously, as Schachter-Singer discussed.

Many appraisal dimensions exist (for examples, refer to Scherer (1997) study in last chapter here). For instance, is the emotion caused by an internal or external event? Is the eliciting event moral or immoral?

In general, cognitive appraisal theorists have noticed that people experience different emotions in response to the same eliciting event. This led them to think about how people interpret eliciting events differently, ultimately leading them to experience different emotions. Of course, for some emotional experiences such as joy (Scherer, 1997), most people experience the same cognitive appraisals and thus the same emotion.

Two Views of Cognitive Appraisal Theory Currently, two views describe the connection between cognitive appraisals and emotions. The first view is that cognitive appraisals cause the emotion. This view suggests that the way we interpret the eliciting event determines our emotions. Thus, different interpretations of the same eliciting event could cause people to experience different emotions. For instance, if we interpret an eliciting event as unexpected – then we might experience fear. If we conclude that someone is blocking out goal, then we would experience anger.

The second view is that emotions cause appraisal. From this view, cognitive appraisals occur after the felt emotion (after physiological and behavior changes). For example, we might hear a gunshot and experience fear, which is then followed by cognitive appraisals of unexpectedness and ability to cope. Alternatively, we might feel

angry and not know why – so we look for a reason. Maybe we determine our friend gossiped about us and make the appraisal of external causation and goal obstruction.

Are appraisals universal or socially constructed?

As discussed in the past chapter, basic emotions researchers believe cognitive appraisals are universal. This view would suggest that the same emotional experience causes us to experience the same cognitive appraisals. As discussed in Scherer (1997), participants did report the same cognitive appraisals across countries when they recalled a time they felt joy. Similar to the autonomic sensitivity hypothesis for arousal, basic emotions theorists are looking for universal cognitive appraisal patterns association with unique emotions.

Social constructivist theorists, unlike basic emotions researchers, would claim that people can appraise the same eliciting event in different ways, causing them to experience different emotions. And Scherer's (1997) study in fact found cultural differences in the cognitive appraisals people reported when calling specific emotional experiences.

So, who is right? Read the next section to find out!

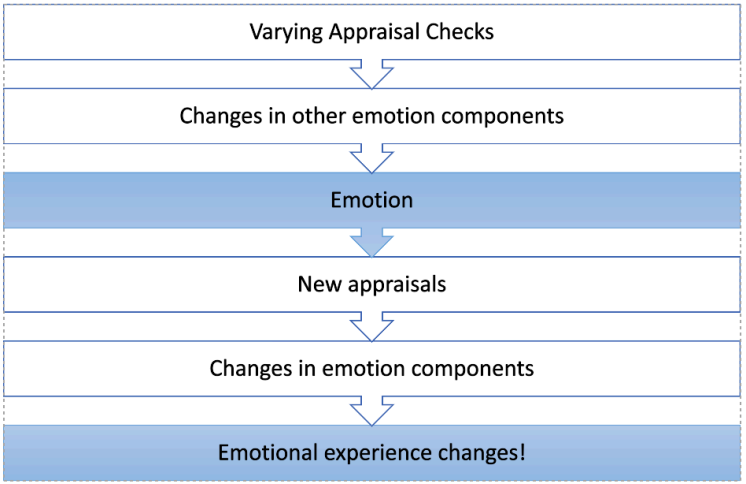
Component Process Model (CPM; Scherer, 2001)

Turns out, both theorists are somewhat right. The current thought is that cognitive appraisals which developed earlier in our ancestral past might be universal. These cognitive appraisals are the less complex appraisals, such as pleasantness and novelty. Theorists believe that cognitive appraisals that developed more recently, such as immorality and responsibility, are those that show cultural differences. For instance, Scherer (1997) found that across emotions, African residents reported more immorality, whereas Latin American residents reported more morality.

Klaus Scherer developed a cognitive appraisal model called the Component Process Model (CPM; Scherer, 2001). The CPM is founded on evolutionary theory and thus views each appraisal as having evolutionary significance (e.g., preventing death, advancing reproductive goals). The CPM states that cognitive appraisal is a process in which we continuously appraise and reappraise our environment. Each time we appraise or reappraise, the new interpretation could change our emotional experience (see Figure 1).

Figure 1

Influence of Appraisals on Emotion Experience



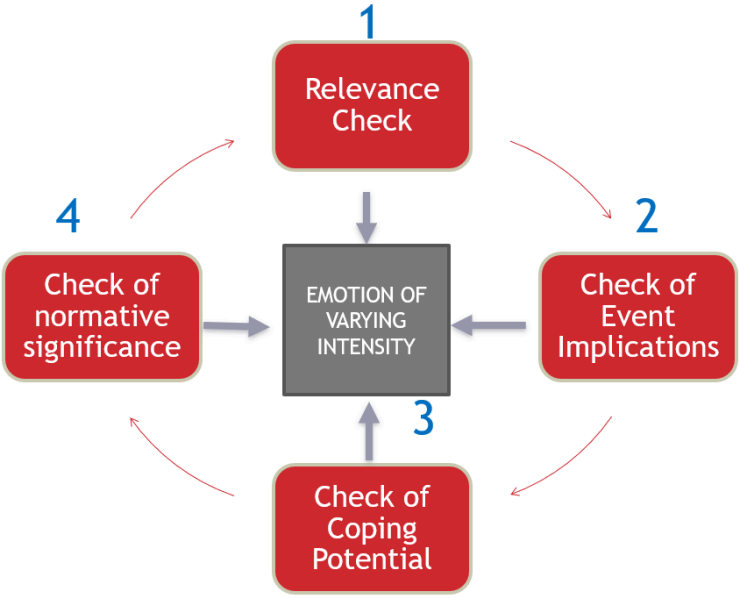
The CPM divides appraisal into four different stages: 1) relevance check, 2) implications check 3) coping potential check, and 4) normative significance evaluation. Stage 1 occurs earliest in the emotional experience, whereas check 4 occurs last. At each step, several cognitive appraisal dimensions occur, with step 1 including the more primitive, universal appraisals and step 4 including the later, more cultural appraisals. Figure 2 shows the four appraisal checks. Each appraisal check contains specific cognitive appraisal dimensions, which Scherer (2001) terms "stimulus evaluation checks" (SECs; p. 94). Table 1 shows the four appraisal checks and the SECs subsumed in each appraisal check.

Scherer views these SECs as the minimum appraisal people must make to distinguish their emotional experiences and to label their emotions. These SECs should be viewed as dimensional and not categorical. This means each SEC ranges from low to high scores with scores anywhere in the middle. Scherer proposes that the emotion label and felt intensity depend on the pattern of SECs that occur during the emotion. Thus, people cannot make one cognitive appraisal and determine their emotion – they must consider all their

evaluations together. In the following sections, we will explain each check.

Figure 2

Component Process Model (CPM) Appraisal Checks



Component Process Model

Table 1

CPM Appraisal checks and corresponding stimulus evaluation checks (SECs)

Appraisal Check	Information Assessed during Apprai
Relevance	How relevant is this event for me? Does it directly affect me or my social group?
Implications	What are the implications or consequences of this even How do these implications affect my well-being? How do these implications affect my short or long-te
Coping Potential	How well can I cope with or adjust to these consequenc
Normative Significance Evaluation	What is the significance of this event with respect to my

Adapted from "Appraisal Considered as a Process of Multilevel Sequential Checking.," by K.R. Scherer, 2001, In K.R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research*, *p.* 94, Copyright 2001 Oxford University Press

Relevance Check

The relevance check comprises the appraisals that occur earliest in the emotion experience and thus tend to be universal (Figure 3 shows the types of cognitive appraisals). At the relevance check, humans and animals quickly determine how much of an impact the eliciting event have on their well-being. The first appraisals relate to novelty of the eliciting events. Changes in the situation that are interpreted as sudden, unfamiliar, and unpredictable are determined to be related to the well-being of the animal, and thus begin the emotional experience. Events assessed as novel might elicit fear (e.g., "this bear is my backyard is sudden and unexpected!"). While other events might be familiar and predictable – such as studying hard eliciting the emotion of pride. Novelty is always the first cognitive appraisal that occurs, such that a new change in the environment attracts the organism's attention toward the eliciting event. After evaluating the level of novelty, organisms will assess pleasantness/unpleasantness of the event. At this point in the emotional experience, the organism may feel globally positive or negative, but a clear discrete emotion is not yet identifiable. Scherer (2001) states that typically, an evaluation of unpleasantness causes avoidance behavior and evaluation of pleasantness causes approach behavior (remember, anger is one exception). Following pleasantness, goal relevance (sometimes called goal significance) is the last step in the relevance appraisal check. At this point, organisms evaluate the relationship between their goals and the eliciting event. Eliciting events that closely impact one's goals are more relevant. Goals could include survival (avoiding death), satisfying drives like hunger, thirst, and sex, succeeding at a task, or maintaining relationships. Remember, goal relevance should be considered a dimensional measure, such that at any point in time the eliciting event could be high in goal relevance, low in goal relevance, or anywhere between high and low goal relevance.

Figure 3

Relevance Check SECs

Graphic displaying the relevance check on universal appraisals.

Implications Check

The implications check (see Figure 4) occurs after the goal significance check. During the implications check, the organism determines whether the event hinders or advances survival and basic needs. The implications check includes the following appraisals in order of occurrence: causal attribution, outcome probability check, goal conduciveness, and urgency. Causal attribution occurs when we make causation and intentional attributions. During a causation attribution, we think about whether we make an internal or external attribution for the eliciting event. An internal attribution would mean that we think the event was caused by the self, whereas when an external attribution occurs we conclude the eliciting event was caused by something outside of the self – such as another person, an animal, or an object. Emotions like pride and shame are caused by internal attributions – when we evaluate the self as achieving something good (pride) or doing something harmful (shame). Further, whether we make an internal or external attribution could change the label we provide the emotion. For instance, if we receive a poor grade on the exam and make an internal attribution for this failure (i.e., It's our fault, we didn't study enough), then this internal attribution would cause us to feel shame. But, if we fail an exam and make an external attribution (e.g., our teacher is terrible, the exam was too hard), then the external attribution would cause us to label our emotion anger. An intention attribution occurs when we think about whether the internal or external thing caused the event on purpose or by accident. For instance, if we think someone hit our car on purpose that could elicit anger, but if we think they hit our car by accident that might cause a different negative emotion such as sadness or disappointment.

The outcome probability check or possible outcomes check

occurs when people assess the likelihood of various outcomes to the event. Scherer (2001) states that how people interpret the probability that the outcomes of an eliciting event would occur could cause a certain emotion. For instance, if we perceive our parents will be very likely to be disappointed by our grade of a B on a statistics exam, then we might experience shame. But, if we perceive our parents will be very likely to be ecstatic about our receiving a B in a difficult statistics course, then we would experience pride or joy!

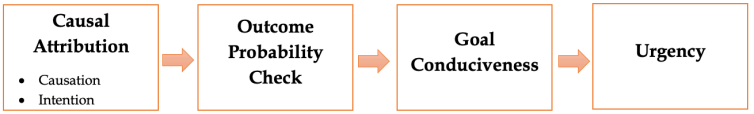
The goal conduciveness check occurs when we assess whether the outcomes of the eliciting event supports our goals and needs or hinder them. As the outcomes push us closer to achieving our goals or satisfying our needs, the greater goal conduciveness we report. For instance, if we receive a B on a statistics exam, our appraisal might be moderate goal conduciveness, but an A on a statistics exam would cause an even greater appraisal of goal conduciveness. In general, when we perceive that we reached our own goals, we experience pride. As the outcomes push us farther away from achieving our goals or not satisfying our needs, the higher goal obstructiveness we report. Goal conduciveness and goal obstructiveness should be viewed as opposite poles of the same cognitive appraisal dimension. For instance, when someone jumps in front of us in the Starbucks line, we might view that event as preventing us from achieving our goals (a coffee) and from satisfying our needs (thirst!). Typically, an appraisal of high goal obstructiveness (or what we term frustration) causes anger. After goal conduciveness, an urgency check occurs.

Urgency represents the amount of time people perceive they have to achieve their goals or satisfy their needs from the goal conduciveness SEC. As a dimensional cognitive appraisal, high urgency indicates people have little time to achieve their goals/needs, while low urgency suggests an individual has a maximum amount of time to achieve their goals/needs. In fact, Scherer (2001)

expands on the urgency definition by combining time and goal significance together, suggesting that high urgency occurs when goals are highly relevant, and people have little time to achieve these goals.

Figure 4

Implications Check SECs



Graphic depicting the implications check

Coping Potential Check

The third appraisal check is a coping potential check, during which people determine whether they can cope or not cope with the eliciting event (Figure 5). During the coping check, people appraise the possible behavior changes that they could exhibit in response to the eliciting event. In addition, during the coping check, people consider the consequences that will result from the repertoire of possible behavior changes they are considering. The first SEC within the coping check is controllability. Controllability is whether we perceive that we or someone else can control the event or outcome of the event. Specifically, controllability is the probability that we can or cannot control the event. For instance, if we perceive that we can control the grade we receive on an upcoming exam, we might experience hope, and be motivated to study (an approach behavior!). But, if we perceive we have little control over our exam grade, then we might experience sadness and avoid studying. It is important to note that we can also perceive whether other people can help us cope. Power or Resources, the second SEC dimension, describes whether the organism has the power or resources to cope with the event. Specifically, power is the probability that we or someone we know has the resources to influence an event that is controllable. For instance, if we perceive we have control over our exam grade and we have the money to pay for a tutor, then we have high levels of coping potential. But, if we perceive we can cope but do not have appropriate resources to achieve the desired outcome, our coping potential would be a bit lower. Resources might include physical strength, money, knowledge, social attractiveness, education, IQ, and even status. After we evaluate our power and resources, we next assess the adjustment SEC, in which we determine whether we can adjust or not adjust to the eliciting event. If we determine we do not have the power/resources to change our outcomes, then we must determine whether we can

adjust or not to the outcome of the event. Whether or not we view we can adjust to the outcome might cause different emotional experiences.

Figure 5

Coping Potential Check SECs

Graphic displaying the coping potential check process

Normative Significance Evaluation

The final appraisal check is called normative significance evaluation (Figure 6). During this check, people compare the eliciting event and their behavior changes against their values, social norms, morals, and cultural standards. During these appraisals, people consider how their behaviors and the outcome of the event will be viewed by other people and how the outcome and their behaviors will influence their self-esteem. This last group of appraisals applies only to animals who engage in complex thought – so humans!

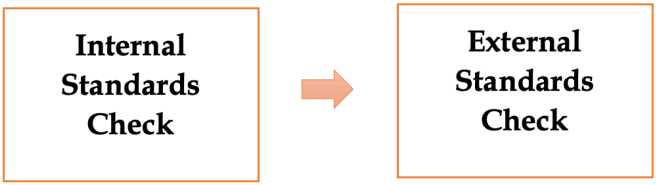
Two checks occur during this last step. The first is the internal standards check. During the internal standards check, people evaluate the eliciting event and their own behavior against their own internal standards (self-concept, morals, values, rules, etc.). This evaluation against our own internal standards could increase or decrease our self-esteem. For example, if we lie to a friend, we will evaluate this behavior as violating our self-concept (we don't view the self as dishonest) and internal morals, thus temporarily dropping our self-esteem. If we help a stranger, we will evaluate this behavior as highly moral and part of our self-concept (we are good people!), thus temporarily increasing our self-esteem.

The second check is the external standards check. During this check we evaluate the event and our own behavior against standards or pressures from the external environment or a certain reference group. These external codes include perceived social norms, social rules, and group moral codes. In the external standards check, the reference group we consider when comparing our behavior to group norms could change the emotion. For instance, an adolescent teenager's behavior would be viewed

differently by a group of friends and by parents. If a teenager tries a cigarette for the first time, this might match the group norms for the friends, but not the parents. Thus, when a teenager tries a cigarette for the first time their emotion could change based on whether they compare their behavior to their friend reference group (pride!) or to their parent reference group (shame!).

Figure 6

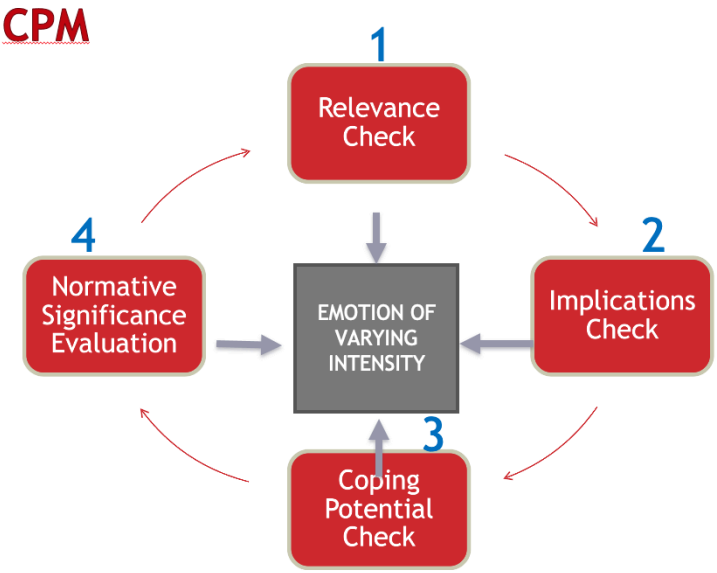
Normative Significance Evaluation SECs



Graphic depicting normative significance evaluation check

Figure 7

Component Process Model (CPM) Appraisal Checks



[Schirmer, A. (2014). What is an emotion? Modern thoughts and concepts. Emotion (Chapter 3, pp.58-69). Los Angeles, CA: Sage.]

Test Your Knowledge!

Match the SECs to the correct CPM appraisal

Below is a table of Appraisal Checks listed in the left column. The right column contains blank spaces with drop zones for each of the appraisal checks. Drag the SECs shown to the right of the table into the correct drop zones corresponding with the appraisal check listed in the left column.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=274#h5p-7

Strengths and Weaknesses of Cognitive Appraisal Theory

The CPM and cognitive appraisal theory have many strengths. One strength is that the theory is not confined to discrete categorical emotions, and thus can explain a wide range of emotional experiences. This theory also explains why people may experience the same eliciting event but report different emotions. Also, measuring the cognitive appraisals dimensionally allows us to find clear differences between emotions.

One weakness is that many cognitive appraisal dimensions exist. For instance, Scherer (1997) identified eight appraisal dimensions! And other researchers (Tong, 2015) have identified additional ones beyond Scherer's eight. Another weakness is that assessing quick, nonconscious appraisals can be difficult. Finally, this theory does not answer whether we can experience an emotion without any appraisal at all!

Summary of Cognitive Appraisal Theory

The CPM states that the appraisals that result from each check are highly subjective and based on an individual's perceptions of the eliciting event. This suggests that personality traits, motivational states, cultural norms, gender, and group pressures all influence our evaluations of the eliciting event.

The CPM is a continuous process in which our first appraisal starts with the relevance check and moves sequentially to the next check. Once the appraisal process starts, though, our conclusions at each step could influence other checks. In addition, as people go through each appraisal check, the intensity of their emotion increases. An emotion is least intense during the first relevance check and most intense at the normative event significance check. This is because as we go through each check, we gain more information about the emotion.

Below is Table 2 reproduced from Scherer (2001, p. 326). This table displays example emotions in the top row and the SECs in the left column. This table shows the appraisal patterns that might occur for different emotions. Remember, Scherer (2001) is interested in how certain appraisal profiles can be used to distinguish emotional experiences. (Note: The prior chapter did not cover discrepancy from expectation, but this SEC is listed in the table).

Table 2

Appraisal profiles for certain discrete emotions

A table showing different appraisal profiles for certain discrete emotions. ENJ/HAP, enjoyment/happiness; ELA/JOY, elation/joy; DISP/DISG, displeasure/disgust; CON/SCO, contempt/scorn; SAD/DEJ, sadness/dejection.

Criterion	ENJ/HAP	ELA/JOY	DISP/DISG	CON/SCO	SAD/DEJ	DESPAIR	ANX/WOR
Novelty – Suddenness	Low	High/med	Open	Open	Low	High	Low
Novelty – Familiarity	Open	Open	Low	Open	Low	Very Low	Open
Novelty – Predictability	Medium	Low	Low	Open	Open	Low	Open
Intrinsic Pleasantness	High	Open	Very Low	Open	Open	Open	Open
Goal / Need relevance	Medium	High	Low	Low	High	High	Medium
Implication – Cause: Agent	Open	Open	Open	Open	Open	Oth/Nat	Oth/Na
Implication – Cause: Motive	Intent	Cha/int	Open	Intent	Cha/Neg	Cha/Neg	Open
Implication – Outcome Probability	Very High	Very High	Very High	High	Very High	Very High	Medium
Implication – Discrepancy from Expectation	Consonant	Open	Open	Open	Open	Dissonant	Open
Implication – Conduciveness	Conducive	Vcon	Open	Open	Obstruct	Obstruct	Obstruc
Implication – Urgency	Very Low	Low	Medium	Low	Low	High	Medium
Coping Potential – Control	Open	Open	Open	High	Very Low	Open	Open
Coping Potential – Power	Open	Open	Open	Low	Very Low	Very Low	Low
Coping Potential – Adjustments	High	Medium	Open	High	Medium	Very Low	Medium

Normative Significance – Internal Standards	Open	Open	Open	Very Low	Open	Open	Open
Normative Significance – External Standards	Open	Open	Open	Very Low	Open	Open	Open

A table showing different appraisal profiles for certain discrete emotions. IRR/COA, irritation/cold anger; RAG/HOA, rage/hot anger; BOR/IND, boredom/indifference

Criterion	FEAR	IRR/ COA	RAG/ HOA	BOR/IND	SHAME	GUILT	PRI
Novelty – Suddenness	High	Low	High	Very Low	Low	Open	Ope
Novelty – Familiarity	Low	Open	Low	High	Open	Open	Ope
Novelty – Predictability	Low	Medium	Low	Very High	Open	Open	Ope
Intrinsic Pleasantness	Low	Open	Open	Open	Open	Open	Ope
Implications – Cause: Agent	Oth/Nat	Open	Other	Open	Self	Self	Self
Implications – Cause: Motive	Open	Int/Neg	Intent	Open	Int/ Neg	Intent	Inte
Implications – Outcome Probability	High	Very High	Very High	Very High	Very High	Very High	Very Hig
Implications – Discrepancy from Expectation	Dissonant	Open	Dissonant	Consonant	Open	Open	Ope
Implications – Conduciveness	Obstruct	Obstruct	Obstruct	Open	Open	High	Hig
Implications – Urgency	Very High	Medium	High	Low	High	Medium	Low
Coping Potential – Control	Open	High	High	Medium	Open	Open	Ope
Coping Potential – Power	Very Low	Medium	High	Medium	Open	Open	Ope
Coping Potential – Adjustments	Low	High	High	High	Medium	Medium	Hig
Normative Significance – Internal Standards	Open	Open	Open	Open	Very Low	Very Low	Very Hig

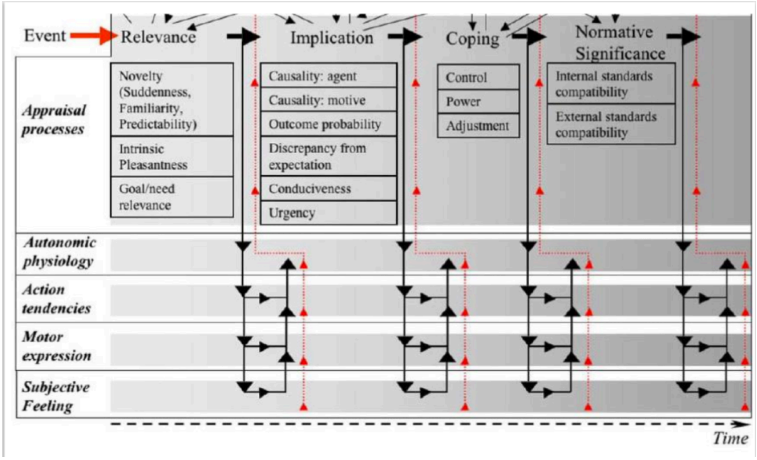
Normative Significance – External Standards	Open	Low	Low	Open	Open	Very Low	High

Reproduced from "A Systems Approach to Appraisal Mechanisms in Emotion," by D. Sander, D. Grandjean, and K.R. Scherer, 2005, Neural Networks, 18(4), p. 326, (https://doi.org/10.1016/j.neunet.2005.03.001). Copyright 2005 Elsevier.

Finally, Figure 8 below demonstrates the how the emotional experience unfolds from the perspective of CPM. After each broad appraisal check, people experience changes in physiology (called "autonomic physiology"), changes in behavior (called "action tendencies" and "motor expression"), and conscious subjective feelings. It is important to note that these three changes – physiology, behavior, and subjective feelings – in turn, influence each of the later appraisal checks.

Figure 8

Visual of How Emotion Components Unfold Over Time and Continuously Influence Each Other



[Figure 8 taken from Sander, D., Grandjean, D., & Scherer, K.R. (2005). A systems approach to appraisal mechanisms in emotion. Neural Networks, 18, 317-352.] Reproduced from "A Systems Approach to Appraisal Mechanisms in Emotion," by D. Sander, D. Grandjean, and K.R. Scherer, 2005, Neural Networks, 18(4), p. 321, (https://doi.org/10.1016/j.neunet.2005.03.001). Copyright 2005 Elsevier.

Chapter 4 References

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Tong, E. M. (2015). Differentiation of 13 positive emotions by appraisals. *Cognition and Emotion*, 29(3), 484-503. https://doi.org/10.1080/02699931.2014.922056

End of Chapter Activities (Chapter 4)

Match the SECs to the correct CPM appraisal

Below is a table of Appraisal Checks listed in the left column. The right column contains blank spaces with drop zones for each of the appraisal checks. Drag the SECs shown to the right of the table into the correct drop zones corresponding with the appraisal check listed in the left column.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2290#h5p-7

CHAPTER 5: DIMENSIONAL MODELS

Chapter 5 Learning Objectives

- Explain the differences between Woodworth's Emotion Scale and Schlosberg's Revised Woodworth Emotion Scale.
- Define valence and activation and identify examples of each.
- Explain the difference between a bipolar and unipolar dimension of emotion.
- Compare and contrast Russell's (1980) and Watson and Tellegen's (1985) circumplex model. What are the underlying dimensions posited by each model?
- How does the Evaluative Space Model (Cacioppo et al., 1999) contribute to dimensional theories?

Chapter 5 Introduction

This chapter focuses on dimensional models. Dimensional models focus on the emotion component subjective feelings. This means dimensional models believe that understanding and measuring conscious, subjective feelings is important.

Developers of dimensional models criticize basic emotions for seeking categories of emotions. They identify three problems with basic emotion theory: 1) the four components do not clearly combine into separate emotion categories, 2) facial expressions are not accurate measures of emotional experiences, and 3) the number of basic emotions differs across theories. Instead of measuring emotions with categories, dimensional researchers emphasize that we should measure emotions — dimensionally!! Thus, one goal of the dimensional perspective is to identify the smallest number of dimensions that represent all emotions. In turn, dimensions researchers state that all the basic emotion categories can be measured with a small number of dimensions.

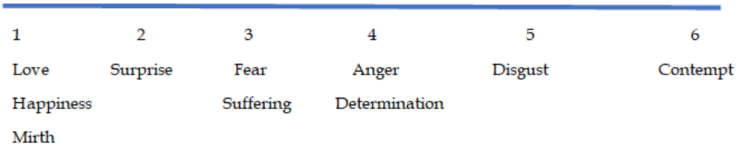
Early Dimensional Models

Woodworth Emotion Scale

Robert S. Woodworth was one of the first to view emotions from a dimensional perspective. Instead of focusing on subjective feelings like current dimension theorists, he focused specifically on how people interpreted facial expressions (a behavior change component!). Specifically, Woodworth reviewed prior research on misinterpretation of facial expressions and developed a scale that displayed common errors people made when interpreting others' facial expressions. For instance, an error in interpretation would occur if people viewed an anger face but labeled the emotional expression as fear. Based on his review, Woodworth (1938, as cited in Schlosberg, 1952) developed the Woodworth Emotion Scale. This scale included only one dimension that ranged from 1 (love, happiness, mirth) to 6 (contempt). Based on his scale, emotions in the same space are those most typically misinterpreted for each other. For instance, on his scale disgust facial expressions (a 5) would be commonly mislabeled as contempt (a 6) or anger (a 4). In general, his review showed that people tend to confuse emotions similar in valence (anger and disgust), but do not confuse emotions with drastically different valences (happiness and fear).

Figure 1

Visual Display of Woodworth's Emotional Scale



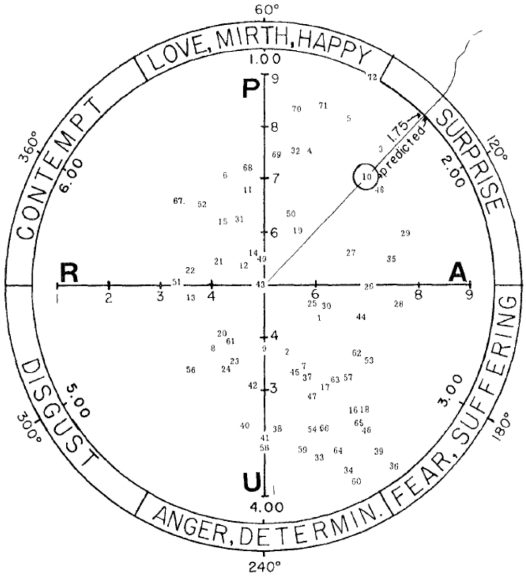
Schlosberg's (1941) Revised Woodworth Emotion Scale

After Woodworth developed his scale, Schlosberg revised this scale in 1941. Schlosberg asked participants to group 200 facial expressions into six bins based on similarity in facial expressions. A major finding from his study was that participants tended to group happiness and contempt emotions in the same bin – indicating these two facial expressions were similar. But Woodworth had placed contempt and happiness on opposite poles of the dimension, which would suggest happiness and contempt were not related to each other. Based on his findings, Schlosberg decided Woodworth's one dimension should be changed to a circumplex. A circumplex means that emotions words are arranged around a circle, such that emotions closest in space to each other are most similar to each other. By revising to a circle, this would allow happiness and contempt to be placed in the same place. Circumplex models are developed around at least 2 dimensions, so this change suggested that two dimensional underlie emotions, not one as Woodworth thought!

What are the two poles Schlosberg identified? Schlosberg labeled one dimension pleasant/unpleasant and the second dimension attention/rejection (see Figure 2). Per his model, happiness (coded as 1) was most pleasant because it fell on the pleasantness/unpleasantness dimension, and anger was labeled as most unpleasant. The attention/rejection dimension measured whether people focused their attention when experiencing an emotion or engaged in more rejection/avoidance behavior. Surprise (2) and fear (3) were highest in attention, and disgust (5) and contempt (6) were highest in rejection. Using this model, ANY emotion should be described on the pleasant/unpleasant and attention/rejection dimensions. For instance, contempt (6) is high in rejection and high in pleasantness, according to Schlosberg's theory.

Figure 2

Schlosberg's Original Two dimensions of Emotion



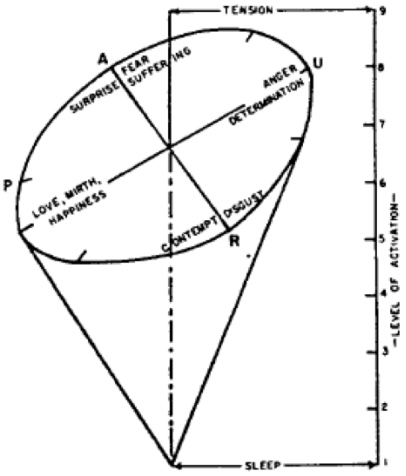
Note. In this model, the P-U dimension stands for pleasant-unpleasant. The R-A dimension stands for rejection-attention. Reproduced from "The description of facial expressions in terms of two dimensions," by H. Schlosberg, 1952, Journal of Experimental Psychology, 44(4), p. 232 (https://doi.org/10.1037/h0055778). Copyright 2016 by the American Psychological Association.

During his research, Schlosberg realized that some emotional expressions could not be measured with just two poles. So, he added a third pole called activation (see Figure 3). This activation dimension ranged from sleepy to tense, and thus measured the arousal level of the emotion. In Figure 3, Schlosberg sloped his original model of two dimensions. Emotions on the high end of the slope are highest in activation (e.g., anger, fear), while emotions on the low end of the slope (e.g., happiness, contempt) are lowest in

activation. To determine how each emotion scores on the three dimensions, think about which ends of the dimensions are closest in space to that emotion. For example, the emotion fear is closest to unpleasant, attending, and high activation. Conversely, the emotion contempt is closest to unpleasant, rejecting, and low activation. Keep in mind that modern dimensional theorists (Russell, 1985) view activation and unpleasantness/pleasantness as the underlying dimensions of emotions.

Figure 3

Schlosberg's Three Dimensions of Emotion



Note. In this model, the P-U dimension stands for pleasant-unpleasant. The R-A dimension stands for rejection-attention. Reproduced from "Three dimensions of emotion," by H. Schlosberg,

1954, Psychological Review, 61(2), p. 87 (https://doi.org/10.1037/h0055778). Copyright 2016 by the American Psychological Association.

Summary of Early Dimensional Theories

Woodworth and Schlosberg were the first to suggest that emotions could be measured on a continuum. They showed how emotional experiences could be reduced to a smaller number of dimensions. In addition, they found that people often confused the facial expressions of similar emotions, providing evidence against the categorical basic emotion perspective.

One limitation of these early models is that the models focused on interpretation of facial expressions and ignored other components such as subjective feelings. In addition, Woodworth and Schlosberg disagreed on how many dimensions existed (an argument still prevalent today!). A review of the circumplex model misses many important emotions – such as sadness and shame. Finally, the theories were not based on sound statistical analyses, mainly because computers did not exist in the 1940's.

Modern Dimensional Models

The goal of modern dimensional theorists is to understand the relationship between emotions by identifying underlying dimensions of emotions. Typical methodologies include participants ratings of their emotions in the past two weeks or participants rating how similar emotions are to each other. Then, researchers use statistical analyses to arrange participants ratings around a circle based on similarity (or those emotions that are positively correlated). A circumplex model is developed that displays similar emotions in the same space based on scores that are positively correlated.

Before investigating modern dimensional theories, let's define some terms. Valence is a dimension that measures the extent to which an emotion is pleasant or unpleasant. Activation measures the extent to which an emotion arousing and intense or calm and low in intensity. Mixed emotions occur when people experience more than one emotion at the same time. Mixed emotions could be similar in valence/arousal (e.g., tense and nervous) or different in valence/activation (e.g., happiness and sadness). Each dimensional model varies in the emotions they consider to co-occur. For example, some models believe happiness and sadness can co-occur, while others do not.

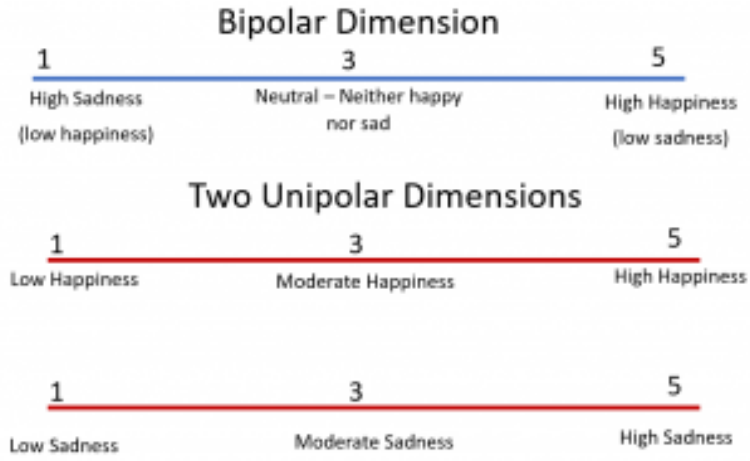
In the dimensional models, dimensions may be bipolar or unipolar. On bipolar dimensions, participants are asked to determine the ratio of two opposing concepts. A bipolar pole measuring emotions might place two opposite emotions at each pole (e.g., happiness and sadness). On bipolar dimensions, the two poles are negative correlated. So, if happiness-sadness represents a bipolar dimension, then this means someone high in happiness is

low sadness. This further means that an individual cannot be happy and sad at the same time (i.e., high happiness AND high sadness).

On unipolar dimensions, participants are asked to consider whether a certain emotion is present or absent (high sadness versus low sadness). Typically, unipolar dimensions place the high and low levels of the same adjective at each pole. For instance, Figure 4 shows one bipolar dimension and two unipolar dimensions. So, on the bipolar dimension below, people cannot experience happiness and sadness at the same time (because people can only pick one spot on the line). This bipolar dimension implies that happiness and sadness are negatively correlated – as happiness increases, sadness decreases. But, in the two unipolar dimensions below, people can simultaneously experience high happiness and high sadness. The unipolar dimensions suggest happiness and sadness are not correlated. As we work through modern dimensional theories, pay close attention to which dimensions are unipolar and bipolar.

Figure 4

Example Bipolar and Unipolar Dimensions Using the Emotions Happiness and Sadness



Russell's (1980) Circumplex Models

For this activity, place the below emotion words in a spot on the line according to each emotion's level of valence and level of activation.

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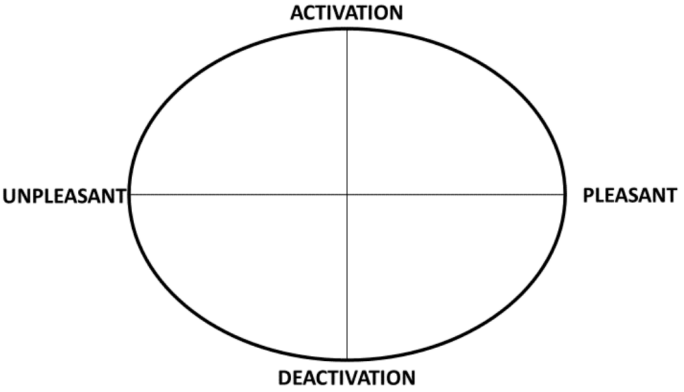
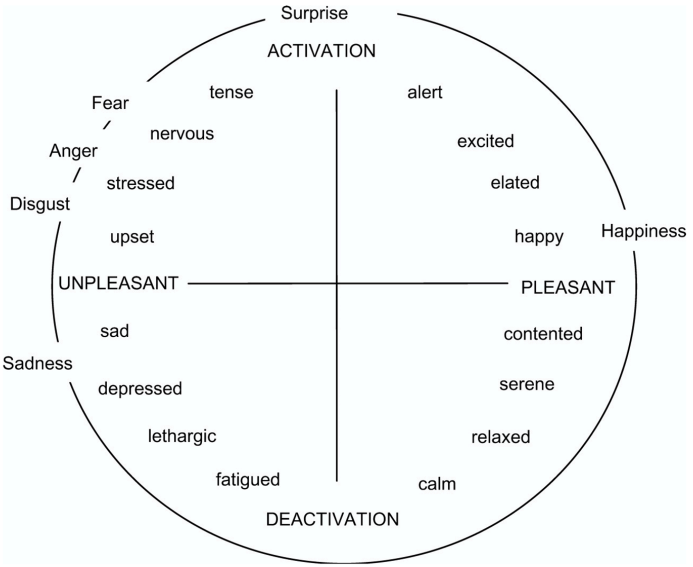


Russell's (1980) Circumplex Model

James Russell developed a circumplex model based on subjective feelings (see Figure 5). In an early study, Russell (1980) asked participants to sort 28 emotion words into categories based on perceived similarity. Then, Russell used a statistical technique to group the emotion ratings based on positive correlations – in essence, grouping similarly related emotion words together in a circle. This multidimensional scaling analysis revealed two bipolar dimensions – valence and activation! Thus, any emotion can be described using an unpleasantness/pleasantness dimension (valence) and a high arousal/low arousal dimension (activation).

Figure 5

Russell's (1980) Circumplex Model



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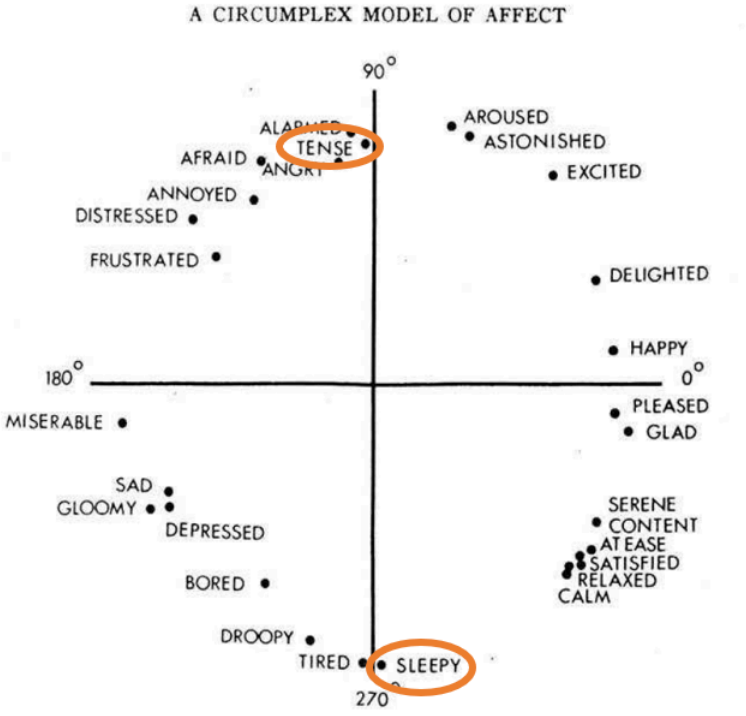
Russell's (1980) model suggests valence and activation are independent, bipolar dimensions. Independent means valence and activation are uncorrelated. Bipolar means that opposite emotions terms represent each of the opposite poles for valence and activation. For example, in Figure 5 above, happy and sad are displayed at opposite poles of the pleasantness dimension. As shown in Figure 6 below in the orange circles, tense and sleepy are displayed at opposing ends of the activation dimension. Thus, a person cannot be tense and sleepy at the same time. Finally, according to this model mixed emotions are similar in subjective feelings. Thus, a mixed emotion cannot be comprised of feelings that differ drastically in valence or arousal – such as happiness and sadness. In the figure below, mixed emotional experiences would be those emotions located next to each other in the same quadrant.

Figure 6

A More Detailed Version of Russell's (1980) Circumplex Model



Adapted from "Independence and bipolarity in the structure of current affect," by L. Feldman Barrett and J.A. Russell, 1998, Journal of Personality and Social Psychology, 74(4), p. 116 (https://doi.org/10.1037/0022-3514.74.4.967). Copyright 1998 by the American Psychological Association.

Russell and colleagues (Russell, 1980; Russell & Barrett, 1999) differentiate between core affect and prototypical emotion episodes (PEE). Core affect represents our most basic feeling at any point in time. Core affect includes prolonged objectless moods AND specific emotion episodes. There is always a cause to core affect. Sometimes people are aware of the cause, as in emotion episodes,

but often people are unaware of the causes, such as when changes in the environment or our physical bodies cause a change in our mood. Core affect is always present and can include feelings of neutrality, although most of core affect describes people's general level of unpleasantness/pleasantness and arousal. Prototypical emotion episodes (PEE) are emotions caused by a specific eliciting event – what we defined earlier as an emotion. Russell and Barrett (1999) state that PEE include the following components:

1. Core Affect
2. Behavior changes
3. Cognitive Appraisal
4. Subjective Feelings
5. Physiological changes, including all bodily, chemical, and brain changes
6. A clear, short time period during which the PEE occurs

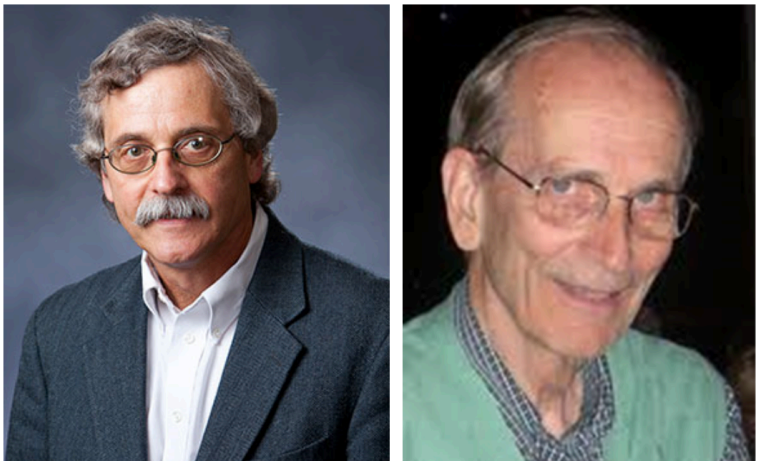
Russell and Barrett further explain that all emotion episodes start when an event causes a change in core affect, but appraisals, behaviors, and physiological changes have not occurred. Once the individual appraises and identifies the eliciting event and exhibits behavior and physiological changes, the prototypical emotion episode has begun. So, if we are feeling down but do not know why – that would represent core affect. If we eventually determine that we feel down because we miss our family, this would represent a PEE because we can now know the cause of our core affect and can consciously identify the emotion as sadness. In Russell's circumplex model, the small emotion terms in the inner circle represent core affect, whereas the emotion terms on the circle represent PEEs.

Watson and Tellegen's (1985) Circumplex Model

Directions: For the below emotion words, circle how much you currentlyfeel this emotion. Then, average your total positive affect (PA) and negative affect (NA). To average your scores, add up all your answers for positive affect (PA) and divide by 10. Follow the same pattern for negative affect (NA). Averages should range between 1 and 5. This scale is called the Positive Affect Negative Affect Scale-Momentary (PANAS-Momentary; Watson et al., 1988)

	1	2	3	4	5
	Very Slightly / Not At All	A Little	Moderately	Quite a Bit	Extremely
Interested	1	2	3	4	5
Excited	1	2	3	4	5
Strong	1	2	3	4	5
Enthusiastic	1	2	3	4	5
Proud	1	2	3	4	5
Alert	1	2	3	4	5
Inspired	1	2	3	4	5
Determined	1	2	3	4	5
Attentive	1	2	3	4	5
Active	1	2	3	4	5
Average PA Score					

	1	2	3	4	5
	Very Slightly / Not At All	A Little	Moderately	Quite a Bit	Extremely
Distressed	1	2	3	4	5
Upset	1	2	3	4	5
Guilty	1	2	3	4	5
Scared	1	2	3	4	5
Hostile	1	2	3	4	5
Irritable	1	2	3	4	5
Ashamed	1	2	3	4	5
Nervous	1	2	3	4	5
Jittery	1	2	3	4	5
Afraid	1	2	3	4	5
Average NA Score					



A picture of Watson and Tellegen

Watson and Tellegen (1985) conducted similar studies to Russell and

Barrett (1999). Their findings suggested that the lines identified by Russell and Barrett were not placed through the greatest cluster of points. So, Watson and Tellegen (1985) rotated Russell's (1980) circumplex 45 degrees (see below) and drew two new dimensions through the greatest cluster of points, which they labeled High Positive Affect and High Negative Affect.

Figure 7

Watson and Tellegen's (1985) 45° Rotation of Russell's (1980) Circumplex

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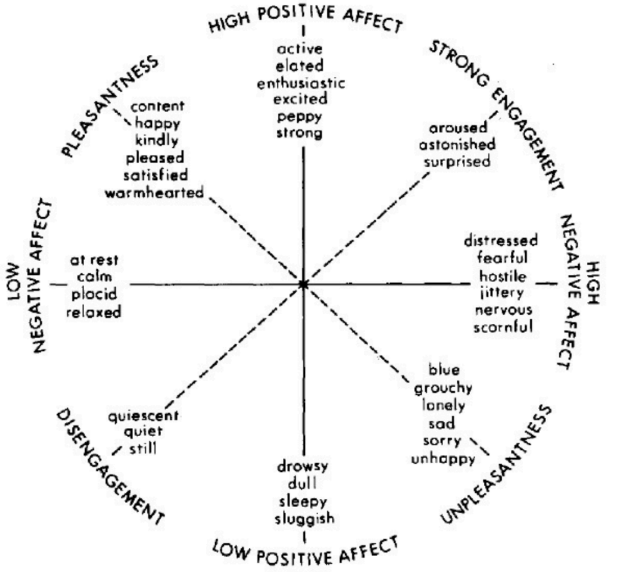


Reproduced from "Toward a consensual structure of mood.," by D.T. Watson and A. Tellegen, 1985, Psychological Bulletin, 98(2), p. 221 (https://doi.org/10.1037/0033-2909.98.2.219). Copyright 1985 by the American Psychological Association.

Rotating Russell's (1980) circumplex resulted in eight octants subsumed by four dimensions: pleasantness, engagement, positive affect, and negative affect. Pleasantness/unpleasantness and engagement/disengagement are bipolar measures, whereas positive affect and negative affect are unipolar dimensions (although Watson and Tellegen state they are bipolar dimensions as well). Pleasantness ranges from moderately arousing pleasant emotions to moderately arousing negative emotions. They are moderately arousing emotions because these emotions are located

between strong engagement and disengagement. The engagement dimension measures high to low arousing emotions that are moderately pleasant or unpleasant. High Negative Affect (NA) and High Positive Affect (PA) represent highly activated positive and negative emotions because PA and NA are located closest to engagement. Specifically, High NA is feeling unpleasant, highly arousing emotions. High PA is feeling pleasant and highly activated emotions. Later, Positive Affect and Negative Affect were renamed Positive Activation and Negative Activation to emphasize the terms represent highly activating emotions.

Relationships between emotions are determined by how close in space the octants of each emotion are. Table 1 explains how to interpret the correlational relationships based on octant location(s).

Table 1

Correlational Relationship between Emotion Words based on Octant Location

A table showing the correlational relationship between emotion words based on Octant Location

Octant Location of Emotion Words	Relationship
Emotions words located in same octant	Strongly, positively correlated
Emotion words in adjacent octant	Moderately, positively correlated
Emotion Words 90°apart	Uncorrelated
Emotion Words 180° apart	Strongly, Negatively correlated

Watson and Tellegen (1985) found that self-reports of emotions clustered mostly around High PA and High NA. Thus, they concluded that PA and NA are the only two dimensions of the model and are most representative of true emotions. So, they believe the

important emotions are all high in arousal. Because PA and NA are 90 degrees from each other, PA and NA are uncorrelated with each other. This means an individual could experience High PA and High NA at the same time. In fact, Watson and Tellegen (1985) suggest that mixed emotions occur in the octants between High PA and High NA. It is important to note that this model does not allow happiness and sadness to co-occur.

So, what about the low poles of PA and NA? The low poles represent the absence of PA and NA. Low NA would be the absence of highly arousing negative emotions and Low PA would be the absence of highly arousing positive emotions. So, low NA represents pleasant emotions that are low in arousal. This is because low NA is closest in space to the pleasantness and disengagement dimensions. Similarly, low PA would be the presence of positive deactivation. So, low PA represents unpleasant emotions that are low in arousal. This is because low PA is closest in space to unpleasantness and disengagement.

In this model, PA and NA are usually negatively correlated, such that an increase in negative affect should decrease positive affect. But these dimensions may also be uncorrelated or positively correlated. It is important to point out that researchers disagree over whether PA and NA are unipolar or bipolar. Watson and Tellegen (1985) believe that PA and NA are bipolar – because an increase in high PA results in a decrease of unpleasant, low arousal emotions. Yet, some researchers suggest that PA and NA are unipolar. For instance, PA could range from the presence of highly activating positive emotions (e.g., excited, elated) to the absence of highly active positive emotions (e.g., dull, sluggish).

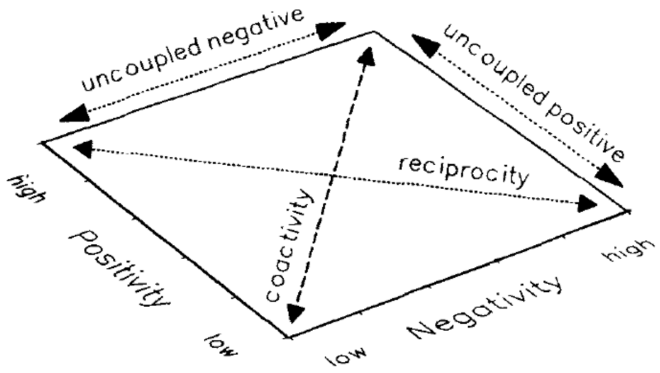
PA and NA are measured using the PANAS-Momentary (Watson et al., 1988), which you completed earlier. One criticism of this theory is that some of the emotion words for high PA and NA seem like motivational states (e.g., attentive, alert), while others seem

like personality traits (e.g., determined, hostile) and still others like moods (e.g., irritable).

Cacioppo and Berntson's (1994) Evaluative Space Model (ESM)

One problem with Russell's (1980) and Watson and Tellegen's (1985) circumplex models is that they do not allow for mixed emotions of happiness and sadness. Cacioppo and Berntson (1994; Cacioppo et al., 1999) developed a bivariate model (see Figure 11) to allow for mixed emotions of any level of valence. Bivariate means that the models investigates the relationship between two variables – these two variables are positive valence and negative valence. Thus, Cacioppo and colleagues measure valence with two separate unipolar dimensions. One dimension measures positive valence from not at all to extremely, while a second dimension measures negative valence from not at all to extremely. Typically, in their research participants self-report their negative and positive emotions on the Evaluative Space Grid (see Figure 12). In the ESM, participants select only one box to represent their current emotion.

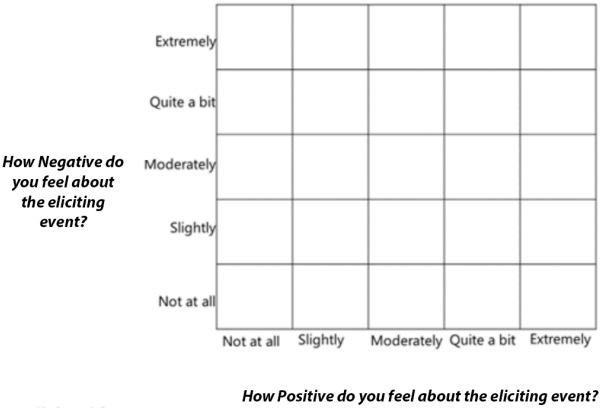
Figure 11
Bivariate Evaluative Plane



Reproduced from "Relationship between attitudes and evaluative space: A critical review with emphasis on the separability of positive and negative substrates," by J.T. Cacioppo, and G.G. Berntson, 1994, Psychological Bulletin, 115(3), p. 402 (https://doi.org/10.1037/0033-2909.115.3.401). Copyright 1994 by the American Psychological Association.

Figure 12

Evaluative Space Grid



From "The evaluative space grid: A single-item measure of positivity and negativity," by J.T. Larsen, C.J. McGraw, A.P. Hawkley, and J.T. Cacioppo, 2009, Cognition and Emotion, 23(3), p. 456 (https://doi.org/10.1080/02699930801994054) Copyright 2009 by Psychology Press.

In the ESM, three terms describe the relationship between pleasantness and unpleasantness. Coactivation occurs when someone experiences two unrelated emotions at the same time. For example, happiness and sadness. In coactivation, PA and NA are positively correlated. Coinhibition occurs when people experience low levels of PA and NA, also a positive correlation. Reciprocity occurs when PA and NA are negatively correlated, while uncoupled activation occurs when PA and NA are not correlated. Cacioppo and colleagues (Cacioppo & Berntson, 1994; Cacioppo et al., 1999) state that typically PA and NA are negatively correlated because experiencing a mixed emotion is uncomfortable and confusing, so people will typically move from a mixed emotion state to either a positive only or negative only state. Finally, when mixed emotions do not exist, circumplex models defined by arousal and valence apply.

In the figure below, identify the boxes that represent coactivation, coinhibition, and reciprocity. Drag the type into the corresponding grid box.

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Summary of Dimensional Models

In this chapter, we covered three circumplex models, which have similarities and differences to each other.

ESM Compared to Earlier Circumplex Models

Both the ESM and other circumplex models allow for mixed emotions, but the ESM is the only model that allows for the simultaneous experience of happiness and sadness. Russell and colleagues view mixed emotions as similar to each other in valence and arousal. Watson and colleagues view mixed emotions as the co-occurrence of PA and NA. In Russell (1980) and Watson and Tellegen (1985), happiness and sadness are negatively correlated. Specifically, Russell (1980) and Watson and Tellegen (1985) view happiness and sadness as moderately activated emotions.

Russell (1980) Compared to Watson and Tellegen (1985)

Russell and colleagues view the underlying dimensions of emotion as valence and activation. Watson and colleagues state the building blocks of emotion are High PA and High NA. Thus, to Watson and colleagues, emotions are highly activating.

The number of dimensions differ between the two models. Russell and Barrett incorporate one bipolar activation dimension, whereas Watson and colleagues include two unipolar activation dimensions – PA and NA. Further comparisons between these two models are displayed in Table 3 below.

Table 3

Location of emotion words on Watson and Tellegen (1985) as Compared to Russell (1980)

Emotion Words	Watson and Tellegen's (1985) Dimension	Russell's (1980) Dimensions
alert, excited, peppy, elated	High PA	Pleasantness + Activation
disgust, fear, anger	High NA	Unpleasantness + Activation
lethargic, fatigued, drowsy	Low PA	Unpleasantness + Deactivation
calm, content, serene	Low NA	Pleasantness + Deactivation

Chapter 5 References

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End of Chapter Activities (Chapter 5)

Valence and Activation

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Circumplex Model

For this activity, place the below emotion words in a spot on the line according to each emotion's level of valence and level of activation.

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Evaluative Space Model

In the figure below, identify the boxes that represent coactivation, coinhibition, and reciprocity. Drag the type into the corresponding grid box.

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CHAPTER 6: MEASURING AND MANIPULATING EMOTIONS

Chapter 6 Learning Objectives

- How are emotions measured?
- What are the pros and cons of emotion measures or manipulations?
- What is emotion coherence and does evidence for coherence exist?
- Emotion coherence would provide support for which modern theory? Why?
- Why is measuring emotions difficult?

Chapter 6 Introduction

This section focuses on the ways that researchers measure emotions and elicit emotions in the laboratory. The first half of the chapter will focus on ways that researchers measure participants' emotional experiences, such as through self-report surveys or facial expression coding. The second half of the chapter will discuss the methods researchers use to manipulate emotions, such as by using scenarios or photos. As we discuss each method, identify the advantages and disadvantages of each. The third section of this chapter focuses on the importance of emotion coherence when manipulating and measuring emotions.

Measuring Emotions

This section focuses on the ways that researchers measure emotions and elicit emotions in the laboratory. The first half of the chapter will focus on ways that researchers measure participants' emotional experiences, such as through self-report surveys or facial expression coding. The second half of the chapter will discuss the methods researchers use to manipulate emotions, such as by using scenarios or photos. As we discuss each method, identify the advantages and disadvantages of each method. The third section of this chapter focuses on the importance of emotion coherence when manipulating and measuring emotions.

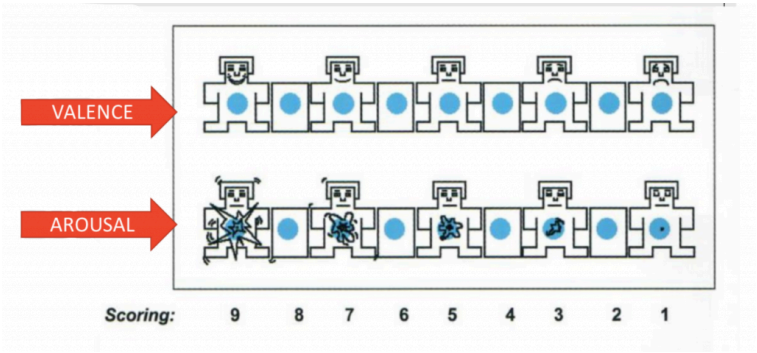
Self-Report Measures

Self-report surveys can be used to measure many of the emotion components. Some self-report scales measure subjective feelings, such as the extent to which you feel anger or sadness. Self-report surveys could also measure conscious cognitive appraisals. For instance, "did you or someone else cause this event?" One self-report scale is the PANAS (Watson, Clark, & Tellegen, 1988), which measures PA and NA (see prior chapter). The Current Mood Questionnaire (CMQ; Feldman, Barrett & Russell, 1998) measures the activation and valence dimensions from Russell's (1981) circumplex model. One disadvantage to these self-report scales is that participants must be able to read and introspect about their emotional states. The Self-Assessment Manikin (SAM; Bradley & Lang, 1994) was developed to solve this major criticism of common self-report scales. The SAM measures valence, arousal, and a third dominance dimension with facial expressions in clip art (See Figure

1). Thus, this self-report measure is language-free and can be completed by children who cannot yet read. A criticism of all self-report measures is that researchers are assuming participants have introspective access to understand their emotions accurately. In addition, sometimes people mislabel their emotion, as Schachter and Singer first discussed.

Figure 1

The Self-Assessment Manikin



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Facial Expressions

In 1872, Darwin theorized that facial expressions in humans and animals uniquely displayed emotional experiences. Before Darwin's ideas were published, a medical doctor named Guillaume-Benjamin Duchenne de Boulogne proposed the same concept. Unlike Darwin, who was interested in universality and evolution, Duchenne was interested in identifying the anatomy of facial muscles and in using electrical stimulation of facial muscles for treatments of neurological disorders. Instead of observing facial expressions in animals like Darwin, Duchenne used electrical stimulation to manipulate facial expressions that he believed were associated with unique emotions (see Duchenne's photos below in Figure 3). He is credited with identifying muscular dystrophy and the Duchenne smile, a genuine smile some believe represents pure happiness or joy. A Duchenne smile occurs when both the eyes and mouth change and is different from the Pan-Am smile, which does not show a change in the eyes. The Duchenne smile (see Figure 4) is a genuine, naturally occurring smile that occurs when people experience joy. Conversely, the Pan-Am smile (see Figure 5) is considered a fake, more forced smile that doesn't represent one's true emotion. In fact, in Darwin's (1872) book on The Expressions of Emotion in Man and Animals, Darwin displays Duchenne's photographs as evidence of discrete facial expressions of emotion. Duchenne is credited with developing the first EMG-like machine. Duchenne's work was the proponent to the component method.

This MET website provides more photos of Duchenne's work.

Figure 2
Photo of Guillaume-Benjamin Duchenne de Boulogne, 1806-1875

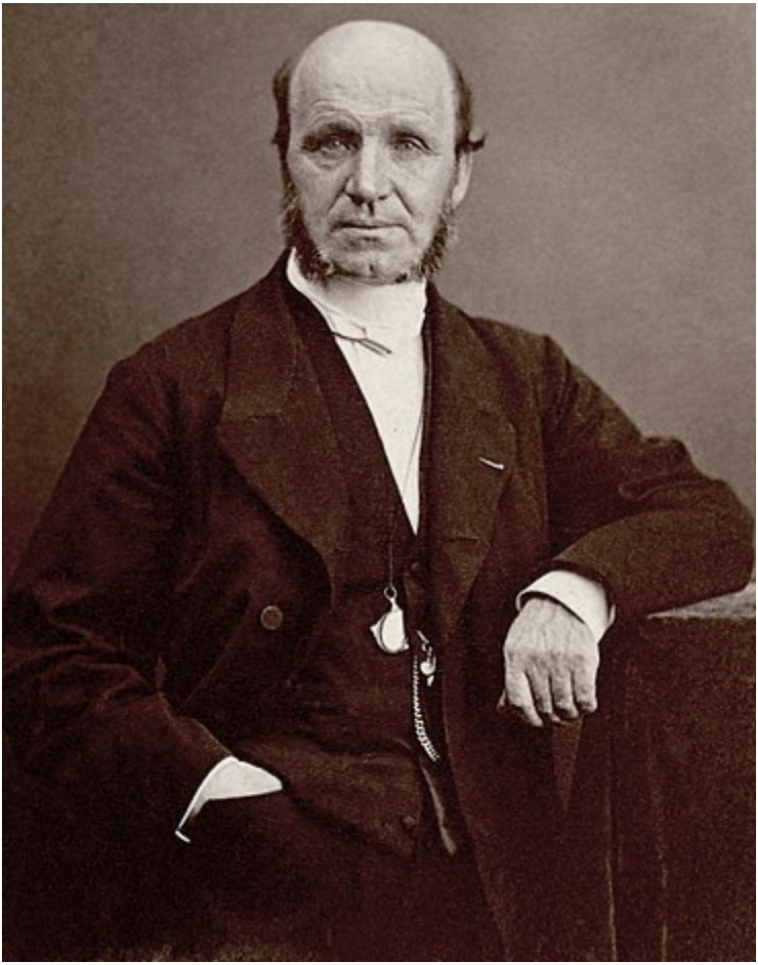
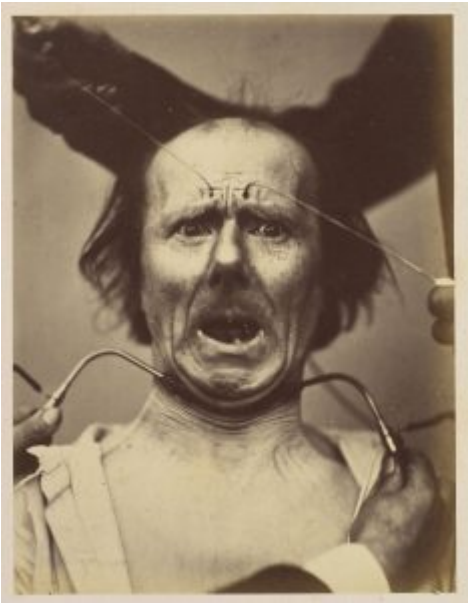


Figure 3
Photos of Duchenne Manipulating Facial Expressions



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https://search.creativecommons.org/photos/4f3a45b0-cd51-4f92-ba13-e3c9013f6d1d

Right photo reproduced from "Icono-photographique. Mécanisme de la Physionomie Humaine. Fig. 651854–56, printed 1862" by The MET, Open Access API. Retrieved from: https://www.metmuseum.org/art/collection/search/266904

Figure 4

Example of Duchenne Smile

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Figure 5

Example of Pan-Am Smile

Pan-Am Smile example

Component Method

The component method was derived from Duchenne's work. The goal of the component method is to split emotional expressions into specific action units or components (described here in the basic versus social constructivism chapter). Supporters of the component method believe that each emotion is displayed with a unique combination of action unit changes. Ekman and Friesen's (1978) Facial Action Coding System (FACS) is the most common type of component method utilized. When researchers use the FACS, they code participants' facial expression for changes in AUs AND changes in intensity of each AU change.

For example, let's say a researcher is coding facial expressions. They find that action units 9 (Nose Wrinkler), 15 (Lip Corner Depressor), and 16 (Lower Lip Depressor) change, which are associated with the disgust emotion. Then, they would code each action unit change for intensity on a 5-point scale (1=barely noticeable to 5 = maximum intensity). When the action units 9, 15, and 16 are coded as 5, they could conclude the participants was experiencing a highly arousing disgust emotion. Today, some advantages to the component method exist. Modern computer technology can quickly and accurately code these facial expressions (whereas in the 1970's the coding was completed manually). This method can help us to identify when people experience certain emotions and measures how emotions in the face change over time. Some cons are that manual coding and training research assistants costs time and money. The methodology only captures changes visible to the naked eye.

Today to measure nonvisible changes in emotional expressions, facial electromyographic activity (EMG) is combined with the component method. Using sensors located on specific facial muscles, the EMG measures the electric current that occurs when facial muscles change. Typically, sensors measure changes in the

following muscles: corrugator (a frown), right and left zygomatic (a smile), and the orbicularis oculi (muscles underneath the eyes). Table 1 displays the muscles associated with each emotional expression. Figure 4 displays the location of these three muscles on the face.

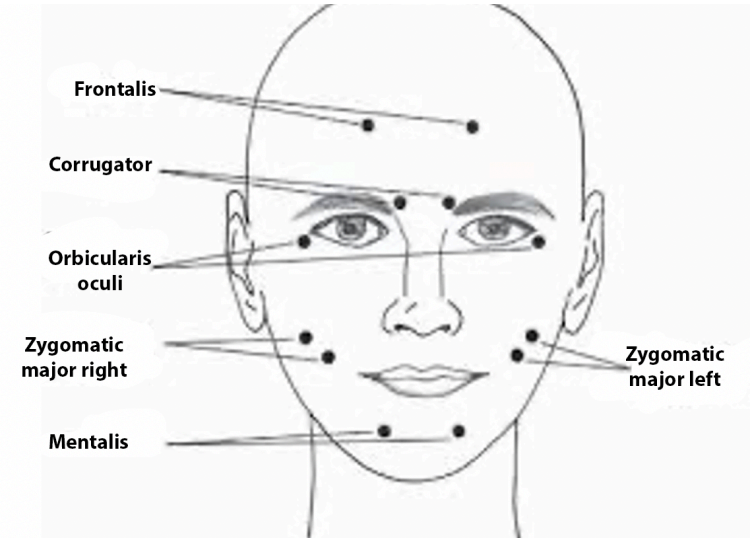
Table 1

Facial Muscle Changes for Three Emotional Expressions

Type of Emotional Expression	Facial Muscle Changes
Dunchenne Smile	Orbicularis Oculi + Zygomatic
Pan-Am Smile	Corrugator + Zygomatic (but less change in zygomatic than Duchenne smile)
Disgust	Orbicularis Oculi + Corrugator

Figure 4

Location of Common Facial Muscles Measures in Facial EMG



Facial EMG provides a more accurate way to measure changes in

facial muscles, and unlike the FACS, can identify nonvisible changes in facial expressions. One disadvantage to using facial EMG in a study is that the presence of electrodes is invasive and might change the muscles or even elicit a different emotion.

Judgement Method

In the judgment method, participants identify emotions displayed on facial expressions in still photos. Recall that Ekman used the judgment method to test his hypothesis that facial expressions were universal. This method is often forced choice, where participants match emotion words from a list to the correct facial expression. Another way to determine the correct emotion would be to see if participants' answer matches the emotions the people showing the facial expression feel. This method is beneficial when researchers are trying to gain new insights into new emotions. Yet, problems include that identifying emotions in still photos is easier than in real-life and that participants were provided emotion word labels and thus can use process of elimination to determine the correct answer.

Manipulating Emotions

Next, we discuss how researchers manipulate emotions. First, we will discuss the difference between correlational and experimental designs.

Correlational Studies

As you most likely learned in other classes, correlational studies identify the significant direction between two variables. A positive correlation indicates both variables increase or both variables decrease. A negative correlation indicates one variable increases as the other variable decreases. A correlation close to zero suggests a relationship between two variables does not exist. As the correlation becomes closer to +1 or -1, the correlation becomes stronger. Remember, with correlational designs causation cannot be determined. Thus, when describing a correlation, the following terms are appropriate: correlated, related to, and associated with. When describing a correlation, the terms caused, led to, and influenced should be avoided. Finally, when explaining a correlational relationship, always indicate the direction – whether the two variables are positively or negatively correlated.

Experimental Studies

When we are looking to identify causation between two variables, we must conduct an experiment. To meet the requirements for an

experiment, the study must randomly assign participants to one of the independent variable conditions. In emotions research, typically the independent variable conditions include eliciting one or more emotions, and sometimes including a control condition. Some possible independent variable conditions are in Table 2 below.

Table 2

Example Independent Variable Conditions

A table of different independent variable condition examples
Elicit Emotion vs. Control/Neutral
Elicit Emotion 1 vs. Elicit Emotion 2
Elicit Emotion 1, Elicit Emotion 2, Control/Neutral

After eliciting the emotion in the independent variable conditions, research will typically measure changes in one or more of the emotion components.

When an independent variable is between-subjects, each participant experiences one of the independent variable conditions one time. For instance, we might measure skin conductance while 1/3 of our participants watch a sad clip, 1/3 watch a happy clip, and 1/3 watch a neutral clip. Each participant only completes one of the three conditions. Typically, in lab studies, emotions are elicited over several trials. Often, the first trial is a baseline trial that occurs before the manipulation. For within-subject independent variables, each participant experiences all the independent variable conditions. For instance, let's say participants will be looking at 10 disgusting photos while we measure their heart rate. The independent variable conditions would be a baseline measure of heart rate, photo 1 heart rate, photo 2 heart, etc. Thus, this one independent variable includes 11 conditions completed by all participants!

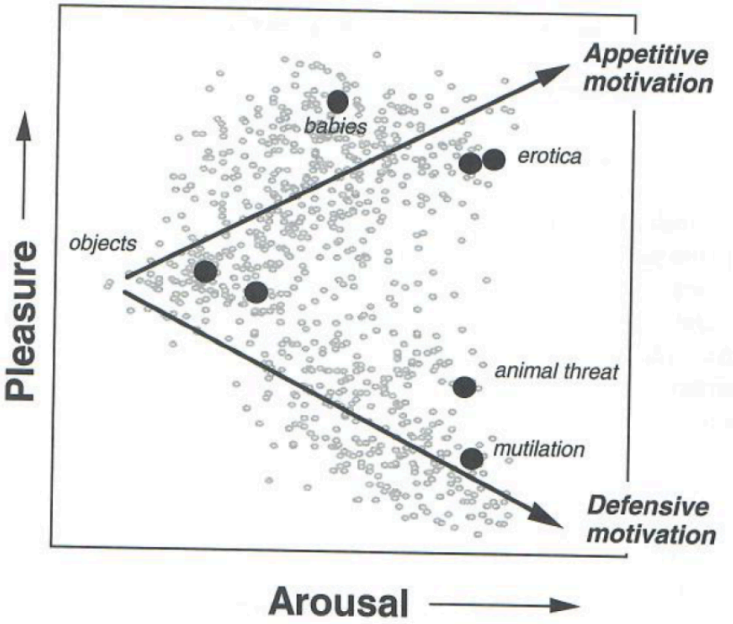
How do we elicit emotions?

Emotions can be elicited with a variety of techniques. Some common methods to elicit emotions include video clips, music clips, scenarios, photos, scripted social interaction, and recall of emotion experience. A scripted social interaction occurred in Schachter and Singer's (1962), where confederates were used to elicit negative or position emotions in participants. In recall studies, participants are asked to recall a time they felt a specific emotion and then rate component changes. In scenarios, participants will be provided a description of a fictional character's emotional experience and then ask to rate measures related to this emotion experience. The emotion music elicits depends on pitch, tempo, and the chords played. For instance, minor chords typically elicit sad emotions, whereas major chords typically elicit positive emotions. Dissonant chords elicit highly arousing, negative emotions like anxiety and nervousness, whereas consonant chords elicit low arousal positive emotions like contentment and calmness. Low pitch sounds (like an animal growling) elicit negatively-valenced emotions, whereas high pitch sounds (like Mariah Carey hitting those high notes), elicits positively-valenced emotions. Finally, slow tempo elicits low arousal emotions and fast tempo elicits high arousal emotions. So, if a researcher wanted to elicit a high arousal positive emotion, she might play a song in a major chord with a fast tempo!

International Affective Picture Systems (IAPS)

The International Affective Picture System (IAPS; pronounced eye-aps; Bradley & Lang, 2007; Lang, Bradley, & Cuthbert, 2008), is a database of photos that may be used to elicit emotions in research. These photos are standardized along the valence and arousal dimensions. Bradley and Lang (2007) , the developers of the IAPS, theorize that these photos measure two evolutionary systems – a defensive system and an appetitive system. Threat activates the defensive system and results in withdrawal, escape, and/or attack behaviors. The appetitive system is activated in safe contexts in which certain behaviors, like reproducing and nurturing children, would increase gene survival. So, the defensive system is adaptive because it protects us from death, whereas the appetitive system is adaptive by creating opportunities for reproduction and raising children into adulthood. According to Bradley and Lang, the valence of an emotion indicates whether the defensive or appetitive system is activated, whereas the arousal dimension determines how intensely the system is activated. How does this relate to IAPS? As displayed in Figure 5, arousal and valence have a boomerang relationship, such that as pictures become more unpleasant or pleasant arousal ratings increase. In other words, Bradley and Lang (2007) state when either system is activated, the arousal ratings are high too. When the motivational systems are not activated, people experience low levels of arousal and neutral valence.

Figure 5
Relationship between Valence and Arousal for IAPS



Reproduced from "The International Affective Picture System (IAPS) in the study of emotion and attention," by M.M. Bradley, and P.J. Lang, 2007, In J.A. Coan & J.J.B. Allen's Handbook of emotion elicitation and assessment, p. 33. Copyright 2007 by Oxford University Press.

In their research, Bradley and Lang (2007) found that people show individual differences in their ratings of the IAPS photos. 20% of participants exhibited a positive bias and showed a strong, positive correlation between pleasantness and arousal. This means people with a positive bias tend to experience their positive emotions as highly arousing. Conversely, 30% of participants exhibited a negative bias, and showed a strong positive correlation between unpleasantness and arousal. This means people with a negative bias tend to experience their negative emotions as highly arousing. 50% of the participants did not show a bias. As can be seen in the

Figure 6 below, men show a positive bias, whereas women show a negative bias (Bradley & Lang, 2007; Bradley et al., 2001). This means women show a stronger correlation between unpleasantness and arousal (r = -.77), whereas men show a stronger correlation between pleasantness and arousal (r = .68). These correlations mean women experience more activation of the defensive system and men experience more activation of the appetitive system. For instance, Figure 7 shows that women rate photos of grief and accidents as higher in arousal than me do. These gender differences parallel gender differences in personality – such that men tend to be higher in Extraversion (the tendency to experience positive emotions), whereas women tend to be higher in Neuroticism (the tendency to experience negative emotions). In fact, evolutionary psychologists suggest that these gender differences in the tendency to experience positive and negative emotions may have helped men and women to solve different adaptive problems. Finally, some findings indicate cultural differences are present in the IAPS. Participants from the USA, Germany, Sweden and Italy, rated IAPS photos (Bradley & Lang, 2007). Compared to American and German participants, Swedish participants rated photos as less arousing, while Italians rated photos are more arousing. Yet, this study is comparing only Western-oriented countries. It would be interesting to compare difference in IAPS ratings between Western and Eastern countries.

Figure 6

Relationship between Valence and Arousal for Men and Women

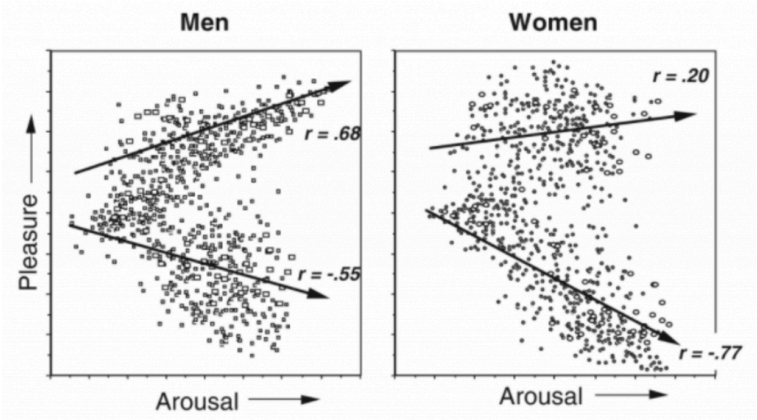


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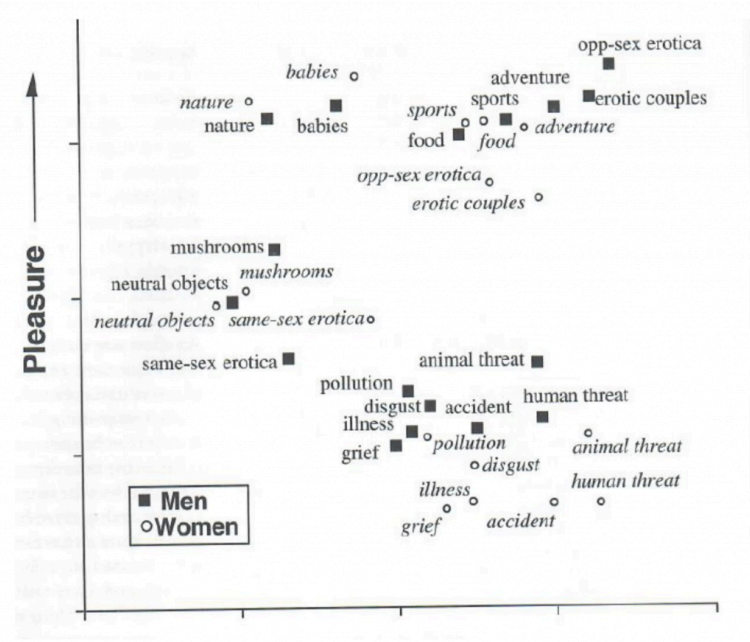
Figure 7

Valence and Arousal Ratings by Picture Content for Men and Women



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It is important to note that the IAPS do not measure discrete emotions. Research shows that participants select many different emotion labels for the same photo. Participants show the highest agreement for photos that elicit disgust – pollution, spoiled food, dirty toilets. A similar database of open access photos can be found at Open Access Affective Standardized Images (OASIS) (Kurdi, Lozano, & Banaji, 2016)

Emotion Coherence

The last part of the chapter focuses on emotion coherence. Emotion coherence is measured as an emotional experience occurs over a period of time. Emotional coherence occurs when changes in emotion components occur at the same time. For instance, coherence would occur if someone saw blood and showed a disgust expression, experienced an increase in arousal, and made an external cognitive appraisal all at the same time. Researchers want emotion coherence to occur in their studies, because coherence provides further evidence that someone is truly experiencing the emotion being manipulated.

A classic study by Bonanno and Keltner (2004) investigated several types of emotion coherence. These three types of coherence are displayed in Table 3. Note that event-response coherence is an example of between-system coherence.

Table 3

Definitions and Examples of Types of Emotion Coherence

Definitions and Examples of Types of Emotion Coherence

Type of Coherence	Definition	Example with Disgust
Within-system coherence	coherence within the same emotion component	AU 9 (nose wrinkle), AU 15 (lip corner depressor) and AU 16 (lower lip depressor) all change at same time
Between-system coherence	coherence between two or more emotion components	AU 9 (nose wrinkle) and increase in physiological arousal
Event-response coherence	coherence between one emotion component and an appraisal of event	AU 9 (nose wrinkle) and external cognitive appraisal

In this study, women who experienced the passing of their husbands spoke about this loss. During the study, participants facial expressions were videotaped. This study included three variables: narrative units, facial expressions, and self-reported subjective feelings. For the narrative units, researchers coded the participants' verbal prose for themes of injustice, loss, happiness, and pride. These four themes represent conscious, cognitive appraisals. An injustice cognitive appraisal should occur with anger, whereas a loss appraisal should occur with sadness. Using FACS, researchers coded action unit changes for emotions. After the study ended, participants indicated how often they felt four emotions – interest, enjoyment, anger, and distress (i.e., sadness).

To test for event-response coherence, Bonnano and Keltner (2004) investigated whether facial expression changes were correlated with the narrative unit appraisals. Sadness and anger showed coherence, while joy/happiness did not. Specifically, the expression of sadness occurred when participants were speaking about loss (i.e., loss appraisal), while angry expressions occurred when participants were speaking about injustice. Although the Duchenne smile should have occurred with participants spoke about happiness or pride, researchers did not find this. They found that the Duchenne smile and laughing occurred when the participants were speaking about injustice, but did not occur when participants were speaking about happiness or pride!

To test for between-response coherence, Bonanno and Keltner (2004) tested whether certain facial expressions matched subjective feelings. Again, they found coherence for sadness and anger, but not for positive emotions. They found participants who reported high distress at the end of the study, showed sad facial expressions during the study. In addition, participants who showed anger expressions, reported high anger at the end of the study. The Duchenne smile was not associated with self-reported emotions.

Finally, Bonanno and Keltner (2004) found that for sadness and

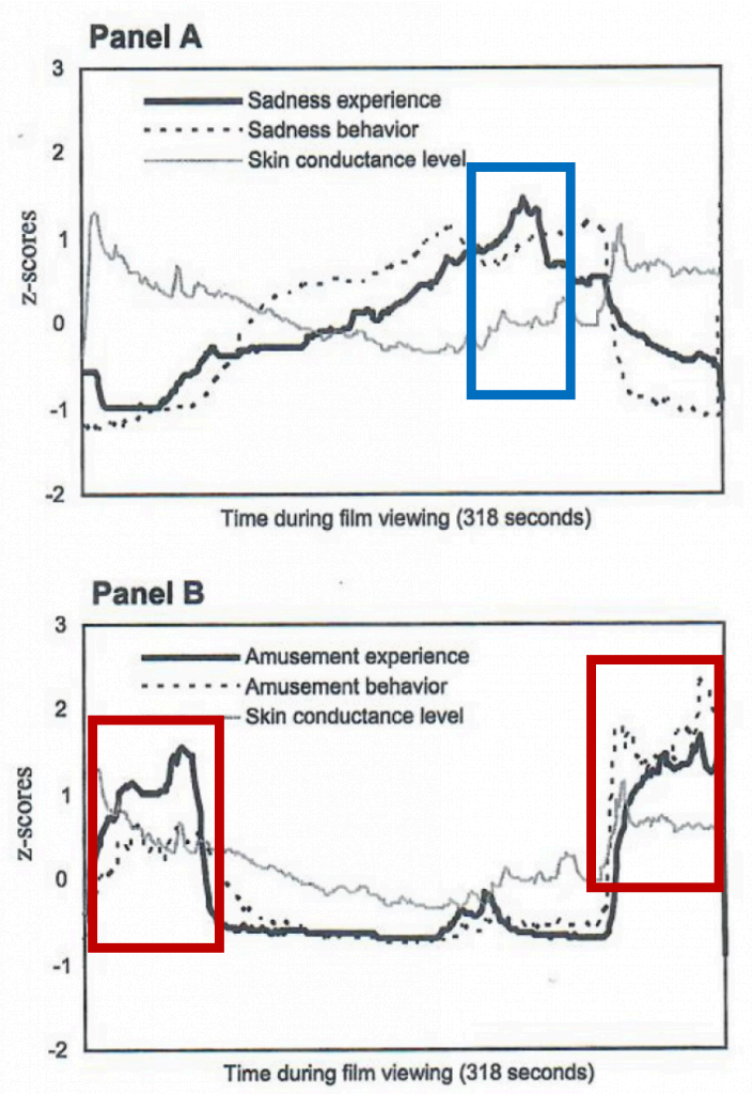
anger, as event-response coherence increased, self-reported emotion increased. This means that people with the greatest event-response coherence for sadness and anger, in turn reported the most sadness and most anger at the end of the study, respectively. Why is this important? These findings show that when our emotion components change at the same time, our subjective report of that emotion is high in intensity.

Why was coherence not found for positive emotions? One reason could be the undoing effect of negative emotions. The undoing effect states that when people feel negative emotions, we might try to experience positive emotions as a way to reduce our negative emotions. Another could be that participants were trying to hide their negative emotions by placing a smile on their faces. Finally, a third could be that participants did not report their subjective feelings of happiness and pride, and instead reported the positive emotions of interest and enjoyment. A major limitation of this study is that subjective feelings and facial expressions were tested at different times in the study – so these two components did not really occur at exactly the same time.

Another study assessed emotion coherence over time while participants watched a clip from the movie Steel Magnolias (Rottenberg, Ray, & Gross, 2007). The selected clip fluctuates between sadness and amusement. While watching the clips, participants reported their subjective feelings of sadness and happiness, skin conductance levels were measured, and researchers coded for sadness and amusement facial expressions. In Figure 8, Panel A shows emotion coherence for sadness, while Panel B showed emotion coherence for amusement. In the blue box in Panel A, participants who showed a sad expression reported feeling sad at the same time. In the red boxes in Panel B, participants who showed an amused expression and an increase in skin conductance simultaneously reported amusement.

Figure 8

Emotional Coherence for Sadness (Panel A) and Amusement (Panel B)



Reproduced "Emotion elicitation using films," by J. Rottenberg, R.D. Ray, and J.J. & Gross (2007), in J.A. Coan & J.J.B. Allen (Eds)., Handbook of emotion elicitation and assessment (p. 22). Copyright 2007 by Oxford University Press.

Summary of Measuring and Manipulating Emotions

This chapter viewed two common ways researchers measure emotions – through self-report and facial expression changes. The next chapter will focus on more physiological and brain-related changes. This chapter discussed the difference between measuring emotions in a correlational design versus manipulating the experiences of an emotion to assess how this emotion changes other components. Finally, the third part of the chapter explained emotion coherence. Remember, when researchers manipulate emotions and can show the emotion components are coherent – this provides further validation that they truly elicited the correct emotion. But, as Irene Mauss discusses in the video below, obtaining emotion coherence can be quite difficult!

Yale Expert Interview: Below is an interview with Dr. Iris Mauss on emotion coherence. While watching this video (Start at: 2:21; Stop at: 11:40), consider the below questions:

QUESTION 1: When measuring emotion, why does Mauss suggest that we measure **more than one** emotion component?

QUESTION 2: Why is only using self-report measures to measure emotion a problem?

QUESTION 3: Describe one example that Mauss gives of how emotions could be INCOHERENT/DISSOCIATED.

QUESTION 4: According to Mauss, individual differences exist in people's tendency to show coherent or dissociated emotion

patterns. How does a tendency to experience dissociated emotions impact people's health?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=419#oembed-1

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CHAPTER 7: PHYSIOLOGICAL MEASURES OF EMOTION

Chapter 7 Learning Objectives

- Compare and contrast the sympathetic nervous system (SNS) with the parasympathetic nervous system (PNS).
- Which physiological measures are pure measures of SNS activity?
- Which physiological measures are pure measures of PNS activity?
- Compare and contrast the EEG with PET/fMRI scans.
- Which measures provide evidence of valence?
- Which measures provide evidence of arousal?
- What are problems and potential solutions to consider when measuring ANS activity?
- Compare and contrast the locationist and one-network models of the brain. Which modern theories would support the locationist view? the one-network view?
- Compare and contrast the right hemisphere hypothesis, valence hypothesis, and the approach-withdrawal hypothesis.
- How are brain structures and brain networks linked to certain emotions?
- How many dimensions underlie physiological measures?

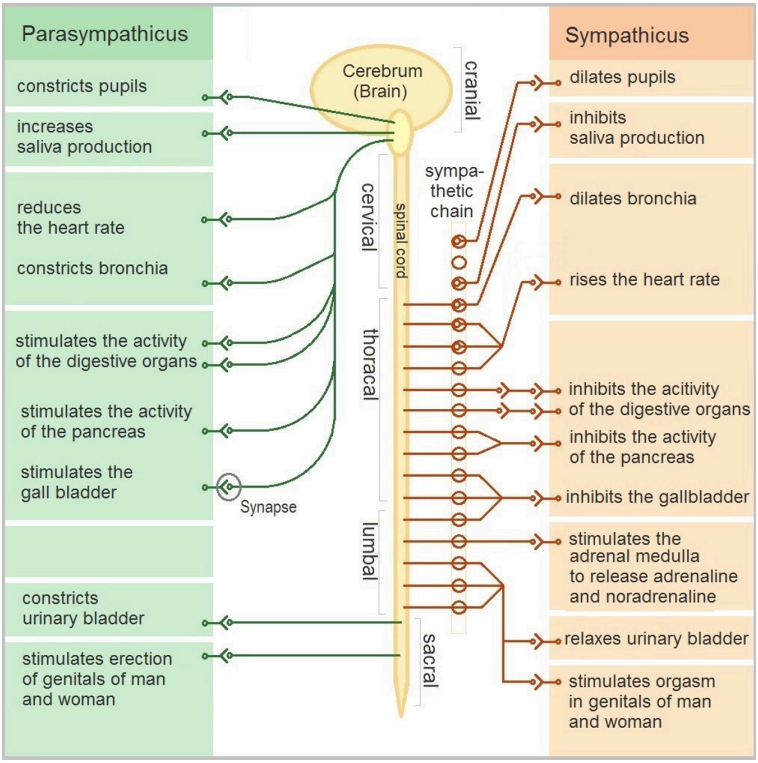
Autonomic Nervous System: Parasympathetic Nervous System (PNS) and Sympathetic Nervous System (SNS)

The nervous system is divided into two parts: 1) the central nervous system (CNS) and the peripheral nervous system. The CNS includes the brain and spinal cord, whereas the peripheral nervous system includes parts of the nervous system outside of the brain and spinal cord. The autonomic nervous system is part of the peripheral nervous system and includes the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The autonomic nervous system controls the functions of internal organs including the stomach, heart, bladder, intestines, blood vessels, and sweat glands.

The SNS prepares the body for physical action, including fighting, fleeing, freezing, and engaging in sexual intercourse (typically called the 4 F's). When the SNS is activated, the body's resources are taken away from processes such as digestion and resting and sent to organs that activate physical activity such as the heart and the pupils. The PNS system is activated when people are at rest, such as after eating or when relaxing. The PNS system slows down organ function, such as slowing down our heartbeat. Figure 1 displays the functions that occur when the SNS or PNS system is activated.

Figure 1

Processes of the SNS and PNS Systems



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The SNS and PNS can work simultaneously or separately – sometimes they are activated at the same time, sometimes at different times. So, because they could be active at the same time, this makes it very hard to tweeze apart which system is working during an emotional experience. For instance, someone's heart rate

could increase because 1) they are scared and the SNS is activated or 2) the PNS became less active or 3) both systems are working at the same time! Further, sometimes these systems only change certain organs at the same time. For example, having a normal heart rate (PNS), but sweating (SNS).

Physiological Measures of ANS Activity

This section will cover the ways that researchers measure ANS activity. Remember, it can be hard to determine whether both the SNS and PNS are working simultaneously or separately. For an excellent review of measurement tools used in emotions research, please read Mauss and Robinson (2009).

Measures of SNS or PNS Activity

Several physiological measures can measure ANS activity but are not considered pure measures of SNS or PNS activity. Some of these measures include blood pressure, respiration rate, and measures of pupil activity. Systolic blood pressure is blood pressure measured while the heartbeat is actively pushing blood through the arteries. Diastolic blood pressure measures blood flow while the heart is between beats. Respiration rate measures our breathing rate and includes measures of breathing rate and breathing depth. Pupil measures include gaze location and pupil size. During SNS activity, blood pressure and breathing increase and pupils dilate – but remember these measures are not pure measures of SNS activity.

Measures of SNS Activity Only

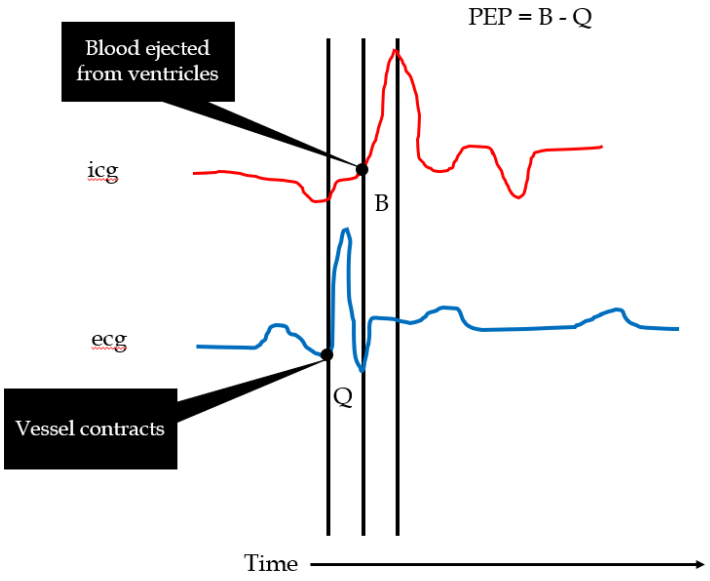
Physiological measures that provide pure measures of SNS activity include skin conductance level and cardiac pre-ejection period. Skin conductance level is not influenced by the PNS system. So, when skin conductance increases this indicates the SNS system is working. Skin conductance level measures the electrical conductance of the skin, which varies when we sweat. To measure skin conductance, two sensors are placed on the forefingers of each hand. One sensor sends an electrical signal through to the other finger and the system determines how long it takes the finger

to reach the other finger. Skin resistance is the time it takes the electrical signal to travel from one sensor to the other. Skin conductance is calculated as the inverse of skin resistance (1/skin resistance).

Cardiac pre-ejection period (PEP) is usually measured in combination with RSA to tweeze apart SNS and PNS activity. In Figure 2 on the EKG printout, the cardiac pre-ejection period is the time between when the heart vessel contracts (B) and the valves open and eject blood (Q). Eventually this blood is ejected through the aortic valve. PEP is calculated by subtracting Q from B (PEP = B – Q). Faster time periods (or fewer seconds) indicate greater activation of the SNS.

Figure 2

Cardiac PEP displayed on EKG printout



Measures of PNS Activity Only

Measures of pure PNS activity include heart rate variability and vagal tone, which are both related to each other. Before explaining these two measures, I first need to explain respiratory sinus arrhythmia (RSA). Arrhythmia means irregularity or to skip. Typically, heart arrhythmias are diagnosed irregularities in heartrate. But, RSA is a naturally occurring irregularity in the heart rate that occurs when we take a breath. Everyone has an RSA. When we inhale our heart rate increases, and when we exhale our heart rate decreases. To measure RSA, heart-rate variability is used.

Heart-rate variability (HRV) is calculated as our inhaling heartrate minus our exhaling heartrate. HRV indicates how strongly the PNS is working to slow down our heart rate while we breathe. A higher HRV number indicates activation of the PNS.

Respiratory Sinus Arrhythmia

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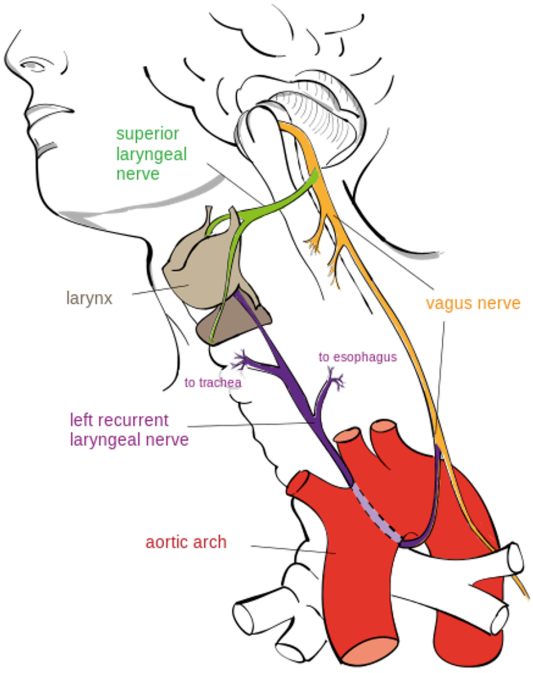
Vagal tone measures the degree of PNS activity on the heart while a person is at rest. The vagus nerve (see Figure 3) operates during PNS activity and specifically communicates between internal organ

functioning and the brain. Vagal tone measures vagus nerve activity during rest and digestion, but currently there is not a direct method to measure vagal tone activity. As a work around, researchers measure heart rate and heart-rate variability because the vagus nerve impacts the function of the internal organs like the heart and stomach.

Figure 3

Vagus nerve (in yellow)



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Watch Dachnar Keltner Explain the Vagus Nerve

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Increased vagal tone (which means the vagus nerve is currently operating) is associated with a reduced heart rate and a more variable heart rate (i.e., higher HRV). HRV, vagal tone, and PNS activity are positively correlated. High HRV and high vagal tone are associated with better emotion regulation, and the tendencies to experience positive emotions and relationship-oriented emotions like compassion. New work is suggesting that reduced or less complex heart rate variability during REM sleep could be a predictor of major depression (Kwon et al., 2019).

Startle Reflex - A Pure Measure of Valence

The startle reflex is a reflexive response in the physical body that occurs in response to an unexcepted, intense stimulus. Types of startle reflexes include knee jerks, neck jerks, and eye blinks. The purpose of the startle reflex is to alert us to danger and to protect our body from harm. The startle reflex is managed by the amygdala. In the laboratory, the startle reflex is measured with the eye blink. The amplitude of the eye blink is positively correlated with the magnitude of the startle reflex. An electromyogram (EMG) is the tool that measures the magnitude of the eyeblink. An electrode is played underneath the lower eyelid on the orbicularis oculi muscle. This electrode measures how much muscle activity occurs after people experience a startle probe. A startle probe occurs when participants experience 50 milliseconds of loud, white noise that was not expected.

The startle reflex is a pure measure of the valence of an emotion that occurs in high-arousal situations. When viewing IAPS photos of negative events (e.g., mutilations, snakes, spiders) participants showed a greater eyeblink magnitude compared to when viewing IAPS photos of positive events (e.g., opposite-sex erotica, food, and children; Bradley et al., 1990; Vrana et al., 1988). Remember, the IAPS photos all elicit high-arousal emotions – either positive or negative. So, these findings tell us that high arousal negative and positive emotions both cause the eyeblink, it's just negative emotions cause LARGER eyeblink magnitude and positive emotions cause a SMALLER change in the eyeblink. So, the startle reflex is a pure measure of whether someone experiences a high-arousal negative emotion or a high-arousal positive emotion.

Other Central Nervous System Measures

Electroencephalography (EEG) is a central nervous system measure. In an EEG, an electrode headcap is placed on the scalp (see Figure 4). Then, over time, the headcap measures changes in the electricity from action potentials of neuron groups. The EEG *cannot* determine in which brain structure the neuronal activity is occurring. The EEG *can* determine whether the right or left of the brain is more active or whether the back or front of the brain is more active. Frontal asymmetry (also called hemispheric lateralization) can be determined by EEG (see Figure 5). Frontal asymmetry occurs when a person experiences greater activation of the right or left frontal lobe. Typically, more activation of the right lobe is associated with avoidance behavior (e.g., fear) whereas more activation of the left frontal lobe is associated with approach emotions (e.g., joy, anger). Later in this chapter, we will return to hemispheric lateralization when we discuss three theories that explain the relationship between the left and right side of the brain and emotional experiences.

Figure 4
EEG Headcap

Reproduced from “A cap holds electrodes in place while recording an EEG” by C. Hope, 2012. Open Access. Creative Commons Attribution 2.0 Generic. Retrieved from:

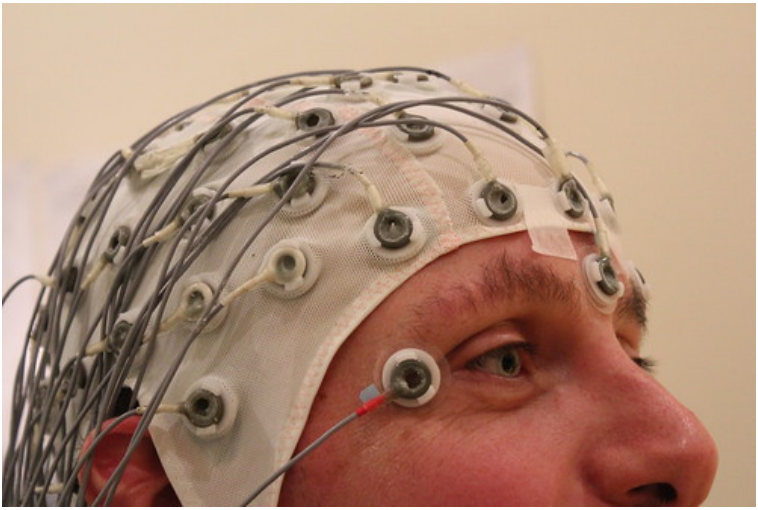
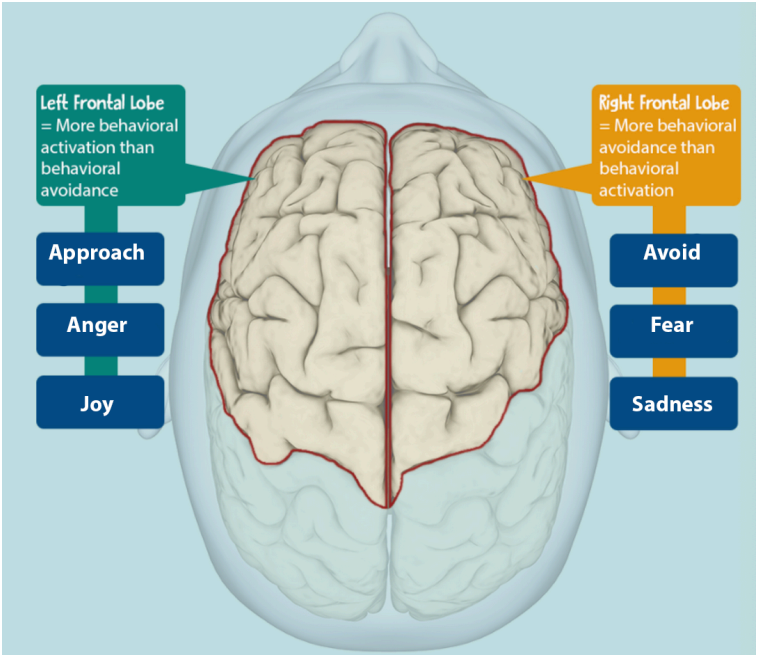


Figure 5

Visual display of hemispheric lateralization



The left frontal lobe is in charge of more behavioral activation than behavioral avoidance. It is activated when we experience emotions like anger and joy. The right frontal lobe is in charge of more behavioral avoidance than behavioral activation. It is activated when we experience emotions like fear and sadness.

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fMRI and PET scans provide better measures of specific structures involved in specific emotions. The fMRI measures the uptake of oxygen in the blood. To conduct a PET scan (see Figure 6), the

participant is injected with a radioactive isotope, and then the metabolic activity of a brain structure is measured. Greater signals from the fMRI and the PET scan provide evidence that more blood is flowing to a certain brain structure and thus the brain structure is activated and working.

Figure 6

Example of PET scan machine

Reproduced from "This is a PET scanner" by L. West, 2006. Open Access. Creative Commons Attribution 2.0 Generic. Retrieved from: https://www.flickr.com/photos/calliope/221238656/

Problems with Measures of ANS Activity

When measuring ANS activity during emotional events, some problems could easily arise. Below, are four common problems that researchers must consider when developing a physiological study of emotions and possible solutions to these problems.

Problem #1: ANS activity is not a pure measure of emotion. Other bodily processes such as digestion and homeostasis occur with emotional experiences and could influence activity. Using baseline measures and several trials, will ensure the data collected is accurate. Additionally, adding a within-subjects neutral condition will allow comparison between participants' elicited emotions and their neutral states.

Problem #2: Most measures do not differentiate between SNS and PNS changes. Thus, many researchers take several measures simultaneously to tweeze apart SNS and PNS changes. In addition, measures of skin conductance and HRV should be used.

Problem #3: Individual differences in responses. Participants will show different magnitude of changes across physiology measures. Using baseline measures allows researchers to determine the amount of change that occurred.

Problem #4: Intrusiveness of the measures like headcaps and sensors could confound the experimental and baseline measure. One solution to this problem is to conduct several trials and baselines. Another solution would be to use less intrusive measures, when possible.

Locationist and One-Network Views of Emotions in the Brain

Currently, two views exist on the relationship between the brain and emotional experiences. The goal of the locationist perspective (see Figure 7) is to identify specific brain areas responsible for specific emotions. Basic emotions researchers support the locationist perspective. The one-network view believes that a one-to-one mapping of specific emotions and brain structures does not exist. Instead, one-network theorists look for emotional networks that operate during an emotional experience. Social constructivist support the one-network view. First, we will review evidence for the locationist perspective, followed by the one-network perspective.

Locationist Perspective

There are many sub-theories of the locationist perspective, and they differ on the emotions posited to activate various parts of the brain. One theory suggests that the amygdala, insula, orbitofrontal cortex (OFC) and anterior cingulate cortex (ACC) are activated during specific emotional experiences. Work has found that the amygdala is activated during experiences of fear, anger, and disgust, and somewhat for positive emotions. The insula is activated for disgust and amusement. Although these two emotions seem quite different, some research shows that when we hear about something disgusting (like a joke) we in turn laugh (which would be amusement!). The orbitofrontal cortex is associated with anger and identifying anger facial expressions (so, possibly experiencing fear). The anterior cingulate cortex is linked with pain, sadness, loneliness, and also fear. Finally, the basal ganglia is part of the reward system and contains large amounts of dopamine. Thus, the

basal ganglia is often associated with positive emotions. Figure 7 displays the locationists' hypotheses of brain structures that are linked to specific emotions. There does seem to be some connection between specific emotions and brain structures, but also different emotions activate the same structure. So, this might suggest structures could be linked to general valence (negative or positive), but not necessarily categorical emotions (anger or fear).

Figure 7

Locationist Perspective of Brain

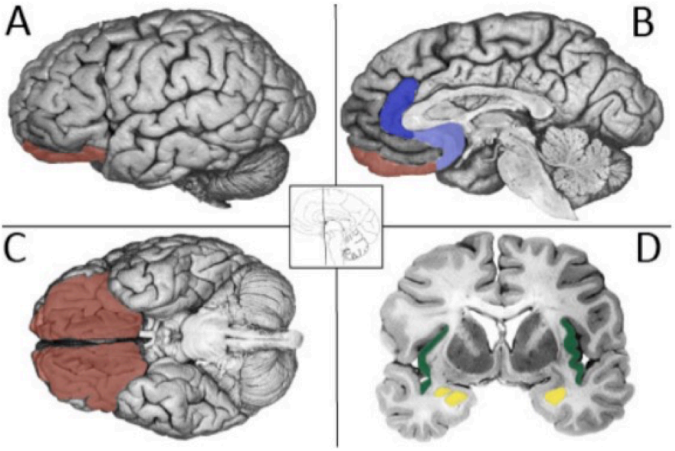


Table 1

Description of Color Coded Areas in ***Figure*** **7**

Description of Color Coded Areas in Figure 7

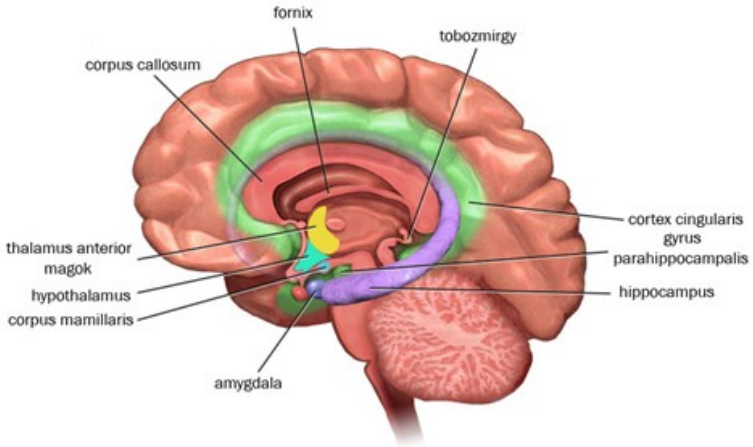
Color	Brain Structure	Activated for Emotion..
Yellow	Amygdala	Fear
Green	Insula	Disgust
Brown	Orbitofrontal Cortex (OFC)	Anger
Blue	Anterior Cingulate Cortex (ACC)	Sadness

Reproduced from "The brain basis of emotion: a meta-analytic review," by K.A. Lindquist, T.D. Wager, and H. Kober, E. Bliss-Moreau, and L.F. Barrett, 2012, The Behavioral and brain sciences, 35(3), p. 53 (https://doi.org/10.1017/S0140525X11000446). Copyright 2011 by the Cambridge University Press.

In the next sections, I will cover some specific structures and discuss their role in emotional experiences. In the fear chapter, we will cover the functions of the amygdala in more detail.

The Relationship between Emotions and Common Brain Structures Hippocampus

The hippocampus is involved in the creation of vivid, episodic memories. An episodic memory is a memory of a specific event or situation we have experienced – such as our first day of college! Episodic memories involve emotional content. In fact, the amygdala and hippocampus work together to encode episodic memories. The amygdala determines whether an event has a strong emotional component. If yes, then the amygdala tags the event as emotional and sends the information to the hippocampus for encoding.



Reproduced from "Limbicus rendszer" by Capucettorosso, 2019. Open Access, Creative Commons Attribution-Share Alike 4.0 International. Retrieved from https://commons.wikimedia.org/wiki/File:Limbicus_rendszer.jpg

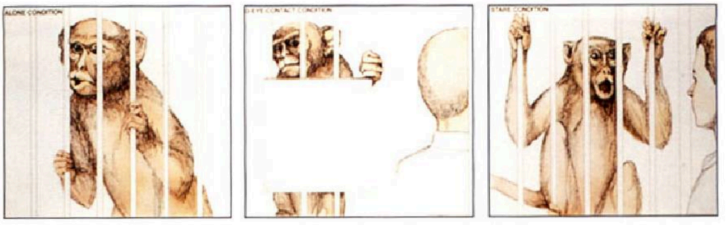
One way to further identify the functions of brain structures is to evaluate the impact of damage to one structure on our emotional experiences. One study recruited wounded U.S. soldiers – one group who had damage outside the amygdala and another who had brain damage that included the amygdala (Koenigs et al., 2008). Those soldiers who experienced damage to the amygdala did not develop PTSD, while 40% of those soldiers who had no damage to the amygdala developed PTSD! Why? What does this have to do with the hippocampus? If our amygdala is damaged, then our amygdala cannot tag events as fearful or emotional so the amygdala does not send the information about the emotional event to the hippocampus for encoding.

In another study (Kalin & Shelton, 2000), young rhesus monkeys were exposed to three conditions and their behavioral responses were evaluated. Figure 8 shows drawing of these conditions. It is important to note that the monkeys were separated from their mothers, which elicits distress. After separation from the mother, the young monkeys were placed in a cage and experienced each condition for a three- to nine-minute period. In the first alone condition, the monkeys were left alone. In the alone condition, normal behavior included increased bodily movement and cooing, which the researchers believe is similar to crying to help the mother locate the infant monkey. In the second condition, the monkeys saw the profile of a human intruder, but the intruder never made direct eye contact with the monkeys. During this no-eye-contact profile condition, typically monkeys reduced cooing and increased freezing and/or hiding behavior. In the third condition, a human intruder stared at and made eye contact with the monkey. In this stare condition, the monkey either exhibited aggressive behavior (e.g., barking, shaking, and approaching/lunging) or submissive behaviors, labeled "lip smacking and fear-grimacing" (p. 52). Typically, monkeys showed more freezing behavior during the profile condition than the two other conditions. Out of 100

monkeys, three monkeys showed context-inappropriate responding – which occurs when the behavior changes do not match the context of the emotional event or when the behavior changes last long after the emotional event has ended. These 3 monkeys showed context-inappropriate responding by exhibiting freezing, not aggressive, behaviors in the stare condition. Further results showed these three monkeys had greater activation in the right cortex and elevated cortisol levels, changes associated with the emotion fear. How does this relate to the hippocampus? Well, researchers (Davidson et al., 2000; Kalin and Shelton, 2000) believe that the hippocampus helps us to switch our emotions based on changing situations – such as the situation changing from the profile to stare conditions for the monkeys. Monkeys with abnormally functioning hippocampi may have more trouble adjusting behaviors to new contexts. Further, increased cortisol may be associated with hippocampus abnormalities and the tendency to experience fear. It is important to note that Kalin and Shelton (2000) and others are theorizing that the hippocampus damage or size could be one explanation of context-inappropriate responding (which is a symptom of depression and anxiety disorders).

Figure 8

Experimental Conditions from Kalin and Shelton

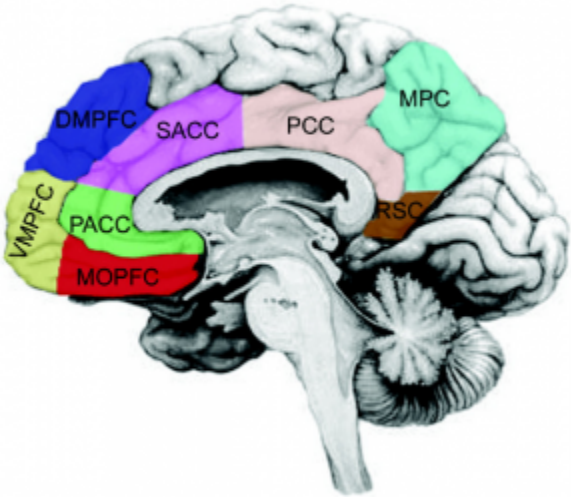


Note. In order from left to right, conditions are: 1) alone 2) profile – no eye contact and 3) stare – direct eye contact. Reproduced

from “The regulation of defensive behaviors in Rhesus monkeys: Implications for understanding anxiety disorders,” by N.H. Kalin, and S.E. Shelton, 2000, In R. J. Davidson (Ed,), Anxiety, depression and emotion, p. 52. Copyright 2000 by Oxford University Press

Prefrontal Cortex

The functions of the prefrontal cortex (PFC) include planning, working memory, and inhibition of impulses. Related to emotions, the PFC is activated when people use emotional information to make decisions. For instance, people might think about how they will feel if they lie to their romantic partner (guilty!) and this prediction of the emotion guilt might help people to decide to not lie to their partner. The ventromedial prefrontal cortex (VMPFC) is a structure within the PFC. The VMPFC operates when people are anticipating how they will feel if they receive a reward (not how they will feel when they actually win the reward). The VMPFC is activated for taste, smells, touch, and social approval. When the PFC or VMPFC are damaged, people select the wrong outcomes in risky games because they cannot anticipate their emotions. Even though people understand and can verbally state the consequences of their actions, they have impaired ability to make decisions based on how they will feel after the action (e.g., sad, guilty, joyful, disappointed). Further symptoms include flat emotions, less empathy, and less reasoning about choices.



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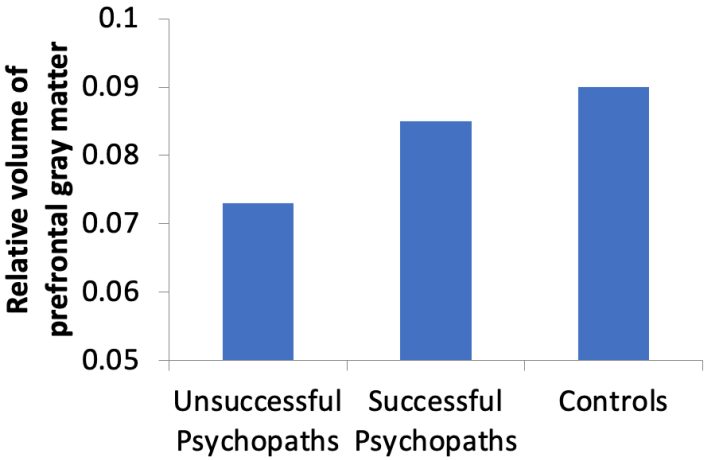
Studies have linked PFC activation and damage to the occurrence of crime. Researchers (Raine et al., 1998) divided criminals into two groups – 1) people who committed impulsive, emotional murders and 2) people who committed well-thought out and premeditated murders. Impulsive murders showed greater amygdala activation and reduced PFC activation These findings might suggest that impulsive murders experienced highly intense negative emotions (due to the amygdala), but reduced inability to inhibit the amygdala's activity and control their emotions (because of the PFC). Another study (Yang et al., 2005) compared successful and unsuccessful male psychopaths (all determined to be psychopaths from a diagnostic checklist). Successful psychopaths were males who self-reported high levels of crime, but who had not been caught for their crimes.

Conversely, unsuccessful psychopaths were convicted for their criminal acts. A third group of participants represented the control group and did not meet the requirements for psychopathy. Results showed that higher psychopathy scores were linked to lower volume of prefrontal gray matter. In fact, as shown in Figure 9, unsuccessful psychopaths (compared to male controls) showed a 22.3% reduction in prefrontal gray matter. Successful psychopaths did not show a significant difference in the size of the PFC compared to the control group.



The unsuccessful psychopaths showed the smallest volume of prefrontal gray matter, followed by successful psychopaths. The controls showed the biggest volume of prefrontal gray matter.

Figure 9

Volume of Hippocampus for Unsuccessful Psychopaths, Successful Psychopaths, and Control Participants

Adapted from "Volume reduction in prefrontal gray matter in unsuccessful criminal psychopaths," by Y. Yang, A. Raine, T. Lencz, S. Bihrle, L. LaCasse, and P. Colletti, 2005, Biological Psychiatry, 57(10),

p. 1106 (https://doi.org/10.1016/j.biopsych.2005.01.021). Copyright 2005 by Society of Biological Psychiatry.

Below is a video and an article link to the story of Charles Whitman. Charles Whitman committed the University of Texas massacre in the 1950's. After his death, his autopsy revealed a small tumor pressing on his amygdala, thalamus, and hypothalamus. Since his autopsy, doctors have argued over the role of the tumor in his horrific actions. Did the tumor's placement near the amygdala increase his negative emotions and aggressive behavior? Although we do not have information about the volume of his PFC, we have to wonder whether the tumor on the amygdala possibly combined with an abnormally functioning PFC could have contributed to his disastrous decision. Watch from 4:10 to the end of the video.

Check out this article by Eva Frederick

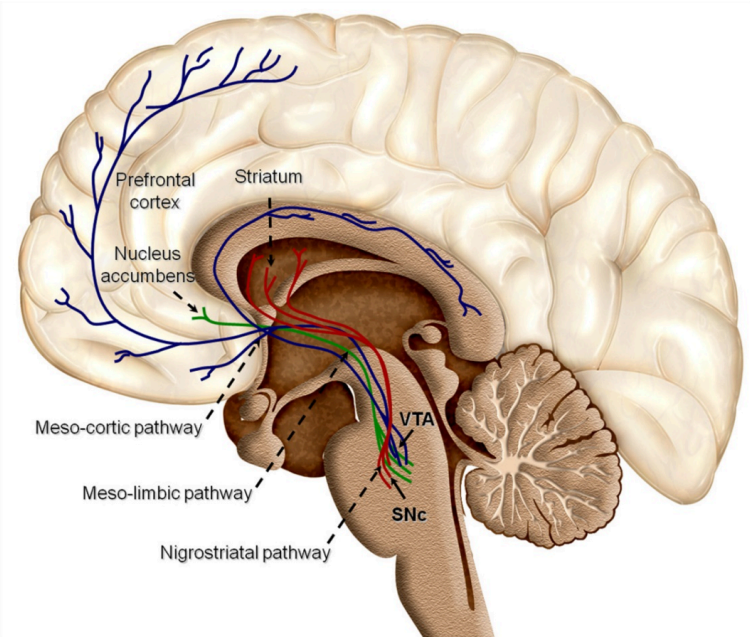
Watch from 4:10 to the end of the video.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=772#oembed-1

Reward Circuit

The reward circuit is comprised of many structures, two of which are the basal ganglia and the ventral tegmental area (VTA; see Figure 10). The basal ganglia includes the ventral striatum (which encompasses the nucleus accumbens) and the dorsal striatum (which includes the caudate nucleus). The VTA makes and releases dopamine into the nucleus accumbens. Many of these structures are activated when seeking rewards like drugs, alcohol, and sexual intercourse, as well as associated with romantic love (for a review, see Haber & Knutson, 2010 and Ranaldi, 2014). These structures are activated when people are anticipating and thinking about a reward, but are not activated when people are actually consuming or enjoying the reward. Thus, these structures might motivate people to approach rewards. Activation of reward structures is positively correlated with the magnitude and likelihood of the anticipated reward (Knutson et al., 2001, 2005). The bigger the reward and the more likely one is to receive the reward – the greater the activation in these structures! More recent work has found that the reward system is activated for pride (Roth et al., 2014), gratitude, and when engaging in prosocial behaviors (Moll et al., 2006; Rilling et al., 2002). But, some work suggests this the reward system is activated for emotions like schaedenfraude (Takahashi et al., 2009), and negative emotions like shame (Roth et al., 2014). Clearly, these structures play an important role in positive emotions. Damage to these structures could make experiencing positive emotions harder, leading people to seek out riskier rewards such as drugs and video games to feel pleasure. Alternatively, damage might actually elicit dislike to events that initially caused positive emotions (for a review, Berridge & Kringelbach, 2008).

Figure 10
Reward System



Reproduced from , "Dopaminergic reward system: A short integrative review" by O.C. Arias-Carrión, M.Stamelou, E. Murillo-Rodríguez, M. Menéndez-González, and E. Pöppel, 2010, *International Archives of Medicine*, 3(24), p. 2 (https://doi.org/10.1186/1755-7682-3-24). Open Access. Creative Commons Attribution 3.0 Unported. Retrieved from: http://www.biomedcentral.com/1755-7682/3/24/

3 Theories of Hemispheric Lateralization

Currently, three theories of hemispheric lateralization (also called frontal asymmetry) exist. These theories hypothesize how the hemispheres of the brain are related to our emotional experiences. Hemispheric lateralization was described earlier in the EEG section.

Right Hemisphere Hypothesis

The right hemisphere hypothesis suggests that the right hemisphere of the brain processes emotions, while the left hemisphere is not involved. The right hemisphere is thought to control the behavior, cognitive appraisal, and subjective feelings components of emotion. Brain lesion studies support the right hemisphere hypothesis, while fMRI and EEG studies do not provide strong support (Schirmer & Kotz, 2006). Damage to the right hemisphere of the brain or left side of the body has been linked to volatile emotions and inability to identify emotions in others' facial expressions (Adophs et al., 2000, 1996). But, keep in mind these findings only tell us what happens when the right side is damaged, but does not tell us anything about if the same thing happens when the left side of the brain is damaged. The Wada test is a methodology that can help us to test the functions of the right and left hemispheres separately. The Wada test occurs when a sedative sedates only one side of the brain and body and effectively puts one side of the brain to sleep. But, the other side of the brain and body continues to function normally. Researchers used the Wada test to evaluate how the right and left side of the contribute to emotional experiences. When the Wada test sedated the right side of the brain and participants were shown a photo on the left side of their visual field, participants reported less intense emotions than when the right side was functioning normally (Ahern

et al., 1991). When the Wada test sedated the left side of the brain and participants were shown the same face in the right visual field, participants reported no change in emotion. Thus, these findings do suggest the right hemisphere might control arousal or intensity of emotions, but not necessarily valence or specific emotions.

Valence Hypothesis

The valence hypothesis theorizes that the right hemisphere of the brain controls negative emotions and the left hemisphere controls positive emotions. There is some evidence to support this hypothesis. A Wada test to sedate the left hemisphere caused an increase in sadness – because now the right hemisphere is dominant (Demarree et al., 2005). Further, damage to the right hemisphere makes it harder to recognize negative emotions in facial expressions, but not positive emotions (Adolphs et al., 1996). Finally, when people perceive negative emotions in others' faces and when they show negative emotions on their own faces, an EEG shows more activity in the right hemisphere than the left hemisphere (Davison & Irwin, 1999).

What about the left side of the hemisphere? A Wada test that sedated the right hemisphere caused joy-like emotions, because the left hemisphere is now dominant (Demarree et al., 2005). When people perceived or showed positive emotions, the EEG similarly showed more activity in the left (vs. right) hemisphere (Davison & Irwin, 1999). Although an interesting hypothesis, some recent research suggests that difference between the left and right side of the brain is not valence, but whether people are motivated to approach or avoid.

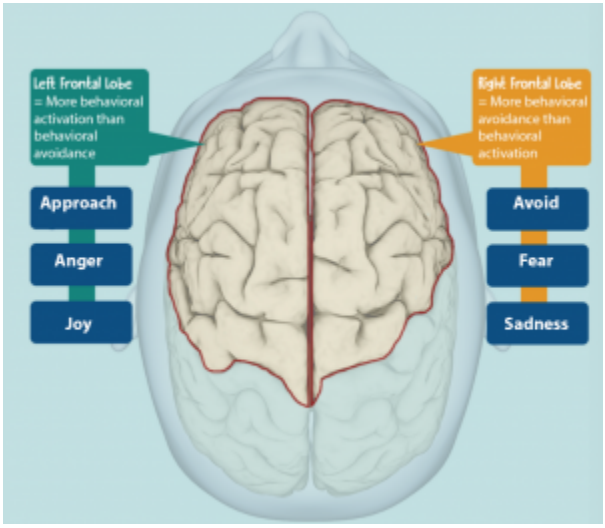
Approach-Withdrawal Hypothesis

The approach-withdrawal hypothesis (see Figure 11) focuses on the right and left frontal lobes, instead of the right and left hemispheres as in the past studies. This hypothesis suggests that the right frontal lobe is activated for emotions that cause avoidance behavior, while the left frontal lobe is activated for emotions that

cause approach behavior. This theory has been supported, in particular because anger, which motivates us to approach the person who angered us, activates the left and not right side of the brain (Harmon-Jones & Allen, 1998; Harmon-Jones & Sigelman, 2001). Some initial evidence has found that expressing fear and disgust emotions on the face resulted in less left cortical activity compared to participants who expressed no emotion and compared to participants who expressed joy and anger approach emotions (Coan et al., 2001). Interestingly, joy and anger facial expressions did not result in more left cortical activity than the control. So, most recent evidence suggests that the left side is less involved in avoidance emotions, but more work is needed to demonstrate that approach and withdrawal emotions differentially activate the left and right hemispheres.

Figure 11

Approach-Withdrawal Hypothesis



The left frontal lobe is in charge of more behavioral activation than behavioral avoidance. It is activated when we experience emotions like anger and joy. The right frontal lobe is in charge of more behavioral avoidance than behavioral activation. It is activated when we experience emotions like fear and sadness.

One-Network Hypothesis

The one-network hypothesis comes from the social constructivist perspective. This hypothesis points out that an emotional experience is comprised of behavior, thoughts, feelings, and physiology, all which activate different parts and structures of the brain. Theorists who support this perspective point out that one emotion can activate several parts of the brain and that brain structures cannot be linked uniquely to one structure. This, theory seeks to find networks or connections of brain structures that can be mapped onto emotion components, not specific emotions. Some hypothesized networks include core affect, conceptualization, executive attention, and emotion words (Lindquist et al., 2012). Core affect , as discussed with Russell's (1980) circumplex model, is a general feeling of pleasantness or unpleasantness accompanied by some feeling of arousal. Conceptualization essentially represents our cognitive appraisal of the emotional event. Executive attention is activated when we are attending to the emotional event and focusing on certain aspects of the event, while ignoring other aspects of the event. The emotion words network is activated when we consciously assess our core affect, behaviors, facial expressions, and other components to determine an emotion word label. These are just some of the hypothesized networks.Figures 12 and 13 display some emotional networks supported by past research (for a review, see Lindquist et al., 2012). Core affect includes the amygdala, insula, orbitrofrontal cortex, anterior cingulate cortex, strai terminalis, and PAG. Conceptualization includes areas such ventromedial prefrontal cortex (VMPFC) and hippocampus.

Figure 12

Display of Unique Emotional Networks

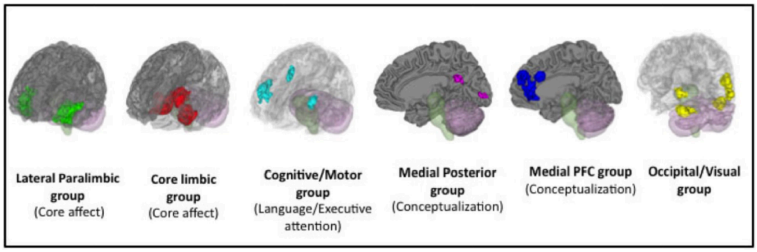


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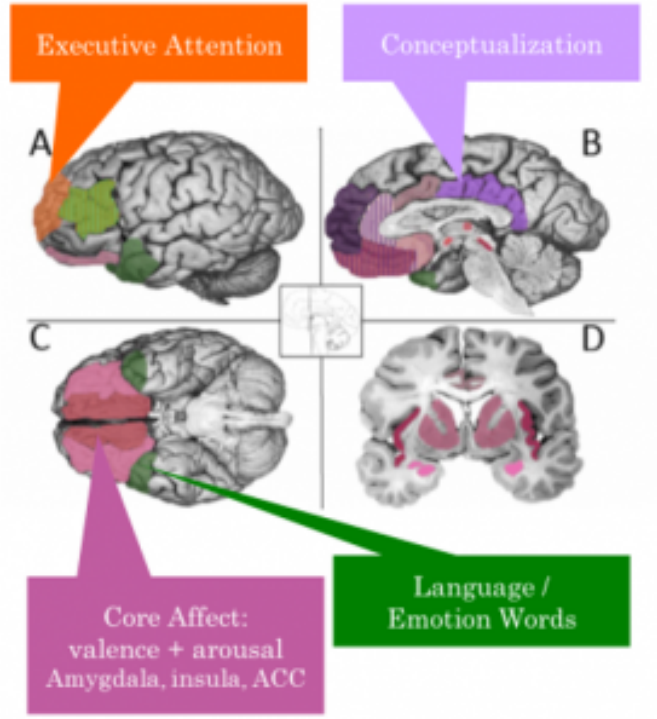
Figure 13

Display of Emotional Networks from Different Views of the Brain



Reproduced from "The brain basis of emotion: a meta-analytic review," by K.A. Lindquist, T.D. Wager, and H. Kober, E. Bliss-Moreau, and L.F. Barrett, 2012, The Behavioral and brain sciences, 35(3), p. 54 (https://doi.org/10.1017/S0140525X11000446). Copyright 2011 by the Cambridge University Press.

How many dimensions underlie physiological measures?

Russell (1980) and Watson and Tellegen (1985) showed subjective feelings can be reduced to a small number of dimensions. But what about other emotion components like physiological changes and behavior changes?

Lang et al. (1993) investigated whether subjective feelings, facial behavior changes, and arousal could together be reduced to a small number of dimensions. Participants viewed a variety of photos from the Internal Affective Picture System (IAPS; more on IAPS later!). Participants viewed 18 different photos: 8 photos were pleasant in valence (nature, food, attractive people), 8 photos were unpleasant (pollution, accidents, mutilated bodies) and 2 photos were neutral (household objects). While viewing the photos, participants self-reported valence, arousal, and interest in the photos. In addition, the amount of time participants looked at each picture was recorded. While viewing the photos, researchers measured facial electromyographic (EMG) activity and physiological measures (i.e., heart rate, skin conductance, startle reflex). Facial EMG measures changes in the facial muscles, such as the corrugator and zygomatic muscles (see Figure 8). Corrugator facial activity is correlated with valence, such that increases in activity is associated with negative emotions and decreases are associated with positive emotions. The zygomatic muscle is the muscle around the mouth used to smile. Increases in zygomatic activity suggests a positive emotional experience. Researchers then correlated participants' self-reported valence and arousal with changes in facial muscles and physiology. It is important to note that higher numbers on the self-report scale indicate higher levels

of pleasantness or arousal.

Figure 8

Location of Corrugator and Zygomatic Facial Muscles

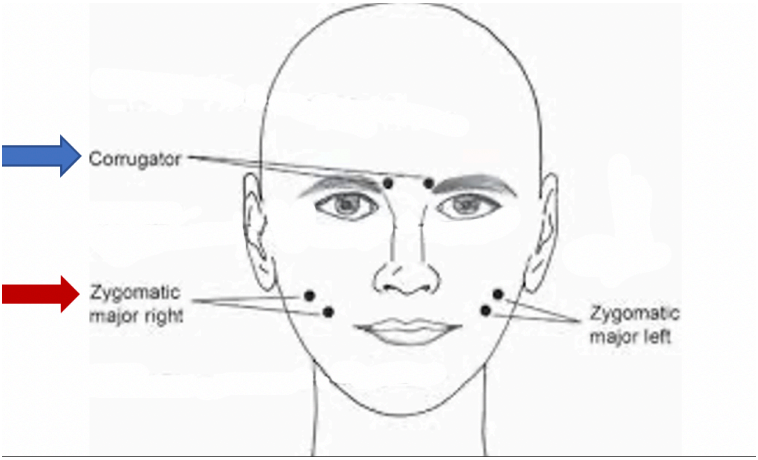


Table 2

Lang et al. (1993) *Results*

Corrugator Activity
Negatively correlated with self-reported pleasant valence
No relationship with self-reported arousal

Zygomatic Activity
U-shapred relationship with self-reported valence
Positively correlated with self-reported arousal

Heart Rate
Positively correlated with self-reported pleasant valence
Positively correlated with self-reported arousal

Skin Conductance
Positively correlated with arousal
No relationship with valence

Startle Reflex
Negatively correlated with self-reported pleasant valence
No relationship with arousal

After finding the results (see Table 2), researchers conducted factor analysis on all data (self-report, facial EMG, physiology). Remember, factor analysis is a statistical analysis that reduces all data into a smaller number of groups. So, this study is reducing subjective feelings, behavior change, and physiology into smaller groups. Factor analysis returned two clear factors – valence and arousal (see Figure 9 below)! The first group was valence. Pleasant valence was associated with an increase in self-reported pleasantness, decrease in corrugator activity, increase in zygomatic activity, increase in heart rate, and decrease in startle reflex. (Later we will discuss how the startle reflex is a pure measure of valence, such that the startle reflex is positively correlated with unpleasantness). On the second factor, high levels of arousal were associated with an increase in self-reported arousal and interest, greater viewing time, and higher skin conductance.

Two Underlying Dimensions from Lang et al. (1993) [Lang, P.J., Greenwald, M.K., Bradley, M.M., & Hamm, A.O. (1993). Looking at pictures: Affective,facial, visceral, and behavioral reactions. Psychophysiology, 30, 261-273]

Pleasant Valence	High Arousal
• Self-reported pleasant valence • Corrugator (-) • Zygomatic • Heart Rate • Startle Reflex (-)	• Self-reported arousal • Self-reported interest • Viewing Time • Skin Conductance

Across several studies conducted by Russell, Barrett, and others (Colibazzi et al., 2010; Posner et al., 2009; Wilson-Mendenhall et al., 2013) researchers replicated Lang et al.'s (1993) study by measuring changes in brain activity. In this study, participants rated the valence and arousal in three tasks: 1) emotion words, 2) sentences with emotional content, and 3) emotional scenarios. While reading and rating these tasks, participants brain activity was measured. Again, these researchers found two underlying dimensions – valence and arousal! (see Figure 10). In general, results showed that activation of the insular cortex, reward circuit (i.e., prefrontal cortex, basal ganglia, ventral striatum, nucleus accumbens, and ventral tegmental area (VTA)), and orbitofrontal cortex was associated with self-reported pleasantness. Activation of the thalamus, amygdala, parahippocampal gyrus, and anterior cingulate was associated with self-reported arousal. It is important to note that the orbitofrontal cortex is also activated for anger (a negative, approach emotion), the insular cortex with disgust and amusement, and that the anterior cingulate cortex is also linked to sadness (a low arousal, negative emotion). Thus, there may not be clear one-to-one mappings of these structures to valence and arousal.

Two Underlying Dimensions from Colibazzi et al. (2010), Posner et al. (2009) and Wilson-Mendenhall et al. (2013)
[Wilson-Mendenhall, Barret, & Barsalou, 2013; Posner, Russell...Colibazzi, et al., 2009; Colibazzi, Posner,.... Russell, 2010]

Pleasant Valence	**High Arousal**
• Self-reported valence • Insular Cortex • Reward Circuit • Orbitofrontal cortex	• Self-reported arousal • Thalamus • Amygdala • Parahippocampalgyrus • Anterior cingulate

Summary of Physiological Measures of Emotion

This chapter reviewed a variety of physiological measures that can be utilized to assess people's emotional experiences. Most of these measures are responsive to changes in both the PNS and SNS, but often these measures are complemented with pure measures of SNS (skin conductance) or PNS (heart rate variability) measures. The relationship between the brain and emotions is complex. Locationist and basic emotions researchers believe that specific brain structures can be uniquely tied to categories of emotions or valence or emotion. One-network and social constructivist theorists disagree with the one-to-one mapping of emotions with brain structures. Instead, one-network theorists look for connections between structures that control certain processes of the emotion (e.g., core affect, language/emotion words).

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CHAPTER 8: FEAR, ANXIETY, AND STRESS

Chapter 8 Learning Objectives

Fear

- What are the components changes of fear?
- What evidence supports fear as a basic emotion?
- What evidence supports fear as a socially constructed emotion?
- What does current work on fear suggest is the adaptive purpose of fear?
- What does the S.M. case tell us the amygdala's role in fear and other emotions?
- Does research on fear and the amygdala support the locationist or psychological constructionist theory?

Anxiety

- Does anxiety meet the requirements for an emotion? Why or why not?
- What is the relationship between anxiety and attentional biases?
- How are fear and anxiety similar? different?
- How does the research on anxiety help us to better understand psychological disorders?

Stress

- Is stress an emotion? Why or why not?
- What is the difference between the General Adaptation Syndrome and Lazarus' View of Stress?
- Explain the importance of cognitive appraisals in the stress process.

Chapter 8 Introduction

In the next several chapters, we will discuss specific emotions from the perspective of the four modern theories. This chapter will discuss the differences between fear, anxiety, and stress and determine whether each construct meets the requirements of an emotion.

Definitions of Fear, Anxiety, Stress

Most psychologists consider **fear** to be an emotion. Fear occurs when we experience a threat to our physical safety in our external environment. Various views of anxiety exist. One view suggests that **anxiety** is a personality trait. Someone high on trait anxiety would experience high levels of anxiety across situations and over time. Trait anxiety is subsumed within the Big 5 trait Neuroticism. Individuals diagnosed with an anxiety disorder would be those who score extremely high on trait anxiety. Another way that anxiety is differentiated from fear is through eliciting events. For instance, Lazarus (1994) suggests fear results from a threat to our physical bodies (like a bear), whereas anxiety results from a threat to one's self-esteem (like interpersonal rejection). Another view is that the timing of the eliciting event distinguishes these two constructs. Fear occurs **post-stimulus**, whereas anxiety occurs **pre-stimulus**. Post-stimulus means fear occurs *after* the eliciting event, whereas anxiety occurs *before* the eliciting event (and anxiety could occur even though the eliciting event never even happens!). Expanding on the pre- and post-stimulus view, because anxiety is pre-stimulus, people may feel anxiety toward a threatening event that may or may not happen (Lang et al., 2000). Thus, anxiety can be present with an expected upcoming stimulus or without an eliciting stimulus – such as when people experience anxiety during baseline measures. Expectedness and novelty are two cognitive appraisals that differentiate fear and anxiety. Fear (as seen below in the Scherer, 1997 study) is associated with novel and unexpected events, whereas anxiety occurs with expected and familiar events. For example, we are aware of an upcoming presentation that evokes anxiety but would not predict hitting a deer on the way to work! In general, anxiety seems to last a longer period of time than fear and other

typical emotions, especially if we assume the trait perspective of anxiety!

Stress is an unfolding process of emotions, such that as people cope with a negative event, their cognitive appraisals of the event cause a change in their emotions. A stress response might include subjective feelings of both fear and anxiety. Thus, stress is not an emotion in itself (stress lasts too long to be considered an emotion) but does encompass changes in emotions.

Fear: Eliciting Events

As stated on the last page, fear occurs when we experience a threat to our physical safety. Many believe that fear is an adaptation that increased the survival of our genes by helping us to avoid death or bodily harm. We will start by discussing how the four components of an emotion change during a fear experience.

Eliciting Events

Arrindell et al. (1991) identified four types of events that elicit fear, as shown in Table 1. Further, each of these eliciting events underlies four of the five classes of specific phobias (American Psychological Association, 2013), as indicated in the righthand column. Many believe that these fears are adaptive (Öhman, 2008). For instance, the fear of animals protects us from predators, while social threats developed dominance hierarchies that facilitated group harmony.

Table 1

Eliciting Events of Fear

Eliciting Events of Fear

Type of Eliciting Event	Definition	Examples	Relation to Phobia
Fear of Death	Fears elicited by situations that might cause death	Injuries, illness, blood, surgical procedures	Blood-injury-injection phobia
Fear of Animals	Fear of animals that could cause death	Insects, reptiles, snakes, harmless animals, domestic animals	Animal Phobia
Agoraphobia	Fear of being trapped	Public spaces, crowds, closed spaces, places without clear escape route	Agoraphobia
Social Threat	Fear about interpersonal events	Criticism, social interactions, rejection, conflict	Social Phobia

Note. The fifth class of phobia in the DSM-5 (American Psychological Association, 2013) is natural environment, which includes fear of heights, storms, and water. This fifth class was not identified in this study

Two problems exist with this categorization of eliciting events. The first is that social threat may be pre-stimulus instead of post-stimulus. For instance, worrying about an upcoming potential criticism or rejection might actually be an anxiety. When we experience rejection, the rejection might cause an emotion other than fear (e.g., disappointment, sadness). The second problem is that the elicitors under fear of death could elicit the emotion disgust instead of fear. Recent research even suggests phobias are a combination of fear and disgust (Cisler, Olatunji, & Lohr, 2009). In fact, body envelope violations (when the internal of our body is revealed, such as during surgery) are a common elicitor of disgust and also underlie blood-injury-injection phobia (Rozin et al., 1999, 2008). Finally, this classification does not identify fear caused by the

threat of other humans – humans who could injure or harm us. This threat might fall under fear of animals or fear of death.

Fear: Behavior Changes - Defense Cascade Model of Fear

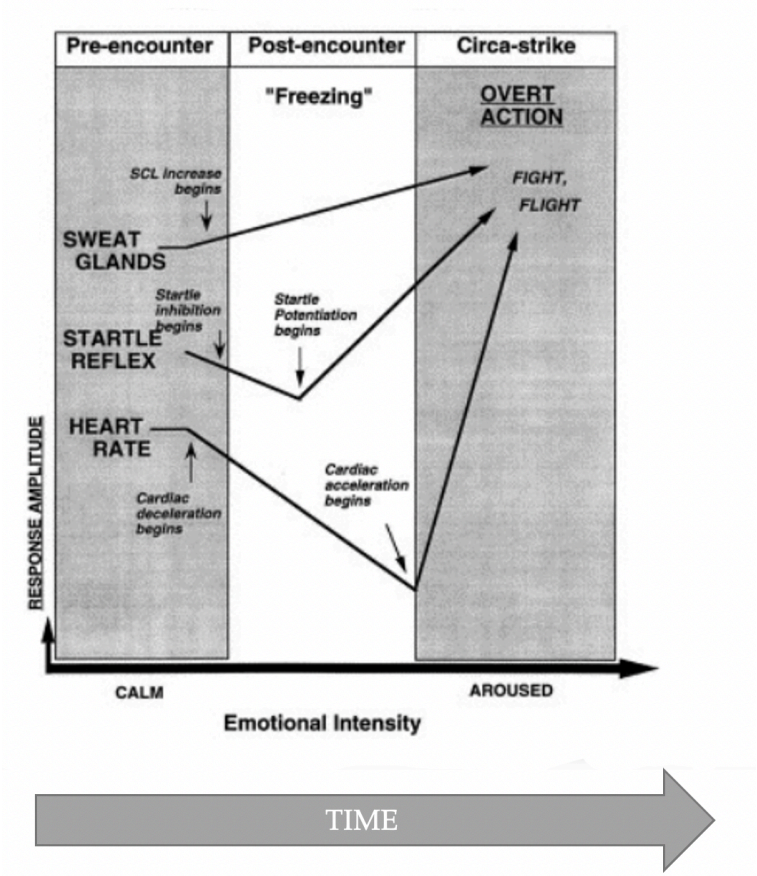
Defense Cascade Model of Fear. The Defense Cascade (Lang et al., 2000) is a model that identifies how behavior and physiological changes occur over time during a fear experience (see Figure 1). According to this model, animals go through three stages during the experience of fear**.** As the animal moves through each stage, the eliciting stimulus becomes clearer and closer, and arousal increases. The **pre-encounter phase** is activated in situations where the animal recalls this stimulus in the past (such as when meeting a predator). During the pre-encounter phase, sweating increases, and heart rate and startle reflex decrease. It is believed heart rate and startle reflex first decrease because the animal is focused – looking for potential threats. The animal moves from the pre- to **post-encounter stage**, when the animal identifies the threat, but this threat may still be ambiguous and physically distant. Thus, in the post-encounter phase the threat is not imminent. During the post-encounter phase, freezing and the startle behavior occurs. Freezing and startle have two functions – 1) pausing helps the animal to evaluate the presence of a threat and 2) pausing may prevent the predator from detecting the animal. Startle reflex and freezing behaviors are called **inhibiting behaviors** – because these behaviors stop the animal's current activities and focus their attention on the threat. In the **circa-strike stage**, the threat or predator is now clear and close to the animal. Note that from pre to post-encounter, heart rate drops, then increases in the circa-strike stage. In the circa-strike stage, the threat is now imminent and clear, thus the animal engages in overt, activating behaviors to avoid physical threat and danger. **Activating behaviors** include escape/

avoidance, and if escape is not possible, then defensive behaviors such as aggression. It is important to note that these behavior changes occur very quickly. It probably takes milliseconds to move from inhibiting to activating behaviors.

Figure 1

Defense Cascade Model of Fear

Defense Cascade
elicited by an aversive stimulus



Adapted from "Fear and anxiety: Animal models and human cognitive psychophysiology," by P.J. Lang, M. Davis, and A. Öhman, 2000, Journal of Affective Disorders, 61, p. 149 (https://doi.org/10.1016/S0165-0327(00)00343-8). Copyright 2000 by Elsevier Science B.V.

Let's discuss these four behavior changes in more depth. The startle reflex was discussed in the past chapter. The **startle reflex** focuses our attention on a threat, protects against physical injury, and prepares the body to fight or flight. The startle reflex is an automatic behavior that is initiated by the brainstem. The brainstem then sends a signal to the amygdala, and in turn the amygdala results in the emotion of fear. It is believed that the emotion fear is not felt until the amygdala receives the signal from the brainstem.

After the startle reflex, freezing behavior occurs. **Freezing** occurs when the body stops voluntary movements and physiological processes such as digestion stop. Freezing has two functions. The first is that freezing behaviors allows us to acquire more information about the potential threat by exploring our environment, called an **orienting response**. The second function is to help the animal avoid detection by not moving or by appearing to be dead. In humans, the visual search and attentional blink paradigms are two methods used to measure the orienting response of freezing behavior (more on these later).

After freezing, if the threat becomes closer and more significant, then **fleeing** and **fighting** occur. The defense cascade theorizes that animals flee when escaping without harm is effective. But, if escaping successfully is unlikely, then animals will engage in defense behaviors such as aggression or submission. In general, if the animal successfully flees, then fight behaviors would not occur.

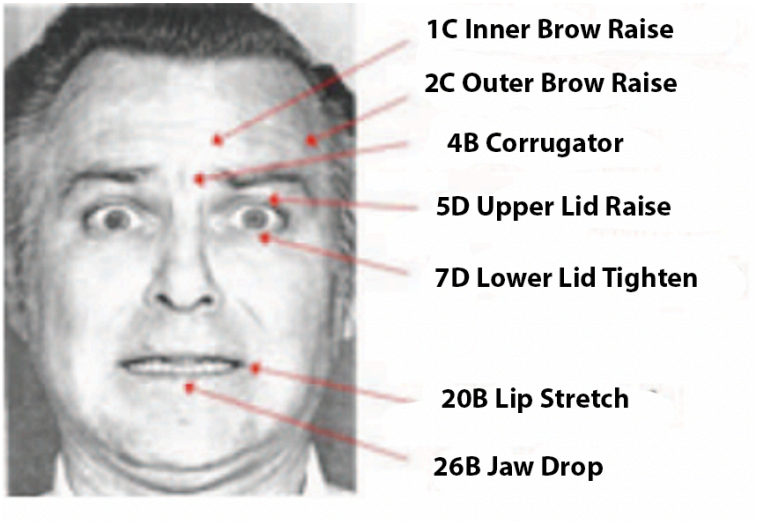
Fear Facial Expressions: Basic or Social Constructivist?

Facial expressions change during a fear experience. Keep in mind that the fear facial expression might differ based on whether the animal in danger is trying to appease or intimidate the threat.

Figure 2 shows the AUs that Ekman and Friesen (1978) found change during a fear experience. Visit this website for a live demonstration of how the AUs for fear change. Evolutionary psychologists have suggested that wide eyes assist the animal is visually exploring the threat. Ekman's AUs seem to express the appeasement behavior changes. If an animal is aggressing during a fear experience, they might show their teeth more or even more of an anger expression.

Figure 2

Fear AU's (Ekman & Friesen, 1978)



Across several industrialized and isolated cultures, Ekman has found people universally recognize the fear facial expression. In his classic study (Ekman et al., 1969, review here), the majority of participants correctly identified fear, but the Fore and Borneo participants showed lower recognition rates than other countries.

Table 2

Recognition Rates for Fear

(Derived from a table shown in previous chapters titled "Recognition Rates for Six Emotions Across Five Cultures)

Affect Category	United States	Brazil	Japan	New Guinea (Pidgin responses)	New Guinea (Fore responses)	Borneo*
Fear (F)	88 F	77 F	71 F	46 F	54 F	40 F

Reproduced from "Pan-cultural Elements in Facial Displays of Emotion," by P. Ekman, E.R. Sorenson, and W.V. Friesen, 1969, Science, 164(3875), p. 87, (https://doi: 10.1126/science.164.3875.86). Copyright Note. For the Fore tribe, some words were in Pidgin language, others in Fore language.

In their follow-up study on adults and children from the Fore tribe, Ekman and Friesen (1971) found that whether adult participants could select the correct fear facial expression to match a fear story depended on the other two facial expressions presented with the fear facial expressions. Table 3 shows that 87% of adult participants correctly identified fear when presented with sadness and disgust facial expressions, but only 28% identified fear when presented with surprise and sadness. When adult participants were shown a fear, surprise, and sad facial expression (last row of Table 3), 67% of the adults selected the surprise photo. Now, children (Table 4) showed better recognition rates than adults, but of course they were only shown one incorrect photo

Table 3

Results for Fore Adult Participants (Ekman & Friesen, 1971)

The fear section of a table shown in earlier chapters of this Pressbook. The table details the emotion described in the story (in this case fear), emotions shown in the two incorrect photographs, corresponding numbers, and percent choosing correct face.

Emotions shown in the TWO incorrect photographs	# Participants	% Choosing correct face
Anger, disgust	92	64**
Sadness, disgust	31	87**
Anger, happiness	35	86**
Disgust, happiness	26	85**
Surprise, happiness	65	48
Surprise, disgust	31	52
Surprise, sadness	57	28

* $p < .05$., ** $p < .01$.

Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, Journal of Personality and Social Psychology, 17(2), p. 127, (https://doi: https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association

Table 4

Results for Fore Child Participants (Ekman & Friesen, 1971)

The fear section of a table shown in earlier chapters of this Pressbook. The table details the emotion described in the story (in this case fear), emotions shown in the ONE incorrect photograph, corresponding numbers, and percent choosing correct face.

Emotions shown in the ONE incorrect photograph	Numbers	% Choosing correct face
Sadness	25	92*
Anger	25	88*
Disgust	14	100*

(p) is less than or equal to .01.*

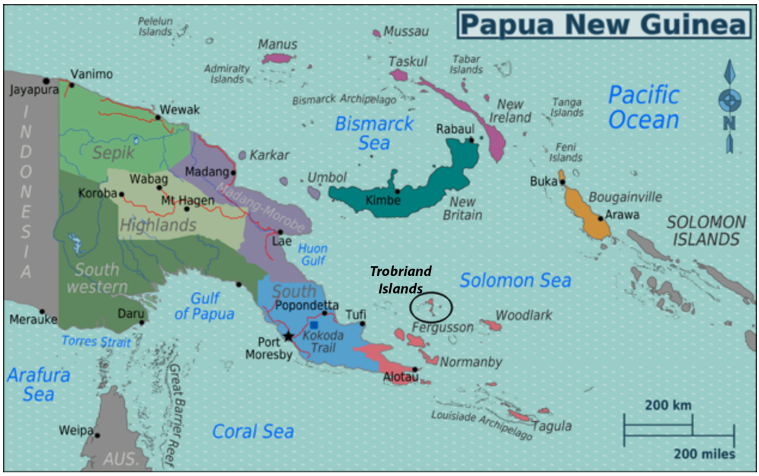
Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, Journal of Personality and Social Psychology, 17(2), p. 127, (https://doi: https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association

Finally, Ekman and colleagues (1987, for review of study click here) found that across 10 cultures, the majority of participants identified fear in facial expressions and rated fearful facial expressions as most intensely fear out of 7 possible emotions.

Some other work has found cultural differences in fear facial expressions. In one study (Matsumoto, 1992), participants saw 48 photos of six emotional expressions (anger, disgust, fear, happiness, sadness, and surprise). Each emotion was displayed in 8 different photos. Participants viewed all 48 photos one at a time. While viewing each photo, participants picked an emotion label from the following seven emotions: anger, contempt, disgust, fear, happiness, sadness, and surprise. 81.85% of American participants and 54.55% of Japanese participants correctly labeled the fearful expression as fear across the 8 fear photos. Matsumoto (1992) states this provides evidence of universality of fear because the percentages for both groups were beyond chance. Yet, two group differences were found: 1) a significantly greater number of Americans identified fear in the

fearful facial expressions and 2) on average, Americans identified 6.5 out of the 8 photos as fear, whereas Japanese identified fewer – about 4.4 photos. In fact, both Japanese and American participants stated the fear photos were the hardest to identify. A similar study by Matsumoto and Ekman (1989) found that 71.12% of Americans correctly identified fear across eight photos, while only 30.82% of Japanese did, forcing the researchers to drop fear from the remainder of their study! In fact, further analyses indicated that 50.35% of the Japanese participants identified the fear photos as surprise.

Another study by Crivelli, Russell, and colleagues (2016) compared Spaniards to Trobrianders, an isolated community found in The Trobriand Islands in Papua New Guinea, north of Australia. In both groups, participants were aged 6 to 16 years old.



In this study, participants were randomly assigned to one of five emotion label conditions (happy, sad, anger, fear, disgust). From six different photos of facial expressions (see Table 5), participants were asked to pick the photos that displayed their assigned emotion from six photos. Thus, in the fear condition, participants were asked to point to the photo that displayed the fear facial

expression. In the fear condition, a significantly greater percentage of Spaniards (93%) than Trobrianders (31%) correctly selected the gasping fear expression. The Trobrianders also tended to pick the sad pouting face (27%) and the disgust nose scrunching face (27%) for fear. These findings show that some cultures believe nose scrunches or pouting communicates the emotion fear.

Table 5

List of facial expression changes for 7 facial expression photos

A table with two columns showing an emotion label and the facial expression change for that emotion.

Correct Emotion Label	Facial Expression Change
Happy	Smiling
Sad	Pouting
Anger	Scowling
Fear	Gasping
Disgust	Nose Scrunching
Neutral	No Change

Reproduced in table format from "Reading Emotions from Faces in Two Indigenous Societies," by C. Crivelli, S. Jarillo, J.A. Russell, and J.M Fernández-Dols, 2016, Journal of Experimental Psychology: General, 145(7), p. 13 (https://doi.org/https://doi.org/10.1037/xge0000172). Copyright 2020 by the American Psychological Association.

Participants were asked to match emotion words to emotion facial expressions displayed in the photo or video clip. All participants completed their tasks for all five emotions – happy, sadness, anger, fear, and disgust (a within-subjects variable). The facial expressions displayed were the same as in Study 1, in Table 5 above. The photo facial expressions were still photos taken from the video clip. All six

facial expressions, including neutral, were shown at the same time for the photos and the video clips. When instructed to select the fear facial expressions, 58% in the static and 47% in the dynamic condition correctly selected the gasping face. (There were no significant differences in the proportion of participants who selected the correct answer in the dynamic or static condition). In general, participants also selected pouting, scowling, and nose scrunching for the fear expression. Finally, Gendron, Barrett and colleagues (2014b) found that both American and Himba participants matched facial expressions with wide eyes into separate piles, indicating that wide eyes may be perceived as fear in both cultures.

Fear: Vocal Changes

The prior study suggests that a gasp could be one vocal change associated with fear. In the basic emotions/social constructivist chapter, we discussed a study by Sauter et al. (2010) in which both Himba and European English participants matched the fear story to the sound of a scream at beyond chance levels. This occurred when participants listened to their own and the other participants' vocal sounds. The emotional story for fear was "Someone is suddenly faced with a dangerous animal and feels very scared" (Sauter et al., 2010, online supplemental material).

Cordaro, Keltner, and colleagues (2016) investigated identification of vocal change across 10 industrialized countries (USA, China, Germany, India, Japan, South Korea, New Zealand, Turkey, Poland, and Pakistan) and Bhutan, with the same procedure as Sauter et al., (2010). Bhutan is an isolated country located in the Himalayas. Across these countries, the scream was correctly matched to the fear story 69% to 95% of the time, suggesting the scream is a universal vocal change of fear.

In one last study by Gendron, Barrett and colleagues (2014a), which we covered earlier, Himba and Boston participants heard a scream and were asked to label the emotion. Approximately 20% of the Himba and 55% of the Boston participants labeled the scream as fear. The Himba findings were not at beyond chance levels and thus might suggest the scream is not universal. But, Gendron et al. (2014a) point out that the Himba used physical terms to label the sound (such as "screaming" or "yelling") instead of mental states like fear. The Himba also labeled vocal sounds of "ahhh-ahhh" and a growl as fear, although these sounds were meant to be surprise and anger, respectively.

Fear: Physiological Changes

Physiological Changes

During a fear experience, the SNS system is activated, but the PNS system is not. In Levenson et al.'s (1990) study on American participants, fear facial expressions caused an increase in heart rate and skin conductance, a decrease in finger temperature, no change from baseline for muscle activity. In a later study (Levenson et al., 1992), American and Mingankabu participants made a fear facial expression. For both groups, the fear expression resulted in similar increases in heart rate, and small increases to no change for finger temperature. But American participants showed significantly greater increases in skin conductance than Minangkabu participants. Levenson's studies may be reviewed here.

A recent review (Kreibig, 2010) of physiological changes in fear has found that generally fear causes an increase in heart rate, blood pressure, breathing, skin conductance, as well as, a shortened cardiac pre-ejection period (PEP; review PEP here). Depending on the methodology and the time at which physiology is measured during the fear experience, some fear fear manipulations result in decreased heart rate, which typically occurs earlier in the fear experience.

Replicating Levenson and colleagues' work, fear causes a decrease in finger temperature. Cardiac vagal influence and HRV decrease during fear, indicating loss of parasympathetic influence.

Fear: Cognitive Appraisals

Scherer's (1997) study found universal and cultural differences in cognitive appraisals. For a review of Scherer's (1997) study, go to the modern theories section on cognitive appraisals. Means (see Table 6) collapsed across all world regions, showed that participants reported the following appraisals when recalling a fear experience: unexpected, unpleasant, neither goal obstruction/conduciveness, slight unfairness, external causation, inability to cope, morality, and no change in self-esteem. [Note that this study suggests that inability to cope occurs during fear, whereas others believe ability to cope is a cognitive appraisal dimension of fear].

Table 6

Mean Changes in Cognitive Appraisal Dimensions for Fear (Scherer, 1997)

A table showing Mean Changes in Cognitive Appraisal Dimensions for Fear. A question and response scale are also shown for the cognitive appraisal dimension.

Cognitive Appraisal Dimension	Mean	Question	Response Scale
Expectedness	1.48	Did you expect this situation to occur?	1 = not at all; 2 = a little; 3 = very much
Unpleasantness	2.88	Did you find the event itself pleasant or unpleasant?	1 = pleasant; 2 = neutral; 3 = unpleasantness
Goal Obstruction	2.32	Did the event help or hinder you to follow your plans or achieve your aims?	1 = it helped; 2 = it didn't matter; 3 = it hindered
Unfairness	1.92	Was the situation unjust or unfair?	1 = not at all; 2 = a little; 3 = very much
External causation	2.45	Who do you think was responsible for the event?	1 = self/internal; 2 = close persons / external; 3 = other persons / external; 4 = impersonal agency / external
Coping Ability	2.63	How did you evaluate your ability to act on or to cope with the event and its consequences?	1 = powerless; 2 = escape possible; 3 = pretending nothing happened; 4 = no action necessary; 5 = could positively influence event and change consequences
Immorality	1.83	Would this behavior itself be judged as improper or immoral by your acquaintances?	1 = not at all; 2 = a little; 3 = very much
Self-esteem	1.77	How id this event affect your self-esteem?	1 = negatively; 2 = not at all; 3 = positively

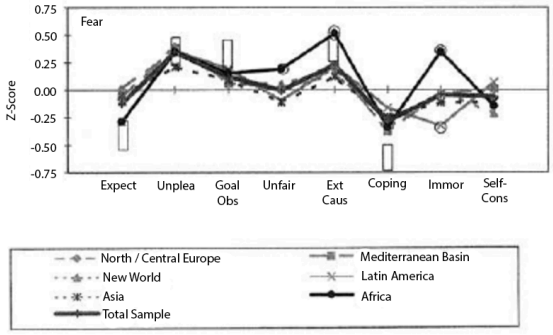
Adapted from "The Role of Culture in Emotion-Antecedent

Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 905, 911 (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Figure 3 displays the cross-cultural differences in cognitive appraisals for fear. In Figure 3, the presence of a circle around a data point indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample. Unfairness, immorality and external causation showed cultural differences. African countries viewed fear as higher in unfairness, external causation, and immorality. Latin American countries viewed fear as lower in immorality compared to the average of all other countries.

Figure 3

Eight Cognitive Appraisal Ratings for Fear across Six World Regions



Note. Presence of a circle around a datapoint indicates that the

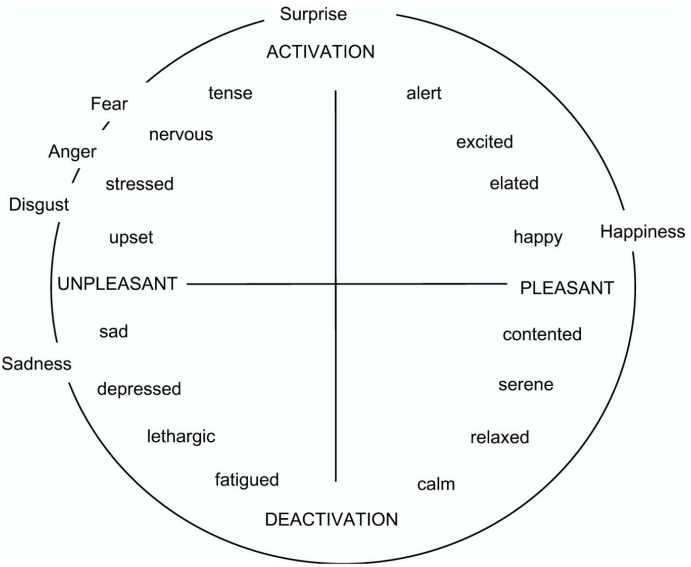
country with the circle showed means significantly different from the mean of the remainder of the sample. Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, *Journal of Personality and Social Psychology*, 73(5), p. 912, (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Fear: Subjective Feelings

Dimensional models view fear as highly unpleasant and highly arousing. Russell's (1980; see Figure 4) model views fear as higher in arousal than anger and disgust, but equal in unpleasantness. Compared to surprise, fear is lower in arousal, but higher in unpleasantness.

Figure 4

Russell's (1980) Circumplex Model



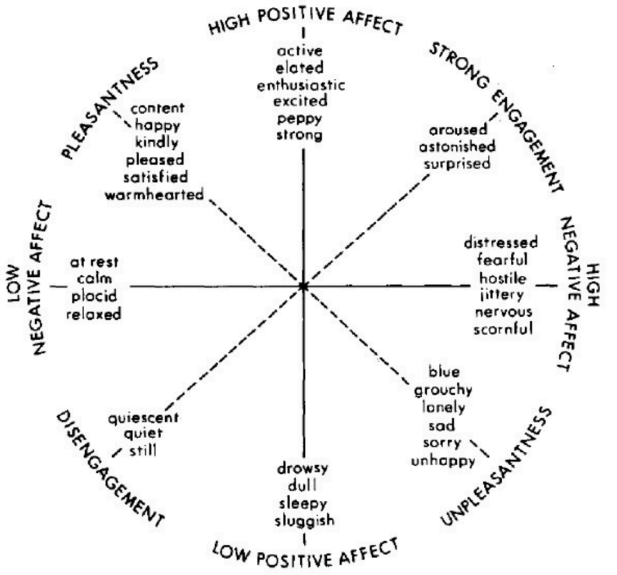
Reproduced from "Independence and bipolarity in the structure of current affect," by L. Feldman Barrett and J.A. Russell, 1998, *Journal of Personality and Social Psychology*, 74(4), p. 970

(https://doi.org/10.1037/0022-3514.74.4.967). Copyright 1998 by the American Psychological Association.

Watson and Tellegen's circumplex (1985; see Figure 5) views fear as high in NA, suggesting that fear is a highly activating negative emotion. In addition, this model views fear and anger (i.e., "hostile") as similar in activation and unpleasantness. Compared to surprise, fear is more unpleasant and lower in arousal.

Figure 5

Watson and Tellegen's (1985) Circumplex Model



Reproduced from "Toward a consensual structure of mood.," by D.T. Watson and A. Tellegen, 1985, Psychological Bulletin, 98(2), p. 221 (https://doi.org/10.1037/0033-2909.98.2.219). Copyright 1985 by the American Psychological Association.

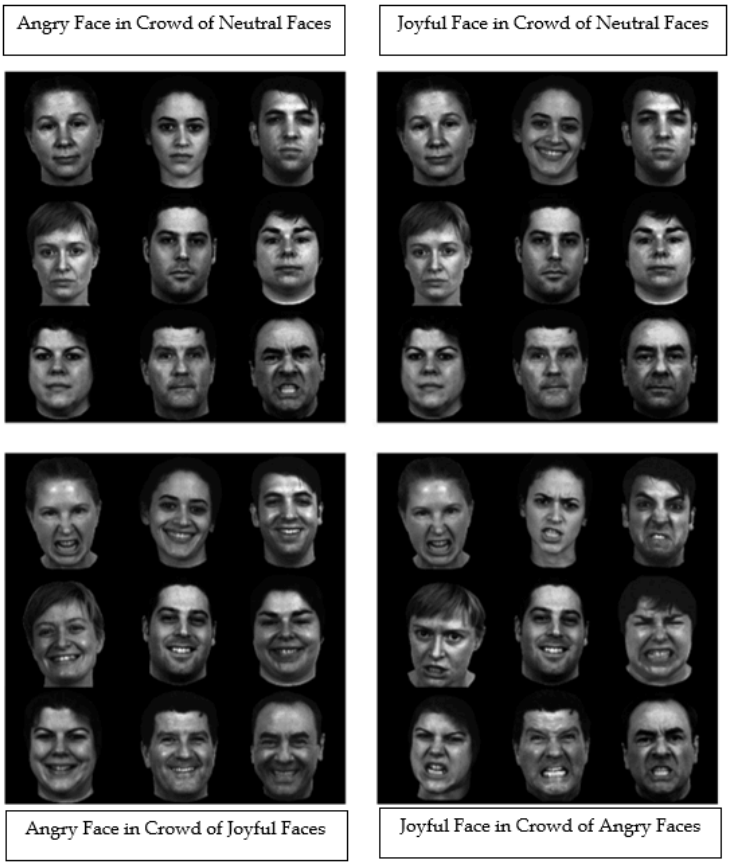
Evolutionary/Basic Emotion Evidence for Fear

Basic emotions theorists view fear as an adaptation that helps animals to pass on their genes. Specifically, the emotion fear causes escape or attack behaviors that are meant to defend the body from harm and death. Two research methods have provided support for this theory – 1) the visual search paradigm and 2) backward masking. A third program of research on infants and fear further suggests babies are not born to experience the fear emotion but are biased to focus their attention on threatening stimuli.

Evolutionary Evidence - Visual Search Paradigm

The **visual search paradigm** is one method to investigate how fear focuses our attention on a threat and prepares us for action to avoid the threat. In the visual search paradigm, participants are instructed to find specific target objects located among many control or distractor targets. For instance, in the two top photos in Figure 6, participants would be looking for the anger (left) or joy (right) face among all the neutral faces (called the "face in the crowd effect"). Generally, studies have found that people are faster to identify and more accurately identify the one anger face in the crowd than the one joyful face (Pinkham et al., 2010). Further, participants are faster and more accurate in identifying anger expressions than joy expressions in crowds of emotional crowds – as shown in the bottom two photos. Similar findings were obtained when participants were faster to locate a snake/spider among neutral objects and slower to locate a neutral object among snakes/spiders (Öhman, Flykt, et al., 2001). Together, these findings are taken as evidence of evolutionary preparedness to act in response to potential threats to our survival.

Figure 6
Visual Search Paradigm from Pinkham et al. (2010)



Adapted from "The face in the crowd effect: Anger superiority when using real faces and multiple identities. ," by A.E. Pinkham, M. Griffin, R. Baron, N.J. Sasson, and R.C. Gur, 2010, *Emotion*, 10(1), p. 143. (https://doi.org/10.1037/a0017387). Copyright 2010 by American Psychological Association.

Basic emotions researchers believe that as part of the fear emotional experience, the brain, particularly the amygdala, is biased

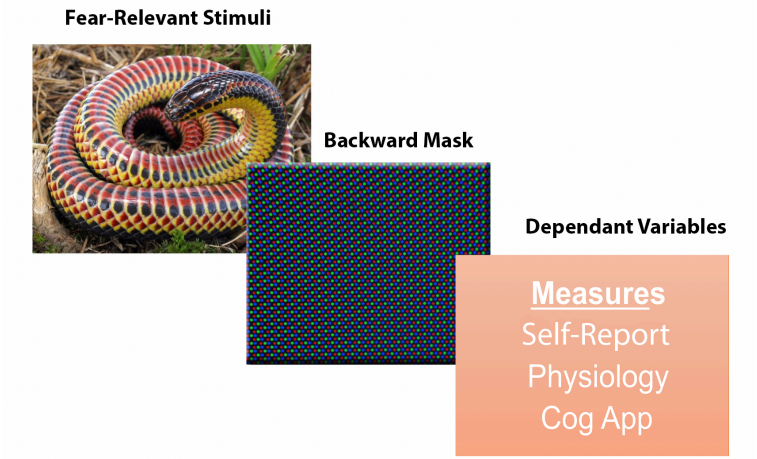
to quickly identify threatening facial expressions in other people, such as an anger facial expression. This threat-advantage bias means that over time, our brains and visual systems evolved to quickly and accurately identify threat in facial expressions and in animals our environment (Horstmann & Bauland, 2006; Öhman, Lundqvist, et al., 2001; Öhman & Mineka, 2001). Yet, Pinkham et al. (2010) findings suggest this mechanism operates best when the threatening facial expression occurs in a neutral versus emotional crowd, suggesting that mismatched emotional expressions could distract our amygdala from quickly and accurately detecting the threat.

Evolutionary Evidence - Backward Masking and Nonconscious Processing of Threatening Stimuli

Backward masking occurs when a visual stimulus is shown and quickly followed by another visual stimulus that MASKS the first stimulus. Typically, the masked image is similar to the feared stimulus in color and texture, but the mask does not contain an image or object. Backward masking allows researchers to assess people's emotional experience at an unconscious level. The idea is that the first stimulus presented is shown so quickly that participants cannot process the first image consciously (although their brain nonconsciously evaluates the image). During the procedure, participants' physiology can be measured and during or after the masking participants can self-report their subjective feelings and cognitive appraisals. During backward masking, participants might report they did not see an image, but this image could still impact their self-reported valence/arousal and physiology. Figure 7 shows an example of the methodology for backward masking.

Figure 7

Example of Backward Masking Methodology



Snake image reproduced from "Farancia erytrogramma (rainbow snake)" by Charles Baker, 2018. Open Access, Creative Commons Attribution-Share Alike 4.0 International Retrieved from: https://commons.wikimedia.org/wiki/File:Farancia_erytrogramma_(rainbow_snake).jpg

Pixels image reproduced from "CRT pixel array" by w:User:Planemad, 2007. Open Access, Creative Commons Attribution-Share Alike 2.5 Generic. Retrieved from: https://commons.wikimedia.org/wiki/File:CRT_pixel_array.jpg

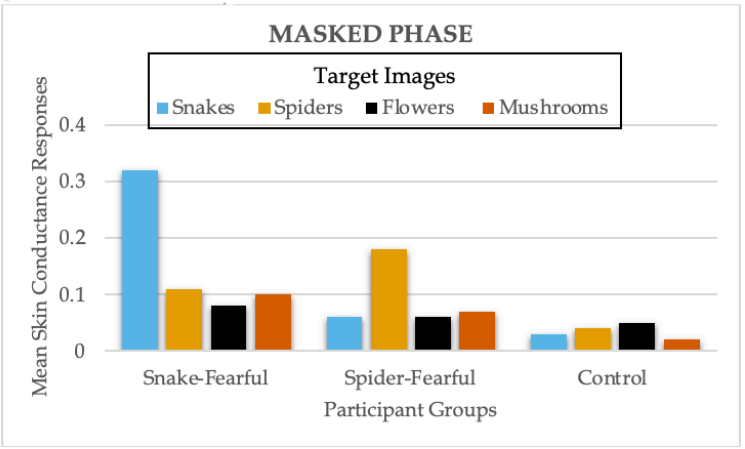
One study (Öhman & Soares, 1994) investigated fear with a backward masking procedure. The between-subjects quasi-IV was whether participants self-reported extreme fears of only snakes, only spiders, or neither (control). Within-subjects variables were target of photo (snakes, spiders, mushrooms, flowers), phase of image presentation (masked vs. unmasked) and number of trials (8 total trials). During each of the masked and unmasked phases, participants completed 8 viewing trials of each photo. So, participants viewed 8 masked photos of snakes, 8 masked photos of spiders, and so on. The dependent variables were skin conductance (a pure measures of SNS activity), and self-reported valence, arousal, and dominance on the Self-Assessment Mannikin (SAM;

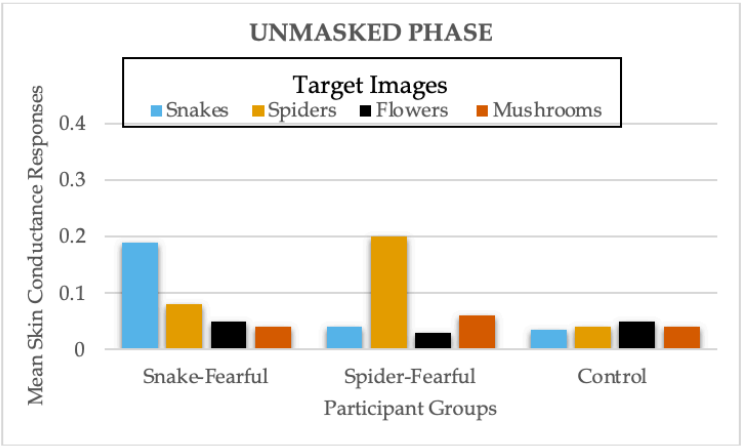
Bradley & Lang, 1994). While viewing these photos, skin conductance was measured. In the masked phases, the target photos were shown for 30 milliseconds, then followed by the mask for a period of 100 milliseconds. In the unmasked phases, the images were shown for 130 milliseconds. After completion of each of the masked and unmasked phases, participants were shown the four images again (masked or unmasked based on phase just completed) from the prior phase and reported the following: 1) image they saw in the photo, and 2) self-reported arousal, valence, and control-dominance to each picture. (Control-dominance could be considered a cognitive appraisal, similar to perceptions of control). Overall, most participants could not consciously identify the masked image (demonstrating the mask worked), while most could identify the unmasked image.

Figure 8 displays the results from the masked and unmasked phases. The results were the same for both masked and unmasked phases. The first result is that collapsed across participants groups, participants showed greater skin conductance to images of snakes and spiders compared to control images of flowers and mushrooms. This might suggest an evolutionary preparedness to experience fear toward threatening stimuli, even when the threatening stimuli are processed at the nonconscious level. The interaction between image condition and participant group was significant. When viewing the snake images, snake-fearful participants, compared to the other two groups, exhibited the greatest skin conductance. Similarly, when viewing spider images, spider-fearful participants showed the greatest skin conductance, compared to snake-fear and control participants. The three participant groups did not show differences in skin conductance when viewing flower or mushroom images. These findings suggest that physiological changes associated with fear occur at a preattentive level – prior to the participants being consciously aware of the threatening stimuli.

Figure 8

Skin Conductance Responses in Masked and Unmasked Phases



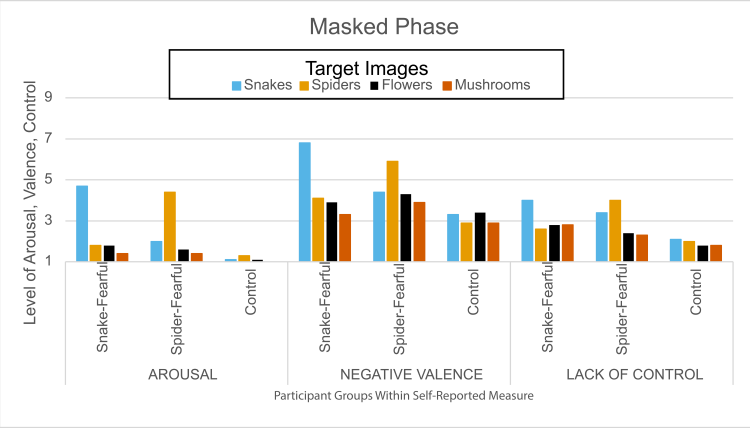


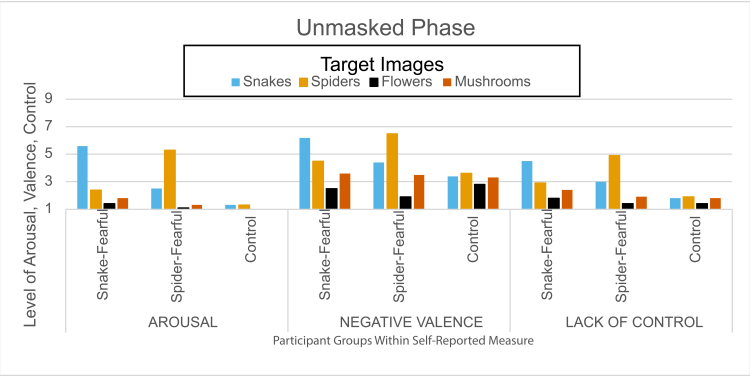
Adapted from “”Unconscious anxiety”: Phobic responses to masked stimuli,” by A. Öhman, and J.J. Soares, 1994, Journal of Abnormal Psychology, 103(2), p. 236. (https://doi.org/10.1037/0021-843X.103.2.231). Copyright 1994 by American Psychological Association.

Findings for self-reported responses (see Figure 9) were similar to those for skin conductance. Snake-fearful participants reported greater arousal, unpleasantness, and lack of control to only the snake photos (versus other two groups), while spider-fearful participants showed greater levels when viewing spider photos (compared to other two groups). These findings held for both masked and unmasked phases, although scores were usually higher in unmasked conditions. These self-reported findings parallel the skin conductance findings and suggest that a threatening stimulus processed at the preattentive level can impact people's self-reported subjective feelings and appraisals, even though the threatening stimuli has not yet entered conscious awareness.

Figure 9

SAM Responses in Masked (Top) and Unmasked (Bottom) Phases





Adapted from ""Unconscious anxiety": Phobic responses to masked stimuli," by A. Öhman, and J.J. Soares, 1994, Journal of Abnormal Psychology, 103(2), p. 236. (https://doi.org/10.1037/0021-843X.103.2.231). Copyright 1994 by American Psychological Association.

These findings show that when people are exposed to stimuli they already fear at a nonconscious level, they experience changes in physiology, subjective feelings, and cognitive appraisals. These findings further suggest that everyone does not universally experience fear to the same objects, which might contradict evolutionary theory. Current thought is that everyone has an evolutionary adaptation that prepares them to acquire fears to certain eliciting events, but the fears we acquire are going to depend on a combination of our genetics and past experiences with the threat. ***This view would suggest that people are not born with fears of snakes and spiders, but that we are born the with capacity to learn to fear certain events.***

Further work supports the idea that the brain preattentively processes threatening stimuli. Patients with V1 or occipital lobe lesions experience a condition called blindsight. Blindsight occurs when a person does not consciously see a stimulus in their blind spot but can still identify the location and provide some information about the image. Patients with blindsight and complete blindness

due to occipital lobe damage have shown greater right amygdala activation to fearful facial expressions compared to neutral expressions (Morris et al., 2001; Pegna et al., 2005). These findings provide further support to the idea that the amygdala can unconsciously process threatening stimuli, even though we cannot consciously see and process the stimuli.

Evolutionary Evidence - Do Babies Fear Snakes?

There is disagreement about whether animals are born with a fear of life-threatening stimuli or whether the evolutionary system biases attention toward potentially threatening stimuli . One way to test these hypotheses is to explore how babies experience fear.

Over several trials, 6-9 months old infants were shown *videos* of snakes or elephants, paired with nonsensical fearful or happy *voices* (Thrasher & LoBue, 2016). While experiencing the video/voice combination, babies experienced a startle probe – an unexpected, white screen on the video, during which their startle reflex was measured. Dependent measures included startle eye blink magnitude (a pure measure of valence; greater magnitude = greater unpleasantness), startle latency (time from baseline to peak startle), heart rate change, and time spent looking at video.

Relevant findings are below with interpretations explaining whether these findings indicate babies innately fear snakes or whether their attention is biased toward snakes.

Result #1: When babies heard the fearful voice, their startle magnitude was *lower* when watching the snake video compared to the elephant video. This indicates that babies experienced *more unpleasantness* during the *elephant/fearful* than snake/fearful trials.

- If babies were afraid of snakes, their startle magnitude should be higher when watching the snake, particularly while listening to a scary voice!
- Why? If babies were born with a fear of threatening stimuli like snakes, when they see the snake, they should already be tense and their SNS system would be activated. Thus, when the startle probe happens their reaction should be even more

intensified if they fear the snakes. This is like our reactions during a scary movie – we are already in activated state because of the scary movie, and then when something happens, we jump! But this did not happen!

Result #2: Babies' startle magnitude AND heart rate change was lower during the snakes/fearful voice than during the snakes/ happy voice.

- After we identify a threatening event, our heart rate and startle magnitude increase (refer back to defense cascade here). If babies were afraid of snakes, their startle magnitude and heart rate should be GREATER when watching snakes with a fearful voice than a happy voice.
- The drop in heart rate during the snakes/fearful voice might suggest that infants were exhibiting an orienting response (described in defense cascade here).

Result #3: When babies heard the happy voice, their startle magnitude did not differ when watching elephant versus snake videos.

- If babies feared the snakes, then the babies should have shown GREATER startle magnitude to the snakes than to the elephants when hearing the happy voice.

Result #4: Babies exhibited shorter startle latencies for snake versus elephant films, indicating they reached peak startle quicker when watching the snake films.

- This finding indicates babies identified the snakes faster than the elephants, not necessarily that the babies feared the snake more than the elephant. A shorter startle latency results in faster detection of potentially threatening stimuli.

What do all these findings mean? Well, Thrasher and LoBue (2016)

state these findings provide evidence that***babies do not inherently experience negative emotions or fear toward snakes***, as some evolutionary theorists might suggest. In line with Öhman and colleagues, this study supports the idea that b***abies are not born with innate fears, but instead are born with the capacity to acquire fears of certain events***. And studies on children support this. In line with earlier findings on the visual search paradigm, young children will quickly locate a snake in a grid of other non-snake photos (LoBue & DeLoache, 2008), suggesting children are predisposed to respond quickly to snakes, but not necessarily to fear them.

Dr. LoBue's website includes her blog about babies and information about her lab.

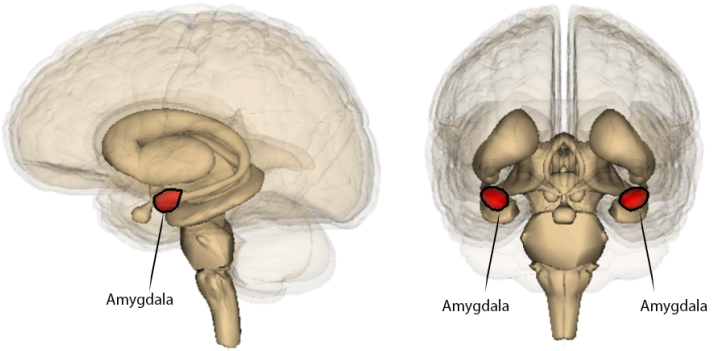
Amygdala and Fear: Klüver-Bucy Syndrome and Urbach-Weithe Disease

In this section, we will discuss the amygdala's role in the emotion fear. The human brain includes two amygdalae, both of which are located in the temporal lobe. The amygdala is often mentioned as one of the brain structures that is activated during a fearful experience. In this section, we will expand by investigating how the amygdala is related to other emotions.

Check out this 3D view of the Amygdala

Figure 10

Amygdalae in Red Viewed from Side (left) and Back (right) of Brain



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Lesion Studies

One way to evaluate the role of the amygdala in emotions is to conduct lesion studies. A **lesion study** investigates how damage in the amygdala effects people's emotional experiences compared to a control group without damage. One way to conduct a lesion study would be to damage the amygdala in rats and assess how that impacts emotion. A second way would be to recruit humans who have damage to the amygdala. **Klüver-Bucy Syndrome** (Klüver & Bucy, 1939) describes a variety of symptoms associated with amygdala damage. Klüver-Bucy can be caused by stroke, encephalitis, tumors, and even a lobotomy. Typically, Klüver-Bucy is expressed when one or both amygdalae, and often parts of the temporal lobe, have been damaged. In 1939, Klüver and Bucy first described the symptoms after conducting bilateral temporal lobectomies in rhesus monkeys. After the lobectomy, monkeys showed odd oral behaviors such as sticking objects in their mouths that they typically do not. The monkeys showed hypersexual behaviors, such as efforts to mate with inanimate objects. A final symptom was that monkeys who were originally fearful and aggressive became placid when presented with fearful objects such as snakes. The removal of the amygdalae seemed to change emotional experiences such as reducing disgust elicited by placing harmful objects in the mouth, and lack of fear or aggression when presented with danger. These symptoms have been replicated with cats and even in humans. Humans who present with Klüver-Bucy show dampened emotions or even exaggerated rage and aggression. One thing to note is that Klüver-Bucy is often caused by damage to the amygdala and surrounding areas, thus any changes in emotions cannot be solely due to damage in the

amygdala. **Urbach-Weithe Disease** is a rare genetic disorder caused by calcium build-up in the amygdala, which causes the brain tissue to harden. In Urbach-Weithe Disease, the damage typically only affects the amygdala – thus allowing researchers to link the symptoms to a specific structure in the brain. Urbach-Weithe symptoms are similar to Klüver-Bucy and include reduced fear, heightened aggression, and changes in the emotion of disgust.

Amygdala and Fear: S.M. Case Study

To understand the role of the amygdala in emotions, researchers have conducted studies on individuals diagnosed with Urbach-Weithe disease. S.M. is a famous case study that has provided some information about the amygdala. S.M. was diagnosed with Urbach-Weithe disease and thus her brain damage is confined to the amygdala. In the upcoming section, we will discuss some very interesting findings related to S.M.'s emotional experiences. (You can also read more about her case on Wikipedia and in Discover Magazine). But, first I would like to clarify three types of amygdala damage that may occur:

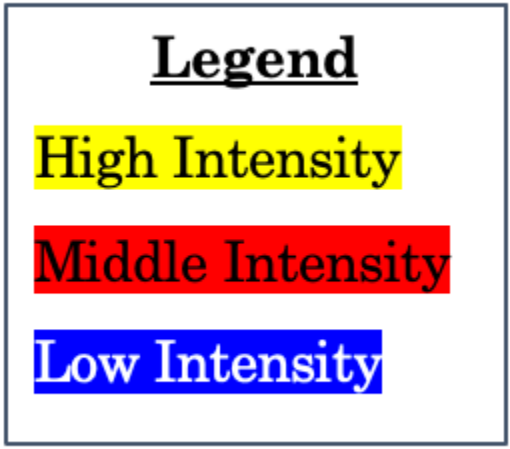
1. **Bilateral Amygdala Damage:** damage to both the amygdalae
2. **Unilateral Left Amygdala Damage:** Damage to the left amygdala, but not the right
3. **Unilateral Right Amygdala Damage:** Damage to the right amygdala, but not the left

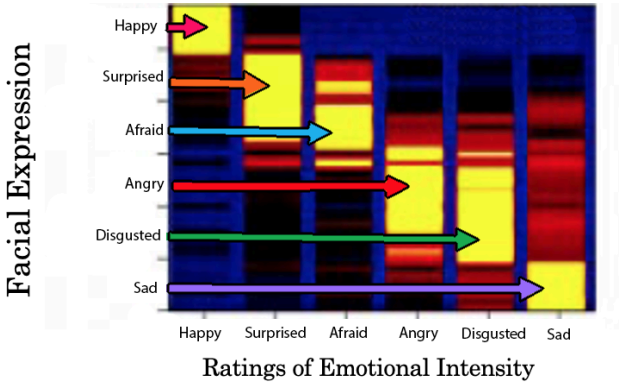
Keep in mind that S.M. has bilateral amygdala damage and her performance on certain tasks will be compared to participants with unilateral damage patients. In addition, other groups of participants include 1) participants with brain damage outside the amygdala and 2) control participants without any brain damage.

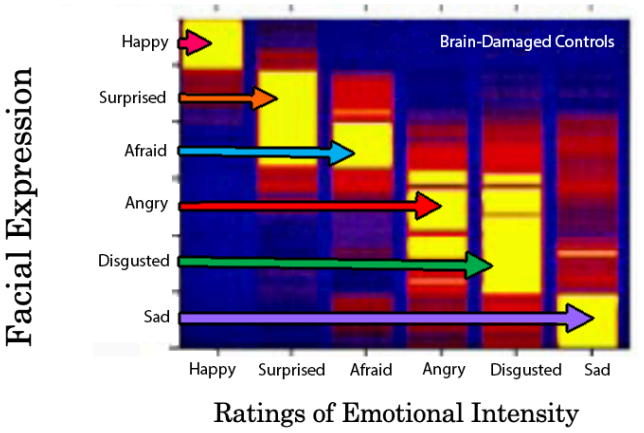
S.M. Case Study: Impairment in Recognition

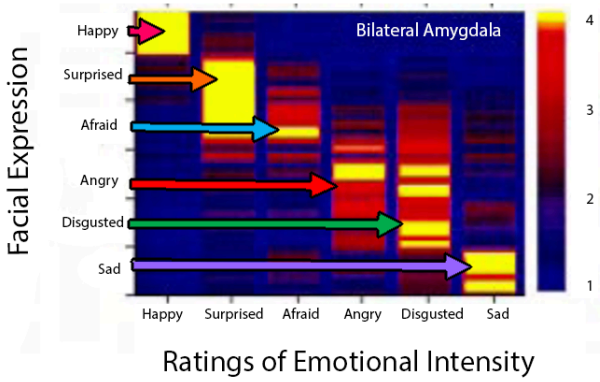
In the first set of tasks, participants were presented with photos of human emotional facial expressions (similar to Ekman's judgment methodology; Adolphs, Tranel, et al., 1999). Specifically, participants were shown six male and female faces of anger, fear, happiness, surprise, sadness, disgust, and also three neutral faces. While viewing each photo, participants indicated on a scale of 0 to 5 (0 = *not at all*; 5 = *very much*) the intensity of six emotions shown on the face: happy, sadness, disgusted, angry, afraid, and surprised. During each trial, participants were asked to rate the intensity of one of the six emotion labels for a group of facial expressions. Figure 11 below displays the findings for three groups of participants. The bilateral amygdala damage group included 9 participants, one of whom was S.M. As indicated in the legend, yellow colors indicate participants selected high intensity (around a 4/5) for the emotion in the face, red indicates moderate intensity (around a 3) and blue indicates low intensity (around a 1/2). To interpret each figure, you should compare the facial expression displayed to participants in the y-axis to the emotional intensity rating (1-5 scale) as reported by the participants. Some findings are described under the figure.

Figure 11


Legend
High Intensity
Middle Intensity
Low Intensity


Facial Expression
Happy
Surprised
Afraid
Angry
Disgusted
Sad
Happy
Surprised
Afraid
Angry
Disgusted
Sad
Ratings of Emotional Intensity





Reproduced from "Recognition of facial emotion in nine individuals with bilateral amygdala damage," R. Adolphs, D. Tranel, S. Hamann, A.W. Young, A.J. Calder, E.A. Phelps, A. Anderson, G.P. Lee, and A.R. Damasio, 1999 Neuropsychologia, 37, p. 1113, (https://doi.org/10.1016/50028-3932(99)00039-1). Copyright 1999 by Elsevier Science Ltd.

Based on Figure 11, the following conclusions can be made:

1. Normal controls and brain-damaged controls showed similar performance. When shown an emotional facial expression, these participants reported the corresponding emotion to be most intense. For instance, when participants saw a disgusted face, they rated the face as intensely disgusting. This demonstrates that control participants were able to identify and recognize the emotional experience in others' faces.
2. When comparing bilateral amygdalae damage patients to the control groups, some of the emotion expressions do not show a corresponding highly intense emotion label. In particular, this is found for faces of fear, anger, and disgust. These findings suggest that impairment to the amygdala may hinder one's ability to identify how much anger, fear, and disgust a person is showing, but this impairment does not exist for surprise, happy, and sad faces.
3. These figures also show that control participants show overlap in their ratings of certain emotion labels for the same face. For example, when controls viewed an angry face, they reported high intensity for the emotions anger and disgust. This overlap is not as intense for bilateral damaged patients.

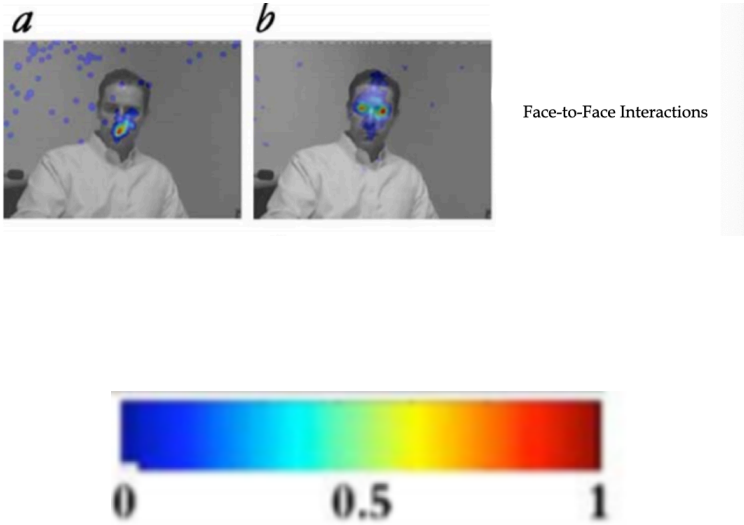
These initial findings show that amygdala damage does indeed impair recognition of fear in others. But this also shows that amygdala does control the identification of other emotions.

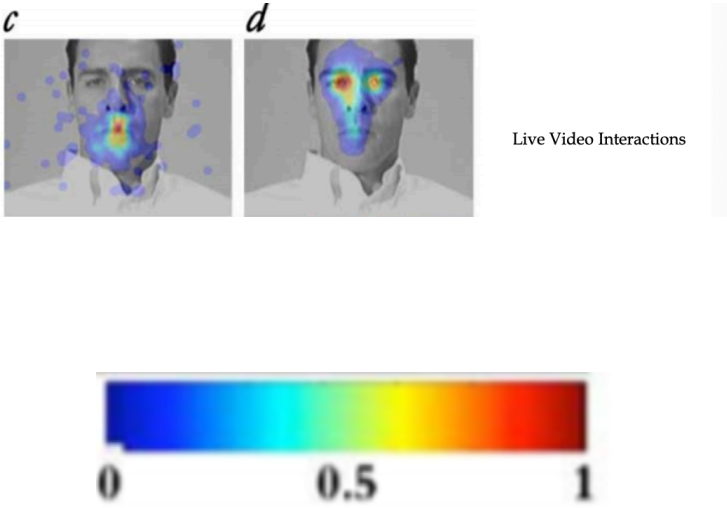
A follow-up study (Spezio et al., 2007) investigated the location of S.M.'s visual gaze when interpreting others' facial expressions. Before discussing this study, it is important to note that people determine whether someone is experiencing fear mostly from their eyes. Even when someone is smiling, but their eyes are fearful – people interpret the facial expression as fear. In this study, S.M. and several healthy female controls engaged in a face-to-face or live video interaction with a professional actor who maintained a neutral facial expression. During the interaction, the participants

wore an eye tracker. Findings (see Figure 12) showed that compared to controls, S.M. spent less time fixated on the actor's eyes and more time staring at the actor's mouth. This might suggest when the amygdala is damaged people identify the wrong facial expression because they are looking at the wrong part of the face. These finding have been replicated with still photos as well, but in the still photos S.M. focused more on the center of the face (Adolphs et al., 2005). Finally, although amygdala-damaged patients experience difficulty identifying emotions in facial expressions, their ability to identify an individual from their face is not hindered (Adolphs et al., 1994; 1995). Thus, if S.M. runs into her friend Wang, S.M. would think "This is my friend, Wang," but she might have trouble interpreting Wang's facial expressions.

Figure 12

Eye-tracking study comparing S.M. to healthy controls (Spezio et al., 2007)





Note. a and b = face-to-face interaction; c and d = over live video. S.M. data in a and c; healthy, female controls data in b and d. Red color indicates participants spent the most time looking at that area of the face. Reproduced from "Amygdala damage impairs eye contact during conversations with real people," by M.L. Spezio, P.Y.S. Huang, F. Castelli, and R. Adolphs, 2007, Neuroscience, 27(15), p. 3996, (https://doi.org/ 10.1523/JNEUROSCI.3789-06.2007) Copyright 2007 by Society for Neuroscience.

S.M. Case Study: Impairment in Recall

The past studies determined that bilateral amygdala damage results in an inability to *recognize* and identify emotions in facial expressions. The upcoming findings will demonstrate that S.M. displayed difficulty *recalling* the emotion components of fear. Participants were asked to draw facial expressions for the emotions happy, sad, afraid, surprised, disgusted, and angry. Participants worked on this task after completing numerous other tasks on recognizing facial expressions, which could have cued them to the correct answer. S.M., as seen in her drawings below in Figure 13, showed difficulty drawing fear. In fact, the experimenter had to encourage her because she said she didn't know what fear looked like. She said the only things she could remember is that during fear people cowered and their hair stood up.

Figure 13
S.M.'s drawings of Six Emotions

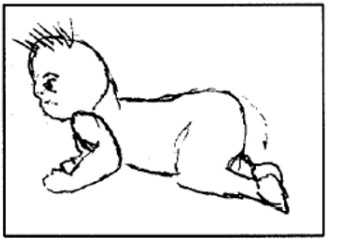
HAPPY

SAD

SURPRISED

DISGUSTED

ANGRY



AFRAID

These findings suggest that the amygdala functions to help us recall fearful facial expressions and to recognize them. So, a memory bias exists when the amygdala is damaged such that people cannot remember a fearful expression. Further studies have showed that after amygdala damage people cannot recall the details of a gruesome death – suggesting our memory for disgust might be impacted too.

Amygdala Damage and Fear: Summary

These findings show that the amygdala damage impairs our recognition and recall of negative emotions, particularly fear, suggesting that the amygdala plays an important role in identifying emotions in others and predicting an upcoming fear event from our memory. Despite these impairments, people who experience amygdala damage can still recognize their close others, maintain a conceptual understanding of fear, and experience the same level of valence and arousal during a fear experience.

Amygdala and Fear: Locationist or Social Constructivism?

The amygdala is activated for a range of positive and negative emotions, and thus the view that the amygdala controls only our fear experience would be naïve. It may be that the amygdala draws our attention to emotional events to help us encode and learn from these experiences. Vytal and Hamann (2010) conducted a meta-analysis on 83 neuroimaging studies that elicited five emotions (fear, anger, disgust, sadness, happiness) using a variety of methods (e.g., photos, facial expressions, induction). These studies looked for two types of patterns:

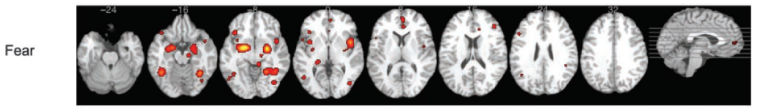
1) **Consistency Patterns:** Across studies, what are the brain regions whose activity was most consistently and strongly associated with each basic emotion?

2) **Discriminable Patterns:** : Across studies, is each basic emotion associated with some unique regional activations, not shared by other emotions?

Across studies, fear consistently activated three structures: both amygdalae, the right cerebellum, and the right insula (see Figure 17).

Figure 17

Consistency Patterns for Emotion Fear



Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, . Journal of Cognitive Neuroscience, 22(12), p. 2870 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

Discriminable Patterns for fear are shown in Table 7. These findings indicate that compared to most emotions, fear resulted in more activation of the amygdalae, particularly the left amygdala. The left putamen seems to also be an important structure, distinguishing fear from both anger and disgust. Another meta-analysis also identified the amygdala as uniquely activated during fear, and found that the anterior cingulate cortex (ACC) and orbito-frontal cortex (OFC) was often activated during fear as well (Murphy et al., 2003)

A table showing a comparison of fear versus other emotions and what the fear resulted in more activation in

Comparison	**Fear resulted in more activation in**
Fear vs. Anger	Left putamen; Right insula (BA 13)
Fear vs. Disgust	Left putamen; right IFG (BA 47), bilateral amygdala, mostly left amygdala
Fear vs. Sadness	Bilateral amygdala, mostly left amygdala
Fear vs. Happiness	Bilateral amygdala, mostly left amygdala

Note: BA = Brodmann's Area; IFG = Interior Frontal Gyrus. Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, . Journal of Cognitive Neuroscience, 22(12), p. 2872 – 2874 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

Discriminable and consistency patterns support the locationist view of the brain. Specifically, locationist theories support the **fear-amygdala hypothesis** which suggests that the amygdala is the main

center of the brain involved in the fear emotion. Similar meta-analysis work by Lindquist, Barrett, and colleagues (2012) has found support against the locationist view and for the social constructivist view. When comparing emotions, they found that activation of both amygdalae was associated with fear perception and disgust experience, but not the fear experience. This means the amygdala was activated when people perceived fear in their environment such as in a fearful facial expression, but also when people viewed something disgusting, such as gore. These findings suggest the amygdala is activated for visual stimuli that result in perceiving fear or in actually feeling disgust. Further, activation in the left amygdala was greatest for sadness perception compared to other emotions (such as in viewing a sad facial expression). Their work found the right amygdala was associated with perceiving or experiencing highly arousing negative emotions like disgust, fear, and anger. Conversely, the left amygdala was activated when participants were introspecting about their emotional state, such as when recalling a fear experience. Thus, this theory suggests that the right and left amygdala serve different emotional functions, not necessarily that the amygdala is only responsible for feeling or experiencing the emotion fear.

In the video below, Lisa Feldman Barrett discuses the social constructivist view of the brain. Specifically, she questions whether the functions of the amygdala are only related to emotional experience.

Watch from 24:17 to 30:45

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1013#oembed-1

Test Your Knowledge! Is this a fear?

Drag and drop the “Yes” or “No” text boxes into the drop zones of each of the labels to determine if it is an actual fear.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1951#h5p-12

Summary of Fear

In the first section, we discussed the emotion components of fear and found that evidence exists for fear as both a basic and socially constructed emotion. Most eliciting events of fear relate to threat of death and map onto specific phobias. 7 AU's change when people express fear, although Westerners show better accuracy at identifying fear from these AU's than East Asian and isolated cultures. The scream is a universal vocal change, and a gasp may be another vocal indicator of fear. From a cognitive appraisal perspective, people universally report fear to be accompanied by the following appraisals: unexpected, unpleasantness, external causation, and inability to cope. Whether people report a fearful experience to be unfair and immoral depends on the world region. People report their subjective feelings during a fear experience to be highly unpleasant and highly arousing. Russell 's (1980) model shows people perceive fear to be higher in arousal and unpleasantness than anger and disgust. While Watson and Tellegen's (1985) model shows people perceive surprise and fear to be equal in arousal, but fear to be higher in unpleasantness. From an evolutionary standpoint, fear functions to direct our attention to threatening stimuli and the amygdala plays an important role in detecting threats to our survival. The left amygdala appears to be activated more for fear than other emotions, providing some evidence for the locationist perspective. Support for the psychological constructionist perspective suggests that although the amygdala is important to fear, other structures like the putamen and ACC are activated during a fear experience too.

Defining Anxiety and Comparing Anxiety to Fear

Let's turn now to anxiety. Remember, the learning objectives for the anxiety section are:

- Does anxiety meet the requirements for an emotion? Why or why not?
- What is the relationship between anxiety and attentional biases?
- How are fear and anxiety similar? different?
- How does the research on anxiety help us to better understand psychological disorders?

Table 8 below shows the differences in the emotion components for anxiety and fear. One major difference between fear and anxiety is the timing of the eliciting event. Fear is called **post-stimulus** because the eliciting event occurs first, followed by the emotion. Anxiety is called **pre-stimulus** because anxiety occurs before the eliciting event. Further, anxiety may or may not even have a clear eliciting event – such as when people experience generalized anxiety. Another difference are the physiological changes – fear results in SNS activation and PNS deactivation, whereas anxiety activated both the SNS and PNS system. For example, during anxiety people report an increase in heart rate (SNS system), but also feeling the need to urinate (PNS system).

Table 8

Emotion Components for Fear and Anxiety

A table comparing different components for fear and anxiety

Component	Fear	Anxiety
Eliciting Event Required?	Yes! Post-stimulus Specific	No! Pre-Stimulus Generalized/Ambiguous
Cognitive Appraisals	"Something bad now, very soon" More Controllable, Unexpected, Can Cope, Close in Time.	"Something bad in the future" Less controllable, Expected, Can't Cope, Far in Time
Physiology	SNS Activation PNS Deactiation	SNS Activation PNS actiation
Behavior	Flee, desire to escape	Limited responses, dont know how to cope
Subjective Feelings	Unpleasant, highly arousing	Unpleasant highly arousing, helplessness

Perspectives of Emotion

In general, most emotion researchers believe anxiety is not a fleeting emotion. Basic emotions researchers such as Ekman further state anxiety does not meet the requirements for a basic emotion – particularly because universal facial expressions do not exist. Social constructivists point out the cultural differences in eliciting events, symptoms, and cognitive appraisals of panic attacks, an anxiety disorder (Lewis-Fernández et al., 2010). Table 9 shows eliciting events across world regions and their corresponding term in that culture's language. Western cultures view anxiety as caused by unexpected events, whereas other cultures view anxiety as caused by expected events (such as standing up or the weather).

A table showing different regions and countries, as well as the cause of panic attacks for that region and the cultural term for said panic attack

World Region or Country	Cause of Panic Attacks	Cultural Term
Latin America	Interpersonal arguments and Major Life Changes	ataque de nervios
Cambodia	Standing up and Atmospheric Wind	khyâl (atmospheric wind causing dizziness, tinnitus, neck soreness)
Vietnam	Atmospheric Wind that causes headaches	trung gió
Japan and South Korea	Fear of offending someone else due to own psychological/physical character flaws (e.g., staring too long, body odor) or showing wrong facial expression	Taijin kyofusho (TKS; Japanese for fear of interpersonal rejection)
United States	Major Life Changes	–

Evolutionary Evidence: Anxiety, Attentional Biases, and the Dot Probe Detection Paradigm

Anxiety is viewed as an evolutionary system biased toward false positives of threat. This means that anxiety might be a form of fear that occurs when an eliciting event is not present or when a harmless eliciting event is present. Thus, anxiety would be adaptive in the sense that it is better to experience unwarranted fear than to NOT experience fear in the face of a dangerous stimulus. Evidence that anxiety is a prolonged fear reaction stems from work on generalized anxiety disorder and trait anxiety. Generalized anxiety disorder (GAD) is a DSM-5 diagnosis. People scoring high on trait anxiety experience stable, high levels of anxiety across situations and over time. Studies on GAD and trait anxiety participants have found that anxiety causes attentional biases. An **attentional bias** occurs when people maintain focus on threatening information for a longer than expected period of time or when people experience difficulty moving their attention away from threatening stimuli.

The **dot probe detection paradigm** is one methodology used to evaluate attentional biases. In the dot probe paradigm, participants are shown pairs of photos or pairs of words. Usually, one of the photos is a threatening face or word and the other photo is a neutral/positive face or word. A plus sign is placed in the middle of the screen and separates the two photos. During each trial, participants are instructed to focus on the plus sign. During each trial, the two photos disappear, and a small dot will remain in the area of one of the photos. Participants are instructed to press one of two buttons to indicate whether the dot replaced the photo on the

left or right of the screen. Response latencies are measured to see how quickly participants hit the button once the dot appears. Faster response latencies for threatening versus neutral photos would mean the participants are already looking at the threatening photo when the dot appears. Faster response latencies for neutral versus threatening photos would mean the participants are already looking at the neutral photo when the dot appears.

Compared to control participants, trait anxious participants displayed faster response latencies to threatening faces and slower response latencies to happy faces (Bradley et al., 1997). These findings mean that anxiety is associated with vigilance for threatening stimuli, meaning it takes anxious participants a longer time to disengage from the threatening face. Further work has found that anxious participants responded faster to threatening versus neutral faces and slower to happy versus neutral faces (Bradley et al., 1998). These findings suggest that anxious participants show a bias toward maintaining attention on threats (called hypervigilance) and a bias toward avoiding happy or positive-eliciting stimuli. Conversely, non-anxious participants show a bias toward maintaining attention on happy versus neutral faces and a bias toward avoiding threatening stimuli and focusing on neutral faces. These findings have been replicated with threatening and non-threatening words (MacLeod et al., 1986).

Eye-tracking studies provide evidence of attentional biases. GAD participants more frequently and rapidly looked at the threatening stimulus first rather than the neutral/positive stimuli (Mogg et al., 2000). When the stimuli are masked happy and angry faces, anxious individuals move their eyes to the masked angry faces, indicating these attentional biases occur at the nonconscious level. Thus, fear is associated with moving attention to threat in environment, whereas anxiety is associated with difficulty disengaging from future threats in the environment.

Watch from 3:00 to 9:20

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Fear vs. Anxiety: Physiological and Brain Differences

This section will highlight some of the physiological differences between fear and anxiety that can help us to further differentiate between these two constructs.

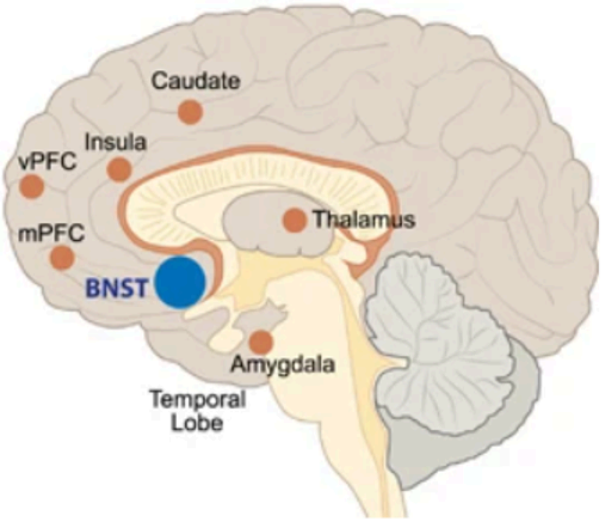
Startle Reflexes. Anxiety and fear both result in startle reflexes, but these reflexes are different. In a fear response, people experience a startle response to an unexpected threat like an unexpected sound or light. This is called the **fear-potentiated startle test** (Davis et al., 1997). This fear startle response is quick to dissipate because the unexpected event quickly stops. Conversely, during anxiety, animals experience a prolonged startle response that does not immediately dissipate. This prolonged response has been demonstrated in rats who stare at a bright light for 5 to 20 minutes (Walker & Davis, 1997). This is called the **light-enhanced startle effect** (Davis et al., 1997). The bright light does not immediately cause the startle reflex, but the prolonged stimulus results in a slow-onset and long startle reflex. Unlike the fear reflex, this startle response remains even after the light is turned off. During a specific threat, people diagnosed with fear disorders show a greater increase in heart rate and greater startle reflex than participants diagnosed with an anxiety disorder. During baseline (when an eliciting event is not present), people diagnosed with anxiety disorders show an increase in heartrate and increased startle reflex compared to people with fear disorders.

Brain Activation. Fear and anxiety demonstrate activation in different structures of the brain. Fear activates the central nucleus of the amygdala, whereas anxiety activates the bed nucleus of the stria terminalis (BNST), a structure located near the amygdala (see Figure 18 below; Davis et al., 1997). The central nucleus of the amygdala is activated for responses to specific fear eliciting events

and is activated by the fear-potentiated startle test. Conversely, the bed nucleus of the stria terminalis (BNST) is part of the extended amygdala. Here is a link for more information.
The BNST is activated without a specific stimulus and is activated by more long-lasting responses to negative emotional stimuli.

Figure 18

Location of Amygdala and the BNST



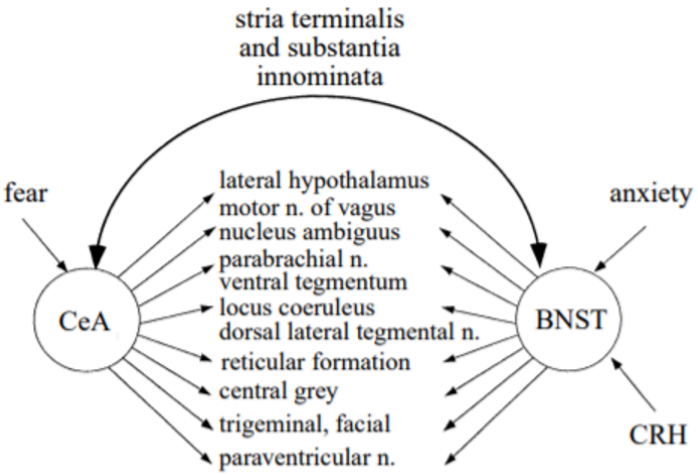
Reproduced from "Over-shadowed by the amygdala: The bed nucleus of the stria terminalis emerges as a key to psychiatric disorders," by M.A. Lebow and A. Chen, 2016, Molecular Psychiatry, 21, p. 455. (https://doi.org/10.1038/mp.2016.1). Retrieved from: https://www.nature.com/articles/mp20161#citeas. Copyright 2016 by Macmillan Publishers Limited, Open Access.

Figure 19 below shows the fear and anxiety brain networks, both

which lead to similar structures listed in the center (e.g., lateral hypothalamus, reticular formation). Further, note that the BNST and amygdala are directly connected and may send information to each other. CRH stands for Corticotropin-releasing hormone. CRH is a stress peptide which regulates the release of cortisol during a stressful, but not a fear-provoking, event. As exemplified in Figure 19, during the prolonged startle reflex, CRH acts on the receptors in the BNST, but not the central nucleus of the amygdala. The bed nucleus is activated for a longer lasting startle reflex that typically releases cortisol, instead of a quick startle associated with fear. When the BNST is lesioned in rats and mice, the fear startle still occurs, but the longer-lasting anxiety startle reflex cannot occur (Davis et al., 1997). Conversely, when the central nucleus of the amygdala is lesioned, the prolonged anxiety startle can occur, but the lesions prevents the short fear startle.

Figure 19

Depiction of brain structures and processes involved in fear and anxiety

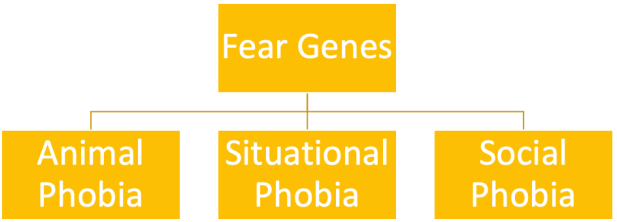


Note. CeA = central nucleus of the amygdala, BNST = bed nucleus of the stria terminalis, CRH = Corticotropin-releasing hormone. Reproduced from "Amygdala and bed nucleus of the stria terminalis: differential roles in fear and anxiety measured with the acoustic startle reflex," by M. Davis, D.L. Walker, and Y. Lee, 1997, Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, 352(1362), p. 1685 (https://doi.org/10.1098/rstb.1997.0149). Copyright 1997 by The Royal Society.

Genetics. Further work on twin studies (Chantarujikapon et al., 2001; Hettema et al., 2005) shows that identical twins share either genes for fear disorders or genes for anxiety disorders (see Figure 20). This would mean that if one identical twin is diagnosed with animal phobia, the other identical twin would be likely to receive animal, situational, or social phobia diagnoses, but NOT agoraphobia, PTSD, GAD, or depression diagnoses. These findings suggest that separate groups of genes contribute to anxiety and fear disorders, further demonstrating that fear and anxiety are different constructs. The only exception is social phobia, which was associated with both anxiety and fear genes. Why? Well, some think social phobia could be pre-stimulus, such that we experience anxiety about an upcoming social event. Social phobia could also be post-stimulus, such that we are currently experiencing the event and feeling a fear response.

Figure 20

Genetic Structure of Fear and Anxiety Disorders



Yale Experts in Emotion video on Anxiety and Emotion with Dr. Douglas Mennin

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Fear or Anxiety? Application to Movie Scenes

Real-life Application: Fear or Anxiety?

Shrek and Donkey

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Imagine That

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Scene for Relevance Start: beginning

Stop: 1:25

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A Quiet Place

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Everyone Except Dwight in The Office

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Stress

Let's turn to our last construct – stress. Remember, the learning objectives for stress are:

- Is stress an emotion? Why or why not?
- What is the difference between the General Adaptation Syndrome and Lazarus' View of Stress?
- Explain the importance of cognitive appraisals in the stress process.

Stress is a process during which our emotional experience changes. Two views of stress exist. Seyle, who developed the General Adaptation Syndrome, view stress as a response to significant changes in life events. Specifically, Seyle believed the same events lead to the same stress for all people, suggesting he held a universal view of stress. Lazarus is a cognitive appraisal theorist. He believed that stress was our interpretation of an event as threatening plus our perceive ability to cope. Both Seyle and Lazarus view stress as a process and not specifically as an emotion.

Seyle's (1974) General Adaptation Syndrome (GAS)

Seyle (1974) emphasized how the physical body reacted to stress. Specifically, Seyle states that during a stressful experience, our bodies move through three stages: 1) Alarm, 2) Resistance, and 3) Exhaustion. Alarm occurs when we experience a brief period of SNS activation. During the alarm stage we experience the highest levels of arousal because our body is preparing for defensive responses. During resistance we experience moderate arousal that lasts for a long period of time. During the resistance stage, the adrenal cortex secretes three hormones – cortisol, epinephrine, and norepinephrine. These hormones prepare our body to heal wounds, fight infections, and to essentially protect our bodies from harm/death. Exhaustion occurs when the prolonged response from the resistance stage weakens our body, resulting in fatigue, loss of appetite, and exhaustion! During the exhaustion stage, we have fewer physical resources

One study (Wallbott & Scherer, 1991) investigated the facial expressions participants showed when exposed to stimuli that elicited stress. Note that this study does view stress as a basic emotion. In this study, participants completed cognitive and emotional tasks to elicit stress. In the cognitive tasks, participants had to complete difficult problems. In the emotional tasks, participants were shown slides of skin diseases and severe injuries and had to answer questions about whether the individuals would improve. In between the experimental slides, participants also completed low stress conditions to provide a control condition in which participants returned to baseline. While viewing each slides, participants physiology was measured and their fascial expressions were recorded. Facial expressions were coded with FACS (Ekman & Friesen, 1978).

Below, the findings are discussed. To view real-life movements of each action unit, please visit this webpage: FACS – A Visual Guidebook.

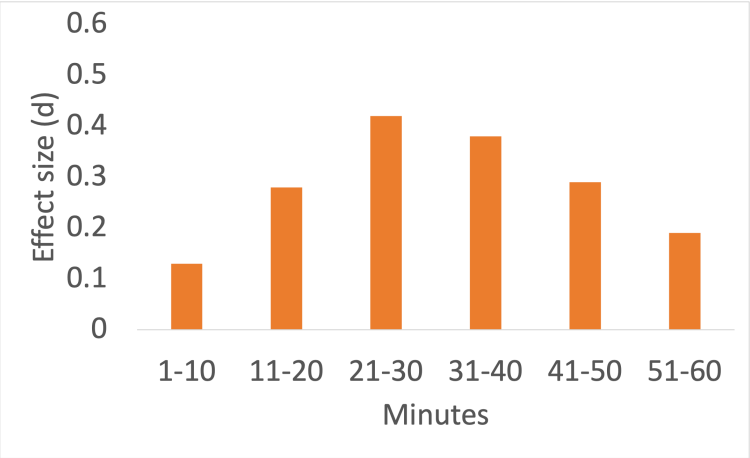
1. **Action Unit 4 – Brow Lowerer/Corrugator:** Compared to low stress conditions, participants in both stress conditions showed more brow lowering. Typically brow lowerer occurs with anger, sadness, fear, and disgust. and may indicate the individual is highly focused on something in their environment.
2. **Action Unit 12 – Lip Corner Puller/Zygomatic:** In the cognitive stress condition, participants showed more zygomatic change compared to the control and emotions stress conditions. Participants in the emotional stress condition, participants showed less zygomatic change compared to the other conditions. So, when experiencing cognitive stress participants smiled more, but when experiencing emotional stress participants smiled less. Typically, AU 12 changes during joy and contempt experiences – both which map onto feeling positive. Note that the authors suggested AU 12 also changes when people are suppressing their emotional facial expressions.
3. **AU 25 Parting of Lips:** During the cognitive and emotional stress conditions, participants showed more parting of lips compared to control conditions. Comparing the two stress conditions, participants showed more parting of lips during cognitive conditions than emotional conditions. Although the authors indicated AU 25 changes with increased attention, more recent work suggest AU 25 changes with several negative emotions including anger, disgust, and fear (CITATION).
4. **AU 26: Jaw Drop:** Participants showed significantly more jaw dropping during the cognitive stress condition, while in the emotional stress condition participants showed few jaw drops. Similar to AU 25, the authors suggest AU 26 changes during concentration. But other work suggests that jaw drop occurs during fear or surprise (CITATION).

5. **Physiological Measures:** Participants showed increased skin conductance during the stress conditions compared to the baseline conditions, indicating they experienced more SNS arousal during the stress conditions. During these conditions, participants also showed increased pulse and respiration rate (compared to baseline), and these measures were higher in the cognitive stress condition than in the emotional stress condition.

A few studies have investigated how our body changes during the stressful experience. Dickerson & Kemeny (2004) conducted a meta-analysis on over 200 studies with 6,000 participants who had experienced a short stressful task in the laboratory. The stressors ranged from physical stress (electric shock, prolonged exercise) to psychological stress (e.g., public speaking, mental arithmetic). The stressful tasks lasted less than 1 hour. During these tasks, participants cortisol levels were measured. Figure 20 displays the effect sizes of cortisol changes after the stressor started and Figure 21 shows cortisol changes after the stressor ended. In these figures, the stars indicate participants' cortisol levels significantly changed from their baseline cortisol levels. Higher effect sizes indicate the significant change in cortisol from baseline was large.

Figure 20

Cortisol Changes after Onset of Stressor

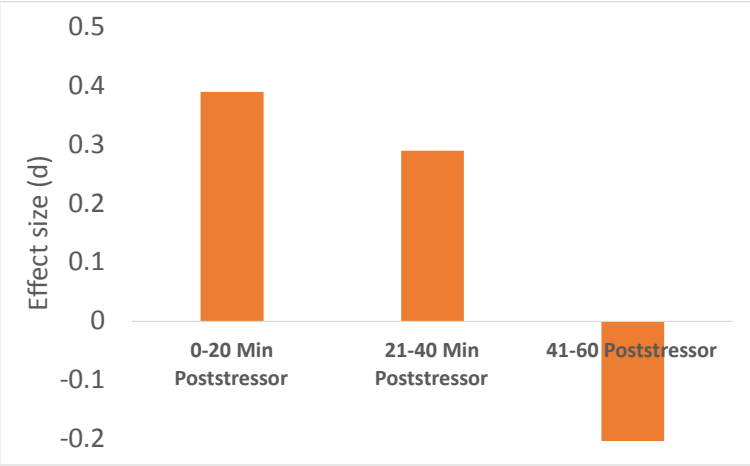


Adapted from "Acute stressors and cortisol responses: a theoretical integration and synthesis of laboratory research," by S.S. Dickerson and M.E. Kemeny, 2004, Psychological Bulletin, 130(3), p. 369 (https://doi.org/10.1037/0033-2909.130.3.355). Copyright 2004 by the American Psychological Association.

In the above figure, participants' cortisol levels increased from baseline from the onset of the stress (1-10 minutes) and remained raised through the 60 minutes of the stressor. These findings demonstrate that stress is not a fleeting emotion but occurs over a long period of time.

Figure 21

Cortisol Recovery



Adapted from "Acute stressors and cortisol responses: a theoretical integration and synthesis of laboratory research," by S.S. Dickerson and M.E. Kemeny, 2004, Psychological Bulletin, 130(3), p. 373 (https://doi.org/10.1037/0033-2909.130.3.355). Copyright 2004 by the American Psychological Association.

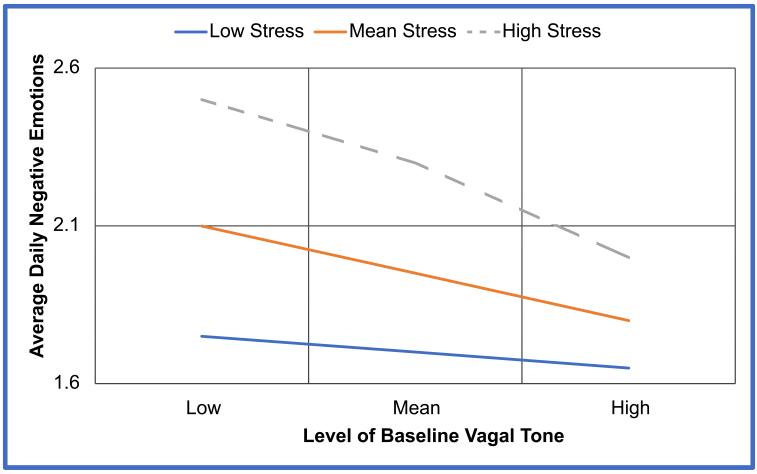
The figure above shows that cortisol levels remained elevated through the 40 minutes after the stressful task had ended. Again, these findings show that stress is NOT an emotion because emotions quickly dissipate after the eliciting event ends. In these figures, we can identify Seyle's three stages. The alarm stage occurred during the 21-40 minutes after the stressor began in Figure 20. I say 21-40 minutes because the time periods 21-30 and 31-40 minutes did not significantly differ in the amount of cortisol. The resistance stage may have started 41-50 minutes after the stressor occurred, in Figure 20. This is the first time period during which cortisol levels significantly drop from earlier time periods.

The exhaustion stage occurred 41-60 minutes poststressor in Figure 21 because at this point cortisol has returned to baseline levels.

Another study (Fabes & Eisenberg, 1997) investigated how baseline vagal tone influence people's stress during a stressful task. We discussed vagal tone here. Vagal tone is an indicator of PNS activation and is associated with the experience of low arousal, positive emotions and better emotion regulation. In this study, participants viewed a neutral film of dolphins swimming with calm music in the background. During the neutral film, researchers obtained a baseline measure of vagal tone. Based on these findings, participants were divided into low, mean, or high vagal tone groups. Participants then completed a 2-week diary. Each day, they described their most stressful experience that day, rated the level of stress, rated 14 emotions about this event, and rated their coping responses. Figure 22 shows the findings. The baseline level of vagal tone from part 1 of the study is on the x-axis. The y-axis shows the outcome variable, which is the average of the extent to which participants experienced 14 negative emotions across the 2-week period. Each line represents participants' stress ratings for each event averaged across the two-week period. For moderate and high stressors, high vagal tone was associated with fewer negative emotions compared to low and mean vagal tone groups. For events low in stress, differences were not found between the three vagal tone groups. These findings suggest that the amount of stress we experience during a stressful event does depend on our baseline vagal tone. People with high vagal tone, experienced fewer negative emotions.

Figure 22

Impact of Vagal Tone and Severity of Stress on Self-reported Negative Emotions

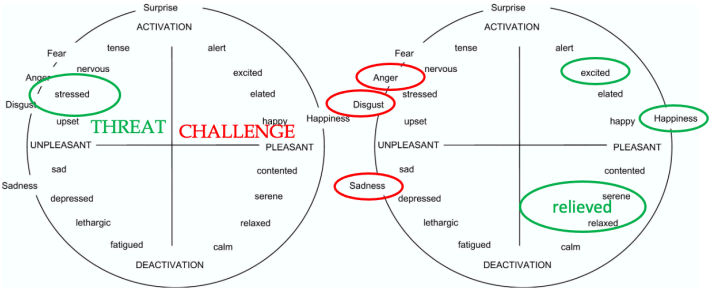

Low Stress
Mean Stress
High Stress
Average Daily Negative Emotions
2.6
2.1
1.6
Low
Mean
High
Level of Baseline Vagal Tone

Dimensional View of Stress

Stress is an unfolding process of emotions, so the dimensional models wouldn't necessarily account for stress. But the types of emotions people experience during a stressful experience could be explained by the dimensional models. It is interesting to note that "stressed" is an emotion on Russell's (1980) circumplex model, while stress does not appear on Watson and Tellegen's (1985) model (see Figure 25).

Figure 25

Russel's (1980) model on right and Watson and Tellegen's (1985) model on the left



Note. Threat emotions in color green and challenge emotions in color red. Left image adapted from "Independence and bipolarity in the structure of current affect," by L. Feldman Barrett and J.A. Russell, 1998, Journal of Personality and Social Psychology, 74(4), p. 970 (https://doi.org/10.1037/0022-3514.74.4.967). Copyright 1998 by the American Psychological Association. Right image adapted from "Toward a consensual structure of mood.," by D.T. Watson and A. Tellegen, 1985, Psychological Bulletin, 98(2), p. 221 (https://doi.org/

10.1037/0033-2909.98.2.219). Copyright 1985 by the American Psychological Association.

Summary of Fear, Anxiety, and Stress

In this chapter, we explored the differences between fear, anxiety, and stress. Most researchers agree that fear is an emotion, although disagreements exist between whether fear is universal and adaptive or socially constructed. Anxiety is viewed as a longer-lasting fear response that results in more hyper-vigilance and may result from an evolutionary system that was biased toward false positives of fear. Stress is an unfolding process of emotions, such that our self-reported emotions and cognitive appraisals change as we experience the stressful event over time.

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End of Chapter Activities (Chapter 8)

Is This a Fear?

Drag and drop the “Yes” or “No” text boxes into the drop zones of each of the labels to determine if it is an actual fear.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2301#h5p-12

Real-life Application: Fear or Anxiety?

Shrek and Donkey

One or more interactive elements has been excluded

from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=2301#oembed-1

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://psu.pb.unizin.org/psych425/?p=2301#h5p-26

Imagine That

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=2301#oembed-2

Start: beginning

Stop: 1:25

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://psu.pb.unizin.org/psych425/?p=2301#h5p-27

A Quiet Place

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=2301#oembed-3

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://psu.pb.unizin.org/psych425/?p=2301#h5p-28

Everyone Except Dwight in The Office

One or more interactive elements has been excluded

from this version of the text. You can view them online here:
https://psu.pb.unizin.org/psych425/?p=2301#oembed-4

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2301#h5p-29

CHAPTER 9: ANGER

Chapter 9 Learning Objectives

- Does anger meet the requirements for an emotion?
- How do the emotion components for anger change?
- What is the support for anger as a basic emotion?
- What is the support for anger as a socially constructed emotion?
- What are the biological bases of anger? Which modern theories are supported by current findings on anger and biology?
- What are the cognitive appraisals associated with anger?
    - Frustration-Aggression Hypothesis
    - CNA model?
    - GAM model?
    - How do the CNA and GAM model differ? How are they similar?
    - What emotion components do the CAN and GAM suggest are important to the causes of anger?
- How does anger differ from other emotions, such as fear, anxiety, and sadness?

Chapter 9 Introduction

This section will cover the emotion anger. Generally, anger is perceived to be a highly intense, negative emotion. This chapter will begin by providing evidence for universal and socially constructed emotion component changes for anger. The second half of the chapter will discuss two current social psychological theories of anger – the Cognitive-Neoassociationistic (CNA) model and the General Aggression Model (GAM).

Defining Anger

Anger definitions vary. Berkowitz and Harmon-Jones (2004) define anger as a "syndrome of relatively specific feelings, cognitions and physiological reactions linked associatively with an urge to injure some target" (p. 108). Shiota and Kalat (2012) define anger as "the emotional state associated with feeling injured or offended, with a desire to threaten or hurt the person who offended you" (p. 176). Both these definitions highlight that anger causes approach behavior – approaching either the person who hurt us or any nearby target. Shiota an Kalat (2012) further highlight that one cognitive appraisal is the perception of someone offending us. Anger represents the emotion and aggression is the term used to discuss the behavior change that occurs from anger. In empirical studies, sometimes aggression is measured in lieu of the emotion anger.

Anger can be divided into types of anger. The first categorization of anger is based on the goal or purpose of the anger. In hostile aggression, the goal is to cause physical or psychological pain to another person. Hostile aggression is caused by our perceptions that someone or something has blocked our goals, threatened us, or shows hostility toward us. Sometimes hostile aggression is called reactive anger or hot anger because we are aggressing in response to some threat. In instrumental aggression, the goal of the aggressor is to obtain some reward or resource, but not to hurt or harm someone. The reward could be winning a game, increasing social status, or obtaining money. Instrumental aggression is sometimes called proactive or cold anger because this aggression is in response to well thought-out plan that will achieve the goal. In addition, instrumental aggression is not accompanied by physiological arousal, as seen in hostile aggression. It is important to note that injury to another person could occur during instrumental aggression, even though the goal was not to harm another person.

For instance, during a football game the goal is to win. Thus, most football players are engaging in instrumental aggression, even though during the game the other team could still be injured. Typically, in anger emotion studies, hostile aggression is viewed as the behavior change that results from an anger emotion.

Another way to categorize aggression is based on the type of harm that is caused to the target individual. Physical aggression is when physical harm or discomfort results from the anger, whereas relational aggression is when harm to a person's social standing or relationships occur. Examples of relational aggression include ostracism, gossip, manipulation, and verbal (insulting, name calling) or nonverbal behaviors (rolling eyes, sighing). Both physical and relational aggression could be considered behavior changes that result from an anger emotion. Physical aggression is also called overt or direct aggression, whereas relational aggression is sometimes called social, covert, or indirect aggression.

Combining these two categorizations together means every aggressive behavior can be classified as instrumental or hostile AND as physical or relational. For instance, someone could engage in gossip (a form of relational aggression) for proactive (obtaining higher social status) or reactive reasons (to hurt another person's self-esteem).

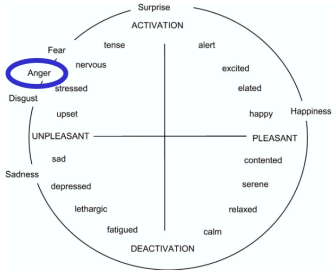
In the following sections, we will break down the emotion components of anger.

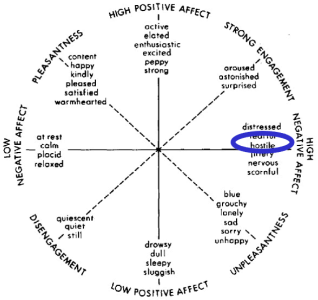
Subjective Feelings

Both Russell (1980) and Watson and Tellegen (1985) view anger as a highly arousing, unpleasant emotion (see Figure 1). Russell (1980) labels the emotion anger, whereas Watson and Tellegen (1985) label this emotion hostile.

Figure 1

Dimensional Models of Anger





Note. Russell (1980) model is on left; Watson and Tellegen (1985) model is on right. Left figure reproduced from "Independence and bipolarity in the structure of current affect," by L. Feldman Barrett and J.A. Russell, 1998, Journal of Personality and Social Psychology, 74(4), p. 970 (https://doi.org/10.1037/0022-3514.74.4.967). Copyright 1998 by the American Psychological Association. Right figure reproduced "Toward a consensual structure of mood.," by D.T. Watson and A. Tellegen, 1985, Psychological Bulletin, 98(2), p. 221 (https://doi.org/10.1037/0033-2909.98.2.219). Copyright 1985 by the American Psychological Association.

Behavior Changes

In this section, we will discuss evidence for both the basic emotion and social constructivist perspective of anger.

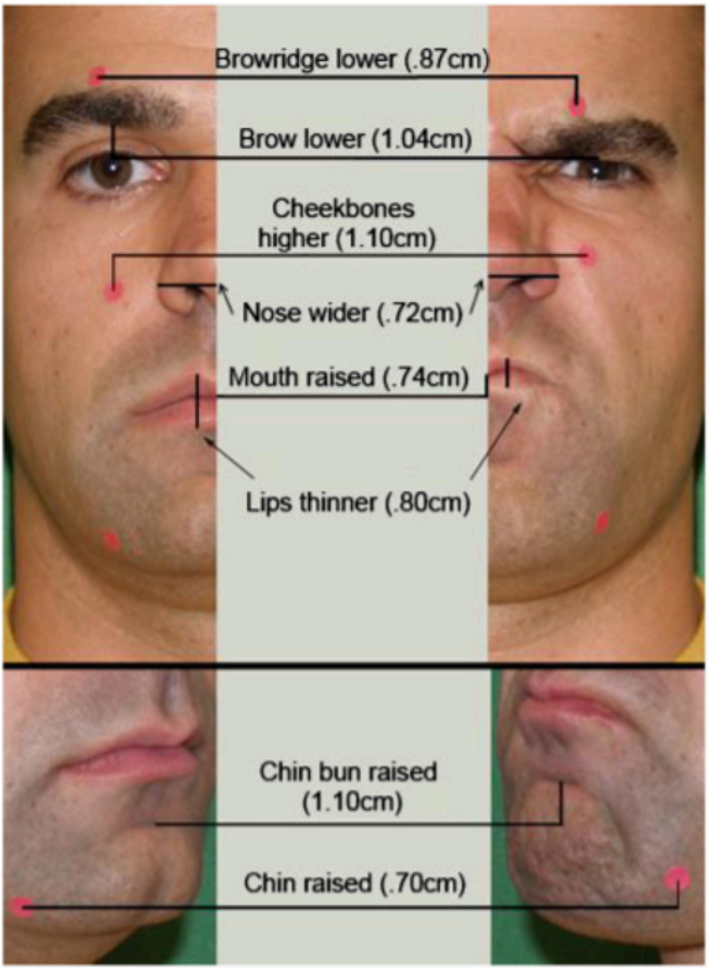
Facial Expressions of Anger: Basic or Social Constructivist?

Facial expressions change during an anger experience. In the FACS (Ekman & Friesen, 1978, displayed in Figure 2), the following action units were associated with anger:

- AU 4: Brow lowerer
- AU 5: Upper lid raiser ("the glare")
- AU 7: Lid-tightener ("the squint")
- AU 10: Upper lip raiser
- AU 17: Chin raiser
- AU 22: Lip funneler
- AU 23: Lip tightener
- AU 24: Lip pressor

Figure 2

AUs for Anger



Note. Face on right represents anger expression; face on left represents opposite of each anger action unit. Reproduced from A. Sell, L. Cosmides, and J. Tooby, 2014, Evolution and Human Behavior 35(5), p. 426 (https://doi.org/10.1016/j.evolhumbehav.2014.05.008). Copyright 2014 by Elsevier.

Visit this website for a live demonstration of how the AUs for anger change. Some believe this anger expression is a universal, adaptive signal. During eliciting events of anger, the anger facial expression functioned to display an individual's strength and probability of winning a fight. In fact, research shows people perceive composite faces showing only one anger action unit change to be physically stronger than the same face showing opposite facial action changes (Sell et al., 2014). Across several industrialized and isolated cultures, Ekman has found people universally recognize the anger facial expression. Similar to findings on fear (Ekman et al., 1969, for a review click here), the majority of participants correctly identified anger, but the Fore and Borneo participants showed lower recognition rates than other countries (see Table 1). In the USA and Japan, some participants incorrectly labeled the anger expression disgust, while the Fore tribe mistakenly labeled anger fear. This is interesting because the Fore tribe also mislabeled fear as anger. So, there appears to be some overlap in anger and fear for the Fore tribe.

Table 1

Recognition Rates for Six Emotions Across Five Cultures

A table showing cross-cultural rates of recognition for a variety of emotion words.

Affect Category	United States	Brazil	Japan	New Guinea Pidgin Responses	New Guinea Fore Responses	Borneo
Happy (H)	97 H	97 H	87 H	99 H	82 H	92 H
Fear (F)	88 F	77 F	71 F 26 Su	46 F 31 A	54 F 25 A	40 F 33 Su
Disgust-contempt (D)	82 D	86 D	82 D	29 D 23 A	44 D 30 A	26 Sa 23 H
Anger (A)	69 A 29 D	82 A	63 A 14 D	56 A 22 F	50 A 25 F	64 A
Surprise (Su)	91 Su	82 Su	87 Su	38 Su 30 F	45 F 19 A	36 Su 23 F
Sadness (Sa)	73 Sa	82 Sa	74 Sa	55 Sa 23 A	56 A	52 Sa

Reproduced from "Pan-cultural Elements in Facial Displays of Emotion," by P. Ekman, E.R. Sorenson, and W.V. Friesen, 1969, Science, 164(3875), p. 87, (https://doi: 10.1126/science.164.3875.86). Copyright Note. For the Fore tribe, some words were in Pidgin language, others in Fore language.

In their follow-up study, 82-87% of adult participants correctly identified anger when presented with two other negative emotions (see Table 2). Most children, children (90%; Table 3) correctly identified anger facial expressions, although anger was posed next

to sad facial expressions instead of emotions more similar to anger, like fear and disgust.

Table 2

Results for Adult Participants (Ekman & Friesen, 1971)

Anger Story

Emotion Shown in the three photographs	Numbers	% Choosing correct face
Anger, Sadness, surprise	66	82%
Anger, Disgust, surprise	31	87%
Anger, Fear, sadness	31	87%

Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, Journal of Personality and Social Psychology, 17(2), p. 127, (https://doi: https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association

Table 3

Results for Child Participants (Ekman & Friesen, 1971)

Anger Story

Emotion Shown in the two photographs	Numbers	% Choosing correct face
Anger, Sadness	69	90%

Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, Journal of Personality and Social Psychology, 17(2), p. 127, (https://doi: https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association

Finally, Ekman and colleagues (1987, for review of study click here) found that across 10 cultures, the majority of participants identified

anger in facial expressions and rated anger facial expressions as most intensely anger out of 7 possible emotions.

Let's review some other studies we discussed in the fear section. You might recall that is Matsumoto's (1992) study, participants saw 48 photos of six emotional expressions (anger, disgust, fear, happiness, sadness, and surprise). Each emotion was displayed in 8 different photos. Participants viewed all 48 photos one at a time. While viewing each photo, participants picked an emotion label from the following seven emotions: anger, contempt, disgust, fear, happiness, sadness, and surprise. Results for anger showed that 89.58% of American participants and 64.20% of Japanese participants correctly labeled the anger expression as anger across the 8 fear photos. This parallels findings for fear, in which about 82% of Americans and 54% of Japanese answered correctly. Similar to findings on fear, two cultural differences were found: 1) a significantly greater number of Americans identified anger in the angry facial expressions and 2) on average, Americans identified 7.17 out of the 8 photos as anger, whereas Japanese identified fewer – about 5.14 photos. A similar study by Matsumoto and Ekman (1989) found that 87.12% of Americans and 69.64% of Japanese correctly identified anger across eight photos, demonstrating universality in facial expression identification.

Recall that Crivelli, Russell, and colleagues (2016) asked Spaniards and Trobrianders (Study 1) and Mwani children (Study 2) to pick the correct photo or video of an emotional expression that showed one of five different emotions. In Study 1 in the anger condition, a significantly greater percentage of Spaniards (91%) than Trobrianders (7%) correctly selected the photo of the angry scowl facial expression. Most of the Trobrianders picked the fear gasp (30%) as the photo that represented anger, followed by the disgust nose scrunch (20%), the happy smiling face (20%), and the sad pouting face (17%). Only 9% of the Spaniards incorrectly picked the disgust nose scrunch. These findings show that the angry scowl most Western cultures perceive to display anger does not hold in other cultures. In Study 2, only 18-26% of Mwani children selected

the angry scowl in the video or photo as representative of anger. Mwani children also selected the fear gasp, disgust nose scrunch, and pouting face as showing anger.

In Barrett's study (Gendron et al., 2014b), the American participants free sorted scowl faces into the same piles, while the Himba did not. Instead, sometimes the Himba grouped scowls into piles with nose scrunches, neutral faces, OR even pouting faces! Thus, although this study found universality for fear and joy, these findings did not present for the emotion anger.

Vocal Changes

Think about some vocal changes you might express when angry. For instance, do you yell, growl, or even lower the tone of your voice?

In the basic emotions/social constructivist chapter, we discussed a study by Sauter et al. (2010) in which both Himba and European English participants matched the anger story to the sound of a growl at beyond chance levels. This occurred when participants listened to their own and the other participants' vocal sounds. The emotional story for anger was "Someone is being treated in a rude way deliberately, and is very angry about it" (Sauter et al., 2010, online supplemental material). Note that the term angry is in the actual story, thus presenting a confound. In Cordaro et al.'s (2016) similar vocal change study, the growl was matched to the anger story 48% (for Bhutan) to 100% of the time (with chance set at 25%). These findings suggest the growl is a universal vocal change of anger. In one last study by Gendron, Barrett and colleagues (2014a), which we covered earlier, Himba and Boston participants heard a "guttural yell and growl" and were asked to free-label the emotion. About 65% of the Boston participants and less than 5% of the Himba participants labeled the sound as anger. The Himba findings were not at beyond chance levels and thus might suggest a growl combined with a yell is not universal. Most Himba did not provide an emotion label for the growl/yell. For those who did provide an emotion label, the emotion most often stated for the growl was fear. So, why the different findings? Well, recall that Gendron et al. (2014a) stated that Himba participants tended to use action terms to describe the vocal sounds, such as "yell" or "growl." Thus, free-labeling seems to result in Himba using behavioral terms, whereas providing emotional stories and labels provide some context to the participants.

Other Behavior Changes

In general, anger causes approach behavior, typically in the form of aggression. We could approach the person or thing that made us angry OR we might aggress toward a more vulnerable target to express our anger. There may be other bodily changes associated with anger, such as expanding the chest or leaning forward to express one's strength and dominance. But more research needs to be done in this area.

Physiological Changes

SNS/PNS Activation

In two studies by Levenson and colleagues, participants completed the directed facial action task for anger while physiological measures were taken. In Levenson et al.'s (1990) study on American participants, anger facial expressions caused an increase in heart rate, finger temperature, and skin conductance, and a no change in muscle activity. This study also showed the only difference in physiology between anger and fear was that anger resulted in an increase in finger temperature, whereas fear resulted in a decrease in finger temperature. In a later study (Levenson et al., 1992), American and Minangkabau participants made an anger facial expression. For both groups, making an anger expression resulted in similar increases in heart rate and finger temperature for anger, but American participants showed significantly greater increases in skin conductance than Minangkabau participants.

Kreibig's review (2010) demonstrates that anger causes similar increases in SNS measures as fear – including heart rate, blood pressure, breathing, and skin conductance, as well as a shortened cardiac pre-ejection period (PEP; review here). Taken together, these changes indicate the SNS system is activated. Findings on finger and head temperature vary; some research has found decreased head and finger temperature, increased head temperature, and unchanged finger temperature (Kreibig, 2010). These findings on finger temperature do contradict Leveson et al.'s (1990) work described above. It might be that the directed facial action task, a method which does not have a clear elicitor of anger, might cause these different results for finger temperature.

During an anger experience, heart-rate variability (HRV; pure measure of PNS activity) decreased or remained the same,

indicating PNS deactivation. One major difference between anger and fear is that fear decreases peripheral resistance, but anger increases peripheral resistance. Peripheral resistance means the arteries are constricting or tightening, which parallels the bodily tightening in an anger experience. But, combined with other SNS measures, findings depend on the method used to elicit the emotion. When people are shown angry facial expressions, their heartrate and skin conductance decrease, and their heartrate variability increases. These findings might occur because viewing anger on another person causes us to feel fear – and the decrease in HR and SCL would be an indicator of orienting. When viewing angry films, participants show decreased heart rate AND heart-rate variability, suggesting both PNS and SNS systems are not operating. Kreibig (2010) suggests angry film clips might result in participants focusing and interpreting the film but may not actually result in an anger emotion (again, the issue being the participants are not specifically threatened, but are instead watching another person experience a threat).

Finally, keep in mind that some researchers are leaning toward the idea of several types of anger (Kreibig, 2010). Approach-anger has shown no change in heart rate, while avoidance-anger results in decreased heart rate. Anger-out (anger caused by an external agent), resulted in increased heart rate, blood pressure, and other measures of SNS activation. Whereas, anger-in (anger directed toward the self) resulted in increased heart rate, but no changes in blood pressure. A final note – some emotions experts believe anger toward the self (such as when we fail or hurt another person), actually results in the emotion shame or guilt, not anger.

Anger and the Brain

Amygdala

Like with fear, the amygdala is often activated for anger experiences. Lesions of the amygdala cause changes in social dominance hierarchies, such that previously high-status monkeys become lower in status after the lesion (Rosvold et al., 1954). But, other times, Klüver -Bucy Syndrome (Klüver & Bucy, 1939) in monkeys makes the monkey act tame, even though the situation would typically elicit aggression. Thus, lesions impair the normal anger behavior changes, sometimes resulting in patterns that are opposite the expected patterns for anger. Some recent work is suggesting that the amygdala plays an important role in regulating anger and aggression. Lesions to the human amygdala both increased and decreased aggression (for a review, Haller, 2018; van Elst et al., 2000). Taken together, damage to the amygdala suggests that this structure regulates behavior changes during an anger experience – either by increasing aggressive approach or down-regulating aggression. Some work (Matthies et al., 2012) has found that amygdala volume and trait aggression are negatively correlated. This means that as the amygdala volume decreases, people exhibit greater levels of an aggressive personality trait. Research on mice, voles, hamsters, and even lizards suggests that different parts of the amygdala may be specific to different types of aggression (for a review, see Haller, 2018). For instance, the medial amygdala is activated for male rivalry aggression to acquire dominance (activated with the intruder test discussed in fear), the central amygdala for predatory aggression, and maternal aggression activated both the medial and central amygdala.

One study (Coccaro et al., 2007) compared control participants to participants diagnosed with intermittent explosive disorder (IED),

a disorder defined by overly aggressive behaviors. While an fMRI scanned their brain, participants viewed seven of Ekman's FACS emotional expressions and clicked a button to indicate the gender of the individual in the photo. Results showed that when participants viewed only the ANGRY faces, IED participants exhibited greater activity in the amygdala, but less activity in the orbitofrontal cortex (OFC), compared to control participants. Does this show anger results in an overactive amygdala and underactive OFC? Maybe! But consider which emotions participants may have been experiencing when viewing the ANGRY face.

Orbitofrontal Cortex

The orbitofrontal cortex (OFC) is located in the prefrontal cortex. The OFC is activated when viewing anger facial expressions, highlighting the role of anger perception (Blair et al., 1999), and this activation increases as the intensity of the anger expression increases. Damage to the OFC is associated with 1) impairment in identifying negative, but not positive emotion facial expressions, 2) difficulty identifying the intensity of emotions on facial expressions, and 3) greater reactive aggression (Blair, 2012; Blair & Cipolotti, 2000; Dal Monte et al., 2013; Heberlein, et al., 2008; Marinkovic et al., 2000; Zald & Andreotti, 2010). A recent study (Willis et al., 2014) found that OFC damaged-patients experienced difficulty recognizing emotions of faces in the first 500 ms that a photo was shown but were able to eventually correctly identify the emotion. These findings suggest that impairments may occur at a more nonconscious level. Studies on normal populations have shown that as the OFC shows greater activation to angry faces, people exhibit reduced aggressive behavior (Beyer et al, 2015). These findings would suggest that for normal functioning individuals, when we

experience anger, the OFC helps us to regulate our aggressive approach behaviors.

Activation of the OFC is negatively correlated with aggressive behavior. But remember when we view an anger expression on another person's face, that might cause us to experience fear. Taken together, these findings might suggest that the OFC helps us to perceive anger in others, to down-regulate our anger/aggression, and maybe even to engage in fear avoidance. Paralleling findings on the ventral striatum, lesions to the OFC hinder recognition of anger facial expressions and can also increase aggressive behavior. Said another way, if the OFC is not normally operating, then we might fail to perceive anger and our OFC cannot regulate our anger expression.

In the study discussed above (Coccaro et al., 2007), IED participants reported reduced OFC activation when viewing angry and happy faces, suggesting underactive OFC relates to positive emotions too.

Periaqueductal Gray (PAG) regions of mid-brain

In the 1960's, Reynolds (1969) accidentally learned that stimulating the PAG in rats allowed him to perform surgery on the rats without using anesthetics. This was the first study to notice the role of the PAG in reducing pain. The PAG also regulates other physiological responses during an emotion, such as the heart rate or blood pressure. Siegel et al. (1999) discusses that electrically stimulating the hypothalamus and PAG results in aggression in cats.

Reward Circuit

The ventral striatum is located in the basal ganglia and is considered part of the brain's reward circuit. This reward circuit contains high levels of dopamine, so often these structures are activated when people anticipate upcoming rewards. When people recalled and described personal stories of anger, the ventral striatum was activated (Hornak et al., 2003). While describing these stories, participants reported angry subjective feelings, suggesting the ventral striatum is activated when we experience anger. In one study (Hornak et al., 2003), participants recalled times that they felt angry and rated their subjective feelings, all while an fMRI scanned their brain. Findings showed that self-reported feelings of anger were positively correlated with activity in the reward circuit. BUT the problem is that self-reported positive emotions are also positively correlated with activity in the same areas. So, we cannot say that the ventral striatum controls only specific positive or negative emotions. It is more likely that activity is this area is associated with approach emotions. Damage to the ventral striatum (Calder et al., 2004) or interfering with the dopamine receptors (Lawrence et al., 2002) hinders people's ability to recognize anger in facial expressions. Taken together, these findings indicate the ventral striatum regulates approach behavior and controls ability to perceive anger in others. Furthers, some believe that the ventral striatum may be activated for instrumental aggression, when we are approaching a goal, and may be less related to reactive aggression due to a threat.

Warrior Gene

The warrior gene is the everyday term used to describe the

presence of a polymorphism on the enzyme monoamine oxidase A (MAOA). This polymorphism is called low activity (L) variant of monoamine oxidase A (MAOA). A similar genetic mutation was originally discovered in a Dutch family in which many male relatives had a history of violence, extended periods of anger, and low levels of IQ (Bruner, 1993a; for more information, Brunner et al., 1993b). MAOA is an enzyme that controls the levels of other neurotransmitters and hormones. If a person does not have enough MAOA, they could end up with too much of the neurotransmitter or hormone. With the presence of the L variant, people do not have enough MAOA and end up with too much dopamine or testosterone, thus resulting in a tendency for "warrior-like behavior" or aggression. Conversely, with the high (H) variant of MAOA people exhibit adequate or normal levels of MAOA. So, technically, this warrior gene is one cause of an angry or aggressive personality – such that people with this gene tend to experience more anger across situations and over time. The L variant is coded on the X chromosome, thus men, more than women, tend to express the L variant. This is because men only have one X chromosome, whereas women have two X chromosomes – meaning if a woman has an L variant on one X chromosome her other X chromosome can counteract the effect.

Further work has found that the presence of this gene combined with specific situations together causes the highest levels of aggression (called a gene X environment interaction). For instance, children with the L variant of MAOA *and* who had been maltreated showed more antisocial behavior than children with the L variant but no neglect, or children who were neglected but did not have the L variant (Caspi et al., 2002). Other work has found that when participants were excluded in a cyberball game, those participants who took the most points away from another player (a form of aggression) are those with the L variant (Gallardo-Pujol et al., 2013). These findings were not found when participants were included in the game – suggesting the interaction is between the eliciting

event (inclusion or exclusion) and biology. Another interesting study (Meyer-Lindenberg et al., 2006) found that when people with the L variant viewed angry and fearful faces, L carriers showed more amygdala activation and less orbitofrontal activation than H variant carriers. This study also looked at how the volume of the amygdala, OFC, cingulate cortex differed for men and women with the L variant. Two important results were found:

- 1) Participants with the L variant (vs. high activity variant) had reductions in the amygdala and cingulate cortex. Reductions in these areas are linked to more aggression.
- 2) Male participants with the L variant showed greater volume of OFC than males with H variant. Females with L and H variant did not show differences in OFC.

Testosterone

Testosterone is a male androgen that is positively correlated with aggression and anger. Because men produce more testosterone than women, this may explain the common gender differences seen in aggression – with men expressing more aggression than women. While playing a cyberball game, male participants' testosterone increased from baseline to the time when they were excluded from the cyberball game (Peterson & Harmon-Jones, 2012). In fact, men who reported more anger at the end of the game showed higher levels of testosterone! This means testosterone increases proportionately with our subjective feelings of anger.

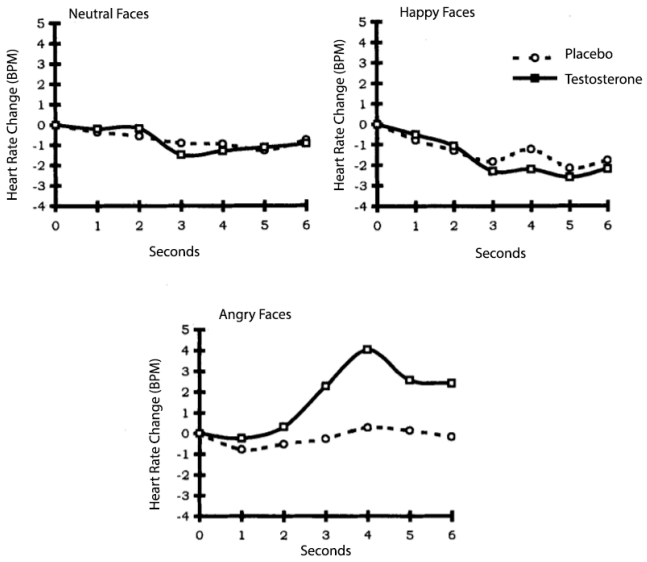
Although most studies examine testosterone with male participants, one study (van Honk et al., 2001) looked at the effects of testosterone on young female participants' physiological

responses to anger. After taking baseline measures of heart rate, two within-subjects independent variables were manipulated. The first within IV was whether the participants had a testosterone shot or placebo shot. Then, after each shot, all participants viewed three faces with three different emotional expressions – angry, happy, and neutral. So, all participants received the testosterone shot and viewed the three faces, then received the placebo shot and viewed the three faces again, counterbalanced of course. The dependent variable was how much heart rate increased from baseline when viewing each face.

See Figure 3 for a depiction of the findings. When viewing neutral and happy faces, participants did not show an increase in heart rate for the testosterone or placebo shot conditions. When viewing the angry faces, female participants showed an increase in heart after receiving the testosterone shot, but not in the control shot condition. But this difference between the testosterone and placebo shot groups did not occur until three seconds after viewing photo. The authors stated these findings show that testosterone causes SNS activation to angry faces in preparation for aggressive and dominance behaviors. But remember, often when participants view angry faces they might actually experience fear, not anger.

Figure 3

Average heart rate increases for testosterone and placebo conditions after viewing three emotional facial expressions



Reproduced from "A single administration of testosterone induces cardiac accelerative responses to angry faces in healthy young women," by J. van Honk et al., 2001, Behavioral neuroscience, 115(1), p. 240 (https://doi.org/10.1037/0735-7044.115.1.238). Copyright 2001 by the American Psychological Association.

Matching Activity!

Featured below is a drag and drop activity that lists brain structures on the left side of a table. On the right side of the table are drop zones for emotional changes. Drag and drop the correct emotion changes from the top of the activity into the drop zones for each brain structure.

Note: Some of the emotional changes are used in more than one

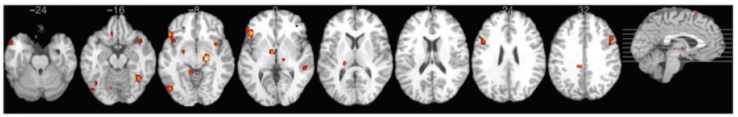
place, and you can drag more than one element into the drop zones on the right. Additionally, penalties have been turned on for this activity, resulting in a deduction of 1 point for missing or incorrectly dropped text.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1107#h5p-13

Consistency and Discriminable Brain Patterns. In Vytal and Hamann's (2010) meta-analysis, anger consistently activated the left inferior frontal gyrus (IFG; BA 47) and the right parahippocampal gyrus (PHG; BA 35). (see Figures 4 and 5).

Figure 4

Consistency Patterns for Emotion Anger



Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, . Journal of Cognitive Neuroscience, 22(12), p. 2870 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

Discriminable Patterns for anger are shown in Table 4. These findings indicate that compared to other emotions, anger resulted in more activation of the IFG and right PHG, thus paralleling consistency results. The IFG in BA 47 is activated when people view

angry, disgusted, and fearful facial expressions (as compared to neutral faces), suggesting a role in perceiving negative emotions (Sprengelmeyer et al., 1998). Damage to the IFG resulted in increased aggression, demonstrating that like the OFC, the IFG might also help down-regulate aggressive behaviors during an anger experience (Grafman et al., 1996). Less work exists on the relationship between the PHG and emotion broadly. One study found that when participants listened to music that became more dissonant, their PHG increased in activation (Blood, 1999). A more recent study found that listening to dissonant (vs. consonant) music resulted in activation in the amygdala, hippocampus, and PHG, while listening to consonant (vs. dissonant music) resulted in activation in the IFG, and ventral striatum (Koelsch et al., 2006). Taken together, these findings suggest that the PHG is activated for unpleasant valence. Another meta-analysis found the lateral (OFC) was most often activated during anger (Murphy et al., 2003)

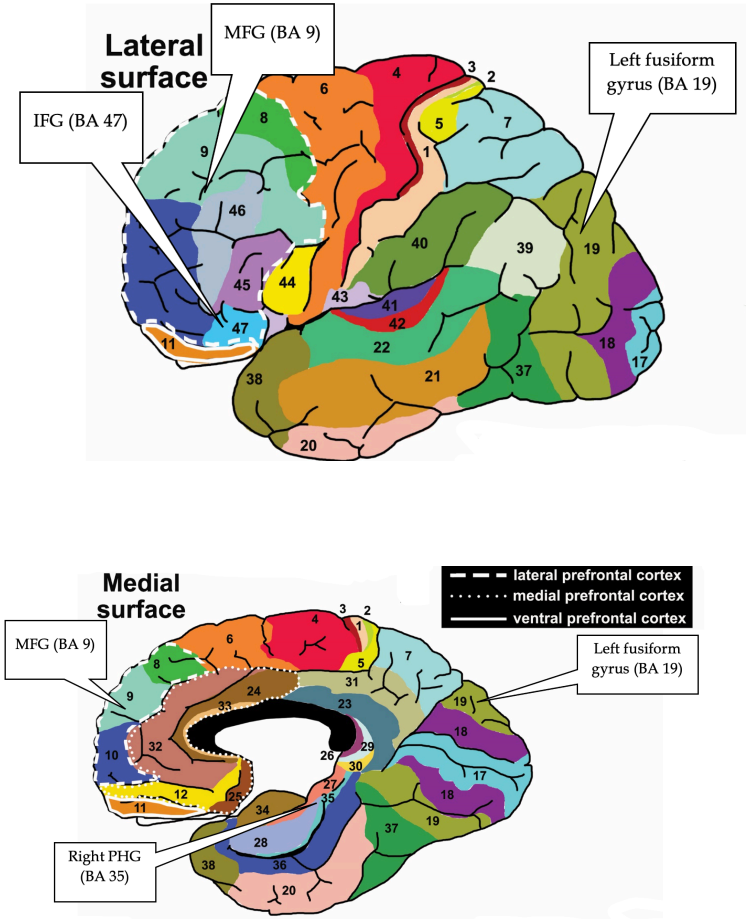
A table highlighting a comparison between anger and another emotion, and activation results for different areas.

Comparison	Anger resulted in more activation in...
Anger vs. Happiness	IFG (BA 47); Right PHG (BA 35)
Anger vs. Sadness	IFG (BA 47); Right PHG (BA 35)
Anger vs. Fear	Left IFG (BA 47); right MFG (BA 9)
Anger vs. Disgust	Left IFG (BA 47); Left fusiform gyrus (BA 19)

Note: BA = Brodmann's Area; IFG = Interior Frontal Gyrus; PHG = Right parahippocampal gyrus; MFG = Middle Frontal Gyrus. Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, . Journal of Cognitive Neuroscience, 22(12), p. 2872 – 2874 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

Figure 5

Brodmann Areas associated with anger



Note. Lateral is an outer view of the brain. Medial is a side view of the brain with the right and left side of the lateral brain divided in half. Reproduced from "Brodmann Areas" by Vysha, 2013. Open Access, Creative Commons CC0 1.0 Universal Public Domain

Dedication. Retrieved from https://commons.wikimedia.org/wiki/File:Brodmann_areas.jpg

Cognitive Appraisals

In this section, we will discuss the cognitive appraisals associated with anger. The information discussed in this section is relevant to the eliciting events that cause anger, as well. Why? Because our cognitive appraisals can include our perception of the eliciting events that caused anger. After reviewing Scherer's (1997) study, we will discuss some social psychological theories that explain the causes of anger.

Scherer's (1997) Study

Scherer's (1997) study found universal and cultural differences in cognitive appraisals. For a review of Scherer's (1997) study, go to the modern theories section on cognitive appraisals. Means (see Table 5), collapsed across all world regions, show that participants reported the following appraisals when recalling an anger experience: unexpected, unpleasant, goal obstruction, perceived unfairness, external causation, perceive that one does not need to cope, slightly immoral, and no change in self-esteem. Figure 6 displays the cross-cultural differences in cognitive appraisals for anger. In Figure 6 the presence of a circle around a datapoint indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample. Unfairness and immorality showed cultural differences. African countries viewed anger as higher in unfairness and immorality, while Latin American participants reported anger to be caused by something moral.

Table 5

Mean Changes in Cognitive Appraisal Dimensions for Anger

A table showing cognitive appraisal dimensions, the mean or average, a question, and a response scale for the question.

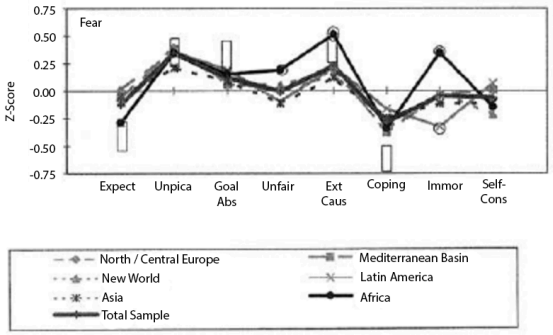
Cognitive Appraisal Dimension	Mean	Question	Response Scale
Expectedness	1.43	Did you expect this situation to occur?	1 = not at all; 2 = a little; 3 = very much
Unpleasantness	2.90	Did you find the event itself pleasant or unpleasant?	1 = pleasant; 2 = neutral; 3 = unpleasant
Goal obstruction	2.55	Did the event help or hinder you to follow your plans or achieve your aims?	1 = it helped; 2 = it didn't matter; 3 = it hindered
Unfairness	2.52	Was the situation unjust or unfair?	1 = not at all; 2 = a little; 3 = very much
External Causation	2.28	Who you think was responsible for the event?	1 = self/internal; 2 = close persons/external; 3 = other persons/external; 4 = impersonal agency/external
Coping Ability	3.23	How did you evaluate your ability to act on or to cope with the event and its consequences?	1= powerless; 2 = escape possible; 3 = pretend nothing happened; 4 = no action necessary; 5 = could positively influence event and change consequences
Immorality	2.20	Would this behavior itself be judged as improper or immoral by your acquaintances?	1 = not at all; 2 = a little; 3 = very much
Self-Esteem	1.77	How did this event affect your self-esteem?	1=negatively; 2= not at all; 3 = positively

Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 905, 911 (https://doi.org/10.1037/

0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Figure 6

Eight Cognitive Appraisal Ratings for Anger across Six World Regions



Note. Presence of a circle around a datapoint indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample. Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 912, (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Dollard and colleagues (1939) Frustration-Aggression Hypothesis

Dollard et al.'s (1939) Frustration-Aggression Hypothesis views frustration as the eliciting event of anger. A frustration is "an unexpected external blockage of an anticipated goal attainment" (Berkowitz, 1981, p. 59). A frustration has the same meaning as Scherer's (1997) goal obstruction appraisal. Aggression is defined

as a behavioral response to the frustration with the goal to hurt a person or animal. Dollard and colleagues view aggression as hostile, but also suggest the target of our aggression could be the person who caused the frustration OR a more vulnerable target who did not cause the aggression. Dollard and colleagues emphasized that our perception of a frustration caused aggression. In other words, the main cognitive appraisal is that we PERCEIVE something blocked our goal. In their definition of frustration, we can identify a couple other cognitive appraisals – unexpected and external causation. Thus, according to Dollard and colleagues, the frustration is not foreseen, and we cannot cause our own anger – something outside of us causes the frustration.

Dollard and colleagues also discussed the determinants of the intensity of anger/aggression:

- The greater the reward that was thwarted, the greater intensity.
- How much the frustration interfered with the goal – if we received partial gratification – received part of the goal, then our anger will be less intense.
- Goal-Gradient Principle: the closer we are to reaching the goal, the greater intensity.
- The more frustrations we experience, the greater the intensity. For an example, watch the Angry Elf clip below. In this clip, the elf continues to insult an individual, who eventually becomes rageful!

The Angry Elf

Dollard and colleagues also discussed behavior changes of anger. They differentiated between direct and displaced anger. In both direct and displaced anger, we approach a target. In direct anger, we aggress toward the individual or thing that caused the frustration. In displaced anger, we approach a lower status or more vulnerable target, such s a child or a pet. Why would we exhibit displaced anger and not direct anger? Well, directly approaching

a target who is stronger or more dominant than us could result in harm to us or even death! Second, sometimes the person who blocked our goal is not in the same physical space or sometimes we may not know who caused the frustration.

The Frustration-Aggression Hypothesis is important because it was one of the first social psychological theories to discuss how goal blockage causes anger and aggression. But, as with all theories, some criticism of this theory exists. First, this theory focused on hostile aggression, where the goal is to injure another person. Researchers point out that all aggression is not a direct result of frustration, as in instrumental aggression. Critics also point out that not every frustration causes anger – we can be frustrated and not show aggression or anger. Anger researchers, such as Berkowitz (1989, 1993, 2012), also state that goal obstruction is not a required cognitive appraisal for anger. Berkowitz suggests that simply feeling unpleasant can increase the likelihood of anger and aggression.

Next, we discuss studies that have identified other cognitive appraisals for anger.

Not Every Frustration Causes Anger

Burnstein and Worchel (1962) conducted an experiment to show that a goal blockage is not a required eliciting event or cognitive appraisal for anger. In their study, the independent variable had three conditions: 1) frustration is justified, 2) frustration is *not* justified, and 3) no frustration control condition. In the study, groups of participants worked on a problem-solving task together. During their group work, a confederate disrupted the problem-solving task. In the frustration is justified condition, the confederate blamed his group interference on a hearing defect, while in the frustration is not justified, the confederate did not have a good reason for interrupting the task. In the control condition, participants were not interrupted by a confederate. At the end of the study, the participants were asked to evaluate the confederate. To evaluate the confederate, participants select one or more of the following three ways:

1. **Public Rejection with Punishment:** Public negative evaluation in front of group
2. **Private Self-Report with punishment:** Low scores on the self-report and confederate will be removed from group.
3. **Private Self-report, without punishment:** Low scores on the self-report, but no punishment

Option 1 represents the greatest aggression, while option 3 represents the least aggression. The punishment was removing the confederate from the group. On the self-report, participants rated whether the confederate was liked and had contributed. Results are displayed below in Table 6.

Participants exhibited the greatest aggression when the confederate did not have a good reason for interfering with the

group project. This finding is demonstrated by 29% of the participants selecting the greatest form of aggression (i.e., public rejection), and 100% selecting private rejection with punishment. Note that 0% of the frustration justified group selected the most severe aggression – public rejection. In this group, when the confederate had a hearing defect, most participants selected to privately aggress on the self-report (50%) and a smaller number (27%) selected the moderate form of aggression – private rejection with punishment. In conclusion, this study shows us that simply experiencing a frustration does not result in overt aggression. Instead, experiencing a frustration that is deliberately caused by another causes the most aggression.

Table 6

% of participants who aggressed toward the confederate (Burnstein & Worchel, 1962)

A table showing IV condition, Frustation Not Justified (no hearing defect), Frustration Justified (hearing defect), and Control

IV Condition	Frustration Not Justified (no hearing defect)	Frustration Justified (hearing defect)	Control
Public Rejection with punishment	29%	0%	0%
Private Rejection with punishment	100%	27%	0%
Private Rejection without punishment	100%	50%	0%

Adapted from "Arbitrariness of frustration and its consequences for aggression in a social situation," by E. Burnstein, and P. Worchel, 1962, Journal of Personality, 30(4), p. 533 (https://doi.org/10.1111/j.1467-6494.1962.tb01687.x). Copyright 2016 by the American Psychological Association.

Other Cognitive Appraisals

Some other cognitive appraisals that cause anger have been suggested. Experiencing a drop in self-esteem, such as after someone insults us, might cause anger (Lazarus, 1991, as cited in Berkowitz, 2012). The experience of anger would motivate us to re-establish our self-esteem. Perceiving that a decision is unfair also may cause anger. In fact, some work is suggesting that perceptions of unfairness combined with high perceptions of control (we can do something about the unfairness), causes anger and approach behavior. But perceptions of unfairness and low perception of control (we can't do anything about the unfairness), causes sadness. Another cognitive appraisal may be personal significance. This means that the frustration must block our own goals to cause anger. Yet, some people point out that we can be angry when something happens to our close other. So, maybe it depends on how close we are to the person who experiences the goal blockage.

In the literature, these is disagreement about whether an external causation is required for anger. Theorists such as Dollard, Lazarus, and other appraisal theorists believe the eliciting event must be external to the self. Yet, others, such as Berkowitz and Anderson disagree. Internal changes in our body, such as pain, heat/cold, bad smells, headaches, and hunger may make it more likely we experience anger. Let's talk about a study that can help us understand!

Similar to our last study, in this study (Geen, 1968) participants worked on jigsaw puzzle with a confederate posing as a participant. The independent variable included three conditions:

1. **Condition #1:** confederate disturbed the participants
2. **Condition #2:** puzzle unsolvable
3. **Condition #3**: Control: no interruption from the confederate

In condition 1, participants' cognitive appraisal would have been external – the confederate is preventing them from completing the puzzle. In condition #2, the cognitive appraisal would be internal causation – it's something about me that is preventing the

completion of the puzzle (maybe we attribute it to IQ). In Group 3, there is no frustration. To measure the dependent variable, participants were given an opportunity to shock the confederates (similar to Milgram's classic study). The dependent variable was a measure of aggression – with greater levels of shock indicating greater aggression.

Level of shocks selected were significantly different among the three conditions. Participants in the external causation group selected the greatest level of shock, followed by condition 2, and condition 3. Thus, experiencing an external cause of frustration causes the GREATEST level of aggression. But, making an internal attribution for our anger (it's something about me! My intelligence or effort!) causes us to aggress toward a target too! Said simply – blaming the self for the frustration causes us to experience anger too.

Now, these findings suggest we can cause our own anger. But some researchers argue over whether we can direct our anger toward the self. Some people believe shame is the emotion we experience when we are angry at the self. Shame occurs when we evaluate our entire, global self as a bad person. Shame, in fact, is positively correlated with anger (Tangney et al., 1992) suggesting that shame may be a word we use to describe anger toward the self. Guilt is negatively correlated with anger (Tangney et al., 1992).

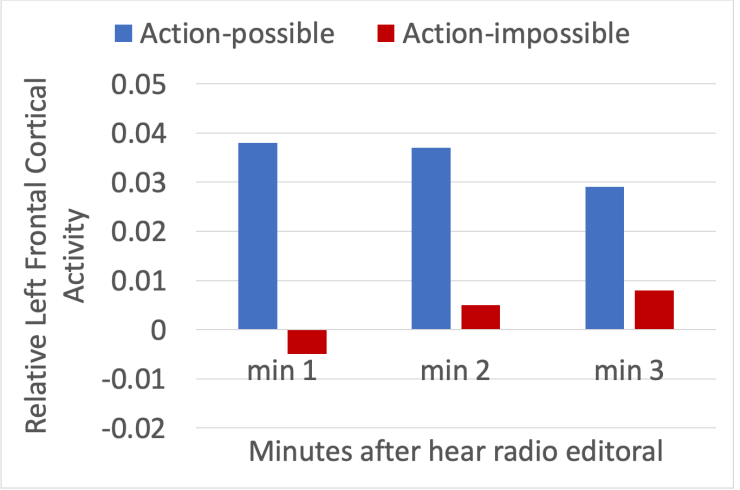
Perceptions of Control

Perception of control, or perceived coping ability, is another cognitive appraisal linked to anger. One study (Harmon-Jones et al., 2003) has linked these perceptions to frontal asymmetry. In this study, participants listened to a radio message arguing for a tuition raise. The independent variable was whether or not participants perceived they could cope and do something to prevent the tuition raise. In the action possible condition, participants were asked to sign a petition to prevent the tuition raise. In the action impossible condition, participants were told they could not prevent the tuition raise. The dependent variables were: 1) left hemisphere cortical activity, and 2) self-reported willingness to sign the petition.

Remember, that the approach-withdrawal hypothesis suggests the left side of the brain is activated for approach emotions, like anger (go here for a review). Figure 7 displays the findings.

Figure 7

Left Front Cortical Activity for Participants (Harmon-Jones et al., 2003)



Adapted from "Anger, coping, and frontal cortical activity: The effect of coping potential on anger-induced left frontal activity," by E. Harmon-Jones, J. Sigelman, A. Bohlig, and C. Harmon-Jones, 2003, Cognition and Emotion, 17(1), p. 14 (https://doi.org/10.1080/02699930302278). Copyright 2003 by Psychology Press Ltd.

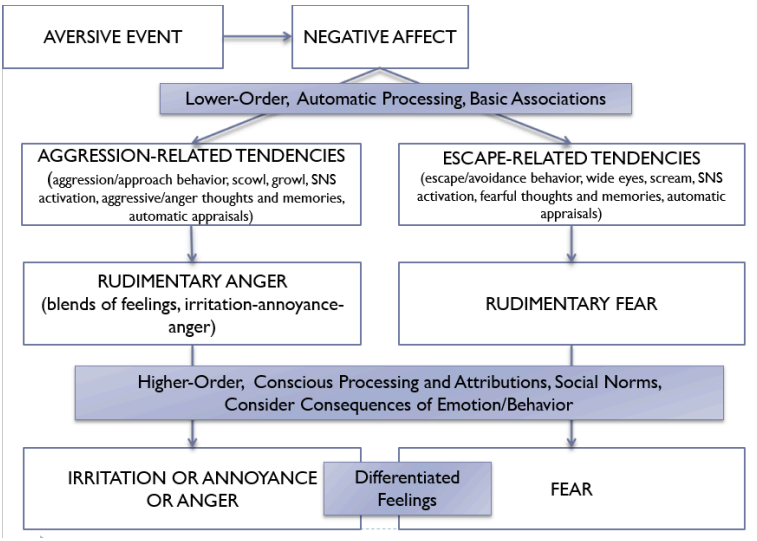
In this figure, the y-axis represents the change from baseline of left front cortical activity. The x-axis displays how much time had passed in the radio editorial. Only participants in the action-possible condition (sign the petition!) showed activity in the left cortex. Interestingly, participants in both conditions reported the same amount of anger. These findings show that when approach is

possible during a goal obstruction, our left cortex is activated, suggesting we are experiencing an approach emotion. A downside to this study is that they did not measure right cortical activity, which may have been activated for the action-impossible condition.

Cognitive-Neoassociationistic (CNA) Model

Berkowitz (1989) developed his CNA model as a modification to the Frustration-Aggression Hypothesis. The main premise of the CNA model is that negative affect is the main cause of anger and affective aggression. Berkowitz has found that in lab and naturalistic studies, when participants experience more unpleasant events, they report more anger (see Berkowitz, 2012; Berkowitz & Harmon-Jones, 2004). Further, when we experience a frustration combined with positive emotions, our experience of anger decreases (see Berkowitz, 2012; Berkowitz & Harmon-Jones, 2004). Berkowitz has also evaluated which cognitive appraisals are the strongest and found that negative affect is a better predictor of anger than goal obstruction and perceptions of control (see Berkowitz, 2012; Berkowitz & Harmon-Jones, 2004). So, Berkowitz states that the ONLY required cognitive appraisal for anger is unpleasantness. Although other appraisals like goal obstruction and perceptions of control could cause anger, they are NOT REQUIRED. A second suggestion from Berkowitz is that English words like irritation, annoyance, and rage all represent different intensities of the same anger emotion.

Figure 8
The CNA Model (Berkowitz, 2003)



Adapted from "Affect, aggression, and antisocial behavior," by L. Berkowitz, 2003, In R.J. Davison, K.R. Scherer, and H.H. Goldsmith (Eds.) Handbook of affective sciences, p. 815. Copyright 2003 by Oxford University Press.

Berkowitz agrees with the Frustration-Aggression Hypothesis in that a frustration does sometimes cause anger. But he doesn't believe that a frustration is a required prerequisite to anger. In his CNA model (see Figure 8), the aversive event represents the eliciting event. According to Berkowitz, this aversive event must cause negative affect for anger and aggression to occur. Negative affect is the same thing as saying unpleasantness or any negative emotion. Thus, the aversive event could be hunger, foul odors, high room temperature, disgusting scenes, or even a goal obstruction. But, Berkowitz states, a goal obstruction only causes anger if the goal blockage makes us feel negative. This aversive event causes certain automatic processes called associative networks. We have

associative networks for many emotions – anger, fear, sadness, etc. Associative networks include the following:

- Subjective feelings
- Cognitive Appraisals
- Memories, Schemas
- Behavioral changes, including facial expressions
- Physiological reactions
- Cues in the eliciting event (such as an angry face or the presence of a weapon)

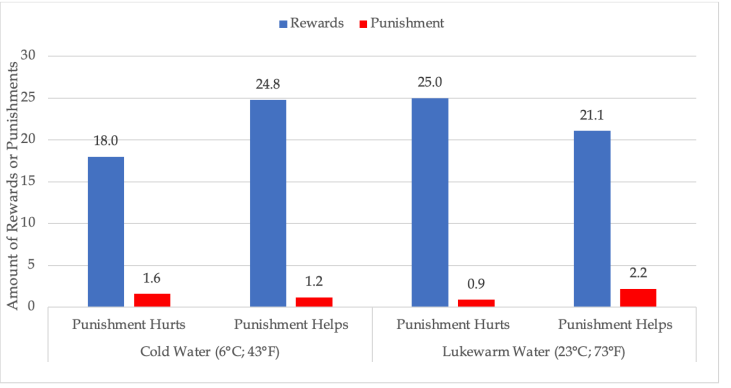
He calls these basic associations or associative networks because any one emotion component can activate the other emotion components in an automatic way. For instance, feeling negative could cause angry memories, an anger facial expression, and increase in physiological arousal. Or as suggested by the facial feedback hypothesis, displaying an anger face could result in physiological arousal and feelings of anger. Associative networks are "Lower-order, Primitive Processing, Basic Associations." Berkowitz labels two of these associated networks "Aggression-Related Tendencies" and "Escape-Related Tendencies," although there could be others. According to Berkowitz, both flight and aggression associative networks are activated at the same time. In other words, we have both an automatic desire to escape the aversive stimulus and to approach and terminate the aversive stimulus. At this point in the model, we cannot state whether the emotion is anger or fear or some other emotion. Berkowitz states that situational cues may determine whether we experience anger, fear, or another emotion. For instance, his work shows that viewing angry faces (Berkowitz, 1993) or nonconsciously seeing a weapon (called weapons effect; Anderson et al., 1996; Berkowitz & LePage, 1967) increases anger and aggressive related tendencies.

Berkowitz has conducted many studies to show that general unpleasantness activates the anger associative network (for a review, see Berkowitz, 2012 or Berkowitz & Harmon-Jones, 2004).

In one of his classic studies (Berkowitz et al., 1981), a cold-stressor procedure was used to cause unpleasantness to female participants. ½ of the females were told to keep their hand in extremely cold water or lukewarm water. While their hand was in the water, participants evaluated a female confederate's solutions to a problem-solving task. A second manipulation was whether participants were told a punishment to the confederate would be helpful or harmful. In the helpful condition, participants were informed punishment would be helpful and motivate the female to improve. Whereas, the other ½ were told the punishment would be harmful by interrupting the female confederate's thought processes. A high amount of punishments or low amount of rewards can both be considered forms of hostile aggression. After hearing the confederate's staged solution, participants selected how much reward and punishment to give the female. Rewards were monetary and punishment was an aversive blast of noise.

Figure 9

Amount of Rewards and Punishments Given to Confederate (Berkowitz et al., 1981)



Adapted from "Physical pain and the goal of aversively stimulated aggression" by L. Berkowitz, S.T. Cochran, and M.C. Embree, M. C., *Journal of Personality and Social Psychology*, 40(4), p. 697 (https://doi.org/10.1037/0022-3514.40.4.687 . Copyright 1981 by the American Psychological Association.

Figure 9 shows the findings. Significant differences were *not* found in the amount of punishments given across conditions. In general, participants provided few punishments to the female confederate. Significant differences were found for the amount of rewards. In the lukewarm water condition, participants who were told the punishment would hurt responded by giving a larger amount of rewards than participants in the lukewarm water-punishment helps condition. The finding switches for the cold-water participants. Participants in the cold-water condition provided FEWER REWARDS when they were told the punishment would HARM the confederate versus when they were told the punishment would help. What do these findings mean? Participants who felt unpleasant because of the cold water exhibited more aggression as measured by providing a smaller number of rewards. These findings partially support the CNA's hypothesis that simple unpleasantness, even from cold water, increases anger and aggression. Interestingly, participants in the cold water condition self-reported more *anger*, *irritation*, *and unpleasantness* than those in the lukewarm water condition. But, these two groups did not differ on levels of self-reported sadness and distress. This again supports Berkowitz's thesis that general unpleasantness causes anger, not sadness.

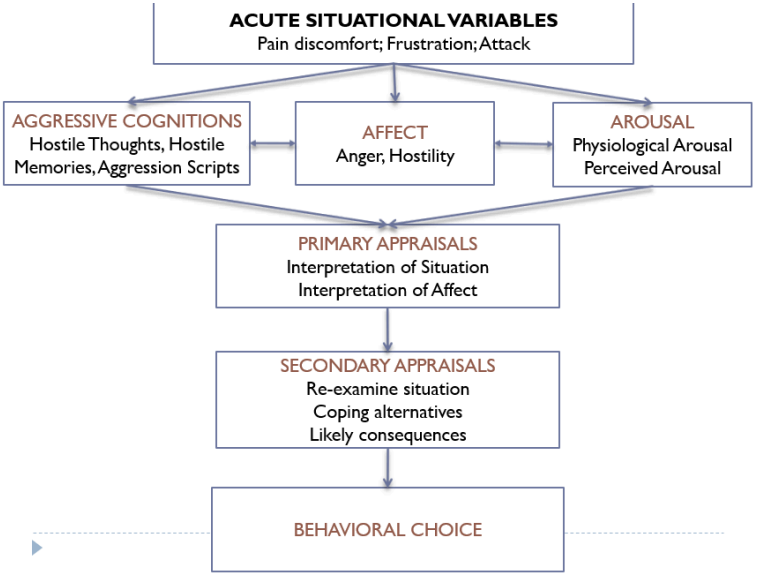
Many things can determine whether the escape or aggression networks are stronger – including genetics, past learning experiences, and the situational cues of the eliciting event. In general, Berkowitz believes that fear occurs when a threat is present, whereas anger results when we feel unpleasant but a clear a threat is not present. Rudimentary Anger and Rudimentary Fear

mean that early in the emotion episode we have basic feelings of anger and fear. At this point in the model, the only cognitive appraisal we have made is the perception of unpleasantness. Thus, we cannot clearly label the emotion. As the emotion episode continues, we engage in more conscious, higher-level critical thinking. Our cognitive appraisals, schemas, and interpretations now may impact and change our labeling of the emotion. Berkowitz says we begin to "differentiate feelings," meaning we determine whether we are experiencing anger, fear, or another emotion. At the later point in this model, we may now identify our emotion as irritation OR annoyance OR anger OR fear OR another emotion. Once we begin to differentiate feelings, we may consciously engage in emotion regulation strategies, such as suppressing our emotion, increasing the intensity of our emotion, or behaviorally expressing our emotion. This model shows that as the emotional episode continues, our emotional experience changes as we obtain more information.

Anderson and Colleagues' General Aggression Model (GAM)

Figure 10

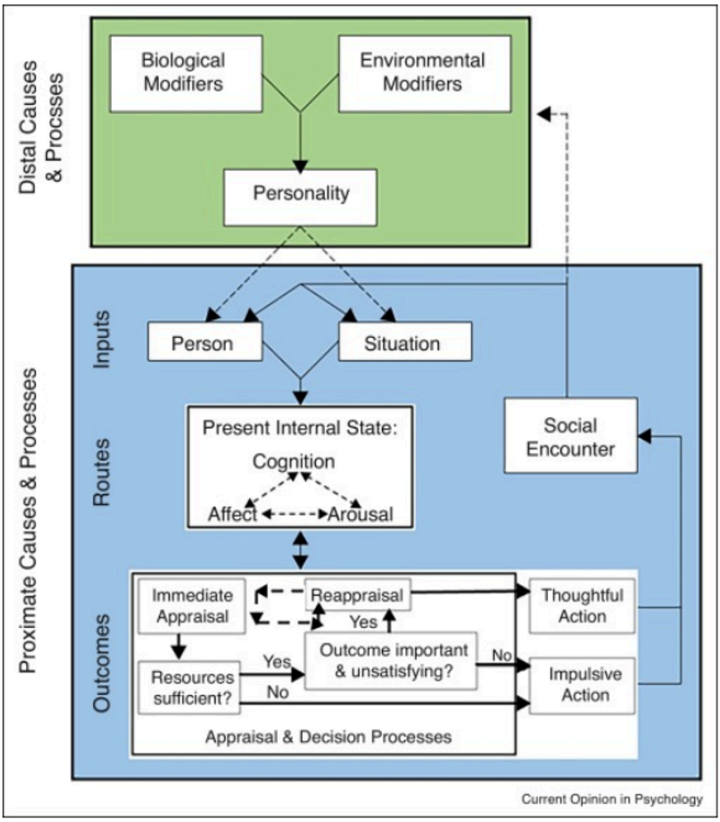
The emotion portion of the GAM Model (Anderson et al., 1995)



Reproduced from "Hot temperatures, hostile affect, hostile cognition, and arousal: Tests of a general model of affective aggression," by C.A. Anderson, W.E., Deuser, and K.M. DeNeve, 1995, Personality and Social Psychology Bulletin, 21(5), p. 436. (https://doi.org/10.1177/0146167295215002) Copyright 1995 by the Society for Personality and Social Psychology, Inc.

Anderson and colleagues (1995) developed a model similar to the CNA called the General Aggression Model (GAM). The overall model is displayed in Figure 11 and the part most relevant to anger is shown in Figure 12. We will focus on the emotion portion of the model. But, keep in mind his overall model accounts for personality and social influences on emotion. Similar to the CNA, the GAM states that the emotion episode starts with an aversive event that causes unpleasantness, termed acute situational variables in Figure 10 or simply situation in Figure 11. The acute situational variable automatically influences aggressive cognitions, affect, and physiological arousal. These three emotion components occur quickly and automatically. In addition, the arrows in the model demonstrate that each component may influence the other component. Primary appraisals are our quick and automatic interpretations of aggressive cognitions, affect, and arousal. Anderson and colleagues (1995) state that if time allows, we engage in more conscious, secondary appraisals. During the secondary appraisal, we might change our emotion label based on new interpretation or new information. Primary OR secondary appraisals could lead to behavioral choice. If we do not have time for secondary appraisals, our earlier automatic primary appraisals quickly determine whether we avoid or approach. It is interesting to note that perceptions of coping are considered a secondary appraisal, suggesting this is a more conscious process.
If you are interested in reviewing the entire model, read this article by Allen, Anderson, and Bushman (2018).

Figure 11
The Complete GAM Model (Allen et al., 2018)



Reproduced from "The General Aggression Model," by J.J. Allen, C.A. Anderson, and B.J. Bushman, 2018, Current Opinion in Psychology, 19, p. 76 (https://doi.org/10.1016/j.copsyc.2017.03.034) Copyright 2017 by Elsevier, Ltd.

Summary of Anger

In this chapter, we discussed whether the emotion components for anger are basic or socially constructed. In general, anger does appear to be a highly intense negative emotion that activates the SNS system. Western and Eastern cultures do recognize the anger facial expression, but individuals living in isolated cultures often select the wrong facial expression. In some studies, isolated cultures like Bhutan recognize the growl as anger vocal change, but only a portion of the Himba did. More work is needed for changes in vocal sounds during an anger experience.

Several brain structures are activated during anger, with the amygdala and OFC being important. Each brain structure controls different aspects of the anger experience.

Research is conflicting on the required cognitive appraisals for anger. Scherer (1997) identified several appraisals that change during an anger experience, with cultural differences found for immorality and unfairness cognitive appraisals. Dollard et al. (1939) and Scherer (1997) both suggest a goal obstruction causes, while the CNA and GAM view the only required appraisals as unpleasantness caused by an aversive event.

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End of Chapter Activities (Chapter 9)

Test Your Knowledge! Which brain structures control the components of anger?

Featured below is a drag and drop activity that lists brain structures on the left side of a table. On the right side of the table are drop zones for emotional changes. Drag and drop the correct emotion changes from the top of the activity into the drop zones for each brain structure.

Note: Some of the emotional changes are used in more than one place, and you can drag more than one element into the drop zones on the right. Additionally, penalties have been turned on for this activity, resulting in a deduction of 1 point for missing or incorrectly dropped text.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2298#h5p-13

CHAPTER 10: DISGUST

Chapter 10 Learning Objectives

- Does disgust meet the requirements for an emotion?
- Define and explain the differences between the four types of disgust.
- Is moral disgust an emotion or is moral disgust anger?
- Are disgust facial expressions universal or socially constructed?
- Are disgust vocal changes universal or socially constructed?
- How does physiology change during disgust? Does this vary with the type of disgust?
- How are important brain structures involved in the emotion components of disgust? Does this research support a locationist or one-network theory?
- How do the circumplex models view disgust? Does disgust co-occur with any other self-reported emotions?
- What are the similarities and differences between anger and disgust (and contempt)?

Chapter 10 Introduction

This section will cover the emotion disgust. Disgust is an unpleasant emotion that may be experiences as low, moderate, or high in arousal (depending on whether the SNS and/or PNS system are activated). This chapter will begin by discussing the four types of disgust and the eliciting events and cognitive appraisals associated with each type of disgust. Then, this chapter will present evidence for both basic emotion and constructivism theory in the areas of facial expressions and vocal change. Physiological and brain activation evidence will be presented. The chapter will end by discussing the CAD Triad Hypothesis – a theory that helps us to better understand the differences between Contempt (C), Anger (A), and Disgust (D).

Note: Some of the studies discuss situations that may be upsetting.

Definition of Disgust

Disgust means "bad taste"(dis = opposite of; gusto = taste/pleasure). In fact, many definitions emphasize how disgust occurs when we place an offensive object in the mouth. Darwin (1872 p. 253) stated that disgust was caused by "something revolting, primarily in relation to the sense of taste as actually perceived or vividly imagined; and secondarily to anything which causes a similar feeling, through the sense of smell, touch, and even of eyesight." Darwin acknowledged the importance of the mouth, but also expanded the disgust definition to include other senses. Later, work suggested that disgust could be elicited by the *thought or idea* of eating something offensive (Angyal, 1941). This definition suggests that we do not necessarily have to put the offensive object in our mouth to experience disgust, we just have to think about doing so.

This chapter starts by explaining eliciting events of disgust, then moves onto explain four different types of disgust.

Eliciting Events

Theorists have suggested many eliciting events that cause the emotion disgust. Many elicitors of disgust are objects that could cause physical harm to the body. In fact, evolutionary psychologists believe that disgust developed as an adaptation to protect the body from ingesting a deadly substance. Evolutionary psychologists suggest that disgust first developed with a focus on the mouth – such that disgust caused us to reject food that tasted bad and could harm the body. Then, the disgust adaptation expanded to include a disgust response to body waste products and infection, and eventually to people who committed moral violations. In general, researchers think disgust protected against harm to the body and later on harm to the soul. We will discuss the type of disgust caused by each eliciting event. Within these four types of disgust, specific cognitive appraisals will be defined.

Four Types of Disgust

The four types of disgust are: core disgust, animal-nature, interpersonal, and moral. Evolutionary psychologists believe core disgust developed earliest in evolutionary history, followed by animal-nature, interpersonal and then moral disgust developed most recently.

Core Disgust

Core disgust is the original evolutionary defense caused by bad tasting and physically harmful objects that enter the mouth. Core disgust is "the revulsion at prospect of oral incorporation of an offensive object" (Rozin & Fallon, 1987, p. 23). Let's break down this definition. Oral incorporation means the offensive object is consumed through the mouth. In fact, they believe that disgust first developed as a defense against eating deadly foods or eating foods that could be contaminated by other animals and body products. With the word "prospect", they highlight that core disgust may elicited by actually placing an offensive object in the mouth OR by *thinking about* an offensive object being placed in one's mouth. An offensive object is any object that is contaminated or has touched a contaminated object. Core disgust is elicited by objects that are distasteful AND dangerous. This means we do not experience core disgust when we eat something that tastes bad or feels funny but is not dangerous. For example, some people HATE the taste of cilantro, but eating cilantro will not harm them. My son refuses to eat apple sauce because of the texture – again not core disgust! Second, core disgust is not just harm to the body. Threats to physical harm without a bad taste would most likely elicit fear or anger. Third, core disgust should be a universal emotion. Thus, any cultural differences in food that elicit distaste would not be considered core disgust. For instance, when studying abroad in Paris I was served a crab in a champagne glass! When receiving the champagne glass I was definitely surprised and "grossed out," but this disgust is caused by cultural expectations of food appropriateness, not by potential physical harm.

Core Disgust = Distasteful + Dangerous

Cognitive appraisals that occur with core disgust represent our beliefs about the origin of food or the objects that food has touched. It is important to keep in mind these appraisals are often automatic and sometimes inaccurate. Three cognitive appraisals cause the emotion core disgust: 1) Oral Incorporation into the Self, 2) Offensiveness and 3) Contamination. Let's discuss each of these appraisals.

Threat of Oral Incorporation in the Self

This appraisal occurs because we perceive an offensive entity as entering the mouth to be more disgusting and harmful than an offensive entity entering though other parts of the body (i.e., skin, eyes, nose). Thus, we will experience the *greatest aversion* to offensive objects entering the mouth than to other parts of the body. Why? Well researchers believe the mouth is a boundary between the self and objects outside the self. This means, anything offensive we consume through the mouth could be incorporated or become part of the self. In essence, the appraisal is "you are what you eat" and represents the perception that we take on the offensive and immoral properties of any offensive objects we eat. Thus, when we consume an offensive object, we make an internal attribution that we are now disgusting. Similarly, when we view others consuming offensive objects we make an external attribution – and conclude they are disgusting and offensive people. How would this play out in real life? Well, in Madagascar a law prevented soldiers from eating hedgehogs because the government feared if soldiers ate hedgehogs the soldiers would exhibit the traits of the hedgehog! What are traits of a hedgehog? Well, hedgehogs tend to become timid and hide when they are in danger – qualities that we would not want in soldiers who defend! Other historical examples reference that in wartime, soldiers would eat the flesh of superior armies to take on the personality traits of "strength and courage."

The Aztecs are one group who engaged in exocannibalism, which means to consume the flesh of humans who are not included in one's close social group. As if we don't have enough examples, the Chijon gang, a South Korean gang, would eat the flesh of wealthy individuals to gain a higher status for the self.

Oral Incorporation: Food + Person = Person Takes on Traits of Food

The appraisal "you are what you eat" was tested in a research study (Nemeroff & Rozin, 1989). First, the authors determined the traits college students attributed to four types of living beings (boars, turtles, elephants, and plants). Table 1 shows the lists people attribute to each group. Then using these traits, participants read stories about individuals who ate these beings and rated the personality traits of these eaters. In Study 1, participants read stories about boar-eaters OR turtle-eaters and in study 2 about elephant-eaters OR plant-eaters. Nemeroff and Rozin (1986) concluded that participants viewed boar-eaters to be higher on boar-like traits and turtle-eaters to be higher on turtle-like traits. Similarly, participants viewed elephant-eaters to be higher on elephant-like traits and plant-eaters to be higher on plant-like traits. Yet, these findings were very weak and further research should be conducted to assess the appraisal "you are what you eat."

Table 1

College Students' Perceptions of Traits Assigned to Four Living Beings

a table showing perception of traits assigned to Boar-eaters

Boar-eaters
Ungenerous
Irritable
Excitable
Loud, outspoken
Unreliable
Short-lived
Uncontrolled
Fast-moving
Good runners
Bearded
Heavyset
Aggressive
Brown Eyes

a table showing perception of traits assigned to Turtle-eaters

Turtle-eaters
Generous
Good-natured
Phlegmatic
Quiet and Shy
Reliable
Long-lived
Restrained
Slow-moving
Good swimmers
No facial hair
Slender
Peaceful
Green Eyes

a table showing perception of traits assigned to Elephant-eaters

Elephant-eaters
Interesting
Loud
Smart
Sociable
Aggressive

a table showing perception of traits assigned to Plant-eaters

Plant-eaters
Boring
Quiet
Not too smart
Unsociable
Peaceful

Note. These traits should be viewed as dimensional poles. Reproduced from ""You are what you eat": Applying the demand-free "impressions" technique to an unacknowledged belief," by C. Nemeroff, and P. Rozin, 1989, Ethos, 17(1), pp. 60, 62 (https://doi.org/10.1525/eth.1989.17.1.02a00030). Copyright 1989 by Wiley.

Offensiveness

Offensiveness is an appraisal that occurs when we view aversion to eating animals or to eating the bodily products of any animal, including humans (Rozin et al., 2008). Examples of body products include feces, urine, blood, and vomit. The offensiveness appraisal occurs when people think about eating most animals and the body products of animals. Again, this emphasizes that we do not need to actually eat the animal or body products, but that we experience core disgust when we *think about doing* so. Researchers point out that offensiveness is supported by the fact that most cultures eat a small subset of animals and that cultures have taboos on the type of food to eat. Some food taboos:

- Avoiding foods with slimy textures that remind the self of slugs, worms, etc .
- Avoiding foods that may have touched contaminated animals or humans (e.g., cockroaches, flies, vultures).
- Avoiding animals that eat other animals (i.e., carnivores),
- Avoiding animals that share intimate relationships with humans (i.e., dogs, cats)
- Avoiding physically harmful animals (e.g., snakes, spiders) that elicit both fear and disgust.

When eating other animals, cultures even utilize certain methods to prevent the appraisal of offensiveness. This includes changing the names for animal foods (e.g., ham, steak, pork instead of pig, cow, pig). In addition, we plate or present the food in a more appealing way and remove certain body parts like skin and heads. These methods may be attempts for humans to reduce core disgust reactions by avoiding thoughts about the true animal they are consuming. For example, look at the two photos below. Which would you be more likely to eat? Which elicits more disgust? The first would elicit thoughts of offensiveness in many people and cause core disgust. I say in many people because some people are very low in disgust sensitivity. Disgust sensitivity is a personality trait which suggests some people experience disgust to a lot of different objects (high disgust sensitivity), whereas people low in disgust sensitivity are rarely disgusted.

Reproduced from “Spitfyre’s 50th birthday” by Nicole Bratt, 2012. Open Access, Creative Commons: Attribution-ShareAlike 2.0 Generic (CC BY-SA 2.0)Retrieved from this source.

Reproduced from "Pork tenderloin dish" by User:M, 2016. Open Access, Creative Commons Attribution-Share Alike 4.0 International. Retrieved from: https://commons.wikimedia.org/wiki/File:Pork_tenderloin_dish.png

Contamination

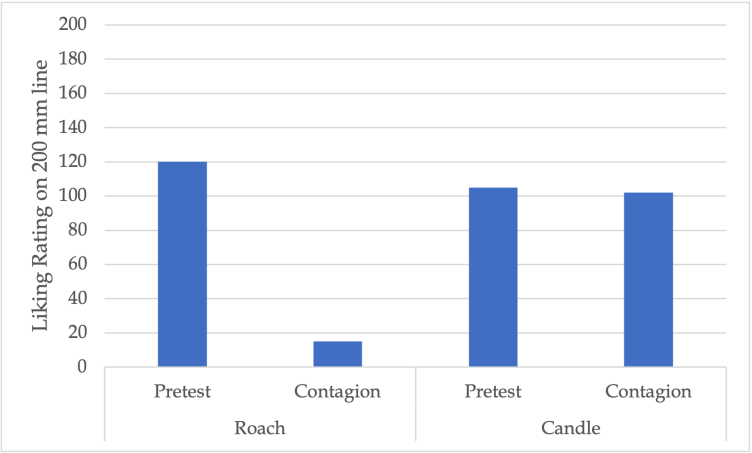
Contamination is the third appraisal of core disgust. A contamination response occurs when we reject contaminated food from the mouth or simply avoid foods that touched a contaminated object, even if the contact occurred over a short period of time. For example, refusing to drink a glass of milk after you remove a fly from the milk. The fly only contacted the milk for a millisecond, but it is still possible the fly touched something contaminated. Some believe the contamination response is an adaptation that functions to help humans avoid diseases and death. Two appraisals explain the universal contamination response: 1) law of contagion and 2) law of similarity (Rozin et al., 1986). The law of contagion occurs when people think "once in contact, always in contact." In other words, the law of contagion assumes that when one neutral object touches a contaminated object, the properties of the contaminated object are permanently transferred to the neutral object, even though a brief contact between two objects may not actually result in contamination. The contaminated object could be food, animal, or even an immoral person. When we perceived that a neutral object that we put into our mouth has retained properties of a contaminated object, that causes core disgust. Though rules and rituals, some cultures try to make the law of contagion less salient or conscious. For instance, Judaism has kosher rules which for example require that different pots/pans be used for meat and dairy, so that the meat from the animal is not cooked in the animal's

own dairy. In some Indian and Asian cultures, people eat with their right hands and use their left hands for contaminated activities (e.g., wiping their bottom, cleaning their feet). Do we have any rituals in North American that reduce thoughts about contamination? What about the five-second rule? In general, people may avoid this appraisal by not thinking about the people making their food or thinking about the animal that the food came from. The law of similarity states that if two products appear similar, then the two products have the same underlying properties as well. Said another way the appearance of an object represents reality; the image equals the object. This applies to disgust such that an object that looks like something disgusting must be disgusting itself. For instance, people refuse to eat objects that look like feces, such as melted chocolate. Together, the laws of contagion and similarity are called the laws of sympathetic magic – magic because long ago, remnants of an individual (e.g., hair, fingernail scrapings) were thought to represent the spirit of the whole individual.

Rozin et al. (1986) tested the laws of contagion and similarity. To test for the law of contagion, participants tasted and rated their liking for juice – these ratings represented the pre-test. Then, participants watched while the experimenter placed one of two objects into the cup of juice – 1) plastic birthday candle (control) and 2) a dried and dead sterilized cockroach (experimental). Participants were all told that the dead cockroach had been sterilized and was safe. After removing the candle or roach from the juice, participants rated their liking for the juice on a 200 mm scale. Figure 1 shows that participants reported significantly LESS liking for the juice when contaminated by a sterile cockroach compared to the pretest trial.

Figure 1

Law Contagion Findings (Rozin et al., 1986)



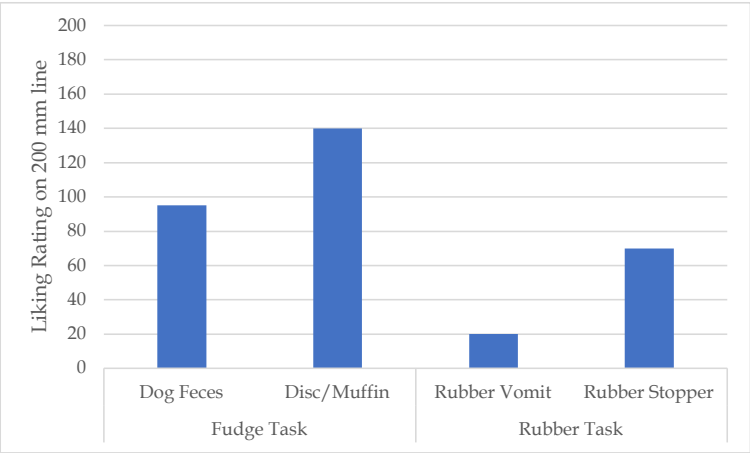
Reproduced from "Operation of The Laws of Sympathetic Magic in Disgust and Other Domains," by P. Rozin, L. Millman, and C. Nemeroff, 1986, . Journal of Personality and Social Psychology, 50(4), p. 706, (https://doi.org/10.1037/0022-3514.50.4.703). Copyright 1986 by the American Psychological Association.

To test the law of similarity, participants completed two other tasks. In the first fudge task, participants were given a square piece of chocolate fudge and allowed to eat the fudge. After this, participants were given the same fudge – except now the fudge was either in the shape of a muffin/disc or in the shape of dog feces. In the second rubber task, participant were given two rubber objects that they were told were clean. These two objects were a rubber sink stopper and rubber imitation vomit. Participants rated how much they would like to hold each object in between their lips. Results showed that participants liked the fudge in the shape of a disc/muffin significantly more than the fudge in the shape of the dog feces Figure 2. Also, participants preferred to place the rubber stopper in their mouths than the rubber vomit – even though the

stopper and vomit were made of the same exact rubber!

Figure 2

Law of Similarity Findings (Rozin *et al.*, 1986)



Animal-Nature Disgust

Animal-nature disgust is the second type of disgust. When the eliciting event reminds us that we ourselves are animals, animal-nature disgust is elicited. Animal-nature disgust occurs when the boundaries between humans and animals are blurred, thus reminding us that we are just as vulnerable to death as other animals. This type of disgust may have developed after core disgust. Instead of focusing on the mouth like core disgust, animal-nature disgust expands the disgust emotion to the entire body.Haidt et al. (1997) asked participants to list the most disgusting things they could think of, then categorized their answers into groups based on similarity. They found that 25% of the items represented core disgust, whereas 75% of the items did not relate to the mouth, food, or bodily products. The remaining 75% of these events could be grouped into the following types of eliciting events:

a table showing types of animal-nature disgust, and definitions / examples of said type.

Type of Animal-Nature Disgust	Definitions and/or Examples
Inappropriate sexual acts (e.g.,)	bestiality, incest, child sexual abuse, large age differences in sexual partners
Poor hygiene	scabies, lice, skin diseases, foul odors
Death (e.g.,)	corpses, graveyards, smell of decay
Envelope Violations	when the external body is breached or altered; (e.g., gore, deformity, obesity, blood, surgery, open wounds)

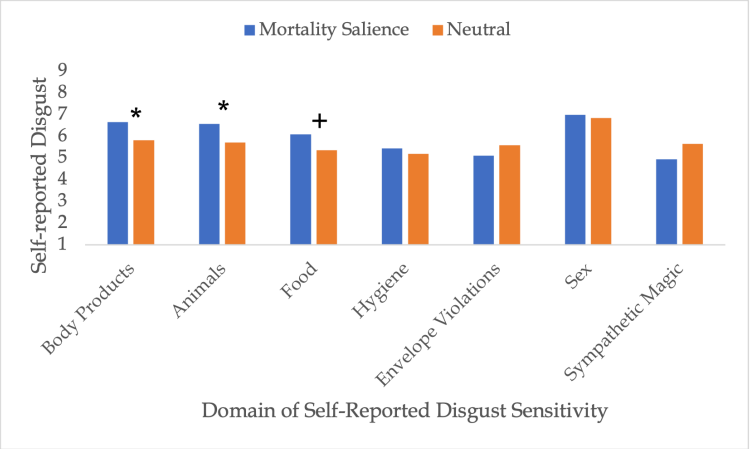
These four groups represent the eliciting events that cause animal-nature disgust. In fact, these four events are additional ways in

which we could contract diseases or infections and thus animal-nature disgust may have evolved as an adaptation to maintain our health. When we hear about these four events occurring, or experience them ourselves, we are reminded of our animal nature and experience animal-nature disgust. Specifically, envelope violations, remind us that we are vulnerable animals whose bodies could be harmed at any time. Terror Management Theory (TMT; Greenberg et al., 1986) suggests that thinking about our own death is threatening and causes death anxiety or "terror." In turn, this death anxiety lowers our self-esteem. TMT further states that when we experience this death-related anxiety we in turn engage in behaviors or thoughts to reduce the anxiety and to maintain our self-esteem. For example, when thoughts of death are accessible, people adhere more to their cultural worldviews (e.g., religion, culture, personal morals; Greenberg et al., 1990), draw closer to their relationship partners (Florian et al., 2002; Mikulincer et al. 2004), and engage in healthy behaviors (e.g., smoke less, exercise more; Arndt et al., 2003; Bozo et al., 2009).

TMT emphasizes that humans are the only animals that have conscious thoughts and awareness of their own death. Extending TMT theory, Goldenberg et al. (2001) suggested that making death salient would elicit a disgust response in humans. In this study, participants were randomly assigned to either a control condition or a mortality salience condition. In the mortality salience condition, participants were asked to describe the emotions they experience when contemplating their own death and to describe what will happen to them after they die. Then, participants completed a disgust sensitivity measure. Participants who thoughts about their death reported more disgust in the domains of body products and animals; food-disgust approached significance (see Figure 3).

Figure 3

Influence of Mortality Salience on Domains of Disgust Sensitivity



Note. *p < .05; +approaching significance

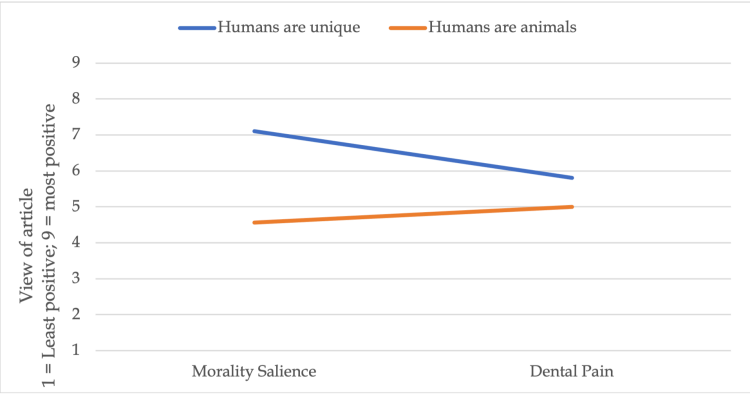
Adapted from "I am not an Animal: Mortality Salience, Disgust, and the Denial of Human Creatureliness," by J.L. Goldenberg, T. Pyszczynski, J. Greenberg, S. Solomon, B. Kluck, and R. Cornwell, 2001, Journal of Experimental Psychology: General, 130(3), p. 431, (https://doi.org/10.1037/0096-3445.130.3.427). Copyright 2001 by the American Psychological Association.

In a follow-up study Goldenberg et al. (2001) conducted the same mortality salience manipulation, but now participants in the control condition discussed an aversive condition – experiencing pain at the dentist. After completing the manipulation, participants rated their views of one of two articles. One article talked about how humans were similar to animals and the other talked about how humans were unique to other animals. Participants thinking about their own death viewed the humans-unique article as more

positive than the humans-animals article, whereas the dental pain condition showed no preference for either article. These findings (see Figure 4) show that thoughts of death, not just thoughts about an aversive situation, cause people to appraise the self as superior to animals. Why? Because thoughts about death increase anxiety and disgust, and by perceiving clear boundaries between the self and vulnerable animals we can reduce our anxiety and disgust.

Figure 4

Self-related positivity of article as a function of morality prime and essay theme



Adapted from "I am not an Animal: Mortality Salience, Disgust, and the Denial of Human Creatureliness," by J.L. Goldenberg, T. Pyszczynski, J. Greenberg, S. Solomon, B. Kluck, and R. Cornwell, 2001, Journal of Experimental Psychology: General, 130(3), p. 432, (https://doi.org/10.1037/0096-3445.130.3.427). Copyright 2001 by the American Psychological Association.

We just reviewed evidence that thinking about death causes us to experience disgust. Similarly, when disgust is elicited, people report thoughts about their death (Cox et al., 2007). In this study, participants read one of the two articles as used in the Goldenberg

et al. (2001) study. These articles functioned to prime people to perceive humans as unique from OR similar to animals. Following the articles, participants viewed either disgusting or neutral IAPS photos. The article participants read and the IAPS photos viewed both represent between-subjects independent variables. For the dependent variable, participants completed 25 partially spelled words, 5 of which could be completed with a death-related word (see Table 2). The dependent variable measured how many of the 5 words participants completed with the death-related answer. Participants who completed all 5 words with death-related terms would be thinking more about death (i.e., death accessibility). Participants who viewed the disgusting photos completed more of the word fragments with death words, compared to people who viewed the neutral photos. These findings indicate that experiencing disgust (as elicited by the photos) resulted in more accessible thoughts about death. Broadly, this means that experiencing disgust causes cognitive appraisals of death.

Table 2

Death-related Dependent Variable Word Fragments

a table showing word fragments and possible answers.

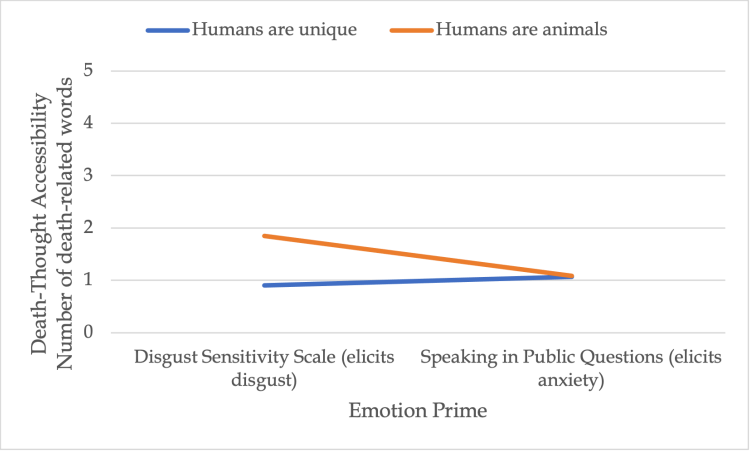
Word Fragment	Possible Answers
D E _ _	Dead or Deed
K I _ _ E D	Killed or Kissed
S K _ _ L	Skull or Skill
C O F F _ _	Coffin or Coffee
G R A _ _	Graver or Grape

Adapted from "Disgust, Creatureliness and the Accessibility of Death-related Thoughts," by C.R. Cox, J.L. Goldenberg, T. Pyszczynski, and D. Weise, 2007, European Journal of Social Psychology, 37(3), p. 500, (https://doi.org/10.1002/ejsp.370). Copyright 2006 John Wiley & Sons, Ltd.

In a follow-up study, Cox et al. (2007) elicited disgust with the Disgust Sensitivity Scale (Haidt et al., 1994), instead of the IAPS photos. In addition, the other emotion primed was anxiety (instead of a neutral feeling state). In this study, participants read one of the same two essays about animals and humans, completed either the disgust emotion or anxiety emotion prime, and then completed the same 25-word fragment test. Results demonstrated (see Figure 5) that participants who experienced disgust AND who read the humans are the same as animals article experienced the most death-thought accessibility. Because participants in the anxiety condition completed the same number of death-related words when they read either essay, we can conclude that its' not that any negative emotions causes thoughts of death – specifically the emotion disgust causes thoughts of death!

Figure 5

Number of death-related thoughts as a function of emotion prime and essay theme



Adapted from "Disgust, Creatureliness and the Accessibility of

Death-related Thoughts," by C.R. Cox, J.L. Goldenberg, T. Pyszczynski, and D. Weise, 2007, European Journal of Social Psychology, 37(3), p. 503, (https://doi.org/10.1002/ejsp.370). Copyright 2006 John Wiley & Sons, Ltd.

Note. Total number of word fragments that could be completed with death-related words was 5. If participants complete more words with death-related terms, then they demonstrated higher death-thought accessibility.

Interpersonal Disgust

Think about a male stranger – someone you have never met. For each scenario below, think about how much disgust you would feel if you had to wear a sweater previously worn by the male stranger in each scenario. Then, sort each scenario from lowest amount of disgust to greatest amount of disgust.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1191#h5p-14

Interpersonal disgust and moral disgust make up socio-emotional disgust. Both interpersonal and moral disgust further expand the elicitors from our bodies to other people – hence the term "socio." Interpersonal disgust is elicited by other people and other people's body products. Interpersonal disgust is often elicited when we use objects that were used by other people, particularly strangers. Four eliciting events are subsumed under interpersonal disgust:

1. **Strangeness/Unfamiliarity:** aversion to contact with an object used by a stranger
2. **Misfortune:** observing or hearing about a stranger who experienced an accident. This accident does not include an infection or moral transgression.
3. **Disease:** observing or hearing about a stranger diagnosed with

a contagious disease

4. **Moral Taint:** observing or hearing about a stranger who committed a moral transgression on purpose.

A study (Rozin et al., 1994b) investigated the disgust elicited by the above four domains. In this study, college students and their parents(!) reported how much they would like to wear a sweater that had been worn by a male stranger with various experiences (see Table 3), AFTER this sweater was washed.

Table 3

Sweater Manipulation and Corresponding Interpersonal Disgust Domain

A table showing sweater types, a description that was provided to the participant, and the domain of interpersonal disgust

Type of Sweater	Description Provided to Participant	Domain of Interpersonal Disgust
New Sweater	WEaring a brand, new sweater	N/A
Healthy Man	Wearing a sweater worn by a healthy, male stranger	Strangeness / Uniqueness
Accident	Wearing a sweater worn by a man who lost his leg in a car accident he did not cause	Misfortune
Homosexuality	Wearing a sweater worn by a gay man who does not have AIDS	Strangeness or Moral Taint
Murder	Wearing a sweater worn by a man who was convicted of murder	Moral Taint
AIDS from Transfusion	Wearing a sweater worn by a man who contracted AIDS through a transfusion	Disease
AIDS from Homosexuality	Wearing a sweater worn by a gay man who has been diagnosed with AIDS	Disease
Tuberculosis	Wearing a sweater worn by a man with tuberculosis	Disease

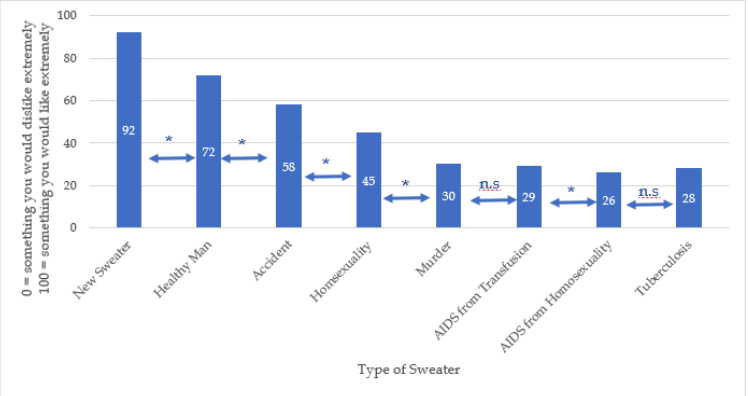
Adapted from "Sensitivity to Indirect Contacts with Other Persons: AIDS Aversion as a Composite of Aversion to Strangers, Infection, Moral Taint, And Misfortune," by P. Rozin, M. Marwith, and C. McCauley, 1994b, Journal of Abnormal Psychology, 103(3), p. 496. (https://doi.org/10.1037/0021-843X.103.3.495). Copyright 1994 by the American Psychological Association.

The findings in Figure 6 suggest that people experience the most interpersonal disgust for the disease domain (e.g., tuberculosis, AIDS) and moral taint domain (murder). People reported moderate interpersonal disgust for homosexuality (immoral as perceived by the participants and to an individual who accidentally lost his leg. Finally, wearing a sweater previously worn by strangers who are healthy elicited more disgust than wearing a new sweater. Rozin and others (2008) suggest that interpersonal disgust is greatest for the disease domain because interpersonal disgust might be an adaptation that protects us from mingling with individuals who MAY have a contagious disease. Similarly, interpersonal disgust may be elicited by moral violations as way to protect the harmony of the group and to maintain social hierarchies. How do you think these findings would fit if we asked people to wear a sweater previously worn by someone diagnosed with COVID?

Figure 6

Mean ratings of desire to wear a sweater worn by a male stranger

with various experiences



Note. *p<.05 for comparison indicated by arrows. n.s. = not significant

Adapted from "Sensitivity to Indirect Contacts with Other Persons: AIDS Aversion as a Composite of Aversion to Strangers, Infection, Moral Taint, And Misfortune. ," by P. Rozin, M. Marwith, and C. McCauley, 1994b, Journal of Abnormal Psychology, 103(3), p. 498. (https://doi.org/10.1037/0021-843X.103.3.495). Copyright 1994 by the American Psychological Association.

The amount of interpersonal disgust elicited by each group should be negatively correlated with relationship closeness. In other words, we experience more interpersonal disgust when strangers are involved in the above events and less interpersonal disgust when our close others experience the same events. Stated plainly – we would experience more interpersonal disgust when we use a stranger's toothbrush versus when we use our siblings' toothbrush. Finally, a major difference between core and interpersonal disgust is that core disgust is elicited when we perceive contamination from another object or non-human animal. Conversely, interpersonal disgust is elicited when we perceive potential contamination from another human, particularly a stranger. Remember, animal-nature disgust is when we are reminded that we are vulnerable animals, whereas interpersonal disgust is elicited when we hear about strangers and perceive we have been

contaminated by the stranger.

Test Your Knowledge! Core? Animal-Nature? Interpersonal?

Imagine yourself in each scenario. Then, select the type of disgust elicited by each scenario.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1194#h5p-15

Behavior Changes - Facial Expressions

Facial Expressions of Disgust: Basic or Social Constructivist?

Researchers disagree over the specific action units that change with the disgust facial expression. Darwin suggested four specific changes in facial muscles (see Table 7), while Ekman and Friesen (1978) emphasized three specific action units. In general, researchers agree that the gape, retraction of upper lip, and nose wrinkle all represent disgust (Rozin et al., 2008). Rozin et al. (1994a) has found that facial expressions vary depending in the type of disgust experienced. Some of these action unit changes can be viewed here.

Table 7

Action Unit Changes for Disgust Facial Expression

A table showing theorists and their hypothesized action unit changes

Theorist(s)	Hypothesized Action Unit Changes
Darwin (1872)	AU 26 – Gape (protruding tongue) AU 10 – Retraction of Upper Lip AU 9 – Nose Wrinkle AU 15 – Dropping of Mouth Corners
Ekman Friesen (1978)	AU 10 – Retraction of Upper Lip AU 9 – Nose Wrinkle AU 17 – Chin Raiser
Rozin et al. (1994a)	Varies according to type of disgust

Figure 7

Disgust facial expression shown in Darwin's (1872) The expression of the emotions in man and animals.

Disgust facial expression shown in Darwin's (1872) The expression of the emotions in man and animals.

Across several industrialized and isolated cultures, Ekman has found people universally recognize the disgust facial expression. In his first study (Ekman et al., 1969), Ekman and colleagues showed people facial expressions that were a combination of disgust and contempt. Even though the expression was a combination of disgust and contempt, participants' correct answer would be to select the label "disgust" from the list of words. The majority of participants from USA, Brazil, and Japan correctly identified disgust. In fact, the recognition rates were higher than anger and similar to the rates for fear. But the Fore and Borneo participants showed lower recognition rates than other countries (see Table 8). Fore participants labeled the disgust-contempt expression as disgust or anger, while the Borneo participants labeled the expression as surprise or happiness! One has to wonder if the combination of disgust and contempt action units confounded the results.

Table 8

Recognition Rates for Six Emotions Across Five Cultures

A table showing cross-cultural rates of recognition for a variety of emotion words.

Affect Category	United States	Brazil	Japan	New Guinea Pidgin Responses	New Guinea Fore Responses	Borneo
Happy (H)	97 H	97 H	87 H	99 H	82 H	92 H
Fear (F)	88 F	77 F	71 F 26 Su	46 F 31 A	54 F 25 A	40 F 33 Su
Disgust-contempt (D)	82 D	86 D	82 D	29 D 23 A	44 D 30 A	26 Sa 23 H
Anger (A)	69 A 29 D	82 A	63 A 14 D	56 A 22 F	50 A 25 F	64 A
Surprise (Su)	91 Su	82 Su	87 Su	38 Su 30 F	45 F 19 A	36 Su 23 F
Sadness (Sa)	73 Sa	82 Sa	74 Sa	55 Sa 23 A	56 A	52 Sa

Reproduced from "Pan-cultural Elements in Facial Displays of Emotion," by P. Ekman, E.R. Sorenson, and W.V. Friesen, 1969, *Science*, 164(3875), *p.* 87, (https://doi: 10.1126/science.164.3875.86).

For the Fore tribe, some words were in Pidgin language, others in Fore language.

In their follow-up study (Ekman & Friesen, 1971), 77% and 89% of adult participants correctly identified disgust when presented with two other negative emotions (see Table 9). It is interesting to note that the recognition rates were higher for "He/she is looking at something he/she dislikes" compared to "He/she is looking at something which smells bad" (p. 126). The two stories of disgust may present a confound. Consider the types of disgust we reviewed and which types of disgust the past two stories represent. Did Ekman correctly manipulate disgust in the stories?

Most children, children (78-95%; Table 10) correctly identified disgust facial expressions. It is interesting that in both the adult and children samples, participants had to differentiate disgust from sadness and/or surprise. Sadness is an unpleasant-low arousal emotion, whereas surprise is a positive, high arousal emotion. A better test would be to have participants differentiate disgust from contempt or anger – emotions more similar to disgust.

Table 9

Results for Adult Participants (Ekman & Friesen, 1971)

Emotion described in the story	Emotion Shown in the two incorrect photographs	Numbers	% Choosing correct face
Disgust (smell story)	Sadness, Surprise	65	77**
Disgust (dislike story)	Sadness, Surprise	36	89**

Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, Journal of Personality and Social Psychology, 17(2), p. 127, (https://doi:

https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association

Table 10

Results for Child Participants (Ekman & Friesen, 1971)

Emotion described in the story	Emotion Shown in the one incorrect photographs	Numbers	% Choosing correct face
Disgust (smell story)	Sadness	19	95**
Disgust (dislike story)	Sadness	27	78**

Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, Journal of Personality and Social Psychology, 17(2), p. 127, (https://doi: https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association

Finally, Ekman and colleagues (1987, for review of study click here) found that across 10 cultures, the majority (60% of Japanese to 89% of Italians) of participants identified disgust in facial expressions and rated disgust facial expressions as most intensely disgust out of 7 possible emotions. Let's review some other studies we discussed in the fear and sections. You might recall that in Matsumoto's (1992) study, participants saw 48 photos of six emotional expressions (anger, disgust, fear, happiness, sadness, and surprise). Each emotion was displayed in 8 different photos. Participants viewed all 48 photos one at a time. While viewing each photo, participants picked an emotion label from the following seven emotions: anger, contempt, disgust, fear, happiness, sadness, and surprise. Results for disgust showed that 91% of American participants and 74% of Japanese participants correctly labeled the anger expression as anger across the 8 fear photos. Similar to findings on fear and anger, two cultural differences were found: 1) a significantly greater

number of Americans identified disgust in the disgust facial expressions and 2) on average, Americans identified 7.29 out of the 8 photos as anger, whereas Japanese identified fewer – about 5.98 photos. A similar study by Matsumoto and Ekman (1989) found that 78% of Americans and 68% of Japanese correctly identified disgust across eight photos, demonstrating universality in facial expression identification.

Recall that Crivelli, Russell, and colleagues (2016) (study can be reviewed here) asked Spaniards and Trobrianders (Study 1) and Mwani children (Study 2) to pick the correct photo or video of an emotional expression that showed one of five different emotions. In Study 1 in the disgust condition, a significantly greater percentage of Spaniards (83%) than Trobrianders (25%) correctly selected the photo of the nose wrinkle facial expression. Most of the Trobrianders picked the fear gasp (29%) as the photo that represented disgust, followed by the happy smiling face (18%), the sad pouting face (11%) and the neutral face (11%). 15% of the Spaniards picked the fear gasp as disgust. These findings show that the Western cultures perceive the nose wrinkle as disgust, but isolated cultures perceive the nose wrinkle as disgust, fear, or even happy. In Study 2, 37-41% of Mwani children selected the nose wrinkle in the video or photo as representative of disgust. Mwani children also selected sad pouting, fear gasp, and angry scowling.

In Barrett's study (Gendron et al., 2014b), the American participants free sorted nose-wrinkles and pouting into the same pile – suggesting Americans view disgust and sadness facial expression to display the same emotion. The Himba grouped scowls, pouting, and nose wrinkles into the same pile, suggesting that they perceive expressions of anger, sadness, and disgust to represent the same emotion.

The combination of AU changes that express disgust may depend on the type of disgust experienced. In one study (Rozin et al., 1994a), participants imagined themselves in various scenarios, then selected the facial expression that best displayed the expression they would show in this scenario. Expressions and scenarios related

to anger, fear, surprise, core disgust, animal-nature disgust, and interpersonal disgust. Nine different facial expressions of disgust displayed different combinations of AUs thought to express disgust. Figure 8 shows the facial expressions utilized in this study.

Figure 8

Emotional Facial Expressions with Prominent Expression or Action Unit

Reproduced from "Varieties of disgust faces and the structure of disgust," P. Rozin, L. Lowery, and R. Ebert, 1994a, , Journal of

Personality and Social Psychology, 66(5), p. 872. Copyright 1994 by American Psychological Association.

The photos below in Figure 9 display the facial expressions a majority of participants selected to represent the same scenarios. Below each photo is the action units displayed in the face and the scenarios a majority of participants matched to the facial expression. Although not shown below, participants correctly matched the fear and surprise photos to the fear and surprise scenarios. Note, that in some of the disgust facial expressions include the orbicularis oculi, which we discussed earlier as being part of the disgust facial expression.

Figure 9

Results from Rozin et al. (1994a)

Facial Expressions of the Sour Face

AU – cheek raiser (orbicularis oculi)

AU 18 – lip pucker

AU 17 – Chin Raiser

AU 24 – Lip pressor

AU 24 – lip pressor

"eating something sour" and "eating a lemon"

AU 9 – Nose *wrinkle*
Core Disgust: *Scenarios related to decaying or irritating smells*: "*smelling rotten meat*, "*smelling rotten eggs*," "*ammonia*"

Eating used or decayed food

AU 19 – *tongue protrusion*
AU 26 – *gape/jaw drop*

AU 9 – *Nose Wrinkle*

Core disgust related to eating/drinking something bad: “drinking spoiled milk,” “eating rotten meat,” “thinking about the fact that you ate an apple with a worm in it,” “eating food after it was chewed by someone else.”

Mostly Animal-Nature Disgust

Gore and death: mangled human/dog bodies, concentration camp, morgue dissection"
Sexual violations: bestiality, inappropriate age, incest
Interpersonal Contamination: wearing Hitler's sweater, dirty hotel linen
Animal disgust substances: cockroach on plate, stepping in dog feces

Deformity
"Seeing a deformed person," "looking at pictures of the slaughter in a World War II concentration camp,"

Animal-Nature Disgust Related to Dogs

AU 10 – *upper lip raise*
AU 26 – *gape/jaw drop*
"*Human-dog intercourse*"
"*Stepping in dog feces*"

AU 10: *unilateral upper lip raise "sleeping in a hotel bed on which the linens have not been changed" "wearing Hitler's sweater"*

Visit this website for a live demonstration of how the AUs for disgust change. Some believe this anger expression is a universal, adaptation. During eliciting events of disgust, the disgust facial

expression functioned to eject toxic foods from the body, nose, and/or eyes. Facial expressions associated with interpersonal and moral disgust might display to the offenders that they are violating social and moral norms.

Vocal Changes

Some vocal sounds we make when disgusted would include vomiting, gagging, and saying "yuck!"

In the basic emotions/social constructivist chapter, we discussed a study by Sauter et al. (2010) in which both Himba and European English participants matched a disgust story to the sound of a vomiting/retching at beyond chance levels. This occurred when participants listened to their own and the other participants' vocal sounds. The emotional story for disgust was "Someone has just eaten rotten food and feels very disgusted" (Sauter et al., 2010, online supplemental material). Note that the term disgust is in the actual story, thus presenting a confound. In Cordaro et al.'s (2016) similar vocal change study, retching/vomiting was matched to the disgust story 53% (for Bhutan) to 100% of the time (with chance set at 25%). These findings suggest that vomiting is a universal vocal change of disgust. In one last study by Gendron, Barrett and colleagues (2014a), which we covered earlier, Himba and Boston participants heard "ewww" and were asked to free-label the emotion. About 59% of the Boston participants and none of the Himba participants labeled the sound as disgust. Most Himba did not provide an emotion label for the growl/yell. For those who did provide an emotion label, the emotion most often stated for the disgust was amusement. This study at least suggests that "ewww" is not universally linked to disgust. But, work should still test other sounds such as retching or "yuck."

Other Behavior Changes

In general, disgust causes avoidance behavior, whether physically walking away or physically expelling objects from the body. An interesting area of future research could investigate whether disgusting objects that make us laugh cause approach or avoidance behavior. For example, often disgusting jokes make us laugh or hearing about somebody doing something disgusting elicits amusement.

Cognitive Appraisals

At the beginning of this chapter, we reviewed the eliciting events and cognitive appraisals of different types of disgust. In this section, we will review Scherer's (1997) findings on disgust. Think about how Scherer's (1997) findings confirm or disconfirm Rozin et al'.s (2008) disgust appraisals.

Scherer's (1997) Study

Scherer's (1997) study found universal and cultural differences in cognitive appraisals. For a review of Scherer's (1997) study, go to the modern theories section on cognitive appraisals. Means (see Table 11), collapsed across all world regions, show that participants reported the following appraisals when recalling a disgust experience: unexpected, unpleasant, goal obstruction, perceived unfairness, external causation, perception that one does not need to cope, slightly immoral, and no change in self-esteem. In this table, I left the means for anger. Note that the disgust and anger means for all eight appraisals are similar. This might suggest that people make the same appraisals for both disgust and anger. In fact, in Figure 10, we can see that the cognitive appraisal patterns for anger and disgust appear similar. In Figure 10, the presence of a circle around a datapoint indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample. Unfairness and immorality showed cultural differences. African countries viewed disgust as higher in unfairness and immorality, while Latin American participants reported disgust to be caused by something moral.

Table 11

Mean Changes in Cognitive Appraisal Dimensions for Disgust and Anger

A table that shows a cognitive appraisal dimension, disgust mean, anger mean, the question, and the Response Scale

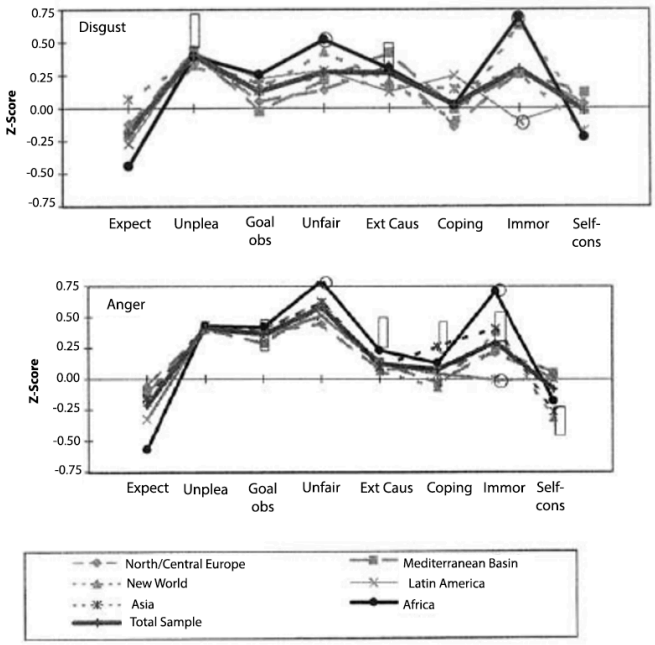
Cognitive Appraisal Dimension	Disgust Mean	Anger Mean	Question	Response Scale
Expectedness	1.47	1.43	Did you expect this situation to occur?	1 = not at all; 2 = a little; 3 = very much
Unpleasantness	2.90	2.90	Did you find the event itself pleasant or unpleasant?	1 = pleasant; 2 = neutral; 3 = unpleasant
Goal Obstruction	2.33	2.55	Did the event help or hinder you to follow your plans or achieve your aims?	1 = it helped; 2 = it didn't matter; 3 = it hindered
Unfairness	2.25	2.52	Was the situation unjust or unfair?	1 = not at all; 2 = a little; 3 = very much
External Causation	2.48	2.28	Who you think was responsible for the event?	1 = self/internal; 2 = close persons/ external; 3 = other persons/ external; 4 = impersonal agency/external
Coping Ability	3.13	3.23	How did you evaluate your ability to act on or to cope with the event and its consequences?	1= powerless; 2 = escape possible; 3 = pretend nothing happened; 4 = no action necessary; 5 = could positively influence event and change consequences
Immorality	2.25	2.20	Would this behavior itself be judged as improper or immoral by your acquaintances?	1 = not at all; 2 = a little; 3 = very much

Self-esteem	1.82	1.77	How did this event affect your self-esteem?	1=negatively; 2= not at all; 3 = positively

Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 905, 911 (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Figure 10

Eight Cognitive Appraisal Ratings for Disgust and Anger across Six World Regions



Note. Presence of a circle around a datapoint indicates that the

country with the circle showed means significantly different from the mean of the remainder of the sample. Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 912, (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

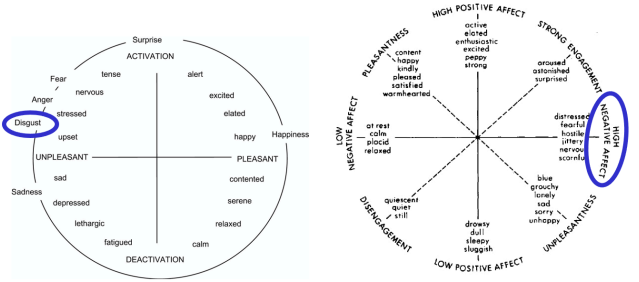
Subjective Feelings

Russell (1980) views disgust as a highly unpleasant, moderately arousing emotion. Per this model, disgust is about equal in valence to anger and fear, but lower in arousal. Disgust's location as moderately arousing may fit with the physiological research above finding that disgust activated both SNS and PNS systems.

Both Russell (1980) and Watson and Tellegen (1985) view disgust as a highly arousing, unpleasant emotion (see Figure 16). Although Watson and Tellegen (1985) do not provide a specific location for disgust on their model, disgust did load on the high negative affect factor (as did similar emotions list anger/hostile, and contempt).

Figure 16

Dimensional Models of Anger



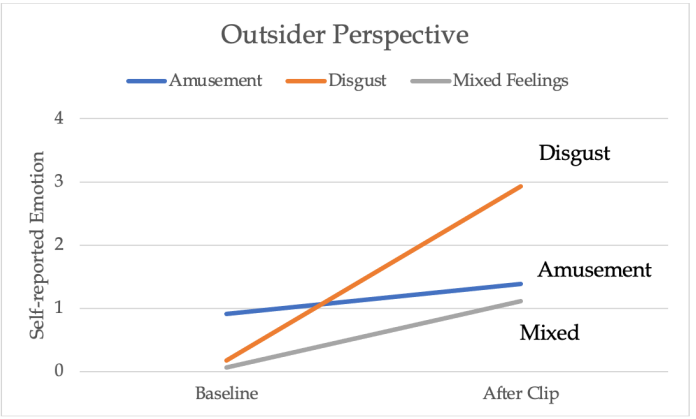
Note. Russell (1980) model is on left; Watson and Tellegen (1985) model is on right. Left figure reproduced from "Independence and bipolarity in the structure of current affect," by L. Feldman Barrett and J.A. Russell, 1998, Journal of Personality and Social Psychology, 74(4), p. 970 (https://doi.org/10.1037/0022-3514.74.4.967). Copyright

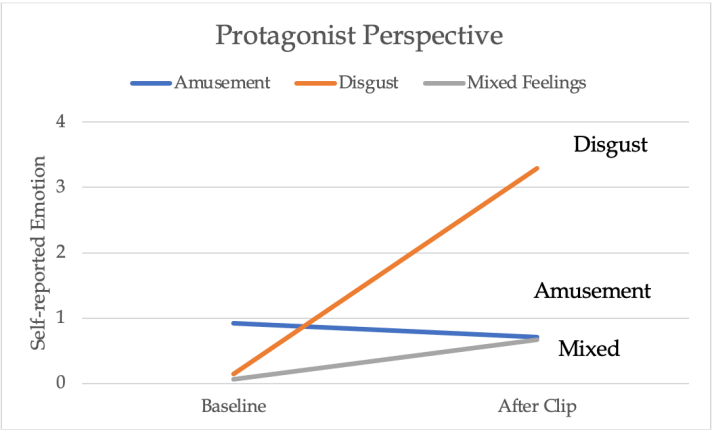
1998 by the American Psychological Association. Right figure reproduced "Toward a consensual structure of mood.," by D.T. Watson and A. Tellegen, 1985, Psychological Bulletin, 98(2), p. 221 (https://doi.org/10.1037/0033-2909.98.2.219). Copyright 1985 by the American Psychological Association.

One study investigated the mixed emotion state of disgust and amusement (Hemenover & Schimmack, 2007). In this study, participants watched a video of a female character eating dog feces in a funny way. Participants were randomly assigned to imagine being the female character while watching the clip OR to view the clip as an outside observer. In both point-of-view conditions, participants reported an increase in self-reported disgust from baseline. But, only in the outsider perspective did participants report an increase in mixed feelings of disgust and amusement (see Figure 17). Taken together, these results show that when we view someone else engaging in disgusting behavior, that elicits mixed subjective feelings of disgust and amusement. But, when we imagine doing something disgusting and when we experience disgust, that elicits mostly disgust and not amusement.

Figure 17

Self-Reported Emotions for Outside and Protagonist Perspectives (Hemenover & Schimmack 2007)





Adapted from "That's disgusting!..., but very amusing: Mixed feelings of amusement and disgust," by S.H. Hemenover and U. Schimmack, 2007, Cognition and Emotion, 21(5), p. 1107 (https://doi.org/10.1080/02699930601057037). Copyright 2007 by Psychology Press.

Physiological Changes

SNS/PNS Activation

In two studies by Levenson and colleagues, participants completed the directed facial action task for disgust while physiological measures were taken. In Levenson et al.'s (1990) study on American participants, disgust facial expressions caused an increase in skin conductance, and no change from baseline for heart rate, finger temperature, and muscle activity. Anger resulted in a significantly greater increase in heart rate and finger temperature than disgust, suggesting these two emotions might be different. In a later study (Levenson et al., 1992), American and Minangkabau participants made a disgust facial expression. For both groups, making a disgust expression resulted in similar increases in heart rate and finger temperature, but American participants showed significantly greater increases in skin conductance than Minangkabau participants. Remember that skin conductance is a pure measure of SNS activity. Taken together, these findings indicate that *displaying a disgust facial expression* activates the SNS system and causes an increase in physiological arousal. Keep in mind that the type of disgust facial expression displayed depends on the type of disgust elicited (Rozin et al., 1994a). Because Ekman was involved in these two studies, we could assume that the facial expressions participants displayed included the following action unit changes: AU 10 – Retraction of Upper Lip; AU 9 – Nose Wrinkle; and AU 17 – Chin Raiser (Ekman & Friesen, 1978). Based on Rozin et al's (1994a) work, the facial expression used in these two studies most likely elicited core disgust due to the nose wrinkle. But, the chin raiser occurs with core, animal-nature, and interpersonal contamination.

Kreibig's review (2010) discusses that physiological changes depend on the type of disgust elicited. Photos and videos of core

disgust/contamination/pollution elicit PNS activation *and* SNS activation. Remember, heart-rate variability (HRV) is a pure measure of PNS activation, while skin conductance (SCR) is a pure measure of SNS activation. Physiological changes for body envelope violations are less consistent. The PNS system is not activated because HRV did not change. Yet, disgust elicited by mutilation does seem to activate the SNS system as demonstrated by the increase in SCR. Researchers do not know yet why this type of disgust increase SCR, but decreases heart rate. One reason some of the physiological changes contradict each other may be the timing at which heart rate increased or decreased. For instance, maybe heart rate decreased halfway through viewing time of the clip or maybe it decreased at the end of the clip.

Table 12

Physiological Changes According to the Type of Disgust (Kreibig, 2010)

A table showing Physiological changes for types of disgust, examples of elicitors, and the actual change physiologically

Type of Disgust	Examples of Elicitors	Physiological Change
Core Disgust, Contamination, and Pollution	• Cockroaches • Maggots on food • Bad smells • People vomiting • Dirty toilets	**PNS Activation** • ↑ Heart-Rate variability/ Respiratory Sinus Arrhythmia/Vagal tone **SNS Activation** • ↑ Skin Conductance **SNS Activation or PNS Deactivation** • ↑ or no change HR • ↑ Respiration Rate • ↑ Diastolic/Systolic Blood Pressure
Body Envelope Violations	Mutilation, injury, blood, injections	**PNS Deactivation** • No change Heart-Rate variability/Respiratory Sinus Arrhythmia/Vagal tone **SNS Activation** • ↑ skin conductance **SNS Activation or PNS Deactivation** • ↑ Blood Pressure • ↑↓ Finger Temperature • ↑ Respiration Rate **SNS Deactivation or PNS Activation** ↓ Heart-Rate

Up arrow = increase
Down arrow = decrease
Up and down arrow = increase or decrease depending on study

Another study investigated the changes in physiology for physical disgust (including core, animal-nature, and interpersonal) compared to moral disgust. Using audio clips (Ottaviani et al., 2013), researchers elicited physical or moral disgust in participants. Moral disgust caused an increase in heart rate while physical disgust did not. Physical disgust caused an increase in HRV and demonstrated other physiological indicators of parasympathetic activation, while moral disgust did not. Taken together, these physiological changes suggest physical disgust activated the PNS, whereas moral disgust deactivated the PNS and activated the SNS.

For subjective feelings, both moral and physical disgust groups reported equally high levels of disgust. Moral disgust participants reported feeling more scornful and more indignant, whereas physical disgust participants reported feeling more dirty.

Disgust and the Brain

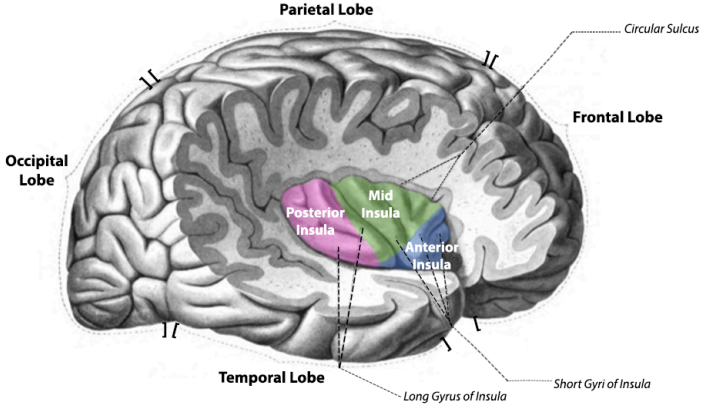
Insula and Putamen. The insula is a term that means "island." The insula is located inside the temporal lobes and next to the gustatory cortex, which is involved in the perception of taste. Some believe the insula actually contains parts of the gustatory cortex. In any case, the insula's location near the gustatory cortex might suggest the insula and gustatory cortex both play a role in core disgust.

The putamen is located in the striatum, which includes the putamen, caudate, and nucleus accumbens. The striatum and its underlying structures are located in the basal ganglia – part of the reward circuit. The putamen regulates physical movement, learning, speech, motor responses to pain, and reward-related learning. In Huntington's, Parkinson's, and Alzheimer's diseases the putamen is damaged or malfunctions.

The insula is activated when people view disgusting facial expressions, watch disgusting videos, view disgusting photos, when imagining the self in core disgust scenarios (Schaich Borg et al. 2008; for a review, Chapman & Anderson, 2012, 2013), and when hearing about moral violations (Harris & Fiske, 2006; Ying et al., 2018). But, the insula is also activated for anger, fear, and pain (Schienle et al., 2002; for a review, Chapman & Anderson, 2013). The putamen is activated when viewing photos of disgust (Calder et al., 2000; Hennenlotter et al., 2004) and when hearing about moral violations (Schaich Borg et al., 2008). But, the putamen is also activated for empathy (Pauli et al. 2016), and when viewing fear and contempt facial expressions (Sambataro et al., 2006; Uono et al., 2017). In fact, Sambataro et al. (2006) showed that healthy individuals experienced greater putamen activation when viewing contempt (vs. disgust) faces. But, contempt faces did not activate the insula at all!

Figure 13

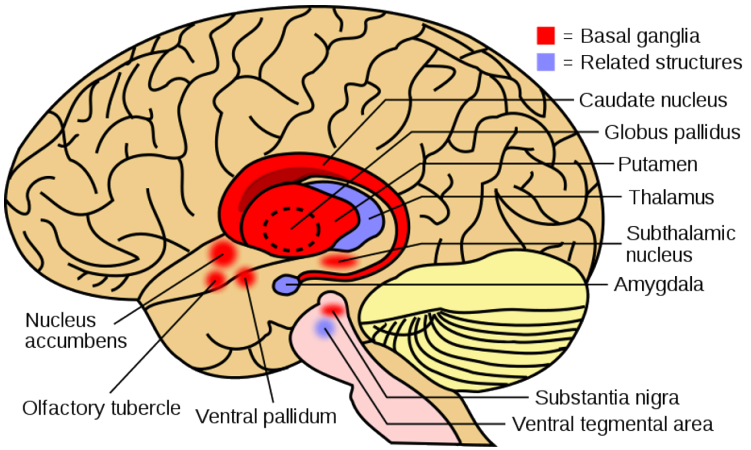
Location of Insula in Brain



Reproduced from "Insula Structure.png" by Schappelle, 2017. Open Access, Creative Commons Attribution-Share Alike 4.0 International. Retrieved from: https://commons.wikimedia.org/wiki/File:Insula_structure.png

Figure 14

Location of Putamen and Other Parts of Basal Ganglia in Brain



Reproduced from "Basal Ganglia and Related Structures(2).svg" by Leevanjackson and SUM1, 2020. Open Access, Creative Commons Attribution-Share Alike 4.0 International.
Retrieved from: https://commons.wikimedia.org/wiki/File:Basal_ganglia_and_related_structures_(2).svg

Damage to the Putamen and Insula. One way to investigate the functions of the insula and putamen is to assess how the emotional experiences of patients diagnosed with Huntington's disease are affected. Huntington's disease is a genetic disorder that includes problems with movements (standing, balance, uncontrolled jerking), cognitive decline, and impairments in emotion recognition and experience. For instance, changes in emotions such as mood swings, aggressive behavior, and/or depression/flat affect. In addition, people diagnosed with Huntington's experience difficulty identifying disgust in facial expressions and vocal sounds. Huntington's disease has been linked to damage to the basal ganglia, insula, and putamen.

Research has demonstrated that people diagnosed with Huntington's exhibit impairment in identification of facial expressions (Sprengelmeyer et al., 1996, 1998) and show less activation in putamen and insula when viewing disgusting facial expressions, compared to healthy controls (Hennenlotter et al, 2004) . In one study (Calder et al., 2000), NK, a patient diagnosed with Huntington's disease, exhibited damage to his insula and putamen. NK and a group of healthy controls were given a list of 6 emotions words and asked to match the 6 words to 6 of Ekman and Friesen's (1978) FACS facial expression. The emotions were anger, contempt, disgust, fear, happiness, sadness, and surprise. NK correctly identified 4 of the 10 disgust photos, whereas controls averaged 8 out of the 10 disgust photos. NK tended to identify the disgust facial expression as anger or contempt, which are three emotions commonly mixed up! NK and controls did not show differences on the other 5 emotional facial expressions. Similarly, NK and the controls were asked to match the 6 emotions to non-verbal sounds. Compared to controls, NK showed reduced recognition of the disgust (retching) and surprise vocal sounds. In fact, he labeled the retching sounds as fear or sadness.

Some interesting work has also compared people with the HD+ gene to people with the HD – gene. HD+ represents individuals who have the Huntington's disease gene, but have not yet experienced the onset of the disease. HD- represents individuals who do not have the gene. Compared to HD- individuals, HD+ individuals demonstrate impairment in recognizing disgust facial expressions, but do NOT show impairment in identifying disgust vocal sounds (Sprengelmeyer et al., 2006). Why is this important? Well, first, doctors are now using inability to recognize disgust faces as a screen for HD. Second, this suggests early damage to the insula/putamen first impacts recognizing faces, and is later followed by vocal sounds. Similar work has found that in healthy participants, the volume size of the putamen is negatively correlated with

accurately identifying fear expressions n Ekman and Friesen's (1978) FACS procedures (Uono et al., 2017).

The Hate Circuit. The hate circuit represents three brain structures (insula, putamen, frontal cortex) hypothesized to underlie the experience of the emotion hate. While in an fMRI machine, participants viewed photos of 1 person they hated and 3 neutral acquaintances (a within-subjects IV; Zeki & Romaya, 2008). The dependent variables were the amount of activation in the three brain structures. Results showed that these three brain structures showed greater activation while viewing the "hated" individuals than the neutral acquaintances. In addition, participants' self-reported amount of hate was positively correlated with activation in these three structures! So, if people reported high levels of hate, they in turn showed high levels of activation! It Is interesting to note that Bartels & Zeki (2000) has identified a romantic love circuit which also includes the putamen and insula. So, we cannot say the putamen and insula are related only to hate. But, it might be that the putamen becomes activated when preparing to cope with or respond to an emotionally-charged individual -whether hate or love. Another question to consider is whether hate really is a separate emotion – or is it similar to moral disgust? It would be interesting to know whether the participants despised these hated individuals because the individuals had committed a moral violation. In fact, in this article in NewScientist.com, author David Robson (2008, no page number) interviewed the author, Zeki, and states:

"*Zeki suggests similar brain scans could one day be used in court – for example, to assess whether a murder suspect felt a lot of hatred towards the victim.*"

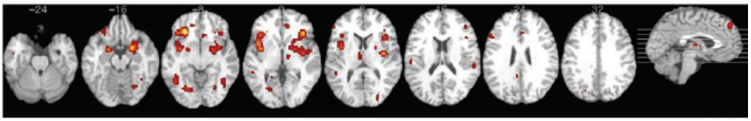
What do you think about the justice system admitting activation

in the hate circuit as evidence for as suspects' motivation to commit murder?

Consistency and Discriminable Brain Patterns. In Vytal and Hamann's (2010) meta-analysis , disgust consistently activated the right insula and right inferior frontal gyrus (IFG; BA 47; see Figure 15).

Figure 15

Consistency Patterns for Emotion Disgust



Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, . Journal of Cognitive Neuroscience, 22(12), p. 2870 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

Discriminable Patterns for anger are shown in Table 16. These findings indicate that compared to other emotions, disgust resulted in more activation in the right putamen and/or left insula.

Table 16

Discriminable Patterns for Disgust from Vytal and Hamann (2010)

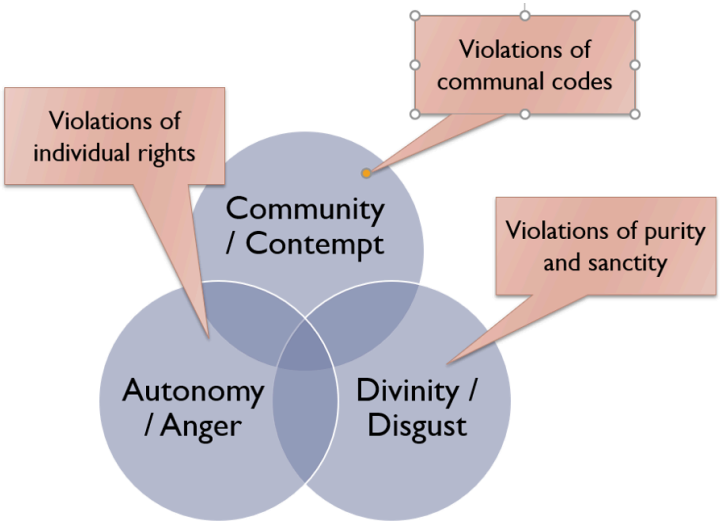
A table that shows an emotion comparison to disgust, and what activation the disgust resulted more in.

Comparison	Disgust resulted in more activation in...
Disgust vs. Happiness	Right putamen and bilateral amygdala
Disgust vs. Sadness	Left insula
Disgust vs. Fear	Right putamen and right IFG (BA 47)
Disgust vs. Anger	Right putamen and left insula (BA 13)

Note: BA = Brodmann's Area; IFG = Interior Frontal Gyrus. Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, . Journal of Cognitive Neuroscience, 22(12), p. 2872 – 2874 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

The CAD Triad Hypothesis

Figure 18
Visual of CAD Triad Hypothesis



Community Violation:

occurs when another person does not uphold or behave in line with the duties established by their "community" or social hierarchy. These violations include disrespect toward authority figures and violation of social/cultural norms.

A person is hearing an 8-year old student speak to his/her teacher in the same way that he/she talks to her friends.

A person is seeing someone burn the American [Japanese] flag.

A person is hearing an oversensitive employee directly criticizing his/her boss.

A person just discovered a cleaning person, who thinks no one is watching, sitting in the chair of the company president.

A person is seeing a 16-year old refuse to give up his/her seat on the bus to a crippled old lady.

Adapted from "The CAD Triad Hypothesis: A mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity)," by P. Rozin, L. Lowery, S. Imada, and J. Haidt, 1999, Journal of Personality and Social Psychology, 76(4), p. 578 (https://doi.org/10.1037/0022-3514.76.4.574)

Autonomy Violation:

occurs when another person directly violates the individual rights and freedoms of another person. The person who is violated could include the self.

A person is scolding a child who hit another child.

A person is hearing about someone who put cyanide in a container of yogurt in the supermarket.

A person is being told about an acquaintance who embezzled from a bank.

A nonsmoker is sitting near a stranger who is smoking in the no-smoking section of a small waiting area.

A person is looking at a picture of the inmates at a World War II concentration camp being led into the gas chamber by the Nazis.

Adapted from "The CAD Triad Hypothesis: A mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity)," by P. Rozin, L. Lowery, S. Imada, and J. Haidt, 1999, *Journal of Personality and Social Psychology*, 76(4), p. 578 (https://doi.org/10.1037/0022-3514.76.4.574)

Divinity Violation:

occurs when another person disrespects God or religion. Also, occurs when people engage in acts that degrade the soul of the self or other people. These violations include all four types of disgust.

A person is eating a piece of rotten meat.

A person is shaking hands with someone who has an incestuous relationship.

A person is touching a corpse.

Adapted from "The CAD Triad Hypothesis: A mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity)," by P. Rozin, L. Lowery, S. Imada, and J. Haidt, 1999, *Journal of Personality and Social Psychology*, 76(4), p. 578 (https://doi.org/10.1037/0022-3514.76.4.574)

To test the CAD hypothesis, US and Japanese students read scenarios that included one of the three moral violations. After reading each scenario, participants selected one of 6 facial expressions and one of three emotion labels to describe the scenario. Each emotion was displayed in two different facial expressions – this allowed researchers to account for different combinations of AUs to represent the same emotion (remember, above we talked about how there may be several different disgust expressions).

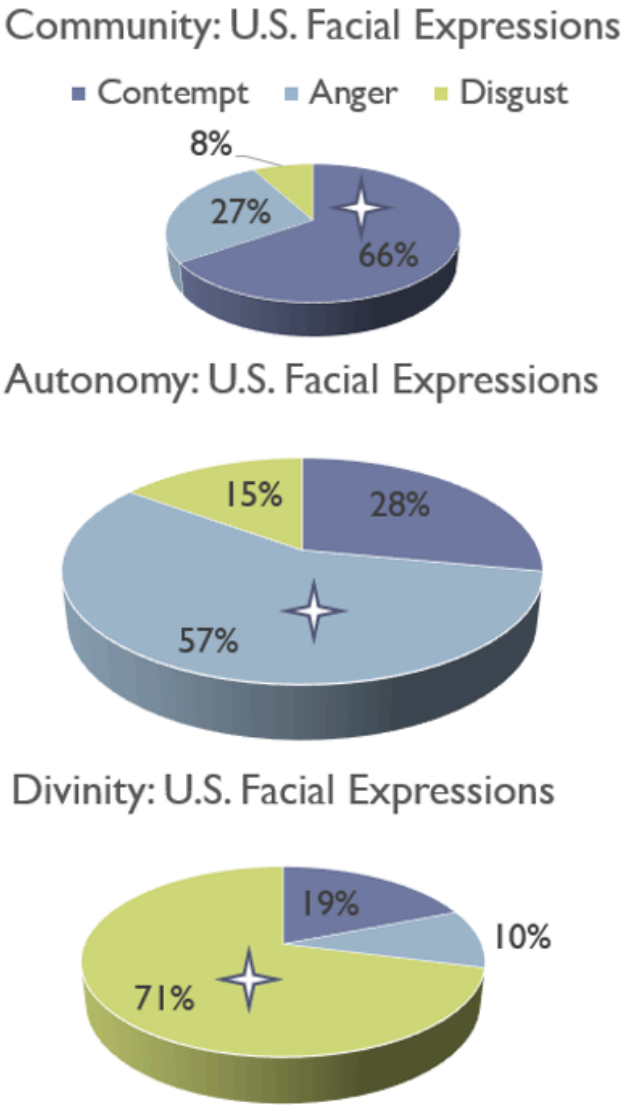
Facial Expressions: 2 of anger, 2 of contempt, 2 of disgust.

Emotion Labels: Anger, Contempt, Disgust, No Emotion

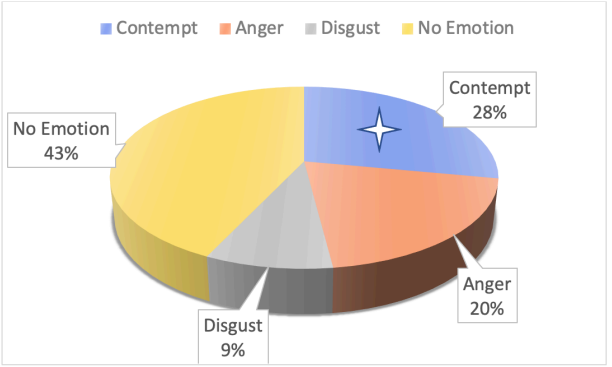
The findings for the American participants are displayed below. These results were the same for the Japanese and American participants. For facial expressions, participants matched the facial expression to the correct violation at beyond chance levels. For emotion labels, participants matched the correct label to the correct violation for anger (58%) and disgust (79%; see Figure 19). But, participants did not select the contempt word label for the community violations at a beyond chance level. Interestingly, most participants (43%) labeled the community violations as "no emotion."

Figure 19

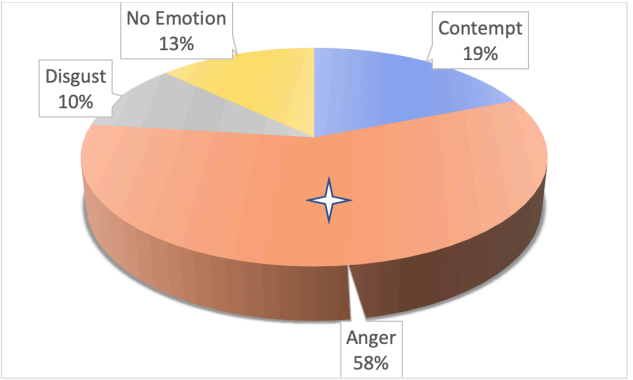
Results for Facial Expressions (Top) and Word Labels (Bottom) for American Participants (Rozin et al., 1999).



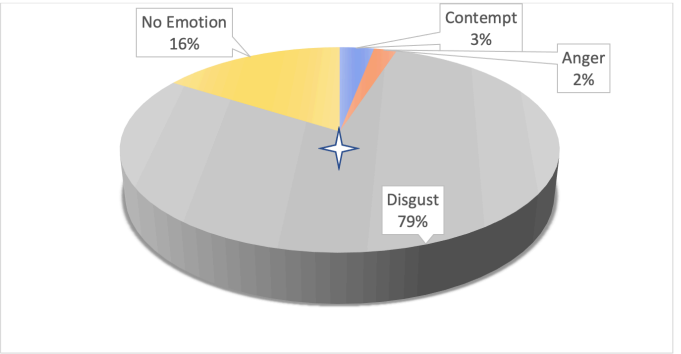
Community Violation: U.S. Word Labels



Autonomy Violations: U.S. World Labels



Divinity Violations: U.S. Word Labels



Adapted from "The CAD Triad Hypothesis: A mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity)," by P. Rozin, L. Lowery, S. Imada, and J. Haidt, 1999, Journal of Personality and Social Psychology, 76(4), p. 580 (https://doi.org/10.1037/0022-3514.76.4.574). Copyright 1999 by the American Psychological Association.

Test Your Knowledge! Identify the CAD violation!

Match the correct CAD violation to the example in the table. Drag and drop one of the three CAD options located at the top of the activity into the boxes on the right side of the table.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1252#h5p-16

Summary of Disgust

In the first part of the chapter, we discussed the four types of disgust: core, animal-nature, interpersonal, and moral. Researchers believe these four types developed in our ancestral past and helped our genes to survive by protecting our bodies from harm or by maintaining social order. Evidence for universality is facial expressions and behavior change does exist, although the action units associated with disgust vary according to the type of disgust. Evidence from Mwani, Trobriander, and Himba cultures do suggest that at least in isolated tribes, disgust is not seen as a distinct emotion. Evidence for SNS and/or PNS activation during a disgust experience exists. In general, SNS activation occurs for moral disgust, whereas PNS activation occurs for physical or core-related disgust. Some have suggested that PNS or SNS activation depends on whether we consume the disgusting object or whether the disgust object is a threat in our external world. Some have suggested the consuming a disgusting object causes PNS activation – which would function to shut down our system and to reject the poisonous object. Conversely, disgusting objects in our external worlds, such as an immoral individual, might heighten our arousal and activate the SNS system to encourage us to avoid the threat. These changes map onto Russell's view that subjective feelings of disgust are moderately, unpleasant. Watson and Tellegen (1985) take the view that disgust is a highly arousing, negative emotion – which fits more within the view that disgust activates the SNS system.

The putamen and insula are two brain structures that play a role in physical and moral disgust. But, it important to note other emotions activate these structures as well. Also, remember that when discussing S.M. in the fear chapter, we saw that S.M. experienced difficulty recognizing disgust expressions – suggesting the amygdala plays a role in disgust too.

Finally, the CAD Triad hypothesis suggests contempt, anger, and disgust are similar because they all deal with moral violations that other people commit. This model also suggests that the CAD emotions are often experienced together as mixed emotions. But, the model also implies that our interpretation of how someone or ourselves was violated determines the emotion we experience. Overall, this study provided initial evidence that anger and disgust are universally associated with autonomy and divinity violations.

Video Resources on Disgust

Yale Experts in Emotion with Dr. David Pizarro on Disgust

I recommend watching from the beginning through 11:15

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1256#oembed-1

Yale Experts in Emotion with Dr. Jonathan Haidt on Morality and Disgust

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1256#oembed-2

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End of Chapter Activities (Chapter 10)

How Disgusting is the Sweater?

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https://psu.pb.unizin.org/psych425/?p=2306#h5p-14

Core? Animal-Nature? Interpersonal?

Imagine yourself in each scenario. Then, select the type of disgust elicited by each scenario.

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https://psu.pb.unizin.org/psych425/?p=2306#h5p-15

Identify the CAD violation

Match the correct CAD violation to the example in the table. Drag and drop one of the three CAD options located at the top of the activity into the boxes on the right side of the table.

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Real-Life Application: Identify the type of disgust displayed in each video.

Outbreak Video

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The Office Video

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Inside Out Video

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CHAPTER 11: NEGATIVE SELF-CONSCIOUS EMOTIONS

Chapter 11 Learning Objectives

- Define the Distinct Emotions Perspective of shame, guilt, and embarrassment.
- What evidence exists for Distinct Emotions Perspective?
- How do emotion components change with shame, guilt, and embarrassment?
- Explain the difference between cognitive appraisals of bad self, bad act, and focus on self.
- Explain the difference between a social conventional violation and moral violation.
- Define the Single-Emotion Theory of shame, guilt, and embarrassment.
- How does single-emotion theory view shame, guilt, and embarrassment?
- Explain the differences between a real flaw and possible flaw.
- Explain the difference between the core self and presented self.
- Differentiate between the two types of embarrassment?

Defining Self-Conscious Emotions

Self-conscious emotions occur when we evaluate the self and this evaluation causes a negative or positive emotion. Examples of self-conscious emotions are embarrassment, shame, guilt, and pride. Embarrassment, shame and guilt are negatively-valenced self-conscious emotions that occur when we evaluate that the self did something that violated either moral or social conventional norms (more on these later). Positively-valenced self-conscious emotions include pride and some believe hubristic pride. These pride emotions occur when we evaluate the self in a favorable way.

Self-conscious emotions are cognitively more complex than emotions we covered earlier. They are more cognitively complex because we are consciously thinking about the self and comparing our behaviors to external and internal standards. To experience self-conscious emotion, our sense of self must be developed. Typically, babies achieve self-recognition between 30-36 months (Lewis & Ramsay, 2004). This, might suggest that self-conscious emotions may not be expressed until age 2.5 years. Some research has found that embarrassment occurred in children who had achieved self-recognition, but not in those children who had not (Lewis et al., 1989). Because these emotions require introspection, this suggests the way we interpret our behavior determines our emotions. For instance, I might perceive that I did well on my accounting exam because I earned a C and feel pride, but others who receive this same grade might feel guilt.

Self-conscious emotions may be adaptive. When bad things happen, it might be adaptive to notice, understand, and remedy the problem (as in guilt) or to avoid the problem and ignore the

event (as in shame). Either reaction might function to maintain group harmony, group protection, and to prevent ostracism. Embarrassment and blush might function to communicate to group members that we are aware we committed a social faux pas and will work on improving our behavior.

Another difference between self-conscious emotions and other distinct emotions is that self-conscious emotions cause both facial and bodily changes. For instance, when people experience embarrassment they might cover their face and when people experience pride they tend to expand their chests and raise their arms.

Self-Conscious Emotions Differ From Other Distinct Emotions (fear, anger, disgust) in the following ways:

- Either positively-valence or negatively-valenced
- Main eliciting event is evaluation of the self (vs. evaluation of an external situation)
- Often, require cognitive conscious processing
- May develop and be expressed later
- Function to maintain group harmony (instead of avoiding threat)
- Cause facial and bodily changes

Distinct Emotion Theory - Eliciting Events

In this section, we will cover two perspectives of the negatively-valenced self-conscious emotions, which include shame, guilt, and embarrassment. The distinct emotions perspective (Tangney, Keltner) view shame, guilt, and embarrassment as three separate and distinct categories of emotion. Conversely, Single-Emotion Theory (Sabini & Silver, 1997; Sabini et al., 2001) view shame and guilt as *different intensities* of the same distinct emotion. Single-Emotion Theory does not view guilt as an emotion at all! As we progress through scientific evidence for both theories, think about which theory you believe to be correct!

Eliciting Events

Social conventional and moral violations differentiate negative self-conscious emotions. A social conventional violation occurs when we exhibit a small failure that violates social codes – such as social faux pas. Some examples include tripping, appearance malfunctions, and bodily noises. Moral violations occur when we exhibit a behavior that violates a moral code. For example, lying and cheating.

According to the distinct emotion view, embarrassment occurs when we perceive that the self committed a social conventional violation. Arguments exist over whether other people must be physically present for us to experience. In addition, some suggest that embarrassment could be elicited by a positive event during

which other people's attention is focused on the self – such as receiving an award in front of people.

Distinct theorists view shame and guilt as both caused by moral violations. In fact, for both shame and guilt experienced, participants reported both were caused by moral violations (Tangney et al., 1996), while embarrassment was less serious and more accidental. Theorists believe shame and guilt may be felt in a private or public setting. After recalling shame, guilt, and embarrassment memories, researchers found that shame and guilt were equally like to occur with people around and when alone (Tangney et al., 1996). Specifically, 10.4% of guilt and 18.2% of shame experiences were felt alone, while only 2.2% of embarrassment occurred alone. In addition, embarrassment was felt in the presence of more people compared to shame. Participants' ratings confirmed the public setting – embarrassing events occurred when people were looking at the self, whereas this was not the case for shame and guilt (Tangney et al., 1996). Overall these findings show that all three emotions tend to occur in a public format. Coding of the participants' descriptions of the events showed that shame and guilt tended to be felt when surrounded by familiar and more intimate individuals, whereas embarrassment was felt more when surrounded by acquaintances or strangers.

A table showing a self-conscious emotion, an eliciting event, and examples.

Self-Conscious Emotion	Eliciting Event	Examples
Embarrassment	Social Conventional Violation Accidental Social Faux Pas People looking at the self Presence of Acquaintances/ Strangers	Loss of control over body, shortcoming in physical appearance, or cognitive ability
Guilt	Moral Violation Presence of Close Others	Lying, cheating, stealing, not helping others
Shame	Moral Violation Social Conventional Violation Presence of Close Other	Lying, poor performance, embarrassment, socially inappropriate behaviors

Tangney (1992) asked undergraduate students to write separate stories about times they felt shame and guilt. Table 2 shows the common eliciting events of shame and guilt. In general, participants reported that both shame and guilt were caused by a variety of moral violations (e.g., lying, cheating, stealing). But more of the guilt scenarios recalled described lying, cheating, stealing, infidelity, not helping others, and breaking a diet. More of the shame scenarios were caused by personal failures, embarrassment, and socially inappropriate behavior, and hurting someone emotionally. These findings suggest that guilt is solely caused by a moral violation, but that shame overlaps with embarrassment in being caused by social conventional violations too.

Table 2

Eliciting Events Coded in Participants' Recall of Guilt and Shame Events (Tangney, 1992)

A table that shows content, guilt situations, shame situations, and z

Content	Guilt Situations	Shame Situations	z
Lying	21.0%	11.0%	-4.08***
Cheating	22.7%	6.4%	-6.12***
Stealing	19.3%	6.0%	-5.12***
Infidelity	4.9%	2.1%	-2.05**
Not helping others	3.7%	1.4%	-1.86*
Breaking a diet	2.9%	0.7%	-2.04**
Failure (work, school, sports, etc.)	4.6%	19.5%	-3.94***
Embarrassment	0.3%	8.9%	-4.04***
Socially inappropriate behavior or dress	0.0%	5.7%	-3.30***
Sex	0.0%	3.2%	-2.52**
Doing something immoral or wrong (unspecified)	2.3%	7.1%	-2.19**
Hurting someone emotionally	8.9%	17.4%	-1.88*
Crime (Unspecified)	2.6%	2.5%	-0.47
Hurting someone physically	1.4%	2.8%	-0.80
Disobeying Parents	1.4%	2.1%	-0.30
Damaging Objects	2.0%	1.8%	-0.56
Murder	2.0%	1.4%	-0.89

Reproduced from J.P. Tangney, 1992, Situational determinants of shame and guilt in young adulthood, Personality and Social Psychology Bulletin, 18(2), p. 204. (https://doi.org/10.1177/0146167292182011) Copyright 1992 by Society for Personality and Social Psychology.

Keltner and Buswell (1996) provide more information on the differences between shame and guilt. In their study, participants

wrote down events that had caused them to feel embarrassment, shame, and guilt. Then, researchers coded these events. Coding revealed some themes that differentiated the three emotions. But Keltner and Buswell (1996) also found that the eliciting events for shame and guilt overlapped. For example, people described "failing of duties" as causing both shame and guilt.

In conclusion, we might not want to rely on eliciting events as the best way to differentiate these three emotions. One limitations of these studies is that the researchers are assuming everyday children and adult have clear, separate definitions of shame and guilt. But, maybe these two words simply describe different aspects of the same emotion?

Sabini et al. (2000) explored the eliciting events of embarrassment. Remember, Sabini and Silver view embarrassment and shame as the same emotion. The goal of the study was to determine whether Social Evaluation Theory or Dramaturgic Theory best explained embarrassment. Both of these theories essentially viewed sociologist Gottman's Dramaturgy Theory (1959, 1967) in different ways. Dramaturgy Theory views people as actors playing out different roles on a stage. To Gottman, the stage represents the social situation the actor experiences. Thus, similar to social psychologists, Gottman viewed the situation, including interactions between actors, as an important influence on behavior. Social Evaluation Theory (Modigliani 1968, 1971) views the cause of embarrassment as a temporary drop in self-esteem. Proponents of this theory would state that to experience embarrassment one of the following must occur: 1) a negative event in which we temporarily view ourselves in an unfavorable way or 2) we think other people around us view us in a negative way. Dramaturgic Theory is a different interpretation – held by Sabini, Silver and colleagues (Parrott et al., 1988; Silver et al., 1987). This theory refutes the idea that embarrassment is caused by a drop in self-esteem or when we think other people view us negatively. The only requirement for embarrassment is a predicted or present failure in

social performance. Finally, Zajonc's (1965) Mere Presence theory states that the presence of other people impacts arousals and emotions. Thus, this theory would state that when other people are present and focus on the self, that causes embarrassment.

In this study, participants rated the extent to which they would feel embarrassed (1 = *not at all embarrassment*; 7 = *extremely embarrassed*) in 40 different scenarios. From these ratings, Sabini et al. (2000) found that eliciting events for embarrassment fell into three groups: Faux Pas, Centre of Attention, and Sticky Situations.

Table 3

Eliciting Events of Embarrassment According to Each Theory (Sabini et al., 2000)

A table showing an eliciting event, a supporting theory, what the embarrassment is caused by, and an example

Eliciting Event	Theory That Supports	Embarrassment caused by...	Example
Faux Pas	Social Evaluation Theory	Small Social Error	The first day of class, realizing you are in the wrong class and you get up to leave.
Sticky Situations	Dramaturgic Theory	Asking someone to complete a task that will highlight their failure in performance (or predicting you will have to do so)	You have to talk to an employee you supervise about your suspicion they are stealing from the petty cash box.
Centre of Attention	Mere Presence	Focus is on one's self	The professor asks you to read your creative writing assignment out loud to the class.

Scenarios reproduced from J. Sabini, M. Siepmann, J. Stein, and M. Meyerowitz, 2000, Who is embarrassed by what?, Cognition & Emotion, 14(2), pp. 236-240. (https://doi.org/10.1080/026999300378941) Copyright 2000 by Psychology Press.

People reported the most embarrassment for faux pas events, followed by sticky situations, and the least embarrassment for centre of attention. These findings suggest that all three theories make accurate predictions about the causes of embarrassment. But, the events that make people feel the most embarrassment are social faux pas – those events in which we exhibit a negative behavior that drops our self-esteem. Thus, Social Evaluative Theory explains the most embarrassing scenarios. But, the other theories are correct too in that a drop in self-esteem is not a prerequisite to embarrassment.Females reported more embarrassment on the faux pas scale compared to men. Researchers also investigated links between personality and the embarrassing events. Neuroticism was positively correlated with embarrassment in all three events. This suggests that as Neuroticism increases, the extent to which people reported embarrassment for the three events increased. Conversely, as Extraversion increases people reported less embarrassment in only the faux pas event. Finally, trait self-esteem was negatively correlated with embarrassment in faux pas events, but not the other two events.

Test Your Knowledge of Sabini et al.'s (2000) Eliciting Events

Match the following scenarios to Sabini et al.'s (2000) types of embarrassment.

Note. The scenarios were reproduced from J. Sabini, M Siepmann, J. Stein, and M. Meyerowitz 2000,Wwho is embarrassed by what? Cognitions and Emotion, 14(2),pp. 236-240. (https://doi.org/10.1177/0146167201271009) Copyright 2000 by Psychology Press.

Note: Fullscreen mode is enabled for this activity via the bottom at the top right corner of the H5P activity.

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https://psu.pb.unizin.org/psych425/?p=1276#h5p-17

Distinct Emotion Theory - Behavior Changes

General Approach/Avoidance Behavior.

To distinguish shame, guilt, and embarrassment we will look at general approach/avoidance behavior, and changes in facial expressions, vocal sounds, and the body.

During shame, people state they have a desire to hide or escape, demonstrating avoidance behavior. Further, during shame, people report they are not motivated to confess their violation or to apologize to the person they transgressed, showing approach is not a behavior change of shame. Compared to guilt, shame led to a greater desire to hide, to not admit wrong doing, and to avoid self-awareness – all examples of avoidance behavior (Tangney et al., 1996), During guilt, people report the desire to act and solve the problem by apologizing, confessing, or trying to compensate for the bad deed (Tangney et al., 1996).

Because embarrassment causes a combination of avoidance and approach behavior, embarrassment could be placed in the middle of shame and guilt. Avoidance behavior includes blushing, smiling, and covering face. Approach behavior could be joking, smiling, and even laughing. Embarrassment results in less motivation to hide or disappear compared to shame, but also results in less desire to apologize and approach (Tangney et al., 1996).

Avoidance > Shame, Embarrassment, Guilt > Approach

Facial Expressions

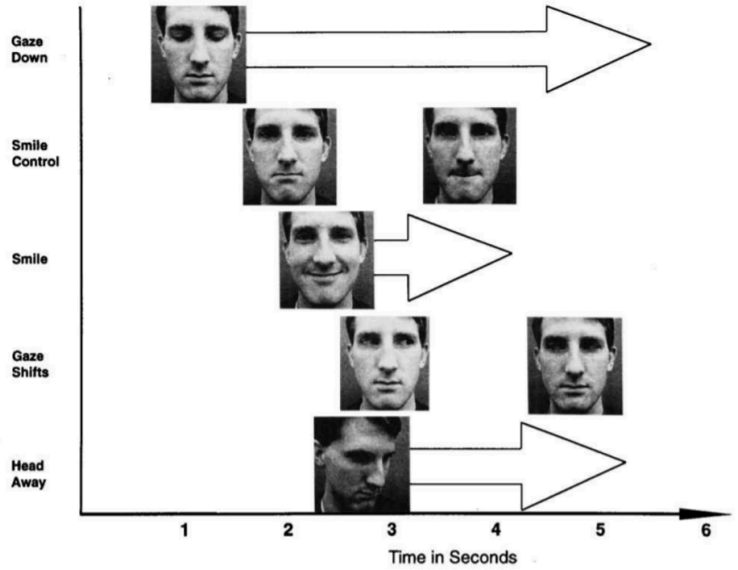
In Keltner's (1995) classic study, he utilized data from participants who had recently completed the Directed Facial Action (DFA) task in an earlier unrelated study. This task is described here . The data from participants who reported feeling embarrassment or amusement during the DFA was analyzed. Specifically, Keltner analyzed the facial expressions and bodily changes of participants in the 15-second rest period following each display of an emotional expression. Compared to participants who felt amused, embarrassed participants…

- looked down faster, spent a longer period of time looking down, and frequently changed their gaze location.
- showed more "smile controls" or attempts to conceal a smile or the zygomatic AU change.
- more lip presses (AU 24)
- turning head away from camera and more downward head movements
- more face touches

Figure 1 shows the facial changes that occurred overtime during the embarrassment experience. The duration of each facial change is from the left edge of the photograph to the end of the arrow. Thus, downward gaze is the facial change that last the longest, followed by head away. It is interesting to note that the embarrassment facial expression comprises several facial changes over a period of six seconds.

Figure 1

Facial Expression Change Over Time and Average Length of Each Change (*Keltner*, 1995)



Reproduced from D. Keltner, 1995, Signs of appeasement: Evidence for the distinct displays of embarrassment, amusement, and shame. *Journal of Personality and Social Psychology*, 68(3),p. 445 (https://doi.org/10.1037/0022-3514.68.3.441) Copyright 1995 by the American Psychological Association.

Some theorists believe the embarrassment facial expression serves an adaptive purpose – to show appeasement to others (Keltner, 1995; Castelfranchi & Poggi, 1990). The appeasement hypothesis states that when an individual violates a social norm, this elicits anger in group members. By displaying the embarrassment facial expression after violating a norm, people acknowledge that they are aware of their violation and exhibit submission to maintain the social order. Yet, Keltner acknowledged the DFA task is one unique situation that elicited embarrassment and that some of the touching

displays could be due to the physiological attachments and not really to embarrassment.

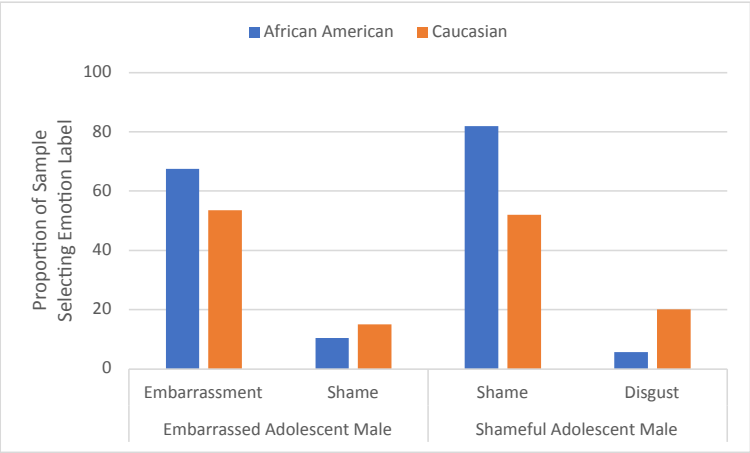
In a follow-up study Keltner (1995) had participants watch a videotape and free list the emotion expressed by the individual in the tape. Participants rated the individuals showing embarrassment as sad, followed by nervous. Participants did not specifically state the term embarrassment (this relates to the Widen and Russell (2011) study below).

In another study, Keltner (1995) explored whether shame and embarrassment facial expressions were unique. In this study, participants watched video recordings of 12– to 13-year-old Caucasian and African American males completing an IQ test. Clips of the IQ test showing facial expressions of amusement, enjoyment, anger, disgust, and shame and guilt were identified using Ekman and Friesen's (1978) FACS. After watching each clip, participants selected an emotion term (amusement, enjoyment, anger, disgust, and shame and guilt) that described the males' facial expressions.

Findings showed that participants selected embarrassed labels for the embarrassed expressions displayed by the adolescent males and picked the shame label for males expressing shame. Interestingly, participants were more accurate in labeling embarrassment and shame when they were evaluating expressions of African-American boys compared to Caucasian boys.

Figure 2

Proportion of Sample Selecting Emotion Label of Embarrassed and Shameful Adolescent Males



Embarrassed Adolescent Male: *Embarrassment*; *African American* – 68, *Embarrassment*; *Caucasian* – 53, *Shame*; *African American* – 10, *Shame*; *Caucasian* – 16.

Shameful Adolescent Male: *Shame*; *African American* – 82, *Shame*; *Caucasian* – 52, *Disgust*; *African American* – 5, *Disgust*; *Caucasian* – 20.

Adapted from D. Keltner, 1995, Signs of appeasement: Evidence for the distinct displays of embarrassment, amusement, and shame. Journal of Personality and Social Psychology, 68(3),p. 452 (https://doi.org/10.1037/0022-3514.68.3.441) Copyright 1995 by the American Psychological Association.

In Keltner and Buswell (1996; the classic study we discussed above), they sought to identify the facial expressions associated with embarrassment, shame, and guilt. Participants were shown 14 facial expressions for five seconds. For each of the 14 emotional expressions, they viewed 2 photos of the same female poser and 2 photos of the same male poser. After viewing each photo, they were presented with a list of 14 emotion labels and instructed to select the emotion that was the best match for previously viewed facial

expression. They had to select the emotion label within 10 seconds. The 14 emotion labels were:

- Amusement
- Anger
- Awe
- (self)-contempt
- Disgust
- Embarrassment
- Fear
- Guilt
- Happiness
- Pain
- Sadness
- Shame
- Surprise
- Sympathy
- No Emotion

Below, are the photos that the researchers believed corresponded to embarrassment, shame, and sadness.

Table

Keltner and Buswell's (1996) Facial Expressions of Embarrassment, Shame, and Sadness

A table that shows an emotion, an image example of that emotion, action units, and described actions for the emotion.

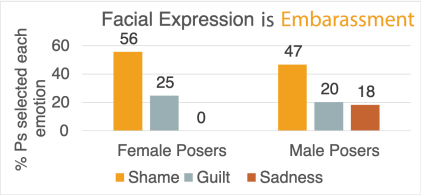
Emotion	Image Example	Action Units	Description
Embarrassment		7 + 12 + 15 + 52 + 54 + 64	Eyelids narrowed, controlled smile, head turned and down (not scores with FACS: hand touches face)
Shame		54 + 64	Head down, eyes down
Sadness		1 + 4 + 6 + 15 + 17	Brows knitted, eyes slightly tightened, lip corners depressed, lower lip raised

Adapted from D. Keltner and D.T. Cordaro, 2017, Understanding multimodal emotional expressions: Recent advances in basic emotion theory. The science of facial expression, p. 59-61. Copyright 2017 by Oxford University.

Figure 4 shows the percentage of participants who selected each emotion when the facial expression displayed was embarrassment. For both female and male posers, a majority of participants selected embarrassment (51% when viewing female posers; 56% when viewing male posers). Not shown in the figure, only 7% of the sample judged the embarrassment photos to be shame.

Figure 4

Percentage of participants who selected each emotion for embarrassment expression



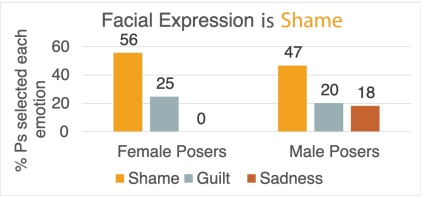
Female Posers: Shame – 56, *Guilt* – 25, *Sadness* – 0. *Male Posers: Shame* – 47, *Guilt* – 20, *Sadness* – 18

Note. Researchers considered 7.2% as above chance; So, when less than 7.2% of sample selected label, label not included in data. Adapted from D., Keltner, & B.N. Buswell, 1996, Evidence for the distinctness of embarrassment, shame, and guilt: A study of recalled antecedents and facial expressions of emotion. Cognition and Emotion, 10(2), p. 166, (https://doi.org/10.1080/026999396380312). Copyright 1996 Psychology Press. Photo reproduced from D. Keltner and D.T. Cordaro, 2017, Understanding multimodal emotional expressions: Recent advances in basic emotion theory. The science of facial expression, p. 59-61. Copyright 2017 by Oxford University.

Figure 5 below shows the percentage of participants who selected each emotion when the facial expression displayed was shame. A majority of participants selected shame for the female posers (56%) and almost a majority for male posers (47%). Not shown in the figure, only 3.4% of the sample judged the shame photos to be embarrassment. Although the facial expressions for shame and embarrassment appear to be unique, it is important to note that in this study recognition rates for negative basic emotions were higher, as shown in Table 4. For instance, when shown a disgust photo, recognition rates were 88.9% and 85.9% for female and male posers (Figure 5).

Figure 5

Percentage of participants who selected each emotion for shame expression



Female Posers: Shame – 56, Guilt – 25, Sadness – 0. Male Posers: Shame – 47, Guilt – 20, Sadness – 18.

Table 4

Percentage of participants who selected each emotion for basic emotions expression (Keltner & Buswell, 1996

A table showing a basic emotion, and percentages of female and male posers responding differently

"Basic" Emotion	Female Posers	Male Posers
Anger	Anger: 66.7 Disgust: 17.2 Contempt: 11.1	Anger: 87.3 Contempt: 07.7
Contempt	Disgust: 66.5 Contempt: 17.5	Disgust: 45.6 Contempt: 32.5
Disgust	Disgust: 88.9	Disgust: 85.9
Fear	Fear: 83.2	Fear: 91.9
Happiness	Happiness: 89.7	Happiness: 74.8
Sadness	Sadness: 84.0	Amusement: 15.6 Sadness: 78.6
Surprise	Surprise: 72.2 Fear: 12.5 Awe: 11.8	Surprise: 84.4 Awe: 12.2

Note. Researchers considered 7.2% as above chance; So, when less than 7.2% of sample selected label, label not included in data. Adapted from D., Keltner, & B.N. Buswell, 1996, Evidence for the distinctness of embarrassment, shame, and guilt: A study of recalled antecedents and facial expressions of emotion. Cognition and Emotion, 10(2), p. 166, (https://doi.org/10.1080/026999396380312). Copyright 1996 Psychology Press.

To test for a unique guilt facial expression, researchers displayed facial expressions of self-contempt, sympathy, and pain. Keltner and colleagues believed these three facial expressions could represent guilt. Why? Well self-contempt could be similar to anger toward the self for committing a violation. After harming another person, we may feel sympathy toward that person (i.e., care, concern, feel bad for them). Finally, pain is a subjective feeling often reported with guilt and shame experiences (Tangney et al., 1996).

Figure 6
Keltner and Buswell's Facial Expressions Related to Guilt

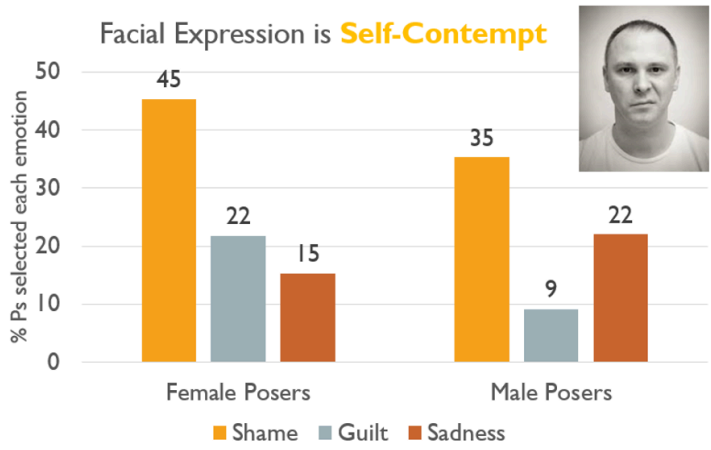
a table showing an emotion, an image example of that emotion, action units, and a description of the facial expression.

Emotion	Image Example	Action Units	Description
Self-Contempt		14 + 54 + 64	Unilateral lip corner tightening, head down, gaze down
Sympathy		1 + 17 + 24 + 57	Inner eyebrow raised, lower lip raised, lips pressed together, head slightly forward

Pain		4 + 6 + 7 + 9 + 17 + 18 + 23 + 24	Eyes tightly closed, nose wrinkled, brows furrowed, lips tight, pressed together, and slightly puckered

Adapted from D. Keltner and D.T. Cordaro, 2017, Understanding multimodal emotional expressions: Recent advances in basic emotion theory. The science of facial expression, p. 59-61. Copyright 2017 by Oxford University.

As can be seen in Figure 7, most participants reported self-contempt facial expressions to be shame.



Female Posers: Shame – 45, Guilt – 22, Sadness – 15.
Male Posers: Shame – 35, Guilt – 9, Sadness – 22.

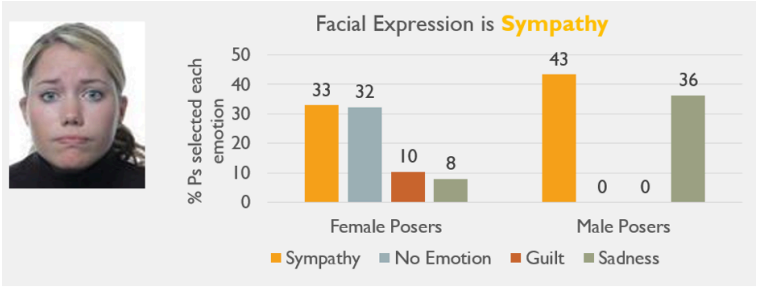
Figure 7

Percentage of participants who selected each emotion for self-contempt expression

Note. Researchers considered 7.2% as above chance; So, when less than 7.2% of sample selected label, label not included in data. Adapted from D., Keltner, & B.N. Buswell, 1996, Evidence for the distinctness of embarrassment, shame, and guilt: A study of recalled antecedents and facial expressions of emotion. Cognition and Emotion, 10(2), p. 166, (https://doi.org/10.1080/026999396380312). Copyright 1996 Psychology Press. Photo reproduced from D. Keltner and D.T. Cordaro, 2017, Understanding multimodal emotional expressions: Recent advances in basic emotion theory. The science of facial expression, p. 59-61. Copyright 2017 by Oxford University.

For the sympathy facial expression (Figure 8), the findings differed according to the gender of the poser. For female posers, 1/3 participants labeled the expression sympathy and another 1/3 selected no emotion. For male posers, 43% selected sympathy, while

36% selected sadness. Guilt was not selected at beyond chance levels.

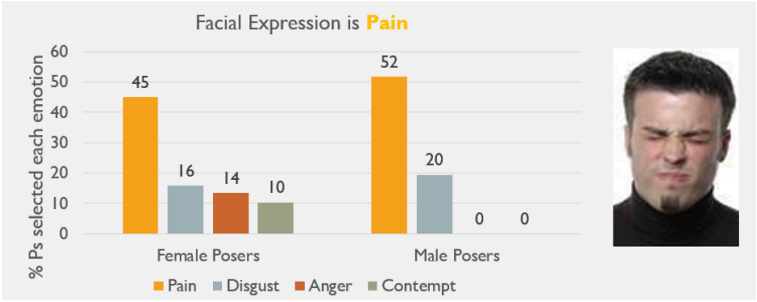


Female Posers: Sympathy – 33, *No emotion* – 32, *Guilt* – 10, *Sadness* – 8.
Male Posers: Sympathy – 43, *No Emotion* – 0, *Guilt* – 0, *Sadness* – 36.

Figure 8

Percentage of participants who selected each emotion for sympathy expression

Note. Researchers considered 7.2% as above chance; So, when less than 7.2% of sample selected label, label not included in data. Adapted from D., Keltner, & B.N. Buswell, 1996, Evidence for the distinctness of embarrassment, shame, and guilt: A study of recalled antecedents and facial expressions of emotion. Cognition and Emotion, 10(2), p. 166, (https://doi.org/10.1080/026999396380312). Copyright 1996 Psychology Press. Photo reproduced from D. Keltner and D.T. Cordaro, 2017, Understanding multimodal emotional expressions: Recent advances in basic emotion theory. The science of facial expression, p. 59-61. Copyright 2017 by Oxford University.



Female Posers: Pain – 45, Disgust – 16, Anger – 14, Contempt – 10.
Male Posers: Pain – 52, Disgust – 20, Anger – 0, Contempt – 0.

Figure 9

Percentage of participants who selected each emotion for pain expression

Note. Researchers considered 7.2% as above chance; So, when less than 7.2% of sample selected label, label not included in data. Adapted from D., Keltner, & B.N. Buswell, 1996, Evidence for the distinctness of embarrassment, shame, and guilt: A study of recalled antecedents and facial expressions of emotion. Cognition and Emotion, 10(2), p. 166, (https://doi.org/10.1080/026999396380312). Copyright 1996 Psychology Press. Photo reproduced from D. Keltner and D.T. Cordaro, 2017, Understanding multimodal emotional expressions: Recent advances in basic emotion theory. The science of facial expression, p. 59-61. Copyright 2017 by Oxford University.

Taken together these findings suggest that currently we do not have evidence for a unique facial expression of guilt. Further, these findings suggest that expressions of self-contempt convey the emotion of shame, instead of guilt. Finally, although shame and embarrassment are uniquely recognized, the recognition rates are lower than for other basic emotions caused by an external eliciting event.

In another study, Widen, Russell and colleagues (2011, yes, James

Russell of the circumplex model), investigated whether participants could identify facial expressions of embarrassment, shame, contempt, and compassion. Participants were shown 10 photographs of emotional expressions. Six of these photos were of the basic emotions happiness, sadness, anger, fear, surprise, and disgust, first identified by Ekman and Friesen (1971). The facial expressions of contempt, shame, embarrassment, and compassion were identified by Haidt and Keltner (1999) using the FACS (Ekman & Friesen, 1978).

Figure 10

Facial Expression Photos from Haidt and Keltner (1999)

Adapted from J. Haidt and D. Keltner, 1999, Culture and facial expression: Open-ended methods find more expressions and a gradient of recognition. Cognition & Emotion, 13(3), p. 234 (https://doi.org/10.1080/026999399379267) Copyright 1999 Psychology Press.

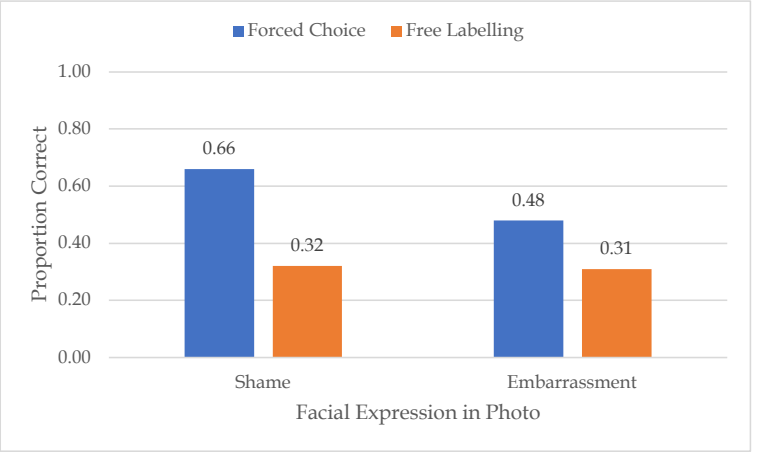
All participants first identified the emotions using free call and then were shown the expressions again and given a list of emotional labels from which to choose. Participants' free responses

were coded into categories of emotion. For instance, the terms ashamed, dejected, guilty, and shameful were placed in the shame category and terms embarrassed, bashful, and shy were placed in the embarrassment category.

Figure 11 shows that for the shame and embarrassment facial expressions, participants got more correct when they completed the forced choice method versus the free label method. It is important to note that recognition rates when free labelling the original six basic emotions ranged from . 41 (for disgust) to .94 (for happiness).

Figure 11

Proportion of Correct Forced Choice and Free Labelled Responses for Shame and Embarrassment Facial Expressions



Shame; *Forced Choice* – 0.66, *Shame*; *Free Labelling* – 0.32

Embarrassment; *Forced Choice* – 0.48, *Embarassment*; *Free Labelling* – 0.31

Adapted from S.C. Widen, A.M. Christy, K. Hewett, and J.A. Russell, 2011, Do proposed facial expressions of contempt, shame,

embarrassment, and compassion communicate the predicted emotion?. Cognition & Emotion, 25(5), p. 901. https://doi.org/10.1080/02699931.2010.508270 Copyright 2010 Psychology Press.

Below, Figure 12 shows that for the facial expression embarrassment, most participants free labeled embarrassment, followed by happy, sad, and cognition (although the remaining 21% of the responses were placed in other emotion categories). Most participants free labeled the shame expression as sadness, followed by shame and then cognition. These findings might suggest that research has not yet identified a unique facial expression of shame or embarrassment. In addition, the shame expression free recall responses incorporated guilt, this making it harder to determine whether guilt and shame are distinct emotions.

Figure 12

Proportion in of Participants Responses for Shame and Guilt Expressions in Free Labeling Session

Shame; *Correct* – 0.32, *Shame*; *Happy* – 0, *Shame*; *Sad* – 0.42, *Shame*; *Cognition* – 0.05

Embarrassment; *Correct* – 0.31, *Embarrassment*; *Happy* – 0.24, *Embarrassment*; *Sad* – 0.23, *Embarrassment*; *Cognition* – 0.01

Note. Cognition category includes free labeled responses of "confused, curious, debating, doubtful, perplexed, skeptical, suspicious, uncertain, and unsure" (Widen et al., 2011, p. 900). Adapted from S.C. Widen, A.M. Christy, K. Hewett, and J.A. Russell, 2011, Do proposed facial expressions of contempt, shame, embarrassment, and compassion communicate the predicted emotion?. Cognition & Emotion, 25(5), p.903. https://doi.org/10.1080/02699931.2010.508270 Copyright 2010 Psychology Press.

Overall these studies provide some initial evidence of embarrassment facial changes, including averting gaze, shifting gaze, head down, and touching the face. More recent evidence by Widen et al. (2011) suggests the recognition rates for shame and embarrassment might be inflated due to the forced choice method used in past research. In fact, Russell found participants did not do a great job at correctly free labeling shame and embarrassment. So, this might suggest that shame and embarrassment are not basic emotions. This could also mean that because the embarrassment facial expressions change over a short period of time, identifying the emotion in still photos could be more difficult. Unfortunately, we do not have much evidence on cross-cultural differences in facial expressions. Some of this new research will be discussed in the pride section here.

Vocal Changes

In 2009, Simon-Thomas, Keltner and colleagues sought to identify unique vocal expressions of shame, guilt, and embarrassment. Similar to the Cordaro et al. (2016) and Sauter et al. (2010) emotional stories were used. But this time, participants were read the emotion term and corresponding scenario to define the emotion labels for participants (see Table 5). Then, participants heard one vocal sound and picked the correct emotion label out of 9 possible emotion labels and no option. The 9 vocal sounds included anger, disgust, fear, sadness, surprise, contempt, embarrassment, guilt, and shame.

Table 5

Emotional stories utilized in Simon-Thomas et al., (2009)

A table showing an emotion and an emotional story to go with it

Emotion	Emotional Story
Embarrassment	Someone discovers that you have made a social gaffe
Guilt	You know that you have done something (morally) wrong that has hurt another person
Shame	You feel like you are a bad person

Below, tables 6 and 7 display the findings for basic and self-conscious emotions. For self-conscious emotions, a significant number of participants did not label the vocal sounds correctly. For the embarrassment, guilt, and shame vocal sounds, 1/3 participants selected the label "no emotion!" Looking further, for these self-conscious emotions, some participants selected the emotion sadness – which is fascinating! So, whatever sounds were selected for shame, guilt, and embarrassment conveyed sadness to the participants. Maybe these self-conscious emotions are simply sadness that we experience when we disappointment the self!

A few other interesting findings unreacted to self-conscious

emotions. Most participants labeled the fear sound (presumably a scream or gasp) surprise – and much work suggests that fear and surprise are often confused. When participants heard a contempt sound they labeled this sound "no emotion." This parallels the CAD triad (Rozin et al., 1999) findings in which people also labeled community violations "no emotion," instead of the correct labels "contempt."

Table 6

For basic emotions, % participants who selected each emotion label for the vocal sound.

A table showing % of participants who selected each emotion label for the vocal sound..

Correct Label for Vocal Sound	% Selected Each Vocal Sound (correct answer bolded)
Anger	**79 Anger** 6 Fear
Disgust	**83 Disgust** 6 No Emotion 46 Surprise
Fear	**37 Fear** **64 Sadness**
Sadness	16 No Emotion 6 Shame 5 Embarrassment
Surprise	**60 Surprise** 17 No Emotion 12 Fear 39 No Emotion
Contempt	**34 Contempt** 7 Disgust 5 Surprise 5 Shame

Table 7

For self-conscious emotions, % participants who selected each emotion label for the vocal sound.

A table showing % of participants who selected each emotion label for the vocal sound.

Correct Label for Vocal Sound	% Selected Each Vocal Sound (correct answer bolded)
Embarrassment	33 No Emotion **17 Embarrassment** 11 Sadness 11 Shame 10 Guilt
Guilt	30 No Emotion 27 Sadness 15 Shame **14 Guilt** 8 Embarrassment
Shame	31 No Emotion 27 Sadness **13 Shame** 10 Guilt 8 Disgust 7 Embarrassment 6 Sadness 5 Contempt
No Emotion	39 Contempt 17 Surprise 16 Sadness 6 Disgust

In Cordaro, Keltner, and colleagues' (2016) study on vocal change (review here), participants matched a story about embarrassment to a vocal sound. The story was "He/she is passionately singing his/her favorite song until s/he realized his/her friends were watching, and now s/he feels embarrassed" (Cordaro et al., 2016, Table 3, p. 121). The correct vocal sound for embarrassment was self-conscious laughter and a groan. All countries, including Bhutan, matched the vocal sound to the embarrassment stories at beyond chance levels.

The lowest recognition rates were obtained in India (79%) and in Bhutan (about 43%).

Watch June Tangey on Guilt and Shame (recommended: beginning through 11:00)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1311#oembed-1

Watch Dachner Keltner Discuss Embarrassment (recommended: beginning through 9:25)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1311#oembed-2

Distinct Emotion Theory - Cognitive Appraisals

Distinct emotion theorists differentiate shame, guilt, and embarrassment with cognitive appraisals. Specifically, these cognitive appraisals occur when we make attributions for our own behavior. An attribution is any explanation we provide for our own and other people's behaviors. When we make an internal attribution for our own behavior, we blame the self for the behavior. When we make an external attribution for our own behavior, we blame an external agent for our behavior (i.e., another person, luck, the situational influences). All self-conscious emotions are caused by internal attributions of the self.
According to Tangey et al. (1992), shame is caused by a "bad self" attribution, whereas guilt is caused by a "bad act" attribution. When we make a bad self cognitive appraisal, we acknowledge that we made a specific transgression AND we make a negative evaluation of the global self. This means because of our transgression we view the entire self as a bad individual. For instance, I might say "I lied to my romantic partner – I'm a bad person." Guilt is caused when we acknowledge the specific transgression, but we do NOT perceive the self as global, horrible individual. For example, we might think, "I lied to my romantic partner, but that doesn't make me a bad person. I lied to make them feel good." Embarrassment occurs when we realize that other people are focused on the self and evaluating us (Tangney et al., 1996). For instance, "I tripped down the stairs in my dorm and other students are staring at me." The focus on the self could also be due to a positive behavior that we exhibit, "I am giving the valedictorian speech and everyone is listening to me."
Other cognitive appraisals might help differentiate the self-conscious emotions. During shame (vs. guilt), participants reported

more focus on other people's thoughts (demonstrating theory of mind). Guilt and shame result in equal levels of acknowledging responsibility for the behavior and immorality (Tangney et al., 1996). Embarrassment, compared to shame and guilt, was associated with higher levels of unexpectedness, event occurring suddenly, and less responsibility for behavior. When predicting others' thoughts, people recalling embarrassment believed other people felt more amusement and less negative emotions toward the violation (Tangney et al., 1996).

Scherer (1997) investigated the cognitive appraisals associated with shame and guilt. In his study, he asked participants to recall a time they experienced shame or guilt (for more information on this study, go to this section). Means (see Table 6), collapsed across all world regions, show that participants reported the following appraisals when recalling an shame/guilt experience: unexpected, unpleasant, no changes in goal obstruction, fair, self/internal causation, pretend nothing happened coping strategy, a little immoral, and reduced self-esteem. It is important to note that participants reported both shame and guilt were caused by internal attributions and people perceived a temporary drop in self-esteem. The drop in self-esteem is probably a contributor to the unpleasant feelings associated with shame and guilt. Also, participants reported that they would cope by pretending nothing happened, which aligns with the avoidance behavior associated with shame. Compare the means for shame and guilt for each cognitive appraisal dimension. Are they similar or different? What does this study tell us about whether shame and guilt are similar or different emotions?

Table 6

Mean Changes in Cognitive Appraisal Dimensions for Anger (Scherer, 1997)

A table that shows a cognitive appraisal dimension, mean averages for shame and guilt, a question, and a response scale to that question.

Cognitive Appraisal Dimension	Mean Shame	Mean Guilt	Question	Response Scale
Expectedness	1.48	1.58	Did you expect this situation to occur?	1 = not at all; 2 = a little; 3 = very much
Unpleasantness	2.80	2.78	Did you find the event itself pleasant or unpleasant?	1 = pleasant; 2 = neutral; 3 = unpleasant
Goal Obstruction	2.33	2.32	Did the event help or hinder you to follow your plans or achieve your aims?	1 = it helped; 2 = it didn't matter; 3 = it hindered
Unfairness	1.73	1.77	Was the situation unjust or unfair?	1 = not at all; 2 = a little; 3 = very much
External Causation	1.63	1.47	Who you think was responsible for the event?	1 = self/internal; 2 = close persons/ external; 3 = other persons/external; 4 = impersonal agency/external
Coping Ability	3.13	3.25	How did you evaluate your ability to act on or to cope with the event and its consequences?	1= powerless; 2 = escape possible; 3 = pretend nothing happened; 4 = no action necessary; 5 = could positively influence event and change consequences
Immorality	1.95	2.05	Would this behavior itself be judged as improper or immoral by your acquaintances?	1 = not at all; 2 = a little; 3 = very much

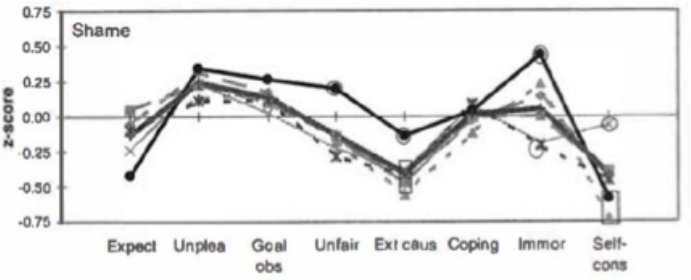
Self-esteem	1.45	1.43	How did this event affect your self-esteem?	1=negatively; 2= not at all; 3 = positively

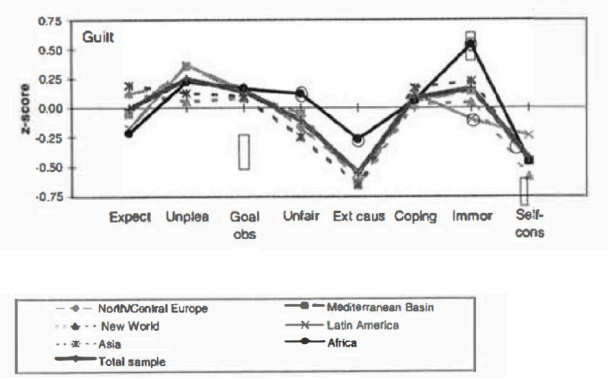
Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 905, 911 (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Figure 13 displays the cross-cultural differences in cognitive appraisals for shame and guilt. In Figure 13 the presence of a circle around a datapoint indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample. The following four cognitive appraisals show cross-cultural differences: unfairness, external causation, immorality, and self-consistency. People living in the Africa region reported they interpreted the eliciting events for shame and guilt as higher in unfairness, more externally caused, and higher in immorality than the average of the sample. Compared to the average of the sample, Latin American participants reported both shame and guilt to be caused by something more moral and they reported the event to have less of a negative impact on their self-esteem.

Figure 13

Eight Cognitive Appraisal Ratings for Shame (Top) and Guilt (Bottom) across Six World Regions (Scherer, 1997)





Note. Presence of a circle around a datapoint indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample. Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 912, (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Distinct Emotion Theory - Subjective Feelings

Table 7 lists the subjective feelings participants identify for each self-conscious emotion (Tangney et al., 1996). Some subjective feelings overlap for shame and guilt. A major difference between shame and guilt is that the subjective feelings of guilt encompass positive and negative emotions, whereas shame seems to elicit only negative emotions. Similar to guilt, embarrassment also includes negative emotions associated with a temporary drop in self-esteem (e.g., looking foolish), but also positive emotions like amusement. Keep in mind these subjective feelings could be part of the emotion experience or might occur directly after the self-conscious emotion. For instance, if we accidentally pass gas in public, our initial emotion might be embarrassment, which is quickly followed by amusement and laughing at the self.

Table 7

Subjective Feelings Associated with each Negative Self-Conscious Emotion

A table showing a self-conscious emotion, and the related subjective feelings.

Self-Conscious Emotion	Subjective Feelings
Shame	regret, depression, immoral, disgust, anger toward the self, contempt, sadness, fear, hopelessness, embarrassment, shyness
Guilt	regret, remorse, rumination/anxiety, disgust, anger toward the self, contempt, sadness, fear, hope
Embarrassment	Foolish, stupid, awkward, less anger toward the self, amusement, joy, astonishment, shyness

The activation and arousal experienced with each emotion differs. In general, activation and unpleasantness are highest for shame and lowest for embarrassment (Tangney et al., 1996). Interestingly, even though participants reported the greatest arousal for shame, participants believed embarrassment caused the most physiological changes in heart rate and blushing. It may be that the blushing aspect of embarrassment biased participants' reports. Some people think shame is the most intense because in shame people evaluate the entire self negatively, whereas in guilt people evaluate one specific behavior negatively.

Activation: Shame > Guilt > Embarrassment
Unpleasantness: Shame > Guilt > Embarrassment

Depending on the self-conscious emotion, subjective feelings may dissipate at different rates. Subjective feelings linked to shame last for the longest period of time, followed by guilt, and then embarrassment (Tangney et al., 1996).

Distinct Emotion Theory - Physiological Arousal

SNS/PNS Changes. In general, the three self-conscious emotions cause SNS activation. A physiological change specific to embarrassment is blushing.

In one study (Freed & D'Andrea, 2015), researchers investigated how the ANS changes during self-conscious emotions. In this study, the physiology of 25 female participants diagnosed with PTSD was taken at baseline and during a slideshow. The slides included 12 trauma-related images pertaining to the event that caused the PTSD. After viewing each slide, participants reported the amount of fear/anxiety and shame/guilty they felt. Two minutes after the slideshow ended, participants self-reported their emotional states again. Dependent variables included a measures of respiratory sinus arrythmia (RSA) and skin conductance level (SCL). In this study, when shame/guilt was elicited by the trauma slides, participants showed in a reduction in RSA but no change in SCL and these findings held in the 2-minute period after the slides ended. Similarly, when participants reported fear/anxiety after the slides, their RSA decreased and their SCL did not change. Although these findings suggest guilt/shame and fear/anxiety cause PNS deactivation and no change in SNS, they should be taken with caution due to the small sample size. But, other research (Gerlach et al., 2003) tasked healthy controls and social phobic individuals to watch a video of themselves singing a song in front of other people. During the video, RSA did not change for either group but skin conductance and heart rate increased, suggesting embarrassment causes SNS activation but no changes in the PNS system. Blushing, a physiological change experienced during embarrassment is caused by SNS activation . When we blush, the SNS opens our blood vessels in our face, neck, and ears essentially overflowing

these areas with blood, causing a red and hot face! Even Darwin (1872) identified blushing as an important indication of emotions describing blushing as "the most peculiar and most human of all expressions" (1872, p. 310).

Darwin 's (1872) chapter on blushing and self-conscious emotions entitled, "Self-Attention -Shame-Shyness-Modesty-Blushing," can be found here.For more discussion of blushing's role in emotion and blushing as an evolutionary adaptation, read this article by Ray Crozier (2010), a human emotions researcher!

Kreibig's review (2010, study described here) included a meta-analysis of physiological changes of embarrassment. Kreibig states that eliciting embarrassment in the laboratory typically includes humiliating the participants, asking participants to watch a video of themselves singing, or even imagining an embarrassing situation. These eliciting events resulted in SNS activation and PNS withdrawal (see Table 8). But Kreibig does point out that too few studies have been conducted on physiological chances in embarrassment to draw any definitive conclusions. In conclusion, research suggests that self-conscious emotions cause SNS activation and either PNS deactivation or no changes in PNS activity.

Table 8

Physiological Changes of Embarrassment Elicited in the Laboratory (Kreibig, 2010)

A table showing a type of ANS change, and the accompanying physiological changes

Type of ANS Change	Physiological Changes
SNS Activation	Increased heart rate Shortened cardiac PEP Increased blood pressure Increased skin conductance
PNS Withdrawal	Decreased heart-rate variability

Distinct Emotion Theory - Brain Activation

Research has begun to investigate how activation in the brain changes during the experience of negative self-conscious emotions. A meta-analysis (Bastian et al., 2016) on brain activation when eliciting shame, guilt, and embarrassment in the lab found the findings in Table 9. The increases in activation are compared either to neutral conditions or conditions in which other negative emotions were elicited. While reviewing the table, think about whether these findings support the locationist or constructivist view of the brain. For a review of these views, go here .

Table 9

Brain Activation During Shame, Guilt, and Embarrassment Laboratory Tasks (*Bastian et al.* 2016)

A table showing an emotion, the number of studies, and the brain areas showing an inrease in activation.

Emotion	# of Studies	Brain areas showing an increase in activation...
Shame	4	↑ Prefrontal cortex, temporal lobes, insula, basal ganglia
Embarrassment	6	↑ Prefrontal cortex, hippocampus, amygdala
Guilt	15	↑ Prefrontal cortex, temporal lobes, insula, ACC, thalamus, basal ganglia, amygdala

Note. The above findings are not exhaustive.

Orbitofrontal Cortex. The orbitofrontal cortex (OFC) is a structure that we first covered in the anger chapter (for a review, click here). Recent work (Beer, Keltner, and colleagues, 2003) suggests this structure is activated when we regulate social behavior and when we experience self-conscious emotions. One study found that

damage to the OFC hinders people ability to regulate their behaviors and impacts their experience of self-conscious emotions. In this study, participants with damage to the orbitofrontal cortex (vs. healthy controls) completed a variety of lab tasks with strangers. During these tasks, the following findings were obtained:

- *Inappropriate self-disclosure*: orbito patients disclosed more personally, intimate inappropriate information to strangers (compared to controls).
- *Inappropriate teasing*: During a nickname game, orbito patients more often engaged in appropriate teasing of the confederate stranger (e.g., staring too long, hostility, occupying stranger's space).
- *Less likely to express repair behaviors*: Orbito patients were less likely to seek to repair the inappropriate behavior through blushing, apologizing, or exhibiting submissive behaviors.
- *Greater facial expression of embarrassment*: During the nickname game, orbito patients expressed more embarrassment on the face than controls.
- *Greater levels of self-reported pride*: After the nickname game ended, orbito patients reported more pride, but the same levels of embarrassment and amusement as the controls.
- *Difficulty recognizing shame and embarrassment*: Orbito patients incorrectly free-labeled photos of shame and embarrassment (photos from Haidt & Keltner, 1999), but did not show impairment in free labeling emotional expressions of anger, disgust, fear, happiness, sadness, contempt, surprise, and amusement.

Taken together, these findings highlight that the OFC functions to keep our behavior in line with social norms and expectations. Further, when damaged, people's behavior changes and subjective feelings do not align. It may be that people's inability to experience high levels of embarrassment may prevent them from realizing that their behavior is socially inappropriate. Alternatively, people with

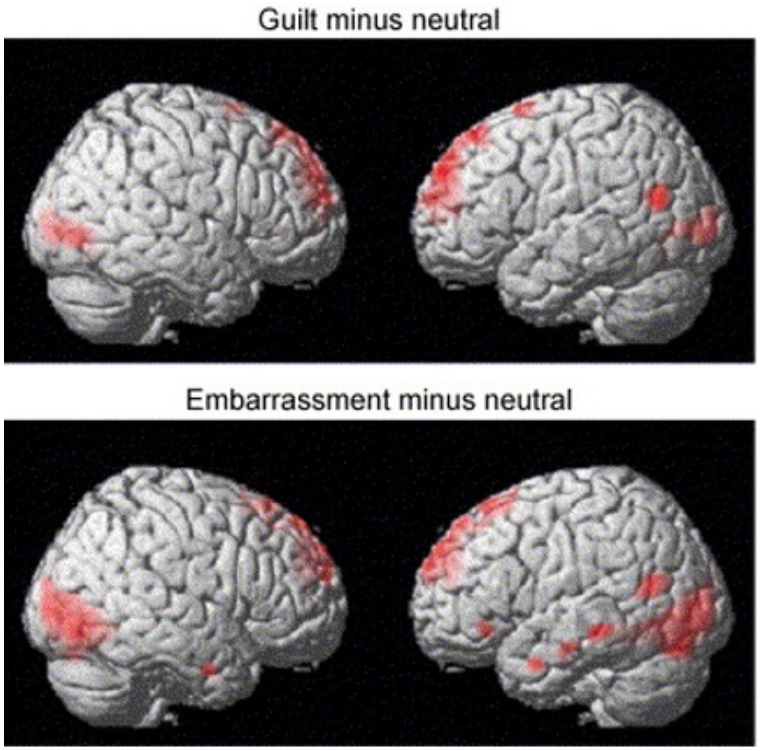
OFC damage may have difficulty evaluating the self's behaviors against society's morals, thus resulting in no change in their self-reported embarrassment.

Self-Conscious Emotions and Theory of Mind. Other research has investigated the relationship between self-conscious emotions and the brain structures that are activated by theory of mind. Developmentally, people exhibit theory of mind (TOM) when they can understand and predict the mental states of other people. TOM develops around age three years old . For example, I utilize theory of mind when I develop my lectures for students – I have to predict the students' mental states – what they already know and what they do not know.

In this study (Takahashi et al., 2004), baseline fMRI measures of healthy, Japanese participants were taken. Then, while in the fMRI, participants read sentences that involved neutral, guilty, or embarrassing contexts. These sentences were meant to elicit the emotion by encouraging the participant to image acting out the behavior. The independent variable conditions would be the baseline fMRI measures versus the sentence-reading fMRI measures. The dependent variables represented activation in various brain structures. Compared to neutral sentences, reading guilt and embarrassing sentences resulted in activation in the medial prefrontal cortex (MPFC), the superior temporal sulcus (STS), and the visual cortex (see Figure 14). Both the MPFC and STS structures are activated during theory of mind tasks. Embarrassment (vs. guilt) showed greater activation in the temporal cortex, hippocampus, and visual cortex. These TOM areas may be activated because when we evaluate a violation we committed, we have to take the perspective of other people to determine how other people are evaluating our violation, and this perspective-taking causes the self-conscious emotion!

Figure 14

Brain Activation During Guilty and Embarrassing Sentences Compared to Neutral Sentences



Reproduced from H. Takahashi, N. Yahata, M. Koeda, T. Matsuda, K. Asai, & Y. Okubo, 2004. Brain activation associated with evaluative processes of guilt and embarrassment: an fMRI study. Neuroimage, 23(3), 90 (https://doi.org/10.1016/j.neuroimage.2004.07.054) Copyright 2004 by Elsevier.

Approach-Withdrawal Hypothesis.
This study looks at the relationship between frontal asymmetry and guilt. For a review of frontal asymmetry, go here.
In this study (Amodio et al., 2007), all white female participants completed three phases in an experiment. Because this was a study

on prejudice, all white female participants were recruited. Females were selected because they tend to experience more negative self-conscious emotions than men.

Table 10

Measures Taken in Each Time Period (Amodio *et al.*, 2007)

A table showing a time period and the measures taken

Time Period	Measures Taken
Time 1	Baseline Measures
Time 2	View photos of faces, IAPS, and shown bogus graphs of EEG results
Time 3	Rate interest on 19 articles as measure of repair behavior

In Time 1, baseline measures of EEG frontal asymmetry were taken and participants reported their current emotions, including shame and guilt. Then, with the EEG cap still on, the white female participants viewed faces of White, Asian-American, and Black individuals. Then, participants viewed positive, negative, and neutral IAPS photos. Following these tasks, the participants were given bogus graphs showing their brain-wave responses to the face and photos. The purpose of these fake graphs was to elicit guilt in all the participants. To provide a cover to the story, participants were told that their brain responses to the IAPS photos were accurate – that when they viewed positive photos their brain responses were positive, etc. Then, they were told that their brain responses revealed patterns about their evaluations of the faces. Participants were informed that they had positive responses to White faces, moderately positive responses to Asian faces, and negative responses to Black faces. The bogus feedback about their brain responses to the faces was meant to trick participants into thinking that their brain waves indicated they exhibited prejudice toward Black individuals.

After showing the graphs, in Time 2, participants were asked to sit

still for two minutes (with the cap still on!). Why? Because at this point we are assuming participants are feeling guilty – and we want to measure the activity in their frontal lobes. At the end of the two minutes, participants self-reported their emotions, including shame and guilt.

At Time 3, participants were given the option to engage in a repair behavior, an approach behavior that would be exhibited by participants feeling guilty. Participants were asked to rate the interest of 19 different articles and one of those articles was on reducing prejudice. Remember, they are rating the article while the EEG cap is still on!

We will discuss three groups of results. Figure 15 compares participants self-reported emotions at Time 1 (Baseline) to Time 2 (After receiving bogus feedback). These findings show that from baseline to receiving the feedback about their prejudice, participants reported an increase in most negative emotions, with guilt and shame showing the greatest increase over time. These findings confirm that participants did feel a negative self-conscious emotion after receiving the bogus feedback. Further findings showed that from Time 1 to Time 2 participants showed a reduction in left frontal lobe activity. This reduction is evidence of a decrease in approach motivation because activation of the left frontal lobe implies approach behaviors. Interestingly, as shown in Table 11, participants self-reported guilt at Time 2 was negatively correlated with activation in the left frontal lobe. This means that as people reported greater guilt intensity, they showed the greatest decrease in in left cortical activity.

Figure 15

Changes in self-reported emotion from Time 1 to Time 2 (Amodio et al., 2007)

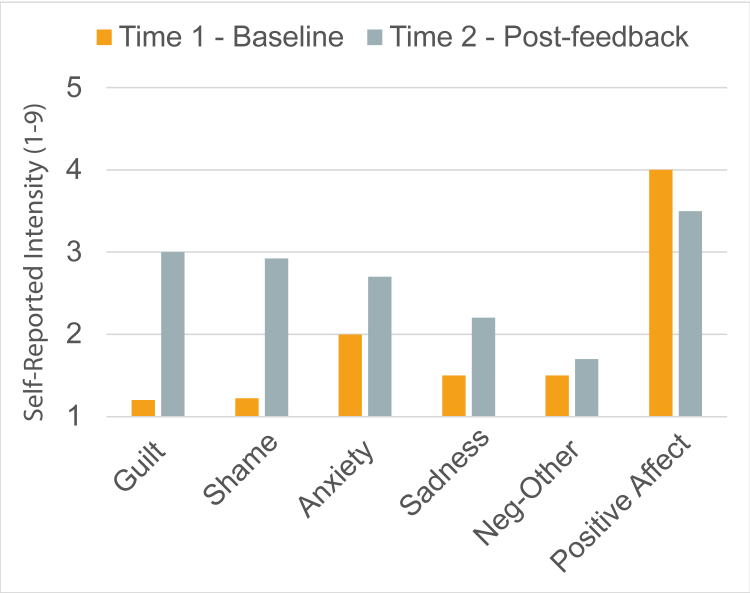


Table 11

Correlation between Self-reported emotion and reduction in left frontal lobe activity

A table showing the self-reported emotion at time 2, and the reduction in left frontal cortical activity at time 2 – Bogus Feedback

Self-reported emotion at Time 2	Reduction in Left Frontal Cortical Activity at Time 2 – Bogus Feedback
Guilt	-.45**
Shame	.00
Anxiety	-.25
Sadness	-.05
Other-directed negative affect	-.10
Positive affect	.08

Next, researchers compared self-reported emotions in Time 2 to repair behavior at Time 3. Remember, participants exhibited repair behavior when they reported high levels of interest in the prejudice reduction article. Findings showed that self-reported guilt and interest in the prejudice reduction article were positively correlated. But, self-reported shame and interest in the prejudice reduction article were not correlated. These findings replicate prior research which has found that guilt causes approach/repair behavior, while shame does not.

Finally, Time 2 and Time 3 frontal asymmetry were compared. Activation in the left frontal lobe increased from time 2 when participants were given bonus feedback to time 3 when participants exhibited the repair/approach behavior. These findings suggest that the opportunity to approach and repair the behavior through the prejudice reduction article activated the left frontal lobe. Finally, results showed that more interest in the article was associated more activation in the left frontal lobe. So, the more motivated people were to approach and resolve their prejudice, the more they showed left frontal lobe activation! Overall, these findings provide further support that left/right frontal lobe activity measures approach/avoidance behaviors and not the valence of the emotion.

Summary of Distinct Emotions Perspective of Shame, Guilt, and Embarrassment

Research on the negative self-conscious emotions does demonstrate that these three emotions result in increases in unpleasantness and activation, although the amount differs among the three emotions. Current work suggests the SNS system is activated for these emotions, but more work should evaluate PNS changes. Work on

cognitive appraisals suggests that the three emotions are caused by internal attributions and the perception that the self exhibited a behavior that violated a social mor moral code. The three emotions do show significant differences in behavior changes and vocal changes. But, we do not currently know whether these changes mean that the emotions are three distinct emotions or whether the three emotions simply represent different intensities of the same emotion. For instance, when reporting subjective feelings for shame people mention embarrassment and for embarrassment people mention shame. Further shame and embarrassment both result in avoidance of eye contact and even looking down. These similarities might suggest that embarrassment is the less intense form of the same emotion as shame. Finally, a major limitation to this research is that in some studies shame and guilt are considered the same emotion. Further many studies, especially on physiological changes, only test one of the self-conscious emotions, which makes comparisons more difficult.

Test Your Knowledge! Identify the emotion components of shame, guilt, and embarrassment

For this activity, drag each component change into the correct box. You need to consider the specific self-conscious emotion and the component change. Some of the same component changes will be used for more than one emotion. More than one draggable answer may be placed in the drop zone boxes for this activity.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1327#h5p-18

Single-Emotion Theory

Single-Emotion Theory was developed by Sabini, Silver, and colleagues. This theory views embarrassment and shame as different intensities of the same emotion. Shame and embarrassment are the same levels of unpleasantness, and shame is higher in intensity/arousal than embarrassment.

According to Single-Emotion Theory, the only required cognitive appraisal for shame/embarrassment is evaluation of the self. Evaluation of the self occurs when we feel that other people's attention is focused on us. Subjective feelings during this state include feeling exposed, flustered, and confused. But, unpleasantness is not a required appraisal – so people may feel negative or positive during this event. Moral or social conventional violations are not required eliciting events. Sabini and Silver point out that people feel shame/embarrassment regarding personal characteristics such as being physically unattractive, feeling stupid, or incompetent – none of which are violations.

Single-Emotion Theory (Sabini & Silver, 1997) define two types of self – the core self and the presented self. The core self represents the entire global self, whereas the presented self represents the parts of the self that other people observe. The presented and core selves may or may not match.

Single-Emotion Theory (Sabini & Silver, 1997) define two types of flaws. The real visible flaw occurs when we THINK that a real flaw in our core self was shown to other people. In this instance, the present self would match the core self. The possible (apparent) visible flaw occurs when we THINK that other people have evidence to conclude a flaw in our core self, but this flaw may or may not have occurred?. With the perception of a possible flaw, two options may occurs. First, the possible, visible flaw might occur when we know that we did not commit a flaw in the core self, but we are aware that other people might conclude we did

reveal a flaw in the core self. The other option could be that we did commit a flaw in the core self, but we do not think other people saw this flaw. In the possible flaw, the presented self does not match the core self.

Let's talk about how these flaws and selves relate to shame and embarrassment. According to Single-Emotion Theory, shame is caused by a flaw in one's core self occurs. For shame, we must perceive that a real flaw in our self/character is visible to other people. Thus, when we feel shame, we perceive that a real flaw of our broad character or self has been revealed to others.

Embarrassment is caused by a flaw in one's presented self. Embarrassment occurs when we perceive that other people POSSIBLY see a flaw in our core self. With embarrassment, people definitely see the flaw in the presented self, but we are not sure whether people attribute this flaw to our core self. With embarrassment, we as the actors, know that this possible flaw does not represent our core self. But, we think that other people have REASONABLE BASIS or enough evidence to conclude we revealed a core flaw.

Remember, shame and embarrassment are different words that represent different intensities of the same emotion. Our cognitive appraisals determine whether we label the emotion as shame or embarrassment. After we experience the emotion, when we describe our experience, we use the real versus possible cognitive appraisal to place a label on the emotion.

If we believe the flaw was revealed to others → SHAME

If we believe a flaw visible in the presented self that people may or may not see as a flaw in the core self → EMBARRASSMENT

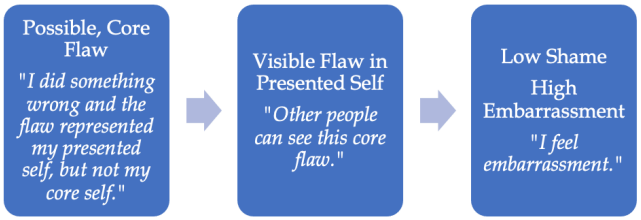
This theory is based on our thoughts about our own transgression and our interpretations of whether other people can see a possible transgression. So, this theory comes from a cognitive appraisal perspective.

To determine whether you feel shame or embarrassment, you want to think about how you interpret the type of flaw.

If you perceive that you did something wrong and you think other people can see it – this is a real, visible flaw. Any other flaws are apparent/possible.

If someone perceives that they committed a flaw in the real core self, and this flaw was revealed to other people, then they would report high levels of shame and high levels of embarrassment. This represents the high intensity form of the shame/embarrassment emotion. People would label this emotion shame.

If someone perceives that they committed a flaw in the presented self, but this flaw does not reveal a flaw in their core self, then they would report low levels of shame and high levels of embarrassment. This represents the low intensity form of the shame/embarrassment emotion. People would label this emotion embarrassment.



So, how does Single-Emotion Theory view guilt? Guilt by itself is

not an emotion. Guilt represents ANY emotion people experience after they commit a transgression. Guilty feelings could include guilt, disappointment, shame, embarrassment, sadness, etc. This theory also discussed the emotion anger. According to Single-Emotion Theory, we feel anger when we did not do anything wrong, but someone accuses us of wrongdoing without any evidence.

Let's review a study (Sabini et al., 2001) that tested whether Distinct Emotions Theory or Single-Emotion Theory was correct. In this study, participants were given 20 scenarios and asked to imagine themselves in each scenario and then to self-report their emotions. The independent variable was whether the scenarios included a real flaw or a possible flaw. The dependent variable was the feelings participants reported after reading each scenario. These feelings were shame, embarrassment, fear, guilt, anger, and regret.

If Distinct Emotions Theory is True:

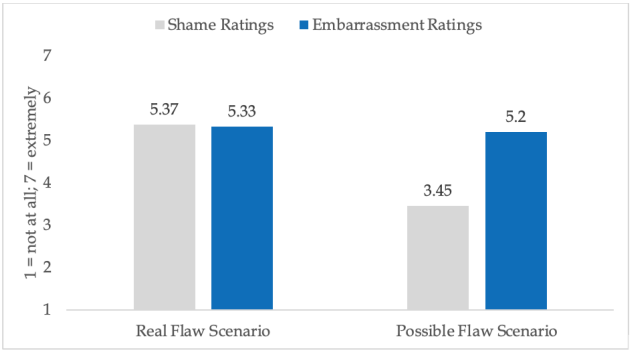
Real Flaw → High Levels of Self-reported Shame only!

Possible Flaw →High Levels of Self-reported Embarrassment only!

If Single-Emotion Theory is True:

Real Flaw → High Levels of Self-reported Shame and Embarrassment!

Possible Flaw → High Levels of Self-reported Embarrassment, but Low Levels of Self-reported Shame!



Real Flaw Scenario

Flaw in Core Self
Presented Self = Core Self
Possible Flaw Scenario

Flaw in Presented Self
Presented Self Does not Equal Core Self

Figure 16

Self-reported shame and embarrassment for real flaw and possible flaw scenarios (Sabini et al., 2001)

Findings are displayed in Figure 16. In the real, flaw scenario participants reported equally high levels of shame and embarrassment, supporting Single-Emotion Theory's view that shame and embarrassment are the same emotion. In the possible, flaw scenario participants reported higher levels of shame than embarrassment. This again supports Single-Emotion Theory for two reasons. First, in the possible flaw scenario, people still reported shame. But, because English-speaking individuals have a separate term to describe a less-intense form of shame, they perceived these possible flaw scenarios to be more representative of shame than embarrassment. This study did not support Distinct Emotions Perspective. If Distinct Emotions was supported, then people should have reported no embarrassment in the real flaw scenario and no shame in the possible flaw scenario.

Now, let's discuss evidence for Single-Emotion Theory's view of guilt and anger. In this study (Sabini et al., 2001), all the scenarios participants read now have possible flaw scenarios. The independent variable is whether the scenario includes one of the following: 1) reasonable basis, 2) no reasonable basis, or 3) guilty of offense. The guilty condition was included as a comparison to the other two conditions in which the person did not actually commit

an offense.

Table 12

Description of independent variable conditions and predictions (Sabini et al., 2001)

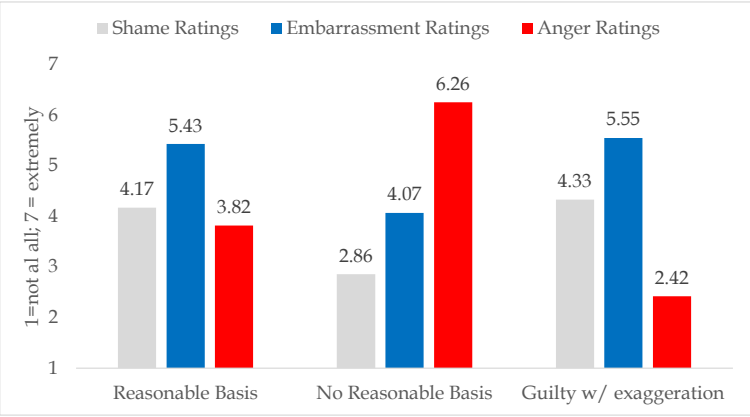
A table showing an independent variable condition, a description of a scenario and a prediction

Independent Variable Condition	Description of Scenario	Prediction
Reasonable Basis	Audience has enough evidence ("good reason") to believe you revealed a flaw, but you did not reveal a flaw.	High Embarrassment
No Reasonable Basis	audience perceives you have a flaw, but they do NOT have a good reason or enough evidence to make this conclusion	High Anger
Guilty	You are guilty of an offense and someone exaggerates your violation.	N/A

Figure 17 displays the results. To interpret the results, we will compare the same emotion across the three IV conditions. Shame was significantly different across conditions. Shame was highest in reasonable basis, followed by no reasonable
Anger was significantly higher in the no reasonable basis condition than the other two conditions. This relates to the unfairness appraisal we discussed with anger. We would likely perceive it unfair that someone concluded we committed a flaw when there was zero evidence! In the no basis scenario, shame and embarrassment were lower than in the other two conditions. This suggests that only when we perceive other people have a good reason for concluding we committed a flaw, then we label that emotion shame/embarrassment. People could draw this reasonable conclusion because we actually committed the flaw (as in the guilty scenario) or because they have good evidence, even though we did not do it (as in the reasonable basis condition). The

guilty with exaggeration condition shows that when we commit an offense and other people know about our offense, we experience high levels of shame and embarrassment, and low levels of anger.

Figure 17



In conclusion, these findings show that the emotion label we provide depends on 1) whether we think we actually committed a flaw and 2) whether we think people have good evidence to conclude we committed the flaw.

For an overview of Single-Emotion Theory (Sabini & Silver, 1997), please see Table 13. In general, this theory suggests that shame and embarrassment are different intensities of the same emotion. Shame occurs when other people's perceptions of the real, serious flaw is correct, causing us to experience this high arousal, negative emotion. Embarrassment is when we think other people saw a flaw in the core self, but it was a flaw in the presented self, causing this low arousal, negative emotion.

Table 13

Overview of Single-Emotion Theory view of shame, embarrassment, and guilt

A table showing an overview of single-emotion theory for shame, embarrassment, and Anger.

Emotion	Overview
Shame	We perceive a real, serious flaw of the self is revealed
Embarrassment	When we communicate that although there seems to have been a real core flaw of the self, there actually was not.
Anger	When we think people's perception of a possible core flaw is unreasonable.

Summary of Shame, Embarrassment, Guilt

Distinct Emotions Perspective views shame, guilt, and embarrassment as three separate categories of emotion. This means that the emotion component changes should discriminate between shame, guilt, and embarrassment. Currently, evidence exists for distinct facial expressions of shame and embarrassment, but not guilt. Cognitive appraisals research suggests that shame and guilt cause the same changes in cognitive appraisals. Findings on physiological changes showed that all three emotions cause increases in the SNS nervous system, but the amount the SNS changes might differentiate the three emotions. More work is needed in many of these areas.

Single-Emotion Theory suggests shame and embarrassment are different intensities of the same emotion and that guilt is not an emotion. This theory suggests whether we label our emotion as shame, embarrassment, or even guilt depends on two cognitive appraisals. The first is whether we PERCEIVE that we truly committed a violation/flaw. The second is whether we THINK about people have a good reason to conclude we committed a flaw. John Sabini passed away in 2005 (SPN obituary here) and much of the work testing single-emotion theory appears to have ceased.

Overall, theories offer different perspectives of embarrassment. The first perspective is often called "embarrassment as less intense shame." This type of embarrassment would be elicited by small, specific failures, cause a negative self-evaluation, and feelings of unpleasantness. Single-Emotion Theory and Social Evaluation Theory fit with this perspective. Distinct Emotions theory also acknowledges that embarrassment is caused by small failures, but would disagree with the view of embarrassment as related to shame. The "embarrassment as exposure" perspective fits with the

view that embarrassment is caused when we are aware that other people are focusing on the self. This view does not require a negative self-evaluation for embarrassment to occurs. This view allows for negative and positive eliciting events as causes of embarrassment. Distinct Emotions Perspective supports this view of embarrassment.

Finally, Distinct Emotions perspective views guilt as a negative self-conscious emotion that occurs when we perceive we committed a bad act, but we do not evaluate the entire self as bad. Distinct Emotions view does acknowledge that maladaptive guilt can turn into shame (CITE). Single-Emotion Theory discriminate between "being guilty" and "feeling guilty." Being guilty is when we commit a violation. Guilty feelings are anything emotions that a guilty person feels. According to this view,

In the next section, we will take about two positively-valence self-conscious emotions – authentic pride and hubristic pride. At the end of the pride section, we will review evidence for universality in facial expressions of shame, pride, and embarrassment. To read about the evidence for universality now, please click here.

Chapter 11 References

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End of Chapter Activities (Chapter 11)

Test your Knowledge of Sabini et al.'s (2000) Eliciting Events!

Match the following scenarios to Sabini et al.'s (2000) types of embarrassment.

Note. The scenarios were reproduced from J. Sabini, M Siepmann, J. Stein, and M. Meyerowitz 2000, Who is embarrassed by what? Cognitions and Emotion, 14(2),pp. 236-240. (https://doi.org/10.1177/0146167201271009) Copyright 2000 by Psychology Press.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2303#h5p-17

Identify the emotion components of shame, guilt, and embarrassment

For this activity, drag each component change into the correct box. You need to consider the specific self-conscious emotion and the

component change. Some of the same component changes will be used for more than one emotion. More than one draggable answer may be placed in the drop zone boxes for this activity.

An interactive H5P element has been excluded from this version of the text. You can view it online here:

https://psu.pb.unizin.org/psych425/?p=2303#h5p-18

CHAPTER 12: PRIDE - A POSITIVE SELF-CONSCIOUS EMOTION

Chapter 12 Learning Objectives

- How do the emotion components differ for authentic and hubristic pride?
- How does the face and body change during an authentic pride experience?
- What are the vocal changes of pride and do the findings support basic emotion or constructivism?
- Do children experience and express pride? Does this support basic emotion or constructivism?
- Explain the cognitive appraisals that cause authentic pride and hubristic pride.
- Explain Tracy and Robins (2009) Process Model of Self-Conscious Emotions
- How do the circumplex models account for pride?
- What are the physiological and brain activity changes for pride?
- Are self-conscious emotions universal or constructed?

Eliciting Events

In this study (Tracy & Robins, 2007b) participants recalled and wrote about a time they felt pride. Then, participants rated the extent to which they felt a variety of pride-related words during this experience, rated their emotions on valence and activation, and reported on their cognitive appraisals. Then, researchers coded each story for a specific eliciting event category. Table 1 show the percentage of participants who discussed each eliciting event.

Table 1

Eliciting Events of Pride

A table showing eliciting events of pride

Type of Event	Example(s)	% of Total Events
Achievement	School, grades, exams, work-related events	69%
Athletic	Winning competitive game	18%
Personal	Personal goals or morals, being better person	12%
Familial	Vicarious pride – pride when someone else achieves something	1%
Relational	Vicarious pride – when romantic partner achieves something	0%

Adapted from "The psychological structure of pride: A tale of two facets" by J.L. Tracy and R.W. Robins, 2007c, Journal of Personality and Social Psychology, 92(3), p. 516. (https://doi.org/10.1037/0022-3514.92.3.506) Copyright 2007 by the American Psychological Association

Two Types of Pride

Research suggests two types of pride exist – authentic (beta) pride and hubristic (alpha) pride. Over several studies, Tracy and Robins (2007c) confirmed the presence of two types of pride. Below, are summaries of these studies. But, keep in mind there are four current theories about these two constructs. These theories are:

Theory #1: Authentic pride and hubristic pride represent two unique emotions.

Theory #2: Pride is comprised of pleasant valence (i.e., authentic pride) and unpleasant valence (i.e., hubristic pride).

Theory #3: Pride is comprised of high activation (i.e., authentic pride) and low activation (i.e., hubristic pride).

Theory #4: Authentic pride is a state emotion that occurs in response to a specific eliciting event, whereas hubristic pride is a personality trait that describes an individual who has a tendency to experienced pride across situations and over time. This theory would be similar to the distinction between fear as a state emotion and anxiety as the trait form of fear.

STUDY 1: Researchers developed 190 pairs of words from a list of 20 pride words. These pairs could include two words similar to authentic pride (e.g., proud, triumphant), 2 words similar to hubristic pride (e.g., arrogant, cocky) or one authentic and one hubris pride word (e.g., proud and arrogant). Participants rated how similar the two words to each other. Findings revealed two groups of pride – authentic and hubristic. (see Table 2). One limitation to this study is that participants' similarity ratings might represent

cultural definitions of pride – but that does not mean we truly experience two distinct type of pride emotions.

Table 2

Emotion Words Associated with Authentic and Hubristic Pride

A table showing authentic and hubristic emotion words.

Authentic	**Hubristic**
Accomplished	Arrogant
Confident	Conceited
Triumph	Cocky
Winner	Stuck-up
Victorious	Boastful
Achieving	Haughty
Winner	Egotistic
Honor	Self-righteous
–	Pompous
–	Pretentious

STUDY 2: In a second study, participants rated their tendency to experience pride-related words and their tendency to experience valence and activation from Feldman, Barrett, and Russell's (1998) Current Mood Questionnaire. In this study, participants recalled and wrote about a time they felt pride. When participants reported their tendency to experience the pride-related words, two factors appeared. This means people who tended to feel accomplished, also reported high levels of confident, triumph and winner. In addition, people who reported they tended to feel arrogant, also experienced high levels of conceited, cocky, and stuck-up. Keep in mind that when we ask people to report their tendency to experience emotions, we are asking them to self-report on their personality or disposition. So, some people have a tendency to experience authentic pride across situations and over time, while others have a tendency to experience hubristic pride across situations and over

time. This study also investigated whether the two pride groups were simply a valence or activation distinction. Through statistical analysis, Tracy and Robins partialled out variance due to valence and then again due to activation. If the two factors still remain after partialling out variance, then that suggests the two factors are not simply due to valence or activation. And that is exactly what the researchers found! To test whether the types of pride represent states or traits, undergraduate students were asked to rate the extent to which each of the pride words was trait-like or state-like. Then, these ratings were correlated with the factors. For both factors, significant correlations were not found – meaning that authentic and hubristic pride are not simply state and trait pride, respectively.

STUDY 3: In study 3, participants were asked to think about a time they experienced pride (study discussed above) and to rate their feelings along 77 pride words. These self-report ratings were submitted to factor analysis. Again, the ratings for these words were factored into two groups – authentic and hubristic pride. In addition, researchers determined that the above eliciting events were associated with both authentic and hubristic pride.

Across these studies, authentic and hubristic pride are correlated with different constructs (see Table 3), revealing further information about the content of each factor. These findings show that authentic pride is associated with high self-esteem, whereas hubristic pride is associated with low self-esteem, high narcissism, and a tendency to experience shame. In fact, narcissism is associated with a discrepancy between low implicit self-esteem and high explicit self-esteem. In other words, a trademark of narcissism is that deep down on a non-conscious level, narcissists experience high levels of shame and low self-esteem. To compensate for these negative evaluations of the self, they express an inflated conscious self-esteem.

Table 3

Correlates of Authentic and Hubristic Pride

A table showing constructs and how they relate to authentic pride, and hubristic pride.

Construct	Authentic Pride	Hubristic Pride
Self-Esteem (trait)	+	–
Narcissism (trait)	–	+
Shame-proneness (trait)	–	+
Extraversion	+	0
Agreeableness	+	–
Conscientiousness	+	–
Emotional Stability	+	0
Openness to Experience	0	0

Based on these past studies, Tracy and Robins (2007c) developed trait and state scales to measure authentic and hubristic pride. These scales can be accessed at Dr. Tracy's Lab website here. Note how she provides different instructions based on whether she is measuring state or trait pride. So, what is the difference between authentic and hubristic pride?

Authentic pride is a positive emotion that occurs after a specific accomplishment. During authentic pride, people experience accurate feelings of self-worth and a boost in self-esteem. Evolutionary psychologists believe that authentic pride is adaptive because the pride emotion encourages us to continue to approach tasks and to succeed. Other ways authentic pride could be adaptive is by garnering higher social status, achieving group acceptance, and even promoting helping behaviors.

Hubristic pride is viewed as unauthentic pride. Hubristic pride occurs when we experience pride in the absence of an eliciting event or even for eliciting events that we did not achieve. During hubristic pride, we experience an inflated sense of self-esteem because we may not have achieved something but still feel pride. Researchers believe that hubristic pride is maladaptive because it

is associated with aggression and relationship dissatisfaction. Although, one could argue that hubristic pride is adaptive by helping an individual to achieve higher status through overconfidence or by taking credit for accomplishments that they did not achieve. Essentially, hubris could help us to achieving dominance, resources, and valuable mates by manipulating others into thinking we are genuinely an achiever.

Behavior Changes

General Approach Behavior

In line with positive emotions, authentic pride is associated with several types of approach behavior. As stated earlier, experiencing authentic pride is rewarding and thus may motivate us to approach and success on future goals. When we experience pride due to a success, we approach our close others to tell them about our accomplishments (Tracy & Robins, 2007b). Further authentic pride leads to prosocial behaviors like helping others and selflessness (Hart & Matsuba, 2007; Michie, 2009), which can also be categorized as approach behaviors. Further, as mentioned above, authentic pride is associated with adaptive levels of the Big 5 traits – Extraversion, Agreeableness, Openness, Conscientiousness, and Emotional Stability, while hubristic pride is linked to low Agreeableness and low Conscientiousness (Tracy & Robins, 2007c).

Similarly, a loss of hubristic pride, such as when we fail or someone insults us, leads to approach behaviors, but these behaviors differ from authentic pride (Bushman & Baumeister, 1998; Tracy & Robins, 2007b). During loss of hubristic pride, people exhibit aggression and hostility toward others. These findings are in line with work on narcissism – which suggests that narcissists exhibit an over inflated sense of self not tied to specific accomplishments (i.e., hubristic pride) combined with an implicit low self-esteem. When narcissists receive negative feedback, they tend to aggress and lash out to re-establish their self-esteem (Baumeister et al., 2000; Tracy et al., 2009; Tracy & Robins, 2007b).

Facial Expressions

Tracy and Robins (2004b) found support for the existence of a distinct pride facial expression. In their first study, male and females posed expressions of happiness, surprise, and pride. Specifically, the pride expression included a smile, head tilt, expanded posture, and hands on hip or raised above the head. For each photo, participants identified the emotion from the following word labels: happiness, pride, surprise, and no emotion. With chance set at 33%, the majority of participants who selected the correct label are displayed in Table 4:

Table 4

When Viewing Photos, Percentage of Participants who Selected Correct Emotion Label

A table showing the correct emotion label for the photos, the % selecting correct emo

Emotion	Range	% Selecting Correct Emotion Label
Pride	73-95%	83%
Happiness	63-98%	79%
Surprise	95-98%	96%

In their second study, participants were shown the same emotional expressions from Study 1, but this time asked to free label the emotion in the photograph. Then, the researchers used a 1-5 scale to rate whether the word participants provided was related to pride. For all 6 pride photos, pride-related words were provided at above-chance levels. On average, a majority (64%) of the participants stated a pride word.

Finally, study three investigated different types of facial expressions and which bodily changes were most indicative of the

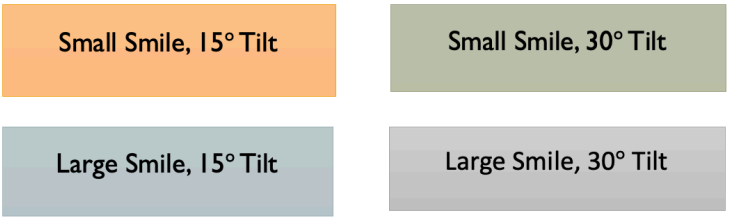
emotion pride. This study included four independent variables, and one dependent variable, outlined in the boxes below.

- Between-Subjects IV – Smile Intensity: small smile or large smile
- Between-Subjects IV – Head Tilt: Slight (15°) or Greater Tilt (30°)
- Within-Subjects IV – Arm Position: Above head and On hips
- Within-Subjects IV – Visible Posture: Waist-up and Shoulders-up

Participants viewed a variety of pride facial expressions based on their assigned conditions above as well as expressions of happiness, surprise, and contempt. When viewing each photo, participants selected from one of the emotion label options above, representing the dependent variable. Below, the figures visually display the photos participants viewed based on the two between-subjects independent variables.

Figure 1

Four Participants Groups Based on the Two Between-Subjects Variables



Findings demonstrated that two facial expressions resulted in the most participants selecting the pride label. The first finding investigated the photos that received the highest numbers of correct pride labels. For photo A, 74% of these photos were

identified as pride and 77% of photo B expressions were identified as pride. Looking at the majority of participants who correctly judged the photo, again photos A and B resulted in the greatest number of participants who selected the correct photo. Taken together, these findings suggest the expressions in photos A and B are the best examples of a universal facial expression. Thus, viewing the entire body, a small smile, and a small head 15° tilt are unique expressions for pride. And it doesn't matter whether the arms are raised above our head or placed on our hips.

Figure 1

Example of Photos Labeled by Most Participants as Pride

Photo A

Small Smile, 15° Tilt

Arms above head

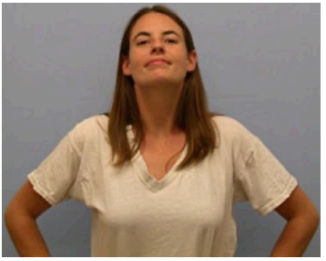
From Waist-up

74% of these photos labeled pride

87% of participants labeled this expression as pride

Reproduced from "Show your pride: Evidence for a discrete emotion expression," by J.L. Tracy and R.W, Robins, R.W, (2004b), Psychological Science, 15(3), p. 196 (https://doi.org/10.1111/j.0956-7976.2004.01503008.x) Copyright 2004 by American Psychological Society.

Photo B



Small Smile, 15° Tilt

Arms on hips

From Waist-up

77% of these photos labeled pride

89% of participants labeled this expression as pride

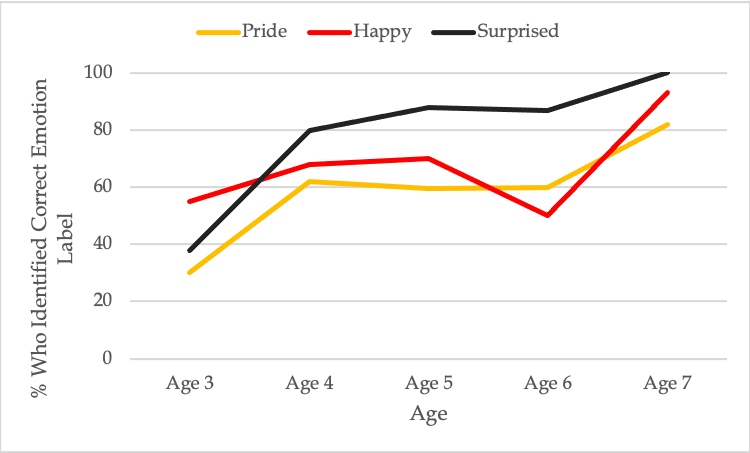
Reproduced from "Show your pride: Evidence for a discrete emotion expression," by J.L. Tracy and R.W, Robins, R.W, (2004b),

Psychological Science, 15(3), p. 196 (https://doi.org/10.1111/j.0956-7976.2004.01503008.x) Copyright 2004 by American Psychological Society.

So, we know that unique facial expressions are easily identified by Americans, but what about universality? One way to test for universality is to assess whether children can differentiate pride facial expressions from similar positive emotions. In one study (Tracy et al., 2005), children between ages 3 and 7 years old were shown three photographs of the same male and female. In these photos, the male and female were posing facial/bodily changes (all viewed from the waist-up) representative of three positive emotions. The emotions in the photos displayed pride, happiness, and surprise. The two pride photos were the same that were identified as most easily identified in the previous study. Child participants were instructed to point to the photos that represented each of the three emotions and to indicate if they did not see a photo that matched the verbalized emotion. In addition to asking participants to identify pride, happiness, and surprise, the researchers also asked them to identify other emotions not shown in the photos, such as love. Figure 2 displays the recognition rates for each emotion. Collapsed across all age groups participants correctly identified 59% of the pride photos (significantly greater than the chance of 33%). Replicating past research, neither of the two pride photos showed significantly higher recognition rates. The authors do state that when children selected the wrong pride photo, they tended to select happiness more often than surprise.

Figure 2

Percentage of Children Identifying Correct Emotion Label



Adapted from "Can children recognize pride?" by J.L. Tracy, R.W. Robins, and K.H. Lagattuta, 2005. Emotion, 5(3), p. 253 (https://doi.org/10.1037/1528-3542.5.3.251) Copyright 2005 by the American Psychological Association.

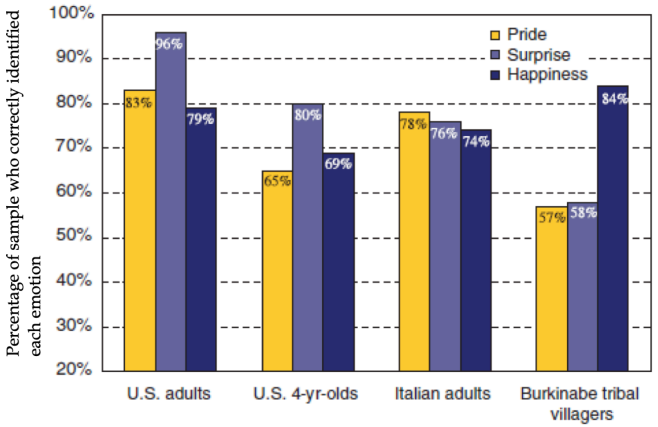
Next researchers sought to determine at which age children successfully recognize pride. Statistical analyses revealed that age 3 the recognition rate is around 30%, thus not meeting the 33% chance. By age 4, the recognition rate is greater than 33% chance (around 65%) and this recognition rate remains stable as children age. Said another way, recognition rates are significantly different for only the period of age 3 compared to age 7. Comparing recognition rates across emotions could provide further evidence that pride is a basic emotion, similar to surprise and happiness. Collapsed across all age groups, pride and happiness showed the same recognition rates, with surprise showing a significantly higher recognition rate. Further, children showed higher recognition for surprise than for pride only at age 5. Another study found that as early as 2 months show pleasure for mother's praise for his/her achievement (Reissland & Harris, 1991).

Tracy and colleagues (2004b, 2005, 2007a, 2008) obtained evidence for universality. Their studies show that children from the USA, Italian adults, and adults from an isolated village in Burkinabe (West Africa) identified pride facial expressions at beyond chance levels.

In this study, participants were shown four different pride photos – two of these were the most recognized photos from the last study (photos A and B) as well as surprise and happiness photos.

Figure 3

Recognition Rates for Four Different Samples Across Three Emotions

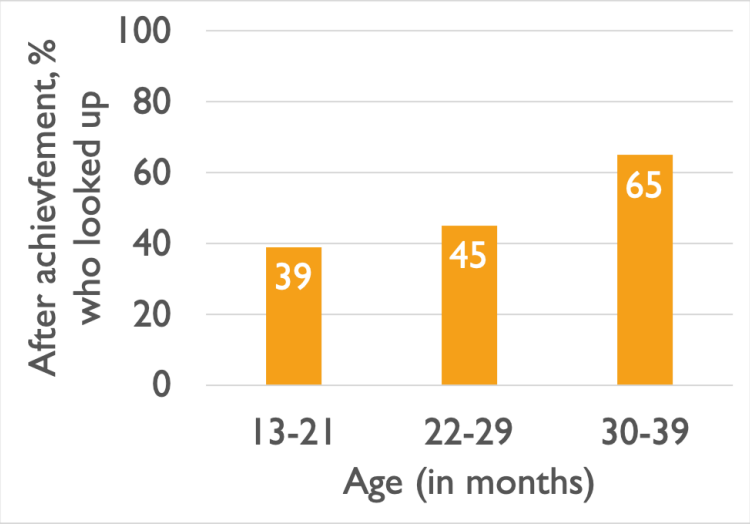


Additional work has found that children show and understand pride. Children first express pride by age 3 years old (Belsky & Domitrovich, 1997; Lewis et al., 1992; Stipek et al., 1992), after they have achieved self-awareness. Children recognize pride facial expression by age 4 (Tracy et al., 2004b) and understand concept of pride by ages 7-9. Developmentally pride differs from other basic emotions which are present in the first two to six months of life (Lewis, 2000; Reissland & Harris, 1991; Stipek et al., 1992). Self-awareness via the mirror-rouge test suggests that children do not differentiate between the self and others until around 18 to 24 months (Lewis, 2000; Lewis & Brooks-Gunn, 1979; Mascolo & Fischer, 1995; Stipek et al., 1992). But, some researchers believe self-recognition is not enough to experience pride and other self-conscious emotions. Some work suggests children cannot experience pride until they have the cognitive complexity to make conscious internal attributions of globality and stability, which may

not occur until 2.5 to 3 years old (Mascolo & Fischer, 1995; Stipek et al., 1992).But other researchers believe pride is present before age 2. First, some evidence suggests self-recognition occurs as early as 2 months old (Rochat & Striano, 2002), suggesting pride could occur this early as well. In one study (Stipek, 1992), children of various ages (x-axis) were given the opportunity to achieve a task in the lab. The dependent variable, experience of achievement, is measured simply as whether or not the child looks up and toward mom or dad after achieving task. Findings in Figure 4 show that about 39% of children expressed pride before age 2 (24 months), while most children do express pride by year 2. These findings do suggest that pride may be expressed earlier than we thought – providing some confirmation for evolutionary theory.

Figure 4

Percentage of Children who Expressed Pride by Age Group (in months)



Adapted from ", Self-evaluation in young children," by D. Stipek, S. Recchia, and S. McClintic, 1992, Monographs of the Society for Research in Child Development, 57(1), Serial No. 226, p. 28. Copyright 1992 by Wiley.

Vocal Changes

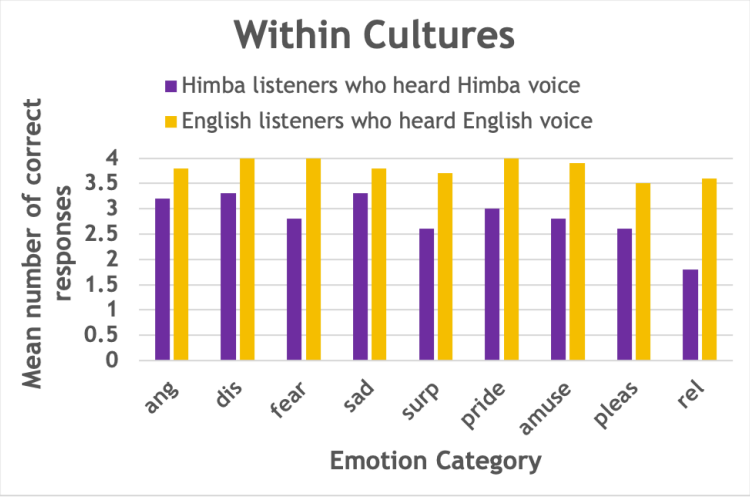
Table 5 displays Sauter et al.'s (2010) study (review here) emotional story and corresponding vocal sound for authentic pride. Recall that in this study Himba and English participants listened to the vocal sound from a Himba voice and an English voice.

A table showing pride as described in the story, two definitions of pride, and the correct vocal sound.

Emotion Described in Story	Correct Vocal Sound
Achievement [Pride]	
English version: Someone gets a phone call and is offered a job that they really want and they feel like they want to celebrate.	Cheers
Himba version: Someone manages to kill a lion by themselves and they feel like they want to celebrate.	

Findings are displayed in Figures 5 and 6. Looking at Figure 5, when participants listened to a voice from their own culture, both Himba and English participants matched sound to story at beyond chance levels. But, when we go to across cultures, Himba do not select the correct sound at beyond chance levels. These findings suggests that the Himba performed better when they listened to cheers from their own culture.

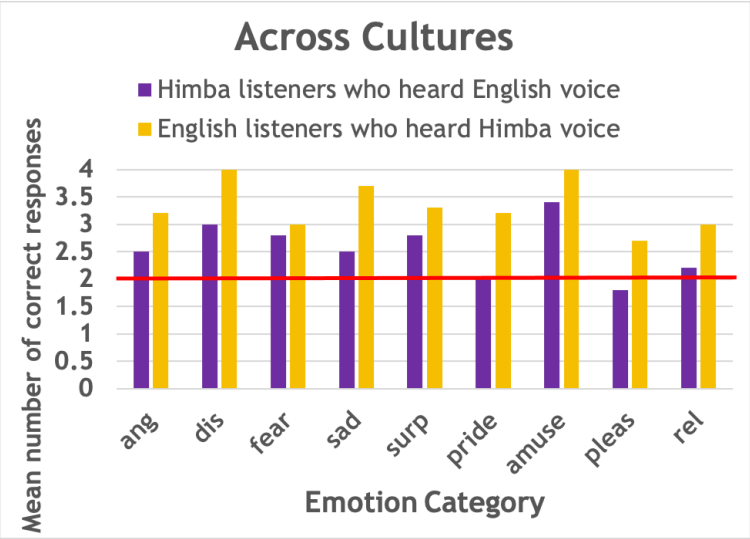
Figure 5



Reproduced from "Cross-cultural recognition of basic emotions through nonverbal emotional vocalizations," by D.A. Sauter, F. Eisner, F., P. Ekman, and S.K. Scott, S.K., 2010, Proceedings of the National Academy of Sciences (PNAS), 107(6), p. 2410 (https://doi.org/10.1073/pnas.0908239106) Open Access by PNAS.

Figure 6

Mean Number of Correct Emotion Labels for Emotion Stories for Himba and European English Participants



Reproduced from "Cross-cultural recognition of basic emotions through nonverbal emotional vocalizations," by D.A. Sauter, F. Eisner, F., P. Ekman, and S.K. Scott, S.K., 2010, Proceedings of the National Academy of Sciences (PNAS), 107(6), p. 2410 (https://doi.org/10.1073/pnas.0908239106) Open Access by PNAS.

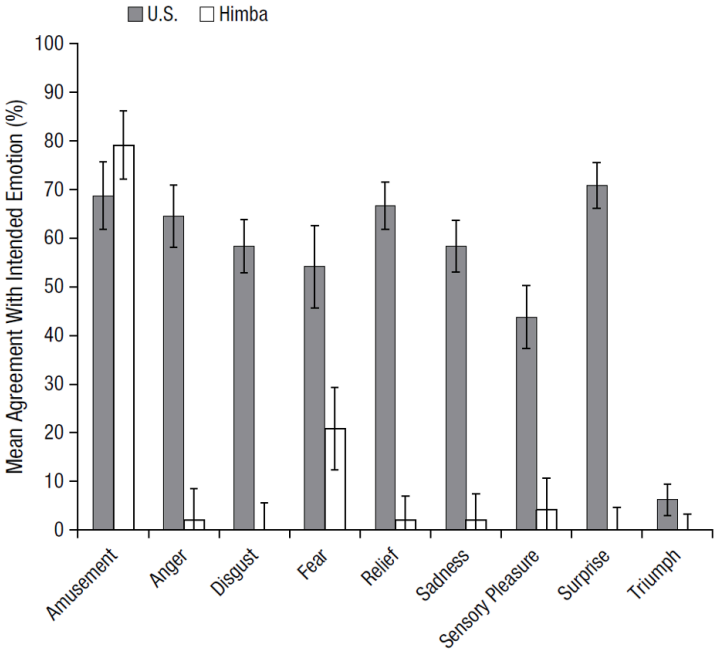
In Cordaro, Keltner, and colleagues' (2016) study on vocal change (review here), participants matched the same above story about triumph to a vocal sound. The story was "S/he has just won a very challenging competition and feel triumphant" (Cordaro et al., 2016, Table 3, p. 121). The correct vocal sound for triumph "woo-hoo." All countries, including Bhutan, matched the vocal sound to the triumph stories at beyond chance levels. The lowest recognition rates were obtained in the US (85.5%) and in Bhutan (about 45%).

Gendron, Barrett et al. (2014a) (review study here), used the "woo hoo" sound to represent triumph (i.e., achievement). Remember in this study, participants heard the sound and then free-labeled the emotion. Then, researchers coded the free label into an emotion category. Findings in Figure 7 show that a small portion of US participants provided a pride-related word for the "woo-hoo" sound and none of the Himba did. Now, a large group of Himba and US

participants did indicate the valence of the "woo hoo" sound was positive (see Figure 8), supporting some constructivist views that emotions are simply a range of valence of arousal. Results showed that Himba participants free label responses for "woo hoo" were either non-emotion related or related to the emotion amusement.

Figure 7

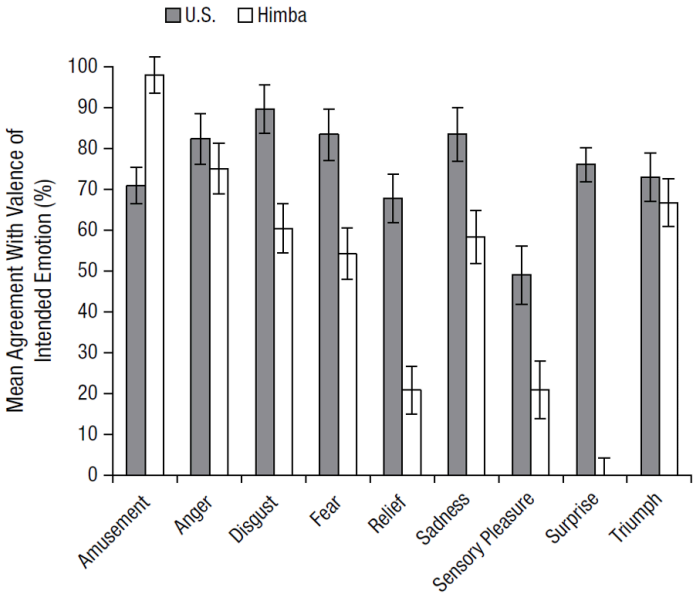
Percentage of Participants who Free Labeled Woo-hoo Sounds as Triumph



Reproduced from "Cultural Relativity In Perceiving Emotion From Vocalizations," by M. Gendron, D. Roberson, J.M. van der Vyver, and L.F. Barrett, 2014a, Psychological Science, 25(4), p. 914, (https://doi: 10.1177/0956797613517239). Copyright 2014 The Authors.

Figure 8

Self-Reported Valence of Each Emotion



Reproduced from "Cultural Relativity In Perceiving Emotion From Vocalizations," by M. Gendron, D. Roberson, J.M. van der Vyver, and L.F. Barrett, 2014a, Psychological Science, 25(4), p. 915, (https://doi: 10.1177/0956797613517239). Copyright 2014 The Authors

Cognitive Appraisals

Tracy and Robins (2007c) investigated whether the attributions for authentic and hubristic pride differ. In this study, participants were randomly assigned to read scenarios meant to elicit authentic or hubristic pride. The scenarios manipulated the attributions participants made for success on a college exam. All scenarios included internal attribution of the participant achieving the exam grade. Each scenario included only one manipulation of the independent variable. After reading each scenario, participants self-reported the extent to which they would feel authentic pride and hubristic pride.

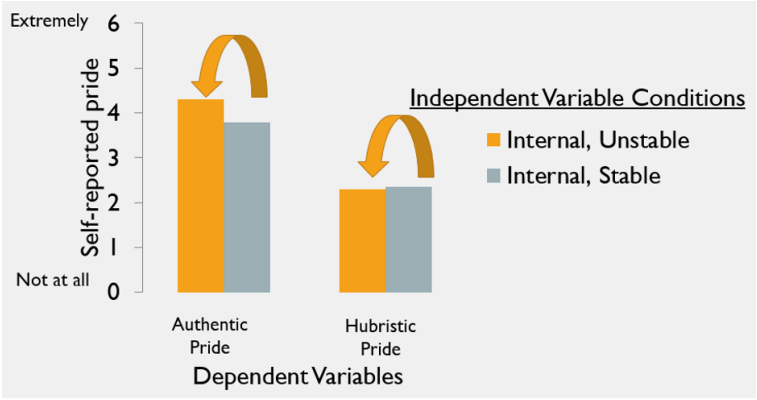
Within-Subjects IV #1: Manipulated Stability Attributions
Condition 1: Stable attribution (due to IQ, personality)
Condition 2: Unstable attribution (due to effort, situation)
Within-Subjects IV #2: Manipulated Globality Attributions
Condition 1: Specific Attribution – one domain in life / good act
Condition 2: Global Attribution – whole self

2 Dependent Variables:
DV #1: Self-reported authentic pride
DV #2: Self-reported hubristic pride

Figure 9 displays the results for IV #1: manipulating stability attributions. Internal, unstable attributions led to greater authentic pride than internal, stable attributions. This means that when people attribute a good act to something unstable about the self people report more authentic pride than when they attribution a good act to something unchanging about the self. The two stability attributions did not result in differences on self-reported hubristic pride.

Figure 9

Findings for IV #1 Stability Attributions

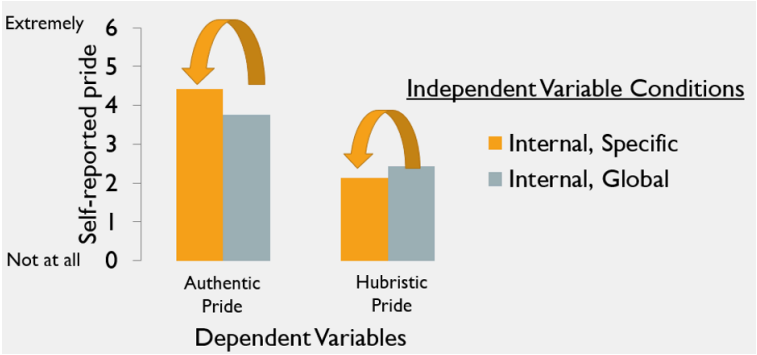


Adapted from "The psychological structure of pride: A tale of two facets," by J.L. Tracy and R.W. Robins, 2007c, Journal of Personality and Social Psychology, 92(3), p. 518. (https://doi.org/10.1037/0022-3514.92.3.506) Copyright 2007 by the American Psychological Association

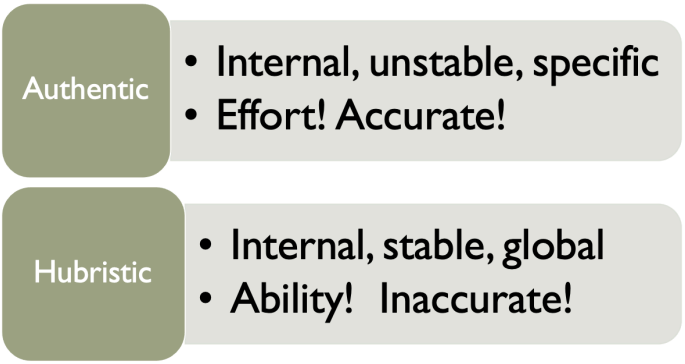
Figure 10 shows the results for IV #2, in which globality attributions were manipulated. Internal, specific attributions resulted in more authentic pride than internal, global attributions. Scenarios with internal, global attributions resulted in more hubristic pride than authentic pride. These findings mean that when people achieve a task, containing this achievement to a specific part of the self causes authentic pride. For instance, I succeeded on my math exam, but that doesn't mean I will succeed on my chemistry exam. Conversely, when people achieve a success and attribute the success to ALL domains of their life, that results in the more inaccurate hubristic pride. For example, I did well on my math exam so I will do well in everything I do!

Figure 10

Findings for IV #1: Stability Attributions



Adapted from "The psychological structure of pride: A tale of two facets," J.L. Tracy and R.W. Robins, 2007c, Journal of Personality and Social Psychology, 92(3), p. 518. (https://doi.org/10.1037/0022-3514.92.3.506) Copyright 2007 by the American Psychological Association



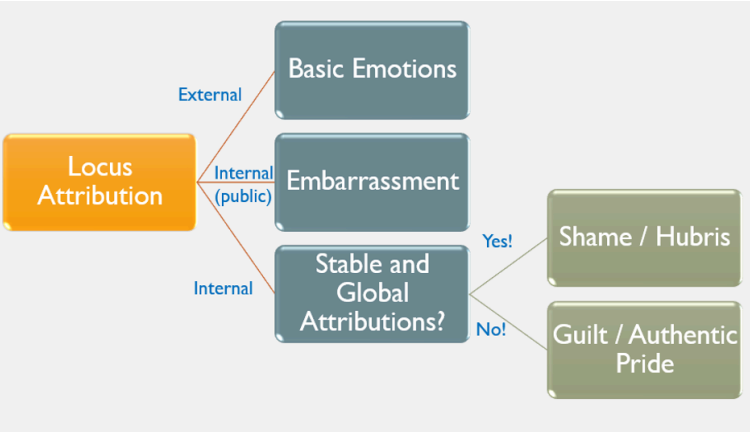
Process Model of Self-Conscious Emotions

Tracy and Robins (2004a) developed the process model of self-conscious emotions (see Figure 11). This model is based on cognitive appraisal theory and demonstrates the type of emotion

people experience based on their attributions. In this model, cognitive appraisals cause the emotion we experience. In this model, locus of attribution simply means do people make an external or internal attribution? When people make an external attribution, they report a basic emotion such as fear, disgust, or anger. When people experience an internal attribution, people report a self-conscious emotion. To determine the type of self-conscious emotion people experience, we have to determine whether people appraise the emotion as negative or positive and whether people appraise the situation as caused by the stable or global self. Shame and hubris are both caused by stable attributions, whereas guilt and authentic pride are caused by stable attributions. Embarrassment does not fit exactly well within this model. According to Tracy and Robins (2004a), embarrassment is simply when we make an internal attribution in the presence of other people. It is important to note that this model fits more with Tangney's view of negative self-conscious emotions and does not fit well with Single-Emotion Theory. Similar to Tangney, Tracy and Robins view this model as subsumed by evolutionary theory.

Figure 11

Process Model of Self-Conscious Emotions (Tracy & Robins, 2004a)



Adapted from "Putting the self into self-conscious emotions: A theoretical model," J.L. Tracy and R.W. Robins, 2004a, *Psychological*

Inquiry, 15(2), p. 110 (https://doi.org/10.1207/s15327965pli1502_01)
Copyright 2004 by Lawrence Erlbaum
Figures 12 and 13 below are study tools to improve understanding of this model. Figure 12 displays the emotions people feel based on three attributions: success/failure, stable/global, and unstable/specific. Figure 13 provides examples of the thoughts people would experience for each emotion.

Figure 12

Three Attributions for Self-Conscious Emotions

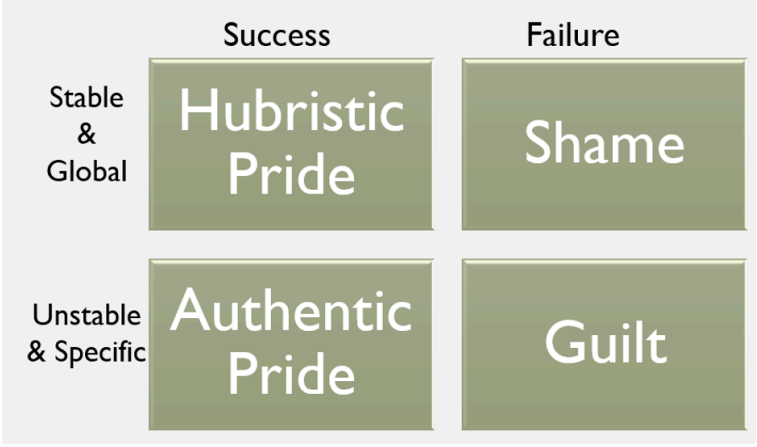
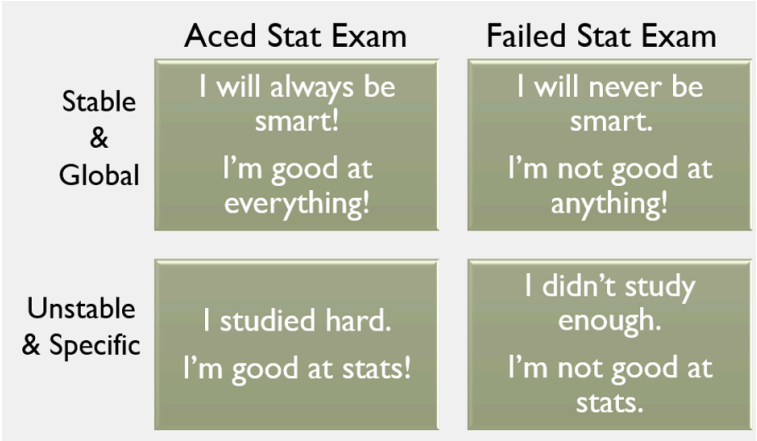


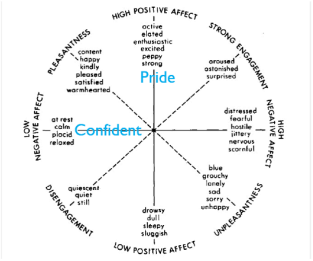
Figure 13

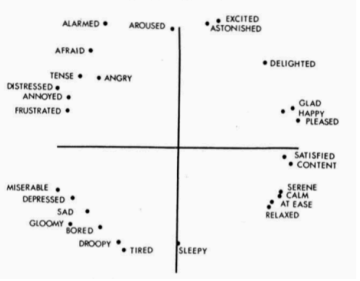
Examples of each Cognitive Attribution



Subjective Feelings

Watson and Tellegen's (1985) study found that the term pride was high in positive affect, but the word confident was low in negative affect. Russell's (1980) model suggests that pride might be somewhere around moderately arousing, pleasant emotions as indicated by similar emotion words like satisfied and pleased.





Left Figure Reproduced from "Toward a consensual structure of mood.," by D.T. Watson and A. Tellegen, 1985, *Psychological Bulletin*, 98(2), p. 221 (https://doi.org/10.1037/0033-2909.98.2.219). Copyright 1985 by the American Psychological Association.

Right Figure Reproduced from "A circumplex model of affect," by J.A., 1980, *Journal of Personality and Social Psychology*, 39(6), p. 1168 (https://doi.org/10.1037/h0077714) Copyright 1980 by the American Psychological Association.

Physiological Changes

Kreibig (2010) reviewed five studies that investigated the physiological changes caused by authentic pride. Table 5 displays the eliciting events and resulting physiological changes for these studies. We cannot draw definitive conclusions because we have so few studies. But, based on these findings we might conclude that pride causes activation of the SNS system, because skin conductance increased. But, the study on experimenter praise (Herrald & Tomaka, 2002) found that cardiac PEP was not shortened, suggesting the SNS system was not activated. The only indicator we have on PNS is a study that elicited pride with film clips and found that heart-rate variability did not change, suggesting the PNS is not activated (Gruber et al., 2008).

Table 5

Physiological Changes Caused by Authentic Pride

A table showing how pride was elicited in the study, and the physiological changes that followed.

How Pride was Elicited in Study	Physiological Changes
Film Clips	Increased HR, Increased SCR, 0 HRV
Recall Pride Experience	Increased SCR
Experimenter Praise	Increased HR, 0 Cardiac PEP

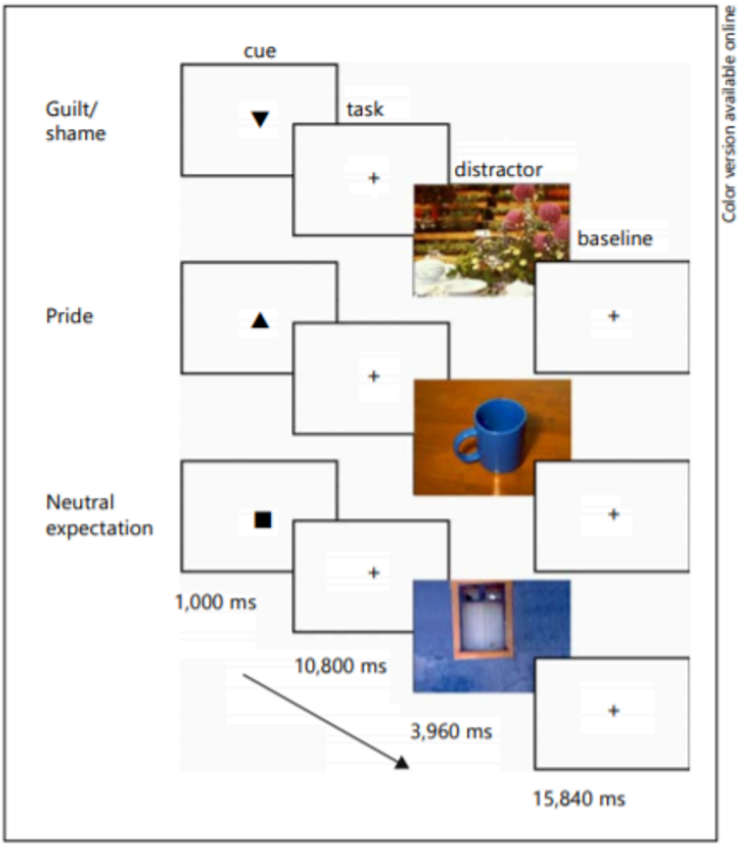
Adapted from "Autonomic nervous system activity in emotion: A review," by S.D. Kreibig, 2010, *Biological Psychology*, 84(3), p. 407 (https://doi.org/10.1016/j.biopsycho.2010.03.010) Copyright 2010 by Elsevier B.V.

Two studies investigated the brain structures activated for pride experiences. In the first study (Roth et al., 2014), participants completed three conditions in which guilt/shame, pride, and neutral emotions were elicited. To elicit each emotion, participants

were asked to recall a time between 3 weeks and 6 months ago that they felt ashamed/guilty, a time they felt pride, and for the neutral condition were asked to simply wait. The procedures are displayed in Figure 15 below. Participants watched a screen and were given a cue that indicated which of the three conditions to think about. During the task step, participants were either thinking about the emotion episode or waiting in the neutral condition. Then, participants viewed a neutral IAPS image to help their physiology return to baseline. In the fourth step, baseline measures were taken prior to starting one of the three conditions. During these four steps, an fMRI machine is measuring brain activation. Table 6 displays the findings. In this study, the two emotion conditions versus the neutral condition showed greater activation in several structures. The authors note that a possible emotion network might be the amygdala, insula, and ventral striatum. This emotion network may simply be activated when we experience any emotion. The MPFC and the PCC are activated when we think about and evaluate the self and thus would be activated for negative and positive self-conscious emotions. Pride showed more activation than shame in five different structures, but we do not yet know what these findings suggest.

Figure 15

Example of Trials from Roth et al. (2014)



Reproduced from "Brain activation associated with pride and shame," by L. Roth, T. Kaffenberger, U. Herwig, and A.B. Brühl, 2014, Neuropsychobiology, 69(2), p. 96 (https://doi.org/10.1159/000358090) Open Access, Zurich Open Repository and Archive, University of Zurich.

Table 6

Summary of Roth et al. (2014) Findings

A table comparing pride versus shame and guilt

Comparison	Findings
Pride and Shame/Guilt (vs. Neutral)	• Amygdala, insula, ventral striatum • Medial prefrontal cortex (MPFC) and posterior cingulate cortex (PCC)
• **Left superior and medial frontal gyrus (FG)** • **Cingulate gyrus** • **PCC** • **Caudate** • **Thalamus**	
Shame/Guilt (vs. Pride)	• None

Adapted from "Brain activation associated with pride and shame," by L. Roth, T. Kaffenberger, U. Herwig, and A.B. Brühl, 2014, Neuropsychobiology, 69(2), p. 98-101 (https://doi.org/10.1159/000358090) Open Access, Zurich Open Repository and Archive, University of Zurich.

A second study explored brain activation during a pride and joy emotion (Takashashi et al., 2008). While in an fMRI machine, participants read sentences meant to elicit joy, pride, and neutral emotions. After reading each sentence, participants self-reported the pride and joy they felt. Findings are displayed in Table 7. Pride resulted in more activation in the TOM structure the posterior superior temporal sulcus (pSTS) compared to both the neutral and joy conditions. But, another TOM structure, the MPFC, did not show more activation in the pride vs. neutral or joy sentences (Note: that the MPFC was activated for self-conscious emotions in the prior study). Joy, compared to neutral conditions, resulted in more activation in the reward circuit (i.e., ventral striatum, nucleus

accumbens), the ACC, and the insula. These structures were suggested to be part of an emotional network in the prior Roth et al. (2014) study. Interestingly, self-reported pride was positively correlated with pSTS activation and self-reported joy was positively correlated with activation in the ventral striatum.

Table 7

Summary of Takashashi et al. (2008) Findings

A table comparing pride versus joy. (Neutral)

Comparison	Findings
Pride (vs. Neutral)	• Right posterior superior temporal sulcus, left temporal lobe • No activation for MPFC
Joy (vs. Neutral)	• Ventral Striatum, nucleus accumbens, ACC, insula/ operculum
Pride (vs. Joy)	• Right posterior superior temporal sulcus (pSTS)

Adapted from "Brain activations during judgments of positive self-conscious emotion and positive basic emotion: pride and joy," by H. Takahashi, M. Matsuura, M. Koeda, N. Yahata, T. Suhara, T., M. Kato, M., and Y. Okubo (2008). Cerebral Cortex, 18(4), p. 900 (https://doi.org/10.1093/cercor/bhm120) Copyright 2007 by The Author.

Overall, studies on brain activation and self-conscious emotions suggests that brain structures that control theory of mind become activated during positive and negative self-conscious emotional experiences. These TOM structures include the posterior superior temporal sulcus (pSTS) and the medial prefrontal cortex (MPFC). It does seem that the MPFC might be activated more so in negative

self-conscious emotions than positive. Second, a hedonic emotional processing network seems to include structures such as the ventral striatum, nucleus, accumbens, and insula. This network might control the processing of hedonic emotions – either positive or negative.

Self-Conscious Emotions: Are They Universal?

Behavior Changes

In this section, we will review an interesting study that sought to determine whether bodily changes of pride and shame are universal. Tracy and Matsumoto (2008) recruited three groups of participants from the judo matches at the Olympics and ParaOlympics: sighted individuals, congenitally blind individuals, and late-onset blind individuals. It is important to note that the sighted and late-onset participants are those who could have learned to express bodily changes for self-conscious emotions by watching other people. Congenitally blind participants, who have never been able to see, would be less likely to have learned which bodily changes accompany self-conscious emotions. Thus, if congenitally blind participants show the same bodily changes as the other two groups, this would provide evidence that these body and facial changes are innate and universal.

Quasi-IV #1: Participants Groups: Sighted vs. Congenitally Blind vs. Late-Onset Blindness

Quasi-IV #2: Whether participants won or lost the ParaOlympics event.

Dimensional Variable: Collectivism-Individualism of 37 Countries.

DV #1: On a 0 to 5 scale, researchers coded the intensity of shame and pride behavior changes.

Pride Behavior Changes included:

- Head-Tilt Back
- Smile
- Arms Out
- Fists
- Chest Expanded
- Torso Out

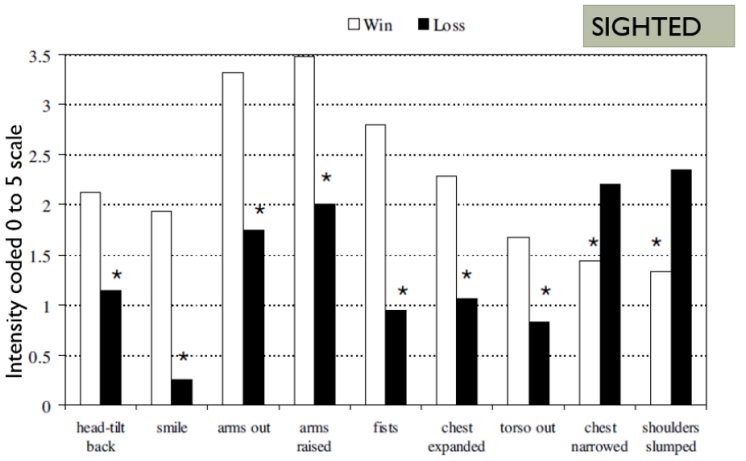
Shame Behavior Changes included:

- Chest Narrowed
- Shoulders Slumped

Figure 16 displays the findings for sighted individuals and Figure 17 displays the findings for congenitally blind individuals. Sighted individuals who won their event displayed greater intensity for the 6 pride behavior changes compared to sighted individuals who lost. Sighted individuals who lost displayed more intense chest narrowed and shoulders slumped compared to sighted individuals who won. Taken together, these findings suggested sighted individuals who won expressed pride behaviors, while sighted individuals who lost expressed shame behaviors.

Figure 16

Pride and Shame Behavior Changes for Sighted Individuals

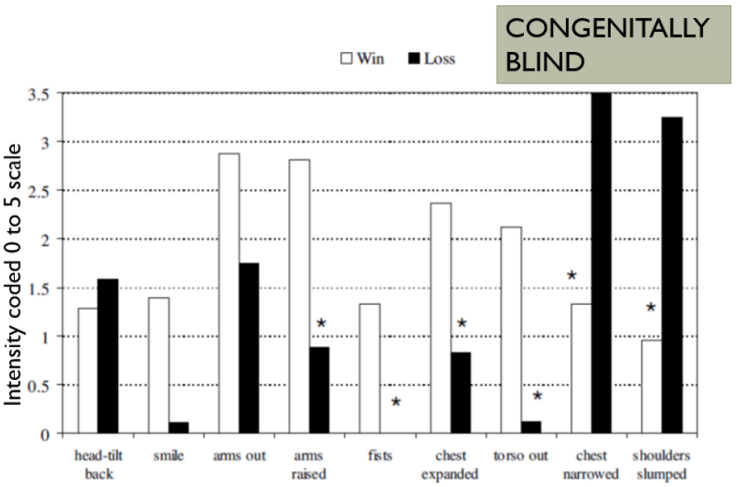


Reproduced from "The spontaneous expression of pride and shame: Evidence for biologically innate nonverbal displays" by J.L. Tracy and D. Matsumoto, 2008. *Proceedings of the National Academy of Sciences*, 105(33), p. 11656 (https://doi.org/10.1073/pnas.0802686105) Open Access, PNAS.

Congenitally blind individuals who won showed more intensity for the following 4 pride expressions: 1) arms raised, 2) fists, 3) chest expanded, and 4) torso out. Congenitally blind individuals who won or lost did not show differences in the following 3 pride expressions: 1) head-tilt back, 2) smile, and 3) arms out. These findings suggest that four of the pride expressions are universal, while the other three expressions are not. Congenitally blind individuals who lost showed greater intensity of chest narrowed and shoulders slumped, confirming that these shame expressions may be universal.

Figure 17

Pride and Shame Behavior Changes for Congenitally Blind Individuals



Reproduced from "The spontaneous expression of pride and shame: Evidence for biologically innate nonverbal displays" by J.L. Tracy and D. Matsumoto, 2008. *Proceedings of the National Academy of Sciences*, 105(33), p. 11657 (https://doi.org/10.1073/pnas.0802686105) Open Access, PNAS.

In this study, individualism-collectivism moderated the relationship of loss/win on shame facial expressions. This moderation means that individuals from collectivist cultures showed greater shame bodily changes after winning. Individualism-collectivism did not moderate the effect of winning on pride behavior changes. In general, this study shows that some behavior changes are universal and some are not. One limitation is that there might be ways that congenitally blind participants could learn about the behavior changes typical for shame and pride, which would contradict basic emotion theory. Interestingly, congenitally blind participants (versus late-onset blind participants) showed greater intensity of

expression for both shame behaviors. In other words, congenitally blind participants slumped their shoulders more and narrowed their chest more. This seems to contradict basic emotion theory. Why do you think congenitally blind individuals expressed more shame?

One last study (Elfenbein et al., 2007) evaluated shame and embarrassment facial expressions for participants living in Quebec versus Gabon. Quebec and Gabon are both French-speaking regions and were once French colonies, so they may hold some similarities. In this study, both participant groups were given a list of 10 emotion words and instructed to pose each emotion on their face like they were expressing this emotion to a friend. In addition, participants were given a mirror to make the facial expression! Then, researchers coded the action units displayed by participants. Results show that individuals living in Quebec and Gabon both posed the same action units for embarrassment. Cultural differences were found for the shame expression. Individuals from Gabon showed changes in only AU54 (head down) or a combination of AU32 (lip bite) and AU54, while Quebecois showed changes in AU 4 (brow lowerer) and AU 14 (dimpler). Examples of the shame expressions are shown in Figure 18. What emotion do you think is displayed on the face of the Quebec individual in the figure below?

Figure 18

Examples of Shame Expressions for Gabonese (left and right) and Quebecois (middle)

Reproduced from "Toward a dialect theory: Cultural differences in the expression and recognition of posed facial expressions," by H.A. Elfenbein, M. Beaupré, M. Lévesque, and U. Hess, 2007, Emotion, 7(1), p. 137 (https://doi.org/10.1037/1528-3542.7.1.131) Copyright 2007 by the American Psychological Association.

Stipek (1998) investigated how subjective feelings of pride and shame differ for Americans as compared to Chinese. Compared to American participants, Chinese participants reported more arousal for their close others' achievement and transgression. In addition, Chinese participants reported more shame feelings elicited by family members (compared to Americans). These findings suggest that for collectivist cultures, our close others' successes and failures are closely tied to our self-concept, such that when our close others succeed or fail we perceive that this is a reflection of the self.

Summary of Negative and Positive Self-Conscious Emotions

In the past two chapters we reviewed negative and positive self-conscious emotions. From a distinct and basic emotions perspective, shame, guilt and embarrassment represent separate categories of three emotions. Single-Emotion Theory views embarrassment and shame as different intensities of the same emotion. Similarly, basic emotion theory views authentic and hubristic pride as two separate emotions, although some evidence suggests hubristic pride may be a personality trait similar to narcissism. All self-conscious emotions are elicited by internal attributions for successes or failures. For shame, guilt, authentic pride, and hubristic pride, stability and globality attributions determine which emotion label we attach to our experience. Current work on the brain suggests that structures involved in theory of mind tasks are also activated for self-conscious emotions. More work is needed in the field of self-conscious emotions. In particular, further work should investigate the physiological changes associated with these emotions and create clearer delineations between shame/guilt and authentic/hubristic pride. Future directions might investigate whether people can experience guilt without committing a "bad act." One example of this might be survivor's guilt – when people feel guilty from surviving a tragedy or death experienced by a close other. In addition, work could consider whether vicarious embarrassment is an emotion – can we be embarrassed for others? Is vicarious embarrassment as intense as embarrassment caused by the self? Related to pride, Ekman (Ekman & Cordaro, 2011) suggests two additional basic emotions are Naches

(Yiddish for vicarious pride) and Fiero (Italian for achieving a difficult challenge).

And remember, that when another person commits a moral violation, we make an external attribution, and experience disgust or anger toward that person. But, when we commit a moral violation, we make an internal attribution and experience shame or guilt.

When others commit a moral violation → DISGUST OR ANGER!

When we commit a moral violation → SHAME OR GUILT!

Additional Video Resources

Below is a Yale Expert in Emotion Video "Jessica Tracey on Self-Conscious Emotions." I recommend watching this video from the start through 10:08 minutes.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1398#oembed-1

Chapter 12 References

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CHAPTER 13: POSITIVE EMOTIONS

Chapter 13 Learning Objectives

- What positive emotions do researchers agree and disagree on?
- Do any of the positive emotions appear to be mixed emotions? Why?
- When experiencing a positive emotion, how do the emotion components change?
- According to Tong, which appraisals cause the experience of positive emotions? Do Tong's findings provide support for universality or constructivism?
- Compare and contrast evidence for universality and socially constructed facial expressions and vocal changes of positive emotions.
- Do positive emotions activate the PNS, SNS, or both?
- Compare and contrast the dimensional model views of positive emotions.
- Explain the broaden-and-build theory and the research support for this theory.
- Compare and contrast the broaden-and-build theory with the malleable mood effects hypothesis.
- How are positive emotions associated with happiness? How can we increase happiness? Should we always be happy?
- What are the current problems with positive emotion research?

Chapter 13 Introduction

This chapter will introduce you to the research on positive emotions. Most of the research conducted has been on the positive emotion joy, but work is starting to consider other positive emotions. Keep in mind that researchers may use different names to represent the same emotion.

How Many Positive Emotions Exist?

Table 1 lists the positive emotions researchers have identified or theorized exist. Clearly, disagreement exists on the number of positive emotions that exist. Keep in mind that Ekman's (1992, 1993) theory suggests that all positive emotions represent different intensities of the same positive emotion family.

Table 1

Positive Emotions According to Emotion Researchers

A table showing emotion researchers, how many positive emotions they claim, and a list of those positive emotions.

Researcher(s)	Number of Positive Emotions	List of Positive Emotions
Paul Ekman (Ekman & Cordaro, 2011)	10	sensory pleasure, happiness, amusement, excitement, wonder, ecstasy, naches (Yiddish – vicarious pride), fiero (Italian – achieving difficult challenge), schadenfreude, rejoicing
Barbara Fredrickson (2013)	10	joy, interest, contentment, gratitude, awe, amusement, inspiration, pride, hope, love
Eddie Tong (2014)	13	joy, interest, contentment, gratitude, awe, amusement, pride, hope, love, challenge, compassion, interest, relief, serenity

Note. For a list of Ekman's emotions and his views, read his interview with Cordaro,
Ekman, P., & Cordaro, D. (2011). What is meant by calling emotions basic. *Emotion Review*, 3, 364-370.

Lets get to know the positive emotions!

Below, is a list of definitions for several positive emotions. For each definition, select the emotion that best fits the definition and drag that emotion into the definition box.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1470#h5p-19

Adapted from four sources: 1) "Differentiation of 13 positive emotions by appraisals," E.M.W. Tong, 2014, *Cognition and Emotion*, 29(3), p. 487-489 (https://doi.org/10.1080/02699931.2014.922056) Copyright 2014 by Taylor & Francis, 2) "What good are positive emotions?" by B.L. Fredrickson, 1998, *Review of General Psychology*, 2(3), p. 370–309 (https//doi.org/ 10.1037/1089-2680.2.3.300) Copyright 1998 by American Psychological Association, 3) "Positive emotions broaden and build," by B.L. Fredrickson, In P. Devine and A. Plant (Eds.) *Advances in Experimental Social Psychology*, 47, p. 4, 6, Copyright 2013 Academic Press and 4) "What is meant by calling emotions basic," P. Ekman and D. Cordaro, 2011, Emotion Review, 3(4), p. 365 (https://doi.org/10.1177/1754073911410740) Copyright 2011 by The Authors

Sensory Pleasure vs. Positive Emotions

Now that we are more comfortable with the definitions of positive emotions, let's discuss the difference between sensory pleasure and a positive emotion. Then, we will delve into the emotion components of positive emotions.

Sensory pleasure and positive emotions share similarities, but most researchers consider these different experiences. Remember, Ekman (Ekman & Cordaro, 2011) does view sensory pleasure as a basic, positive emotion. Sensory pleasure occurs when our bodies reduce or eliminate a negative state such as pain or cold, resulting in a pleasant state. In other words, sensory pleasure is elicited when a motivation or internal trouble is satisfied. For instance, sexual pleasure, satisfying hunger and thirst, or removing painful states. So how do sensory pleasure and positive emotions differ? Well, both constructs include positive subjective feelings, physiological changes, and approach behaviors (Fredrickson & Cohn, 2008). Only positive emotions include cognitive appraisals, while sensory pleasure does not.

Sensory pleasure and a positive emotion can occur at the same time. For instance, if we satisfy a hunger drive, that will result in sensory pleasure and could also elicit the emotion contentment. If we remove an unpleasant stimulus, that could result in sensory pleasure and the emotion relief. So, remember – sensory pleasure and positive emotions can co-occur, but they are different constructs!

Eliciting Events and Cognitive Appraisals

Next, let's discuss the components that change with positive emotions and compare these changes to those that typically occur with negative, basic emotions. Keep in mind that the components that change vary according to the specific positive emotion. Whether a physical, external stimulus is required to elicit a positive emotion depends on the emotion. For instance, joy may be caused by hearing about good news and pride by a compliment, both events that are not physical changes in the environment. In comparison, negative emotions like disgust and fear are caused by a change in the external environment. Some emotions, such as awe, may be caused by a physical external stimulus, such as someone that is greater than the self. The major point to remember is that unlike with negative emotions, for a positive emotion to be elicited, a physical stimulus is not required.

In one study (Campos et al., 2013), participants recalled one experience of a positive emotion and wrote about the positive emotion experience. Participants' descriptions were coded for themes. These themes could be viewed as cognitive appraisals or eliciting events.

Table 2

Themes Identified in Participants' Descriptions of 8 Positive Emotions (Campos et al., 2013)

A table showing a positive emotion and the themes associated with it.

Positive Emotion	Themes
Amusement	• Positive Valence • Appreciation of present circumstances • Awareness of incongruity in situation • Playful with others in the environment
Awe	• Positive Valence • Appreciation of present circumstances • Feeling small and insignificant • Cognitive worldview changed or challenged
Contentment	• Positive Valence • Appreciation of present circumstances • Satisfied and secure
Gratitude	• Positive Valence • Appreciation of present circumstances • Benefited by another's actions • Desire to give back • Feeling vulnerable • Commitment
Interest	• Positive Valence • Focused on novelty • Desire to explore environment
Joy	• Positive Valence • Appreciation of present circumstances • Receiving resources • Increase in energy • Confidence to take on new challenges

Love	• Positive Valence • Appreciation of present circumstances • Feeling vulnerable • Commitment
Pride	• Positive Valence • Appreciation of present circumstances • Confidence to take on new challenges • Accomplishment

Adapted from "What Is Shared, What Is Different? Core Relational Themes and Expressive Displays of Eight Positive Emotions," by B. Campos, M.N. Shiota, D. Keltner, G.C. Gonzaga, and J.L. Goetz, 2013, *Cognition & Emotion*, 27(1), p. 42, 44 (https://doi.org/10.1080/02699931.2012.683852) Copyright 2013 by Taylor & Francis.

In Table 2 above, make note of themes that are unique to each emotion and themes that are present in more than one emotion. For instance, accomplishment is unique to pride, but confidence to take on new challenges in present in both joy and pride. If two themes are present in one emotion, what might this suggest?

Below is a summary of themes that were found in more than one emotion.

- Positive valence was a theme in all 8 positive emotions.
- Except for interest, all emotions mentioned an appreciation for present circumstances suggesting positive emotions occur in environments that are safe, comfortable, and rewarding. Also note, this finding suggests that contentment was not necessarily unique from other emotions.
- Both pride and joy resulted in the theme of confidence to take on new challenges
- Both gratitude and love shared the common themes of

vulnerability and commitment, which might suggest they are part of the same emotion family.

Other work (Keltner & Haidt, 2003; Shiota et al., 2007)) suggests that awe is defined by two unique cognitive appraisals. These appraisals are vastness – feeling small in comparison to something larger in one's environment and accommodation – changing one's cognitive schemas to account for new information.

More Cognitive Appraisals

In line with eliciting events, cognitive appraisals depend on the emotion that is experienced. For instance, pride is caused by an internal attribution, but awe is caused by an external attribution. (We will discuss cognitive appraisals in more depth later when we discuss Tong's (2014) study).

In Scherer's (1997) study, he investigated the cognitive appraisal changes for one positive emotion – joy. For a review of Scherer's (1997) study, go to the modern theories section on cognitive appraisals.

Means (see Table 3), collapsed across all world regions, show that participants reported the following appraisals when recalling a joy experience: a little expectedness, pleasantness, goal conduciveness, not unfair, external causation: close others; coping: no action required; moral, and an increase self-esteem. In Figure 1, we can see that the cognitive appraisal patterns for joy are universal across all world regions (Note: the presence of a circle around a datapoint indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample; circles are not shown in this figure). Recall that in Scherer (1997) the only emotion to show universality across the eight appraisal dimensions was joy!

Table 3

Mean Changes in Cognitive Appraisal Dimensions for Joy

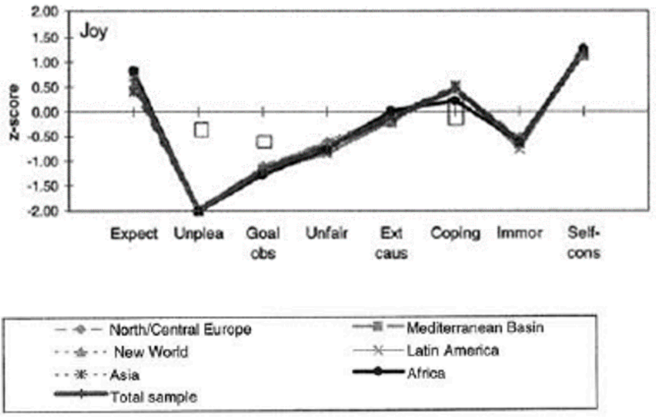
Cognitive Appraisal Dimension	Mean	Question	Response Scale
Expectedness / Novelty	2.07	Did you expect this situation to occur?	1 = not at all; 2 = a little; 3 = very much
Unpleasantness	1.02	Did you find the event itself pleasant or unpleasant?	1 = pleasant; 2 = neutral; 3 = unpleasant
Goal Obstruction	1.17	Did the event help or hinder you to follow your plans or achieve your aims?	1 = it helped; 2 = it didn't matter; 3 = it hindered.
Unfairness	1.05	Was the situation unjust or unfair?	1 = not at all; 2 = a little; 3 = very much
External Causation	2.00	Who do you think was responsible for the event?	1 = self/ internal; 2 = close persons/ external; 3 = other persons/ external; 4 = impersonal agency/ external
Coping Ability	3.80	How did you evaluate your ability to act on or to cope with the event and its consequences?	1 = powerless; 2 = escape possible; 3 = pretend nothing happened; 4 = no action necessary; 5 = could positively influence event and change consequences
Immorality	1.10	Would this behavior itself be judged as improper or immoral by your acquaintances?	1 = not at all; 2 = a little; 3 = very much

Self-Esteem	2.90	How did this event affect your self-esteem?	1 = negatively; 2 = not at all; 3 = positively

Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, Journal of Personality and Social Psychology, 73(5), p. 905, 911 (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

Figure 1

Eight Cognitive Appraisal Ratings for Joy Across Six World Regions



Note. Presence of a circle around a datapoint indicates that the country with the circle showed means significantly different from the mean of the remainder of the sample. Adapted from "The Role of Culture in Emotion-Antecedent Appraisal," by K.R. Scherer, 1997, *Journal of Personality and Social Psychology*, 73(5), p. 912, (https://doi.org/10.1037/0022-3514.73.5.902). Copyright 1997 by the American Psychological Association.

In a study by Tong (2014), American and Singaporean undergraduate

students recalled and described a personal experience of one randomly selected emotion. Then, participants rated each emotion along the below 13 cognitive appraisals.

A table showing results from Tong's study (2014) for recalling one randomly assigned emotion that correspond with the 13 rated cognitive appraisals featured in the table to the right.

Recalled One Randomly Assigned Emotion
Joy
Interest
Contentment
Gratitude
Awe
Amusement
Pride
Hope
Romantic Love
Challenge
Compassion
Interest
Relief
Serenity

A table of 13 rated cognitive appraisals
Rated 12 Cognitive Appraisals
(Un)Pleasantness
Relevance
Problems
Goal Attainment
Agency – Self
Agency – Others
Agency – Circumstances
Control – Self
Control – Others
Control – Circumstances
Certainty
Predictability
Effort

Because of the large number of cognitive appraisals, Tong used factor analysis to reduce the 13 appraisals to four broad cognitive appraisal dimensions (similar to the factor analysis completed for the circumplex models). Table 4 defines these four broad appraisal dimensions.

Table 4

Tong's (2014) Four Broad Cognitive Appraisal Dimensions

A table showing Tong's four broad cognitive appraisal dimensions, accompanied by High scores on cognitive appraisal dimension, and the definition of the dimension.

Broad Cognitive Appraisal Dimension	High scores on cognitive appraisal dimension	Definition
Achievement	goal attainment, relevance, agency-self, control-self	Important goal achieved by the self
External Influence	control-others, agency-others, control-circumstances, agency-circumstances.	• Other people or the general situation caused the emotion (i.e., external attribution) • Other/people or the situation controlled the emotion (i.e., low perceptions of control)
Difficulty	effort, problems, unpleasantness	Problems or obstacles that require effort to overcome and may initially elicit unpleasantness
Clarity	certainty, predictability	Good understanding of current situation and/or future events

Adapted from "Differentiation of 13 positive emotions by appraisals," E.M.W. Tong, 2014, Cognition and Emotion, 29(3), p. 496 (https://doi.org/10.1080/02699931.2014.922056) Copyright 2014 by Taylor & Francis.

For each cognitive appraisal, select the positive emotion that would cause this specific appraisal and drag it into the corresponding cognitive appraisals drop box. Incorrect answers apply a penalty, and are shown when you submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1478#h5p-20

Table 5 below displays cognitive appraisals participants reported for each of the 13 emotions. It is important to note that these ratings did not significantly differ for Singaporean and American students – providing initial evidence of universality.

Table 5

Cognitive Appraisal Definitions (Tong, 2013)

A table showing broad cognit

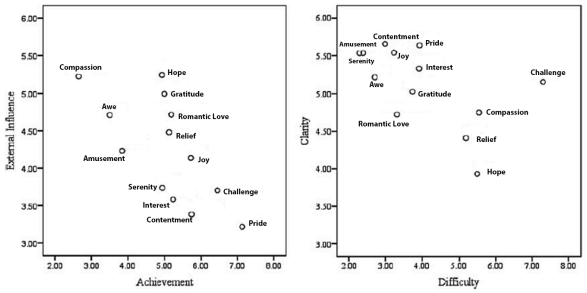
Broad Cognitive Appraisal Dimension	High Scores on cognitive appraisal dimens
Achievement	goal attainment, relevance, agency-self, con
External Influence	control-others, agency-others, control-circ
Difficulty	effort, problems, unpleasantness
Clarity	Certainty, predictability

Adapted from "Differentiation of 13 positive emotions by appraisals," E.M.W. Tong, 2014, Cognition and Emotion, 29(3), p. 496-497 (https://doi.org/10.1080/02699931.2014.922056) Copyright 2014 by Taylor & Francis.

The conceptual maps below show how each of the 13 emotions were rated along the appraisals external influence and achievement (Figure 2) and difficulty and clarity (Figure 3). Based on the ratings, do you think any positive emotions might be the same emotions? Which ones? Keep in mind that there are more cognitive appraisals than those tested in this study, and we are only looking at one emotion component. We would have to investigate physiology, facial expressions, etc., to really determine whether two positive emotions represent the same construct.

Figures 2 and 3

Dimensional Mapping of Emotions Based on External Influence and Achievement (Figure 2) and Difficultly and Clarity (Figure 3)



Reproduced from "Differentiation of 13 positive emotions by appraisals," E.M.W. Tong, 2014, *Cognition and Emotion*, 29(3), p. 497 (https://doi.org/10.1080/02699931.2014.922056) Copyright 2014 by Taylor & Francis.

An earlier study (Smith & Ellsworth, 1985), similar to Tong, asked participants to recall 15 different positive and negative emotions. For each emotion, participants rated their cognitive appraisals. The six appraisal dimensions identified in this study are defined in Table 6.

Table 6

Cognitive Appraisal Dimension Definitions for Smith and Ellsworth (1985) Study

A table showing cognitive appraisal dimensions, and their definitions according to Smith and Ellsworth's 1985 study

Cognitive Appraisal Dimension	Definition
Pleasantness	Amount of pleasantness / unpleasantness felt
Anticipated Effort	Amount of mental or physical effort
Certainty	Clarity and understanding about the situation
Attentional Activity	Paying attention to and thinking about the cause of the emotion
Self-other Responsibility / Control	Whether self or other person was responsible for even that cause emotion
Situational-Human Control	• Situational: Perception that situation was beyond anyone's control • Human: perception that self/others could control situation

Adapted from "Patterns of cognitive appraisal in emotion" by C.A. Smith and P.C. Ellsworth, 1985, *Journal of Personality and Social Psychology*, 48(4), p. 822. Copyright 1985 by the American Psychological Association.

The three figures below show the location of positive and negative emotions for a combination of appraisal patterns. Based on these figures, please note a few take-home points:

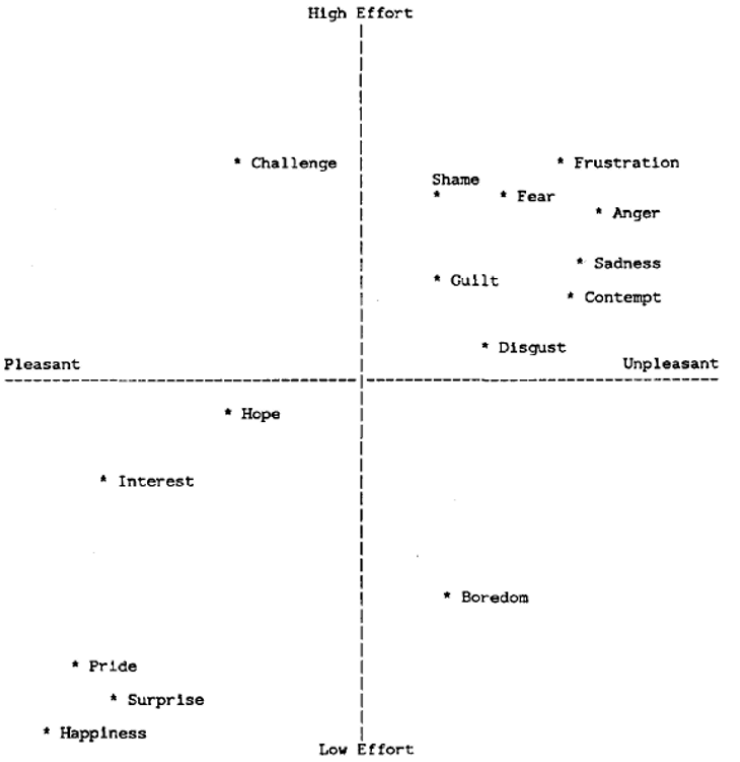
1. **Figure 4 – Effort and Pleasantness**: This study found that all positive emotions were rated as moderate to highly pleasant, including challenge. This is in contrast to Tong's (2014) study that found challenge was more unpleasant than pleasant (Table 5 and Figure 3). Most negative emotions were rated as highly unpleasant and requiring high effort, whereas most positive emotions were rated as pleasant and requiring minimal effort.
2. **Figure 5 – Certainty and Attention:** All positive emotions were rated as high in attention but varied in their uncertainty. For instance, hope was high attention-high uncertainty, whereas

happiness, challenge, and pride were high attention-high certainty.

3. **Figure 6 – Situational/Human Control and Self/Other Control:** The dimension situational control-human control is unrelated to perceptions of whether the self or other people caused the event. Except for interest, the positive emotions were perceived to be caused by the self. Contrast that with negative emotions – some of which were caused by others (e.g., anger and disgust) while some were caused by the self (e.g., shame and guilt). People perceived most positive emotions to be under human control but hope and interest were viewed as under situational control, but not really caused by the self or others.

Figure 4

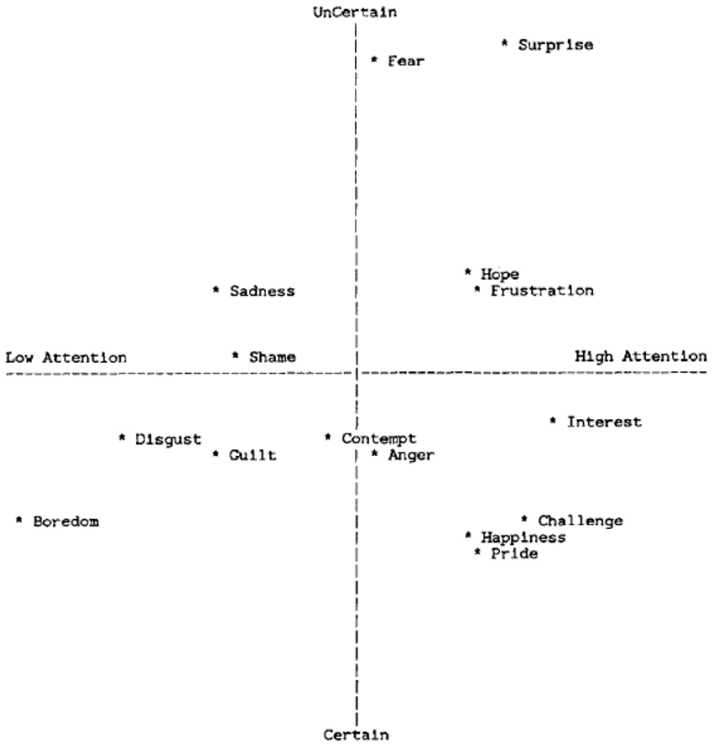
Location of Positive and Negative Emotions along Effort and Pleasantness Cognitive Appraisals



A *graph with four quadrants: Pleasant, High effort (top left). Unpleasant, High effort (top right). Pleasant, Low Effort (bottom left). And Unpleasant, Low Effort (bottom right). "Challenge" emotion places in the pleasant, high effort quadrant. Emotions "Shame", "Fear", "Frustration", "Anger", "Guilt", "Sadness", "Contempt", and "Disgust" all placed in the unpleasant, high effort quadrant. Emotions "Hope", "Interest", "Pride", "Surprise", and "Happiness" are placedd in the pleasant, low effort quadrant. Emotion "Boredome" is pl*

Figure 5

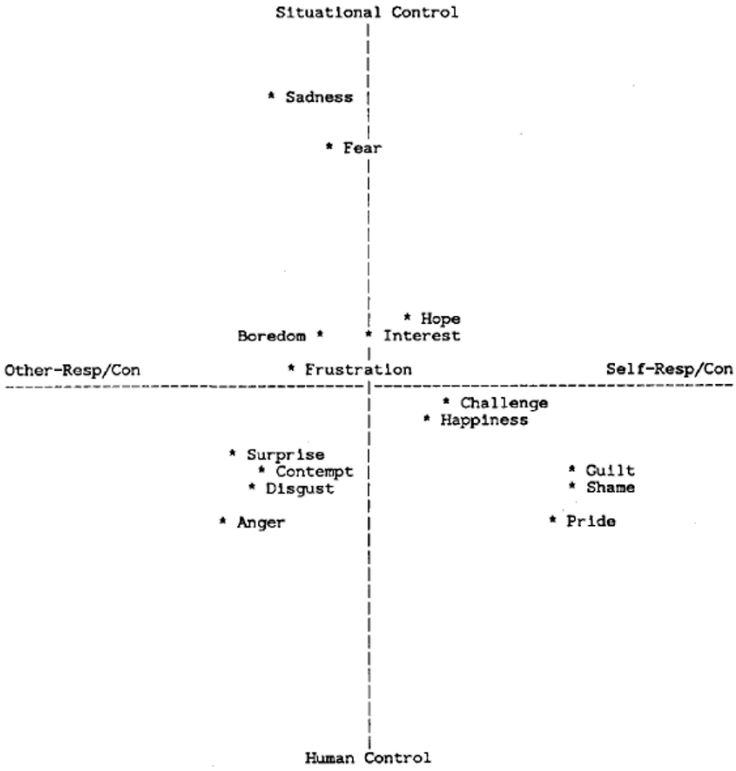
Location of Positive and Negative Emotions along Certainty and Attention Cognitive Appraisals



A graph with four quadrants: Low Attention, Uncertain (top left). High Attention, Uncertain (top right). Low Attention, Certain (bottom left). And High Attention, Certain (bottom right). Emotions "Sadness", and "Shame" are placed in the Low Attention, Uncertain quadrant. Emotions "Fear", "Surprse", "Hope", andd "Frustration" are placed in the high attention, uncertain quadrant. Emotions "Disgust", "Guilt", "Contempt", and "Boredome" are placed in the Low Attention, Certain Quadrant. Emotions "Anger", "Happiness", "Pride", "Challenge", and "Interest" are placedd in the High attention, certain quadrant.

Figure 6

Location of Positive and Negative Emotions along Situation-Human Control and Perceptions of Control – Self Vs. Other



Control (top right). Other – Response / Control, Human Control (bottom left). And Self – Response / Control (bottom right). Emotions "Sadness", "fear", "boredom", and "frustration" are placed in the Other – Response / Control, Situational Control quadrant. Emotion "Hope" is placed in the Self – Response / Control, situational control quadrant. The Emotion "Interest" has no x value, is placed directly on the y axis line, and is placed toward the situational control side of the y-axis. Emotions "Surprise", "Contempt", "Disgust", and "Anger" are placed in the Other – Response / Control, Human Control Quadrant. Emotions "Challenge", "Happiness", "Guilt", "Shame", and "Pride" are placed in the Self – Response / Control, Human Control Quadrant.

Facial Expressions - Early Work

Across several industrialized and isolated cultures, Ekman has found people universally recognize the happiness facial expression. Similar to findings on fear (Ekman et al., 1969, click here for review), the majority of participants correctly identified happiness, including the Fore and Borneo participants (see Table 7).

A table showing cross-cultural rates of recognition for a variety of emotion words.

Affect Category	United States	Brazil	Japan	New Guinea Pidgin Responses	New Guinea Fore Responses	Borneo
Happy (H)	97 H	97 H	87 H	99 H	82 H	92 H
Fear (F)	88 F	77 F	71 F 26 Su	46 F 31 A	54 F 25 A	40 F 33 Su
Disgust-contempt (D)	82 D	86 D	82 D	29 D 23 A	44 D 30 A	26 Sa 23 H
Anger (A)	69 A 29 D	82 A	63 A 14 D	56 A 22 F	50 A 25 F	64 A
Surprise (Su)	91 Su	82 Su	87 Su	38 Su 30 F	45 F 19 A	36 Su 23 F
Sadness (Sa)	73 Sa	82 Sa	74 Sa	55 Sa 23 A	56 A	52 Sa

Reproduced from "Pan-cultural Elements in Facial Displays of Emotion," by P. Ekman, E.R. Sorenson, and W.V. Friesen, 1969, Science, 164(3875), p. 87, (https://doi: 10.1126/science.164.3875.86). Copyright Note. For the Fore tribe, some words were in Pidgin language, others in Fore language.

In their follow-up study, 86-93% of adult participants correctly identified happiness when presented with two other negative emotions (see Table 8). Most children (87%-100%; Table 9) correctly identified happiness facial expressions.

Table 8

Results for Adult Participants (Ekman an Friesen, 1971)

A table showing Results for Adult Participants for Happiness being the emotion described in the story

Emotion Shown in the two incorrect photographs	Numbers	% Choosing correct face
Happiness – Surprise, disgust	62	90%
Happiness – Surprise, sadness	57	93%
Happiness – Fear, anger	65	86%
Happiness – Disgust, anger	36	100%

Table 9

Results for Child Participants (Ekman and Friesen, 1971)

A table showing Results for Child Participants for Happiness being the emotion described in the story

Emotion Shown in the one incorrect photograph	Numbers	% Choosing correct face
Happiness – Surprise, disgust	62	90%
Happiness – Surprise, sadness	57	93%
Happiness – Fear, anger	65	86%
Happiness – Disgust, anger	36	100%

Reproduced from "Constants across Cultures in the Face and Emotion," by P. Ekman, E.R. and W.V. Friesen, 1971, Journal of Personality and Social Psychology, 17(2), p. 127, (https://doi: https://doi.org/10.1037/h0030377). Copyright 2016 by the American Psychological Association

In his third study (for a review, go here), Ekman and colleagues (1987) tested facial expression identification across 10 countries. Again, happiness was the only positive emotion utilized in this study. As show in Table 10, in the single-judgment task, participants in all countries correctly identified happiness when shown the happy photo. This suggests happiness may be universally recognized, even in the isolated Minangkabu tribe (located in Sumatra). But remember this study included only one positive emotion – so it would probably be easy to label a photo displaying a smile as happiness. The multiple-judgment task also suggested happiness was universally identified. In this task, participants rated the intensity of the six emotions shown in the happy photo. For the happy photo, participants rated this photo as most intensely happiness.

Table 9

Single-Judgment Task: Percentage of Correct Labels for Six Emotions Displayed in Photos (Ekman et al., 1987)

Nation	Happiness	Surprise	Sadness	Fear	Disgust	Anger
Estonia	90	94	86	91	71	67
Germany	93	87	83	86	61	71
Greece	93	91	80	74	77	77
Hong Kong	92	91	91	84	65	73
Italy	97	92	81	82	89	72
Japan	90	94	87	65	60	67
Scotland	98	88	86	86	79	84
Sumatra	69	78	91	70	70	70
Turkey	87	90	76	76	74	79
United States	95	92	92	84	86	81

Adapted from "Universals and Cultural Differences in the Judgments of Facial Expressions of Emotion," by P. Ekman, W.V. Friesen, M. O'Sullivan, A. Chan, I. Diacoyanni-Tarlatzis, K. Heider, R. Krause, W.A. LeCompte, T. Pitcairn, P.E. Ricci-Bitti, K. Scherer, M. Tomita, and A. Tzavaras, 1987, Journal of Personality and Social Psychology, 53(4), p. 714 (https://doi: 10.1037/0022-3514.53.4.71). Copyright 2016 by the American Psychological Association.

Some other work has confirmed universality in happiness facial expressions. In one study (Matsumoto, 1992), participants saw 48 photos of six emotional expressions (anger, disgust, fear, happiness, sadness, and surprise). Each emotion was displayed in 8 different photos. Participants viewed all 48 photos one at a time. While viewing each photo, participants picked an emotion label from the following seven emotions: anger, contempt, disgust, fear, happiness, sadness, and surprise. 97.62% of American participants and 98.30% of Japanese participants correctly labeled the happiness expression as happiness across the 8 happy photos. Further analysis revealed identification did not differ across cultures. A similar study by Matsumoto and Ekman (1989) found that 97.97% of Americans and

97.59% of Japanese correctly identified happiness across eight photos.

In the fear chapter, we discussed a study by Crivelli et al. (2016), which can be reviewed here. In this study, participants were randomly assigned to one of five emotion label conditions (happy, sad, anger, fear, disgust). From six different photos of facial expressions, participants were asked to pick the photos that displayed their assigned emotion from six photos. Thus, in the happiness condition, participants were asked to point to the photo that displayed the happy facial expression. In the happy condition, a significantly greater percentage of Spaniards (100%) than Trobrianders (58%) correctly selected the smiling expression. The Trobrianders also tended to pick the neutral face (23%), the sad pout (8%), the fear gasp (8%), and the angry scowl (4%) as representing happiness. These findings might suggest that the happiness expression was universally identified. But note that happiness is again the only positively valenced emotion in this study – thus again making the correct answer easier to identify.

In study 2 (Crivelli et al., 2016), participants were children and adolescents recruited from Mwani. Participants were asked to match emotion words to emotion facial expressions displayed in the photo or video clip. All participants completed their tasks for all five emotions – happy, sadness, anger, fear, and disgust (a within-subjects variable). The facial expressions displayed were the same as in Study 1. The photo facial expressions were still photos taken from the video clip. All six facial expressions, including neutral, were shown at the same time for the photos and the video clips.

When instructed to select the happy facial expressions, 58% in the static and 53% in the dynamic condition correctly selected the smiling face. (There were no significant differences in the proportion of participants who selected the correct answer in the dynamic or static condition.) In general, participants also selected the neutral expression.

Recall that Lisa Barrett and her colleagues (Gendron et al., 2014b) asked Boston and Himba participants to sort facial expressions into

similar piles based on similarity. They found both groups sorted smiles into one pile, suggesting joy was universally recognized. For a review of this study, go here.

Facial Expressions and Bodily Changes

In another study on facial expressions of positive emotions (Campos et al., 2013), participants recalled a time they felt a positive emotion and then posed that emotion of their faces. The eight positive emotions were amusement, awe, contentment, interest, joy, love, pride, and gratitude. To code the expressions, researchers used Ekman & Friesen's (1978) FACS and developed their own coding system for bodily changes. Across all participants, the percentage that each action/bodily change appeared for each emotion was calculated to determine whether that change was important for each emotion (Table 11).

Table 11

Strength of Association between Behavior Change and Emotion

A table showing percentages for action / bodily change present across all participants, and Strength of the association

Percentage Action/Bodily Change Present across all participants	Strength of Association
0% – 24%	Not Associated with emotion
24% – 49%	Weakly Associated with emotion
50% – 74%	Moderately Associated with emotion
75% – 100%	Strongly Associated with emotion

Table 12 displays the action unit and bodily change findings per the percentages in the table above.

Table 12

Facial Expressions and Action Unit/Bodily Changes for each of the 7 Positive Emotions

A table showing Facial Expressions and Action Unit/Bodily Changes for each of the 7 Positive Emotions.

Emotion	Picture Reference	Moderate to Strong Association (Greater than 50%)	Weak Association (25% to 50%)
Amusement		Action Unit six – 85%, Cheek Raiser. Action Unit 12 – 95%, Lip Corner puller. Action Unit 25 – 81%, Lips apart. Action Unit 26/27 – 68%, Jaw Drop, Mouth Stretch	49%, head bounce Action Units 55/56 – 34%, Head tilt. Action Unit 1 – 25%, inner brow raise
Awe		Action unit 25 – 86%, Lips apart Action units 26/27 – 80%, Jaw Drop/ Mouth Stretch Action Unit 1 – 78%, Inner brow raise Action Unit 5 – 61%, Upper lidd raiser	Action Unit 57 – 27%, Head forward

Contentment		Action unit 6 – 56%, Cheek Raiser. Action unit 12 – 85%, Lip corner puller Action unit 24 – 60%, lip Pressor	38%, Head nod. Action unit 25 – 26%, Lips apart
Interest		Action Unit 1 – 58%, Inner brow raise. Action unit 4 – 56%, Brow lowerer	Action Unit 24 – 38%, Lip pressor Action unit 2 – 37%, outer brow raise Action units 55/56 – 37%, head tilt. 37%, forward lean Action unit 57 – 33%, Head forward

Joy		Action Unit 6 – 79%, Cheek Raiser Action Unit 12 – 97%, Lip Corner Puller Action Unit 25 – 50%, Lips Apart	34%, Bounce. Action units 26/27 – 31%, Jaw Drop/ mouth stretch/td>
Love		Action Unit 6 – 69%, Cheek Raiser. Action Unit 12 – 84%, Lip corner puller Action unit 25 – 54%, Lips apart	Action units 55/56 – 49%, Head tilt Action unit 43 – 26%, Eyes closed

Pride		Action unit 6 – 70%, Cheek raiser. Action unit 12 – 80%, lip corner puller. 55%, sit up. Action unit 24 – 60%, Lip Pressor	45%, Shoulders back. Action Unit 53 – 38%, Head Up

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Reproduced from "What Is Shared, What Is Different? Core Relational Themes and Expressive Displays of Eight Positive Emotions," by B. Campos, M.N. Shiota, D. Keltner, G.C. Gonzaga, and J.L. Goetz, 2013, Cognition & Emotion, 27(1), p. 47 (https://doi.org/10.1080/02699931.2012.683852) Copyright 2013 by Taylor & Francis.

Below are some important findings:

- Researchers concluded that the seven above emotions displayed unique changes in facial expressions. Participants did not show consistent AU and bodily changes for gratitude.
- Except for awe and interest, Duchenne smiles (AU 6+12) were present in all positive emotions, although the intensity of this smile differed. Contentment and pride resulted in a less-intense Duchenne smile.
- For awe and interest, Duchenne or non-Duchenne smiles did not meet the 25% threshold.
- For amusement, the jaw drop and head bounce might occur during play experiences.
- The awe expression was similar to a fear expression. For both

emotions, the following action units changed: 1, 5, and 26. To review the fear expression, go here.

- Most emotions resulted in facial expression changes, but few bodily changes. In fact, pride was the only emotion to show a strong association for a bodily change – sitting up.

Facial Expressions and Cognitive Appraisals

Appraisal theorists have applied the Component Process Model (Scherer, 2001; for a review, go here) to determine how action units vary according to cognitive appraisal checks. This study was done by Scherer, who developed the CPM, and his colleagues (Mortillaro et al., 2011). They investigated the action unit changes for joy, pride, sensory pleasure, and interest. (Note: the researchers stated that sensory pleasure and interest may not meet the requirements for an emotion). In this study, 10 professional actors displayed each of the four feeling states – joy, pride, sensory pleasure, and interest. For each feeling state displayed, coders identified the presence of action units and how long the action units were displayed on the actors' face. Overall, this study found that the action unit changes for pride and joy were the same and the action unit changes for interest and pleasure were the same (see Table 13). Thus, overall findings contrasted the differences in action unit changes for two groups – 1) Pride, Joy vs. 2) Interest, Sensory Pleasure. Table 13 displays the findings for each of the relevant action units. Remember, differences were not found between joy and pride OR between interest and sensory pleasure. Overall, the findings in Table 13 suggest that pride and joy results in more Duchenne smiling (AU 6 + 12) than interest and pleasure. But generally, these findings suggest that specific action units do not occur for specific discrete emotions. These findings may support Ekman's (1992, 1993) theory that all positive emotions represent different intensities of the same positive emotion family.

Table 13

Differences in Action Unit Changes and Duration for Pride, Joy vs. Interest, Pleasure (Martillaro et al., 2011)

A table showing a specific Action Unit, a description of that action unit, and also the presence / duration of the action unit.

Action Unit	Action Unit Description		Presence / Duration of Action Unit
1	Inner brow raiser	 *An image of a person's inner brow being raised.*	Present more in joy than pleasure
2	Outer brow raiser	 *An image of a person's outer brow being raised*	Present more in pride than pleasure

6	Cheek raiser		*An image of a person's eyes and cheeks. The person's cheeks are raised.*
7	Lid tightener		*An image of a person's eyes with the lids tightened.*

- Longer, more frequent in joy vs. interest
- Did not distinguish joy from pride or pleasure

Longer duration for interest than joy

12	Lip corner puller	 *An image of a persons cheeks and mouth. The corners of the mouth /lips are pulled.*	Shorter, more frequent smiles in pride vs. interest, pleasure; "small smile" present in pride (Tracy & Robins, 2004, 2008)
17	Chin Raiser	 *An image of a persons mouth, with the chin being raised.*	More in pride than pleasure

Photos reproduced and adapted from "Subtly Different Positive Emotions Can Be Distinguished By Their Facial Expressions" by M.

Mortillaro, M. Mehu, and K.R. Scherer, 2011, Social Psychological and Personality Science, 2(3), p. 265-266 (https://doi.org/10.1177/1948550610389080) Copyright 2011 by The Authors.

This study did not find any unique action unit changes to differentiate the four positive feeling states. So, the appraisal theorists explored whether the duration of certain action units corresponded to three cognitive appraisal dimensions from the CPM: 1) suddenness 2) intrinsic pleasantness, and 3) goal conduciveness.

The suddenness appraisal (Table 14) may be displayed in long durations of AU1 and AU2, which were present in interest and joy displays. Conversely, AU43 was displayed during pride and sensory pleasure, feelings that do not include a suddenness appraisal. Interestingly, the researchers view suddenness as occurring on a dimension from eyes being almost completely closed (AU 43) to eyes being wide open (AU 1+2 + 5). In other words, as shown in Figure 7, the amount of eye openness may be positively correlated with suddenness.

Table 14A

Relationship between Suddenness Appraisal and Duration of Action Unit Changes for ***High*** *Suddenness*

Longer Duration of AU	AU Description		Emotions where the AU is Present
AU 1	Inner Brow Raise 	*An image of a person's inner brow being raised.*	Interest, Joy
AU 2	Outer Brow Raise 	*An image of a person's outer brow being raised*	Interest, Joy

	Upper Lid Raiser		
AU 5		*An image of a persons eyes, the lids are raised, opening the eyes wide.*	Interest, Joy

Table 14B

Relationship between Suddenness Appraisal and Duration of Action Unit Changes for ***low*** *Suddenness*

Longer Duration of AU	**AU Description**		**Emotions where the AU is Present**
AU 43		*An image of a persons eyes closed.*	Pride, Sensory Pleasure

Figure 7

Correlational Relationship Between Suddenness Appraisal and Amount Eyes Opened

An arrow is displayed flowing across the image from left to right, indicating a scale of suddenness. Above the arrow is an image example of action unit 43 – Eye closure (left), and an image example of action units 1, 2, and 5. AU 43 is placed on the left to indicate the suddenness level being low. AU 1, 2, 5 is shown on the right to indicate a larger suddenness level.

Reproduced from "Subtly Different Positive Emotions Can Be Distinguished By Their Facial Expressions," by M. Mortillaro, M. Mehu, and K.R. Scherer, 2011, Social Psychological and Personality Science, 2(3), p. 265-266 (https://doi.org/10.1177/1948550610389080) Copyright 2011 by The Authors.

AU6 is present during the experience of intrinsic pleasantness – general feelings of positivity that exist early in the emotion episode (Table 15). AU6 is present during feeling states of joy and pleasure, but absent during feeling states of pride and interest. Thus, the authors believe AU6 might differentiate positive emotions that cause a joyful smile from positive emotions that cause other smiles, such as the small smile in pride. Interestingly, AU12 (lip corner puller) did not differentiate the four positive feeling states and in fact was present for all four feeling states. This suggests that AU12 may change when experiencing any positive emotion.

Table 15

Relationship between Intrinsic Pleasantness Appraisal and Presence of Action Unit Change

A table showing Action Unit 6, a high intinsic pleasantness appraisal

High Intrinsic Pleasure	AU 6	 *An image of a person's eyes and cheeks. The persons cheeks are raised.*	Joy, Pleasure

Photos reproduced and adapted from "Subtly Different Positive Emotions Can Be Distinguished By Their Facial Expressions," by M. Mortillaro, M. Mehu, and K.R. Scherer, 2011, Social Psychological and Personality Science, 2(3), p. 265-266 (https://doi.org/10.1177/1948550610389080) Copyright 2011 by The Authors.

Emotions caused by appraisals of goal conduciveness (e.g., joy, pride) were accompanied by long duration of action unit changes of 1+2+6 (Table 16). Positive emotions that do not help people achieve their goals (i.e., interest, sensory pleasure) were accompanied by longer duration action unit changes of 7 + 43. The researchers theorize that AU7 represents a state of focus or concentration.

Table 16

Relationship between Goal Conduciveness Appraisal and Duration of Action Unit Changes for ***High Goal Conduciveness***

High goal conduciveness table showing relationships between goal conduciveness appraisal and duration of Action unit changes.

Action Unit	AU Description		Emotions Present in
AU 1	Inner Brow Raiser	 *An image of a person's inner brow being raised.*	Joy, Pride
AU 2	Outer Brow Raiser	 *An image of a person's outer brow being raised*	Joy, Pride

	Cheek Raiser		
AU 6		*An image of a person's eyes and cheeks. The persons cheeks are raised.*	Joy, Pride

Table 16 B

Relationship between Goal Conduciveness Appraisal and Duration of Action Unit Changes for ***Low Goal Conduciveness***

Low goal conduciveness table showing relationships between goal conduviceness appraisal and duration of Action unit changes.

Action Unit	AU Description		Emotions Present in
AU 7	Lid Tightener	 *An image of a person's eyes with the lids tightened.*	Interest, Pleasure
AU 43	Eye Closure	 *An image of a person s eyes closed.*	Interest, Pleasure

Photos reproduced and adapted from "Subtly Different Positive Emotions Can Be Distinguished By Their Facial Expressions," by M. Mortillaro, M. Mehu, and K.R. Scherer, 2011, Social Psychological and Personality Science, 2(3), p. 265-266 (https://doi.org/10.1177/1948550610389080) Copyright 2011 by The Authors.

Facial Expressions - Summary

Overall, both basic emotion and constructivists agree that facial expressions of joy are universally recognized. The only confusion for joy seemed to be when participants from isolated tribes confused joyful and neutral expressions (Crivelli et al., 2016). Pride is the only positive emotion that caused bodily changes, all others only showed facial expression changes (Campos et al., 2013). Studies suggest that positive emotions could be distinguished by Duchenne vs. non-Duchenne smiles, wide eyes open versus eyes shut (Campos et al., 2013; Mortillaro et al., 2011). Most appraisals do not correspond to only one specific action unit change. Suddenness is the exception. Suddenness is positively correlated with amount of eye opening (Mortillaro et al., 2011).

Vocal Changes

Next, we will discuss vocal changes associated with positive emotions. First, let's discuss Sauter et al.'s (2010) study, which you can review here. Pay attention to any limitations discussed about this study.

In this study, participants matched an emotional story to a corresponding vocal sound for positive and negative emotions. Recall that in this study Himba and English participants listened to the vocal sound from a Himba voice and an English voice. In this study, positive emotions or feelings could be achievement/pride, amusement, sensual pleasure, and relief. In Figures 8 and 9, note that all positive emotions met the 2 out of 4 threshold, except for relief (Figure 8) and sensory pleasure (Figure 9). Why would relief and sensory pleasure not be universally recognized? It could be a methodological problem – maybe the story or the voice did not accurately convey the emotion. Alternatively, it could be sensory pleasure and relief are not universal emotions.

Table 17

Emotional Stories and Corresponding sounds from Sauter et al. (2010)

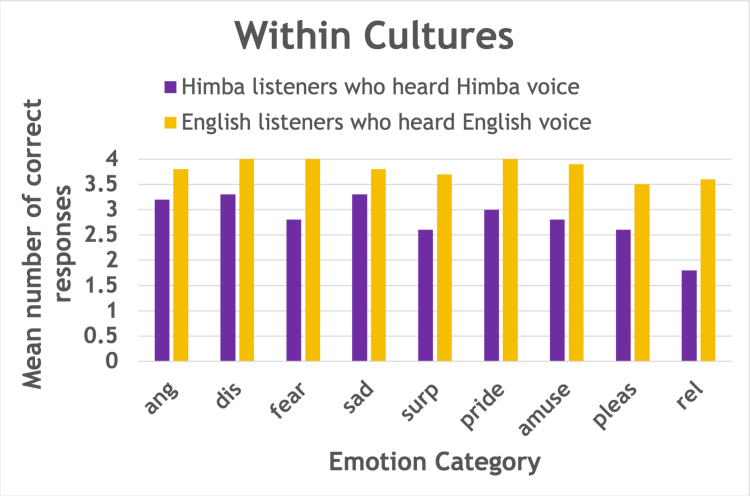
Adapted from "Cross-Cultural Recognition of Basic Emotions Through Nonverbal Emotional Vocalizations," by S.A. Sauter, F. Eisner, P. Ekman, and S.K. Scott, 2010, Proceedings of the National Academy of Sciences (PNAS), 107, Online Supplemental Material (https://www.pnas.org/content/pnas/suppl/2010/01/12/0908239106.DCSupplemental/pnas.200908239SI.pdf), (https:// doi.org/10.1073/pnas.0908239106). Copyright 2010 National Academy of Sciences.

Emotion Described in Story	Correct Vocal Sound
Achievement [Pride]	
English Version: Someone gets a phone call and is offered a job that they really want and they feel like they want to celebrate. **Himba Version:** Someone manages to kill a lion by themselves and they feel like they want to celebrate.	Cheers
Amusement Someone is being tickled by a child and finds it very funny	Laughs
Anger Someone is being treated in a rude way deliberately, and is very angry about it.	Growl
Disgust Someone has just eaten rotten food and feels very disgusted.	Retches [vomiting]
Fear Someone is suddenly faced with a dangerous animal and feels very scared.	Screams
Sensual Pleasure Someone is having sex and enjoying it very much.	Moans
Relief Someone has just found their child after it was lost and they feel very relieved.	Sighs
Sadness Someone finds out that a member of their family has died and they feel very sad.	Sobs

Surprise Someone sees a bright light in the middle of the night and is very surprised.	Sharp Inhalation

Figure 8

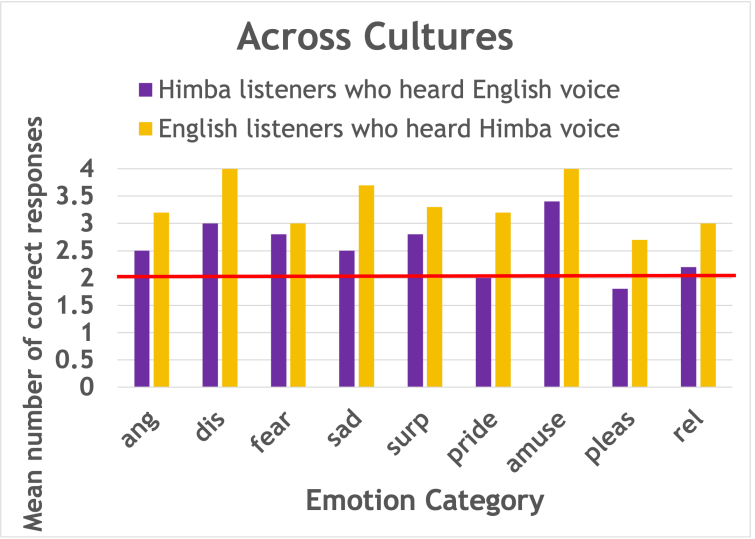
Mean Number of Correct Emotion Labels for Emotion Stories for Himba and European English Participants – Within Cultures



Reproduced from "Cross-cultural recognition of basic emotions through nonverbal emotional vocalizations," by D.A. Sauter, F. Eisner, F., P. Ekman, and S.K. Scott, S.K., 2010, *Proceedings of the National Academy of Sciences* (PNAS), 107(6), p. 2410 (https://doi.org/10.1073/pnas.0908239106) Open Access by PNAS.

Figure 9

Mean Number of Correct Emotion Labels for Emotion Stories for Himba and European English Participants – Across Cultures



Reproduced from "Cross-cultural recognition of basic emotions through nonverbal emotional vocalizations," by D.A. Sauter, F. Eisner, F., P. Ekman, and S.K. Scott, S.K., 2010, *Proceedings of the National Academy of Sciences* (PNAS), 107(6), p. 2410 (https://doi.org/10.1073/pnas.0908239106) Open Access by PNAS.

In Cordaro, Keltner, and colleagues' (2016) study on vocal change (review here), participants in 10 industrialized countries (Table 17) and Bhutanese participants (Figure 10) again matched stories to a vocal sound . Most of the percentages are above 50%, which in general would suggest that each of these nine feeling states have a universal vocal sound. Look at figures 10, and 11. Which positive emotion showed the lowest recognition rates? Which countries showed recognition rates lower than 50 and for which emotion?

Figure 10

Percentage Correctly Matched for 9 Positive Emotions or Feeling States

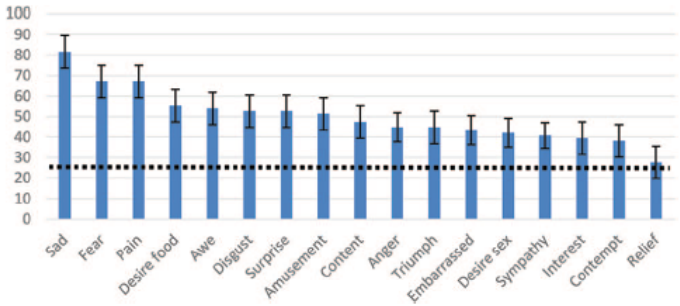
	Amused	Awe	Content	Desire (food)	Desire (sex)	Interest	Relief	Sympathy	Triumph	Overall accuracy
China $N = 52$	88% (.85)	96% (.95)	76% (.66)	62.5% (.49)	60.5% (.46)	81.5% (.74)	82% (.77)	69.5% (.58)	95% (.92)	79% (.71)
Germany $N = 43$	87% (.81)	90% (.88)	82.5% (.75)	90.5% (.88)	57.5% (.44)	88% (.81)	89.5% (.84)	69.5% (.60)	87% (.81)	82.4% (.76)
India $N = 45$	83% (.76)	84.9% (.79)	65.1% (.61)	64.2% (.53)	71.7% (.61)	76.4% (.67)	77.6% (.70)	75.5% (.67)	97.2% (.97)	77.3% (.70)
Japan $N = 55$	69% (.59)	89.5% (.85)	60.5% (.47)	64% (.47)	51.5% (.34)	76% (.68)	80.5% (.73)	55.5% (.39)	88.5% (.85)	70.6% (.60)
S. Korea $N = 50$	66% (.55)	83% (.76)	65.5% (.54)	40% (.20) (ns)	48% (.31)	76.5% (.68)	79% (.71)	34% (.12) (ns)	86.5% (.81)	64.3% (.52)*
New Zealand $N = 11$	87.5% (.88)	100% (1.0)	87.5% (.88)	87.5% (.88)	87.5% (.88)	75% (.76)	75% (.64)	87.5% (.88)	100% (1.0)	87.5% (.87)
Turkey $N = 46$	76% (.68)	92% (.88)	93% (.91)	68% (.57)	77.5% (.71)	59.5% (.45)	75.5% (.68)	75% (.65)	92.5% (.91)	78.8% (.71)
Poland $N = 64$	94% (.91)	96% (.93)	88% (.89)	96% (.93)	87.5% (.89)	89.5% (.89)	94% (.91)	45% (.32)	94.5% (.91)	87.2% (.84)
Pakistan $N = 35$	89% (.85)	84% (.77)	92% (.89)	90% (.85)	56.5% (.43)	85.5% (.81)	95% (.92)	84% (.77)	88.5% (.85)	85% (.79)
U.S. $N = 52$	81% (.74)	86% (.82)	84.5% (.79)	84.5% (.85)	73.5% (.64)	88% (.85)	83.5% (.77)	83% (.77)	85.5% (.82)	83.4% (.78)

Note. Values marke as not significant (ns) represent nonverbal vocal bursts that were not recognized at above-chance rates. Footnotes indicate cultural differences in composit accuracy rating at $p < .01$.

Significant differences in effect sizes were found between Germany > S. Korea (.24), NZ > S. Korea (.35), Poland > S. Korea (.32), Pakistan > S. Korea (.27), U.S. > S. Korea (.26)

Figure 11

Percentage Correct for Bhutanese participants across 17 constructs



Average recognition rates for remote Bhutanese villagers in the vocal burst recognition task. The hashed line represents chance for the nonparametric t test. Error bars are shown at the 95% confidence level. See the online article for the color version of this figure.

Reproduced from D.T., Cordaro, D. Keltner, S. Tshering, D. Wangchuk, and L.M. Flynn, 2016, The voice conveys emotion in

ten globalized cultures and one remote village in Bhutan. Emotion, 16(1), p. 123 (https://doi.org/10.1037/emo0000100). Copyright 2015 American Psychological Association.

Sauter and Scott (2007) sought to identify universal vocal changes for five positive emotions: achievement, amusement, contentment, pleasure, and relief. Participants from London and Sweden participated in this study. Prior to the study, male and female British-speaking actors were given a list of scenarios and asked to provide a non-verbal vocal sound to convey each emotion in the scenario.
Participants first completed a categorization task in which they heard the non-verbal vocal sound and then selected one emotion label from a list of five options: achievement/triumph, amusement, contentment, sensual pleasure, and relief. Each emotion label was shown with the corresponding emotion scenario (see Table 18). Following the categorization task, participants listened to each vocal sound and rated how much each sound represented each of the five emotions on a 1 to 7 scale.

Table 18

Emotional Scenarios for each Emotion (Sauter & Scott, 2007)

A table showing the correct emotional response to the emotional scenario that is also listed.

Emotion	Emotion Scenario
Achievement	You get a phone call offering you a job you really want
Amusement	You are being tickled and find it really funny.
Contentment	You are sitting on the beach watching the sunset.
Pleasure	Your boyfriend/girlfriend is touching you in a sensual way.
Relief	You thought you had lost your keys but find them again.

Adapted from "More Than One Kind of Happiness: Can We

Recognize Vocal Expressions Of Different Positive States?" by D.A. Sauter and S.K. Scott, 2007, Motivation and Emotion, 31(3), p. 198 (https://doi.org/10.1007/s11031-007-9065-x) Copyright 2007 by Springer

Table 19 displays the categorization results. In general, both British and Swedish participants selected the correct emotion label for each emotion sound (indicated by the red). A majority of British participants correctly matched each emotion to each vocal sound, although contentment barely made the 50% threshold. Except for contentment, a majority of Swedish participants correctly identified each vocal sound. It is interesting that for both groups, the contentment vocal sound was the least recognized. In Table 19, we can also identify the wrong answers participants provided for each emotion. For the contentment sound, about 25.2 % of British participants and 26.9% of Swedish participants selected pleasure. So, both groups confused contentment and pleasure for the contentment sound. Results showed that Swedish participants performed worse on the categorization task than British participants.

Table 19

Percentage of ***British*** *Participants who Selected each Emotion Label when Hearing each Vocal Sound*

A table showing results from british particpants for selecting emotion labels for vocal sounds participants heard.

Vocal Sound Participants Heard	Selected Label – Achievement	Selected Label – Amusement	Selected Label – Contentment	Selected Label – Pleasure	Selected Label – Relief
Achievement	88.4	4.7	1.9	1.9	3.2
Amusement	1.9	90.4	1.6	3.9	2.3
Contentment	7.9	5.0	52.4	25.2	9.5
Pleasure	0.3	0.4	29.9	61.6	7.9
Relief	0.3	0.3	10.1	5.3	83.9

Percentage of ***Swedish*** *Participants who Selected each Emotion Label when Hearing each Vocal Sound*

A table showing results from british particpants for selecting emotion labels for vocal sounds participants heard.

Vocal Sound Participants Heard	Selected Label – Achievement	Selected Label – Amusement	Selected Label – Contentment	Selected Label – Pleasure	Selected Label – Relief
Achievement	**70.9**	14.4	4.5	1.9	8.8
Amusement	2.5	**80.6**	4.1	5.3	7.2
Contentment	8.8	2.8	**47.8**	26.9	12.5
Pleasure	0.9	1.3	32.8	**56.9**	8.1
Relief	5.3	0.3	13.1	13.1	**67.8**

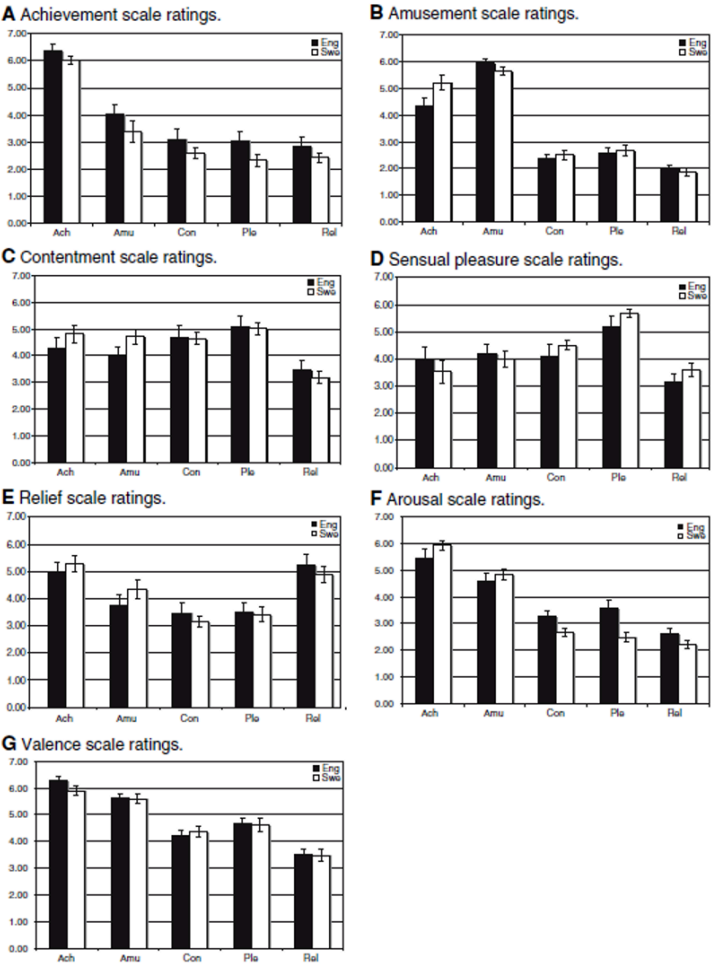
Note. Red bolded percentages indicate the correct answer.

Reproduced from "More Than One Kind of Happiness: Can We Recognize Vocal Expressions Of Different Positive States?" by D.A. Sauter and S.K. Scott, 2007, *Motivation and Emotion*, 31(3), p. 194 (https://doi.org/10.1007/s11031-007-9065-x) Copyright 2007 by Springer

Participants' self-reported emotions for each vocal sound are displayed in Figure 11. For most vocal sounds, participants rated the correct emotion as the highest. For the contentment sound, British participants rated pleasure as the highest whereas Swedish participants rated achievement, sensory pleasure, and amusement higher than contentment. For relief, Swedish participants rated the relief sound as higher on achievement than relief.

Figure 11

Self-reported Ratings on Five Positive Emotions for Each Vocal Sound



Reproduced from "More Than One Kind of Happiness: Can We Recognize Vocal Expressions Of Different Positive States?" by D.A.

Sauter and S.K. Scott, 2007, *Motivation and Emotion*, 31(3), p. 196 (https://doi.org/10.1007/s11031-007-9065-x) Copyright 2007 by Springer

This study provides evidence that participants in two cultures correctly identified several positive emotions. Two exceptions seem to be contentment and relief. Sauter and Scott (2007) suggest contentment was not recognized because contentment is either part of the sensory pleasure emotion or because contentment is a low intensity emotion. It might be that low intensity positive emotions like pleasure and contentment are harder to recognize than high intensity emotions. Although these emotions were recognized in two cultures, both cultures are Western European countries. This work should be further tested in additional cultures to provide evidence for universality.

Gendron, Barrett et al. (2014a) (review study here) looked at vocal changes for positive emotions – amusement, relief, sensory pleasure, and triumph/pride. Remember in this study, participants heard the sound and then free-labeled the emotion. Then, researchers coded the free label into an emotion category. The vocal sounds used for each emotion are displayed in Table 20.

Table 20

Vocal Sounds and Corresponding Emotion from Gendron et al. (2014a)

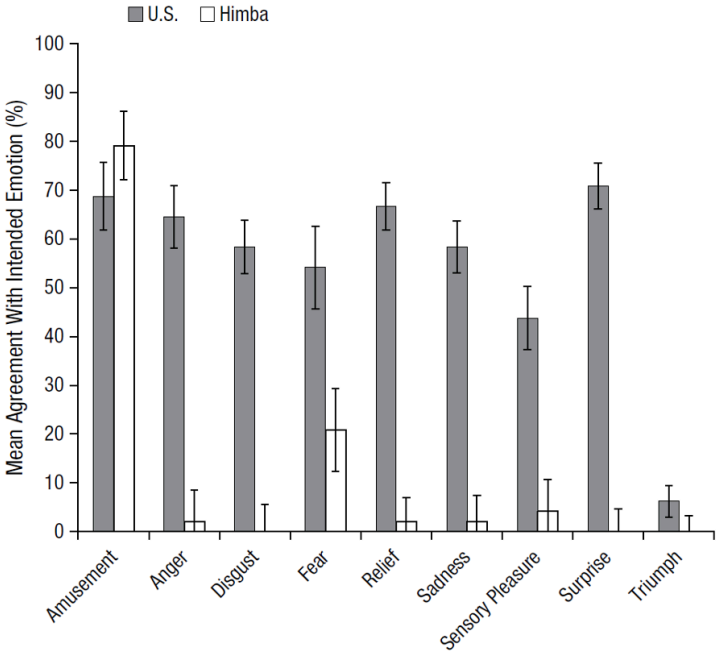
A table showing a descrete emotion protrayed, and the corresponding vocalization of the emotion.

Descrete Emotion Portrayed	Vocalization
Amusement	Giggle, Laughter
Anger	Guttural yell, growl
Disgust	"Ewww"
Fear	Scream
Relief	Sigh
Sadness	Cry
Sensory Pleasure	"Mmm mmm"
Surprise	"Ahhh-ahhh"
Triumph	"Woohoo"

Findings in Figure 12 show that amusement was the only positive emotion identified by both groups. A majority of U.S. participants correctly identified relief, but the Himba did not. For sensory pleasure and triumph, researchers did not find that a majority U.S. or Himba participants correctly identified the vocal sound. Results showed that Himba participants free labeled responses for "woo hoo" were either non-emotion related or related to the emotion amusement. For the feelings relief and sensory pleasure, a majority of Himba participants labeled the sound as no emotion.

Figure 12

Percentage of Participants who Free Labeled Each Emotion Correctly



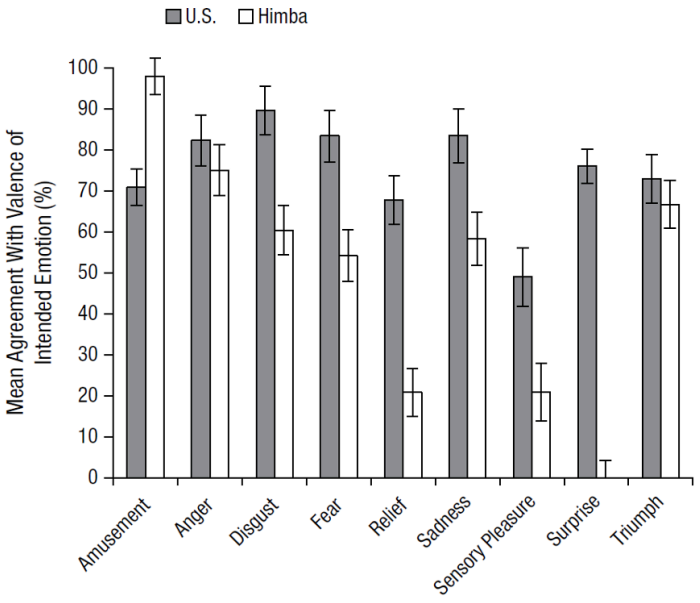
Reproduced from "Cultural Relativity in Perceiving Emotion From Vocalizations," by M. Gendron, D. Roberson, J.M. van der Vyver, and L.F. Barrett, 2014a, Psychological Science, 25(4), p. 914, (https://doi: 10.1177/0956797613517239). Copyright 2014 The Authors.

Now, a large group of Himba and US participants did identify the positive valence of the sounds for amusement and triumph (see Figure 13), supporting some constructivist views that emotions are simply a range of valence and arousal. For relief, only a majority of the U.S. participants agreed the relief sound was positive in valence. For sensory pleasure, the researchers did not find that a majority

of U.S. or Himba participants agreed the "mmm-mmm" sound was positive.

Figure 13

Self-Reported Valence of Each Emotion



Reproduced from "Cultural Relativity in Perceiving Emotion From Vocalizations," by M. Gendron, D. Roberson, J.M. van der Vyver, and L.F. Barrett, 2014a, *Psychological Science*, 25(4), p. 915, (https://doi: 10.1177/0956797613517239). Copyright 2014 The Authors.

Vocal Changes - Summary

Basic emotion theorists (Cordaro et al., 2016; Sauter et al., 2010; Sauter & Scott, 2007) and construcivists both found evidence that amusement vocal sounds were recognized across cultures. Thus, we can conclude that amusement results in the universal sound of laughing. Basic emotions researchers have identified several other vocal sounds that correspond to unique positive emotions, but do conclude that relief and contentment are positive emotions that do may not have a unique vocal sound.

Physiological Changes

SNS/PNS Activation

In two studies by Levenson and colleagues, participants completed the directed facial action task for happiness while physiological measures were taken. In Levenson et al.'s (1990) study on American participants, happy facial expressions caused an increase in heart rate, but this increase was significantly less than the increase for fear, anger, and surprise. For finger temperature, skin conductance, and muscle activity, a happy face caused a small increase from baseline. In a later study (Levenson et al., 1992), American and Minangkabau participants made a happy facial expression. For both groups, making a happy expression resulted in similar small increases in heart rate, finger temperature, and skin conductance. Recall that in this study displaying negative emotions resulted in greater skin conductance for Americans than Minangkabu, but this cross-cultural difference did not occur for the emotion happiness.

Kreibig's review (2010) investigated ANS changes for seven positive emotions: affection, amusement, contentment, happiness, joy, anticipatory pleasure, pride, and relief. The findings for pride were discussed in the pride chapter and can be found here. Table 21 provides a good summary of the PNS and SNS changes for each emotion. Following this table, the specific findings are discussed.

Table 21

SNS and PNS Changes for Each of the Positive Emotions (Kreibig, 2010)

A table showing a positive emotion a

Positive Emotion
Affection
Amusement
Contentment
Happiness
Joy
Anticipatory Pleasure
Relief
Pride

Adapted from "Autonomic nervous system activity in emotion: A review," by S.D. Kreibig, 2010, *Biological Psychology*, 84(3), p. 406-408 (https://doi.org/10.1016/j.biopsycho.2010.03.010) Copyright 2010 Elsevier B.V.

In this study, **affection** is viewed as similar to love, tenderness, and sympathy. Kriebig found that this emotion construct was linked to decreased heart rate and an increase in skin conductance. This suggests SNS activation, but more work should be conducted. Further, these findings do not consider the presence of several types of love – passionate, companionate, and caregiver.

For **amusement**, vagal tone and heart rate variability increased. Skin conductance and cardiac PEP also increased. Combined, these suggest activation of both PNS and SNS systems.

Contentment included pleasure, serenity, calmness, peacefulness, and relaxation feelings. Eliciting contentment states caused deactivation of the SNS system (decreased heartrate, respiration, and skin conductance) and activation of the PNS system (vagal tone and heart-rate variability increase).

Happiness caused an increase in heart rate, respiration, blood pressure, and skin conductance suggesting SNS activation. Further vagal tone withdrawal suggests PNS withdrawal.

Joy or elation typically activates both the SNS and PNS systems. Joy causes an increase in heart rate, skin conductance and shortened PEP and an increase in heart-rate variability.

Anticipatory Pleasure includes mostly the feelings associated with sexual arousal but also the feeling of satisfying an appetite. So, anticipatory pleasure is probably the same concept as sensory pleasure. Anticipatory pleasure caused an increase in vagal tone and heart-rate variability and an increase in skin conductance, decreased/increased heart rate. Taken together, these findings suggest both SNS and PNS systems may be activated.

Relief (avoiding a possible shock in the laboratory) caused SNS withdrawal (decrease in skin conductance, decrease in respiration). Another physiological change that occurs is a high frequency of sighing.

The summary of Kreibig's finding of pride were discussed in the pride chapter. This information is re-pasted below for your convenience.

"Kreibig (2010) reviewed five studies that investigated the physiological changes caused by authentic pride. Table X displays the eliciting events and resulting physiological changes for these studies. We cannot draw definitive conclusions because we have so few studies. But, based on these findings we might conclude that pride causes activation of the SNS system, because skin conductance increased. But, the study on experimenter praise (Herrald & Tomaka, 2002) found that cardiac PEP was not shortened, suggesting the SNS system was not activated. The only indicator we have on PNS is a study that elicited pride with film clips and found that heart-rate variability did not change, suggesting the PNS is not activated (Gruber et al., 2008)" (Yarwood, 2021, Pride Chapter).

Overall, Kreibig's (2010) findings show that SNS and PNS activity vary with the specific positive emotion. Remember, that constructivist and dimensional theorists view positive emotions as simply positive valence and any level of arousal. So, it could be that

positive feelings simply vary in arousal or activation and that we try to categorize these feelings with specific labels.

Shiota et al. (2011) elicited five positive emotions in the lab and then measured physiological changes. These five emotions were anticipatory enthusiasm, attachment love, nurturant love, amusement, and awe (see Table 22). View anticipatory attachment as the emotion joy.

Table 22

Description of 5 Positive Emotions and Elicitation Method in Laboratory

A table showing a positive emotion, what it is elicited by, and the elicitor used in a lab setting.

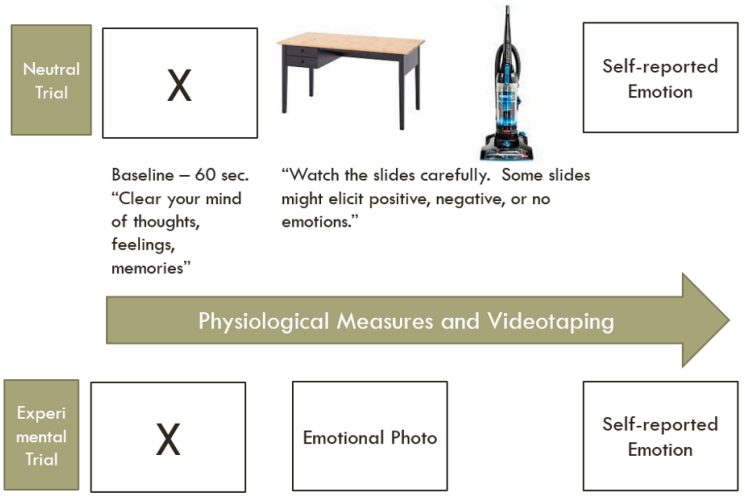
Positive Emotion	Elicited by	Elicitor Used in Lab
Anticipatory Enthusiasm	Anticipation of Rewards	Slides with dollar amount; dollar amount increased with each slide
Attachment Love	Attachment Figure	Childhood characters such as Big Bird and Papa Smurf
Nurturant Love	Caring for young	Baby Animals
Amusement	Physical / Cognitive play; humor	Far Side Cartoons
Awe	New large events that do not fit with current schemas	Panoramic Views

Participants completed a baseline and experimental trial for each emotion. In experimental trials, a neutral emotion or one of the five positive emotions was elicited (displayed in Figure 14). During all trials, physiological measures were taken, and participants were videotaped. To acquire baseline measures, participants were shown an X for 60 seconds and told to clear their mind – while baseline

measures were taken. Then, in the neutral trial, participants were shown slides of neutral household objects – while baseline measures were taken. In the emotion trials, participants were shown slides of the corresponding elicitors. At the end of the trial, participants self-reported their subjective feelings using 10 emotions: amusement, anger, awe, contentment, disgust, enthusiasm, excitement, fear, love/attachment, sadness, and tenderness/compassion.

Figure 14

Pictorial Display of Procedures from Shiota et al. (2011)



In the next few paragraphs, I will explain the findings for each of the psychological measures. For a good overview of the findings for each positive emotion, please skip down to Table 23.

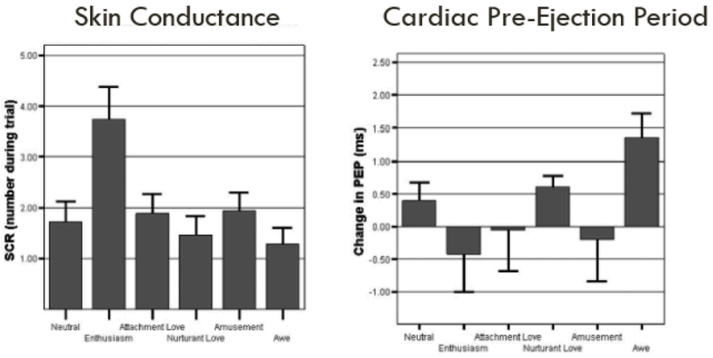
Figure 15 shows the changes in SNS activity for measures that

provide pure measures of SNS activity. For skin conductance (SCR), anticipatory enthusiasm showed the greatest increase from baseline compared to the other emotions. Amusement's increase from baseline was greater than awe but not greater than neutral condition.

For cardiac PEP, remember that lengthening of PEP indicates withdrawal of SNS while shortening of PEP indicates SNS activation (for a review, go here). Awe resulted in a lengthening of PEP and this lengthening was significantly greater than the five other emotion states. Nurturant love showed lengthening of PEP that was shorter than awe, but did not differ from other conditions.

Figure 15

Results for Pure Measures of SNS Activity



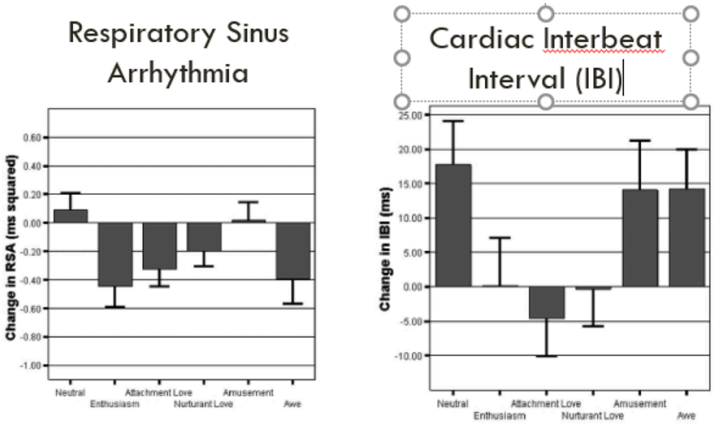
Reproduced from "Feeling good: Autonomic nervous system responding in five positive emotions" by M.N. Shiota, S.L. Neufeld, W.H. Yeung, S.E. Moser, and E.F. Perea, 2011, *Emotion*, 11(6), p. 1375 (https://doi.org/ 10.1037/a0024278) Copyright 2011 American Psychological Association.

Figure 16 shows the changes from baseline for RSA and cardiac interbeat interval (IBI). RSA is a pure measure of PNS activity. In general, all emotion states caused a decrease in RSA from baseline except for the neutral and amusement conditions which showed zero change from baseline. Overall, these findings suggest that for positive emotions the PNS system was not activated. Except for neutral and amusement condition, all other emotion states demonstrated a decrease in RSA, which indicates the PNS system was not activated. Enthusiasm showed a decrease in RSA from baseline and this decrease was significantly different from amusement and neutral condition. Awe, Attachment Love, and nurturant love each caused a decrease in RSA that was significantly different from the neutral condition, but not different from the four other positive emotion states.

Cardiac Interbeat Interval (IBI) is not a pure measure of PNS activity. IBI is inversely correlated with SNS and IBI has a positive relationship with PNS influence. For attachment love, IBI decreased from baseline and this decrease was significantly greater than the neutral, amusement, and awe conditions. Nurturant love also decreased significantly from baseline and this decrease was greater than the neutral condition. Taken together, these findings suggest that attachment and nurturant love caused withdrawal of PNS and activation of SNS. Amusement and awe showed an increase in IBI from baseline and this increase was greater than attachment love, but was not different from the neutral condition. These findings suggest that the neutral, amusement, and awe conditions might have caused an increase in PNS activation and SNS withdrawal.

Figure 16

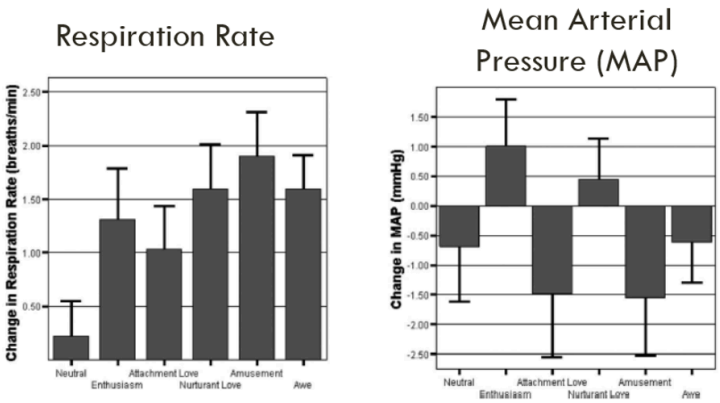
RSA and IBI Activity



Reproduced from "Feeling good: Autonomic nervous system responding in five positive emotions" by M.N. Shiota, S.L. Neufeld, W.H. Yeung, S.E. Moser, and E.F. Perea, 2011, *Emotion*, 11(6), p. 1375 (https://doi.org/ 10.1037/a0024278) Copyright 2011 American Psychological Association

Figure 17 displays the results for respiration rate and mean arterial pressure (MAP). Both measures typically increase with SNS activity, but are less conclusive because they are not pure measures of SNS activity.

Figure 17
Respiration Rate and MAP



Reproduced from "Feeling good: Autonomic nervous system responding in five positive emotions" by M.N. Shiota, S.L. Neufeld, W.H. Yeung, S.E. Moser, and E.F. Perea, 2011, Emotion, 11(6), p. 1375 (https://doi.org/ 10.1037/a0024278) Copyright 2011 American Psychological Association.

Table 23 provides a good summary of how the PNS and SNS systems changed for each emotion. Keep in mind that this is one study and that more research is needed to confirm these changes. As you review the below table, think about possible limitations to this study (Hint: think about the ways in which the researchers elicited each emotion in the laboratory).

Table 23

Summary of SNS and PNS Findings for Each Positive Emotion

A table showing a positive emotion, what it is elicited by, the elicitor used in a lab setting, SNS, and PNS effects.

Positive Emotion	Elicited by	Elicitor used in Lab	SNS	PNS
Anticipatory Enthusiasm	Anticipation of rewards	Slides with dollar amount; dollar amount increased with each slide	SNS Activation Increase in SCR; Shortening PEP	PNS Withdrawal Decrease in RSA
Attachment Love	Attachment Figure	Childhood characters such as Big Bird and Pap Smurf	SNS Activation Decrease in IBI; No change in MAP or PEP	PSN Withdrawal Decrease in RSA, and Decrease in IBI
Nurturant Love	Caring for Young	Baby Animals	SNS Activation Decrease in IBI; Increase in Resp. Rate, No change in for MAP	PNS Withdrawal Decrease in RSA, and Decrease in IBI
Amusement	Physical / Cognitive Play; Humor	Far Side Cartoons	Not Clear Increased Resp. Rate and Increase IBI suggests SNS withdrawal activation	Not Clear Increase in IBI suggests PNS Activation
Awe	New large events that do not fit with current schemas	Panoramic Views	SNS Withdrawal Lengthening PEP; Increase in IBI; Decrease in RSA	PNS Withdrawal, Decrease in RSA, OR PNS activation, Increase in IBI

Adapted from "Feeling good: Autonomic nervous system responding in five positive emotions" by M.N. Shiota, S.L. Neufeld, W.H. Yeung, S.E. Moser, and E.F. Perea, 2011, *Emotion*, 11(6), p. 1371, 1373-1376

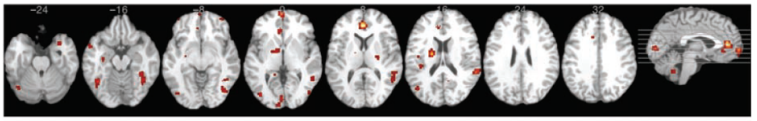
(https://doi.org/ 10.1037/a0024278) Copyright 2011 American Psychological Association.

Brain Activation - Consistency and Discriminable Brain Patterns

In Vytal and Hamann's (2010) meta-analysis (for a review, go here), happiness consistently activated the right superior temporal gyrus (STG; BA 22) and the left ACC (BA 24; see Figure 18).

Figure 18

Consistency Patterns for Emotion Happiness



Neuroimaging of a brain. Different neuroimages of hemispheres and angles are shown of the brain.

Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, . *Journal of Cognitive Neuroscience*, 22(12), p. 2870 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

Discriminable Patterns for happiness are shown in Table 24. These findings indicate that compared to other emotions, happiness resulted in more activation in the ACC and STG.

Table 24

Discriminable Patterns for Happiness from Vytal and Hamann (2010)

A table showing a comparison of happiness to different emotions, and where the happ

Comparison	**Happiness Resulted in more Ac**
Happiness vs. Disgust	Left Rostral ACC
Happiness vs. Sadness	Right STG (BA 22)
Happiness vs. Fear	Right STG (BA 22)
Happiness vs. Anger	Left Rostral ACC

Note: ACC = Anterior Cingulate Cortex, STG= Superior Temporal Gyrus, BA = Brodmann's Area. Adapted from "Neuroimaging support for discrete neural correlates of basic emotions: a voxel-based meta-analysis," by K. Vytal and S. Hamann, 2010, *Journal of Cognitive Neuroscience*, 22(12), p. 2872 – 2874 (https://doi.org/10.1162/jocn.2009.21366). Copyright 2012 by Massachusetts Institute of Technology.

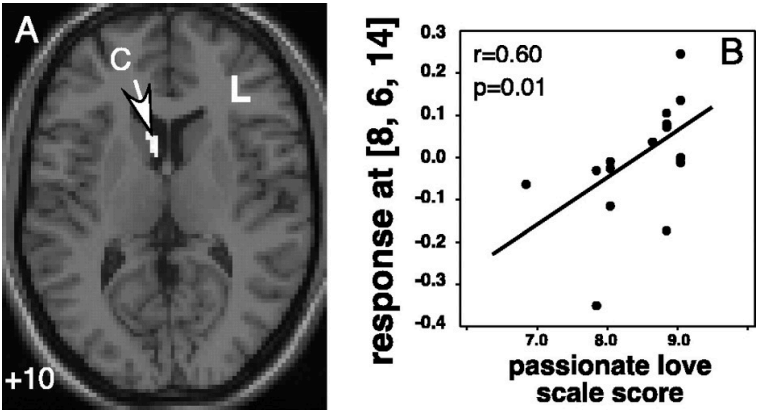
Love and Brain Activation

Bartels and Zeki (2000, 2004) conducted two studies on love – romantic love (2000) and maternal love (2004). In the romantic love study (2000), while in an fMRI machine, participants viewed a photo of their romantic partner and of 3 friends who were the same sex, age, and relationship length as their romantic partner. In the maternal love study (2004), participants viewed photos of their own child, other children, and friends. In both studies, the following three brain areas showed more activation when participants viewed the romantic partner or their own child (vs. the friend/child condition): ventral striatum (putamen, globus pallidus, caudate nucleus; all part of the reward circuit), anterior cingulate cortex, and insula. Many of these structures contain receptors for the bonding/attachment hormones oxytocin and vasopressin. Some differences were found. Romantic love, but not maternal love, activated the hippocampus and hypothalamus, while maternal love only activated the periaqueductal gray (PAG) and orbito-frontal cortex. (Note: gender differences in maternal/romantic love were not found). Now, look back at the findings for the hate circuit and compare the activated structures. What do you notice? Bartels and Zeki (2000) report that their study provides evidence of a unique love circuit comprised of the reward circuit, cingulate cortex, and insula. Maybe future research will determine that early-stage passionate love and late-stage companionate love are two separate emotions accompanied by different biological changes. Interestingly, the amount of activation in the reward circuit varies according to the amount of time participants were in love (Aron et al., 2005). Participants who reported more passionate love on a self-report scale showed more activation in the caudate nucleus when viewing a photo of their romantic partner (See Figure 19). In addition, activation in the VTA (a dopamine-rich center) was positively correlated with attractiveness ratings of the romantic

partner. Brain activation changed as relationship length increased, suggesting that as our feelings of love change, our brain activation changes.

Figure 19

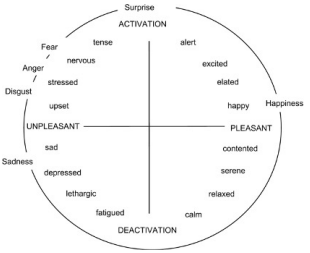
Relationship between Activation in Caudate Nucleus and Self-Reported Passionate Love (Aron et al., 2005)

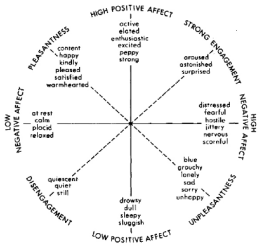


The Neuroimage of the brain (left) is labeled A. it has an arrow pointing to the center-top of the brain and that is labeled "C". The label "L" is placed on the right side of the neuroimage.
The graph on the right has an x axis labeled "passionate love scale score", has the values "7.0", "8.0", and "9.0" labeled. The y axis labeled "response at [8, 6, 14]", which starts at -0.4 and increases in increments of 0.10. There is also a key on this graph that reads: "R=0.60", and "P=0.01". The graph is also labeled "B" indicating its accompaniment to the neuroimage labeled "A".

Subjective Feelings

Figure 20 displays the two-dimensional models we discuss each chapter. Russell (1980) views positive emotions as highly pleasant, ranging from low to moderate to high arousal. Per this model, calm is low in arousal and moderately pleasant, while alert is high in arousal and moderately pleasant. Watson and Tellegen (1985) view true positive emotions to be those that are pleasant AND highly arousing, labeled High Positive Affect. Thus, low arousal positive emotions located on Low Negative Affect are not considered true emotions, which differs from Russell (1980).





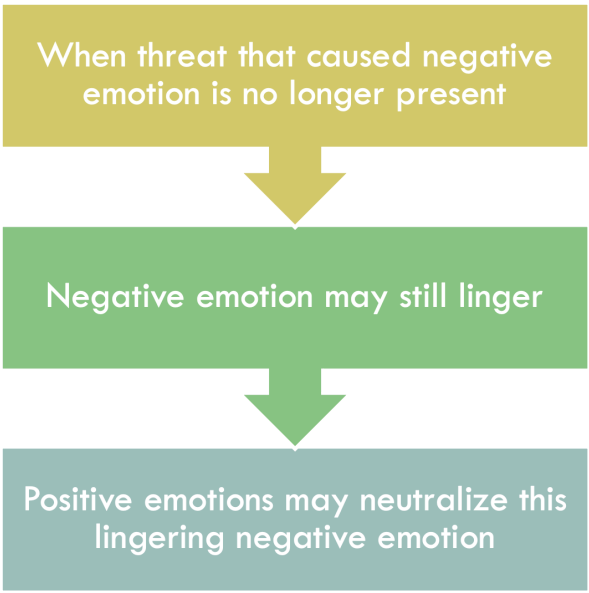
Note. Russell (1980) model is on left; Watson and Tellegen (1985) model is on right. Left figure reproduced from "Independence and bipolarity in the structure of current affect," by L. Feldman Barrett and J.A. Russell, 1998, *Journal of Personality and Social Psychology*, 74(4), p. 970 (https://doi.org/10.1037/0022-3514.74.4.967). Copyright 1998 by the American Psychological Association. Right figure reproduced "Toward a consensual structure of mood.," by D.T. Watson and A. Tellegen, 1985, *Psychological Bulletin*, 98(2), p. 221 (https://doi.org/10.1037/0033-2909.98.2.219). Copyright 1985 by the American Psychological Association.

Purpose of Positive Emotions or The Good and Bad of Positive Emotions

Now that we know how the components change for positive emotions, we will discuss some theories and findings related to the purpose of emotions. Basic emotion theorists suggest that positive emotions function to increase the survival of our genes. How would positive emotions help us to pass on our gene? Some ways might be through finding a valuable mate, raising healthy children, and by maintaining our own physical and psychological health. Let's consider a few theories on the outcomes of positive emotions.

Undoing Effect of Positive Emotions

The undoing effect of positive emotions (Fredrickson et al., 2000) theorizes that positive emotions can help us to reduce the physiological repercussions of negative emotions. In particular, this concept suggests that after a negative eliciting event ends, physical and psychological changes from the negative emotion may still linger, such as increased heartbeat and negative subjective feelings. In turn, positive emotions can completely eliminate the outcomes that linger from the negative emotion.



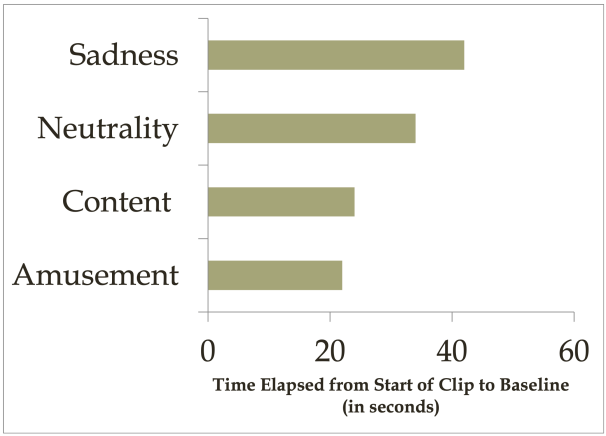
The flowchart reads: When threat that caused negative emotion is no longer present, then Negative emotion may still linger, then positive emotions may neautralize this lingering negative emotion.

In a study that tested the undoing effect (Fredrickson et al., 2000), participants first completed baseline measures of heart rate, finger pulse, and blood pressure. Then, all participants were induced to feel a high-arousal negative emotion by telling participants they would have 60 seconds to write a 3-minute speech on a topic provided to them. After this, participants were randomly assigned to watch a film clip that elicited either amusement, contentment, neutrality, or sadness.

Amusement: Puppy playing with flower
Contentment: Waves breaking on the beach
Neutrality: Abstract movedd of sticks piling up
Sadness: A young boy crying

Remember, throughout the study physiological measures were taken. The dependent variable was cardiovascular recovery measured as the time from which it took participants physiological results to return to baseline. In Figure 21, recovery on the x-axis was measured as the time it took from the start of their assigned clip to the time when their physiology returned to baseline. Keep in mind that a short time indicates faster cardiovascular recovery.

Figure 21
Cardiovascular Recovery for Each Emotion Clip (Fredrickson et al., 2000)



An inverted bar graph. The x axis is labeled – "Time elapsed from Start of Clip to Baseline (in seconds, and with 4 interval marks total: 0, 20, 40, 60)". The Y axis are 4 emotions, each with a bar graph extending over the x axis. From the top of the Y axis, Sadness is listed, and is graphed at 42 seconds on the x axis. The emotion underneath is Neutrality and is graphed to the 35 point on the x axis. The next emotion listed underneath is Content, which is graphed at the 25 second mark on the x axis. The last emotion listed is Amusement, and is graphed at the 23

second mark on the x axis Reproduced from "The undoing effect of positive emotions," by B.L. Fredrickson, R.A. Mancuso, C. Branigan, and M.M. Tugade, 2000, *Motivation and Emotion*, 24(4), p. 254 (https://doi.org/10.1023/A:1010796329158) Copyright 2000 by Plenum.

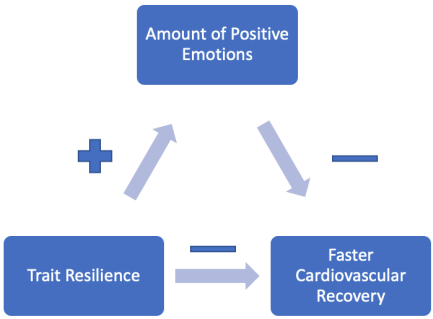
Amusement and contentment resulted in significantly faster cardiovascular recovery than the neutral and sadness film clips. Interestingly, the neutral clip resulted in faster recovery than the sadness clip. In a follow-up study, Fredrickson and colleagues (2000) conducted the same study except that participants did not engage in the first stressor. So, participants simply viewed one of the four clips. Participants watching the sad clip exhibit more arousal than the other three conditions. Differences were not found between the positive and neutral conditions. What does this mean? This means that experiencing positive emotions does not regulate our physiology better than neutral states. Instead, experiencing a positive emotion directly after a negative emotion can help us to mitigate the negative emotional responses better than experiencing a neutral state after a negative emotion.

Undoing Effect of Positive Emotions: After a negative emotion, positive emotions help us to quickly return to baseline cardiovascular states.

One last interesting note about the undoing effect. Later work (Tugade & Fredrickson, 2004) found that the experience of positive emotions mediates the relationship between trait resilience and cardiovascular recovery (see Figure 22). In other words, people high in resilience are faster to recover from physiological arousal because resilient individuals experience more positive emotions .

Figure 22

Positive Emotions Mediated the Relationship between Resilience and Cardiovascular Recovery (Tugade & Fredrickson, 2004)



A flowchart resembling a triangle. From the bottom left of the triangle is the item "Trait Resilience". From this item there is an arrow the flows towards the top item of the triangle which is "Amount of Positive Emotions", and a positive sign is shown next to the arrows flowing up. There is also an arrow flowing from the bottom left item toward the bottom right item, which is "Faster Cardiovascular Recovery" via a right arrow. This arrow has a minus sign shown next to it. There is an arrow that flows from the top item (Amount of positive emotions), to the bottom

right item (Faster Cardiovascular Recovery), and shown next to it is a minus symbol.

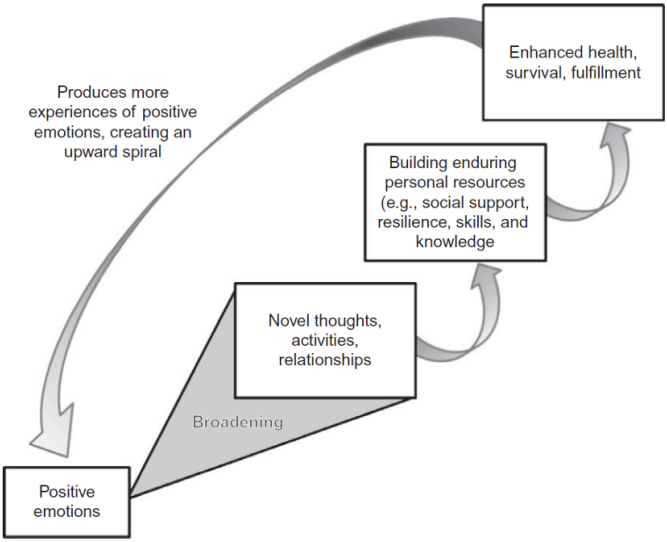
Fredrickson's undoing effect was developed prior to her more well-known theory – the broaden-and-build theory. In fact, Fredrickson originally believed the undoing effect was the main reason we experienced positive emotions and emphasized that positive emotions are adaptive because they help us to recover from negative emotions. Later on (see her Yale Expert in Emotion interview below) she revised this idea to state that the undoing effect was a side-effect of positive emotions. Now, her views is that the broaden-and-build theory represents the adaptive purpose of positive emotion – with the outcome of this model showing that positive emotions increase our physical health, well-being, and survival.

Broaden and Build Theory of Positive Emotions

Barbara Fredrickson developed the broaden-and-build theory to explain how positive emotions increase life satisfaction (see Figure 23). This theory includes four steps: 1) experience of positive emotion 2) broadening of thoughts and behaviors 3) building personal resources and 4) transforming the self by increasing health, well-being, and survival.

Figure 23

Broaden-and-Build Theory of Positive Emotions



Reproduced from "Positive emotions broaden and build," by B.L. Fredrickson, In P. Devine and A. Plant (Eds.) Advances in Experimental Social Psychology, 47, p. 16, Copyright 2013 Academic Press. Adapted from "Positive emotions" by B.L. Fredrickson and M.A. Cohn, , 2008, In M. Lewis, J.M. Haviland-Jones, and L.F. Barrett Handbook of Emotions (3rd Edition, p. 783). Copyright 2008 Guilford Press.

Fredrickson and Cohn (2008, p. 782) define the broaden-and-build theory as:

"…positive emotions broaden people's momentary thought-action repertoires and lead to actions that build enduring personal resources."

Let's break down this definition.

According to this theory, experiencing any positive emotion should immediately and temporarily "broaden" attention, cognitive, and behavioral responses. This is in comparison to negative emotions which narrow our attention and behaviors to the threat in our environment so that we can behave in such a way as to avoid or reduce the threat. In general, Fredrickson means that positive emotions help us to become more aware of our surroundings and to take in more of our external environment. In addition, she states that during this broadening period our possible behaviors are "flexible" (Fredrickson & Cohn, 200, p. 782). By flexible, she means that there are many possible approach behaviors we could exhibit for a positive emotion. Again, in comparison to negative emotions which typically result in one behavior – attack, avoidance, etc. Table 25 displays some examples of the cognitive and behavioral responses for specific positive emotions.

Table 25

Cognitive and Behavioral Responses Caused by Specific Positive Emotions

A table showing a positive emotion, and the broadened and flexible cognitive and behavioral responses.

Positive Emotion	Broadened and Flexible Cognitive and Behavioral Responses
Joy	Urge to play, push limits, be creative
Interest	Urge to explore, take in new information and experiences, and explain the self
Contentment	Urge to sit back and savor current life circumstances; integrate new views of self and world
Love	Urges to play with, explore, and savor loved ones.

Adapted from "Positive emotions" by B.L. Fredrickson and M.A. Cohn, , 2008, In M. Lewis, J.M. Haviland-Jones, and L.F. Barrett Handbook of Emotions (3rd Edition, p. 782). Copyright 2008 Guilford Press.

Over a long period of time as we continue to experience positive emotions that broaden our attention/thoughts/behaviors, this process will lead us to build personal resources. These personal resources, in turn, have a direct impact on improved health, life satisfaction, and depressive symptoms. So, Fredrickson views broadening and building as adaptive processes that improve survival and well-being.

Evidence for the Broaden Hypothesis

The broaden hypothesis states: "Positive emotions broaden the scopes of attention, cognition, and action, widening the array of

percepts, thoughts, and actions presently in mind" (Fredrickson & Branigan, 2005 p. 315)

The narrow hypothesis states that negative emotions narrow attention to focus on the threat in the environment.

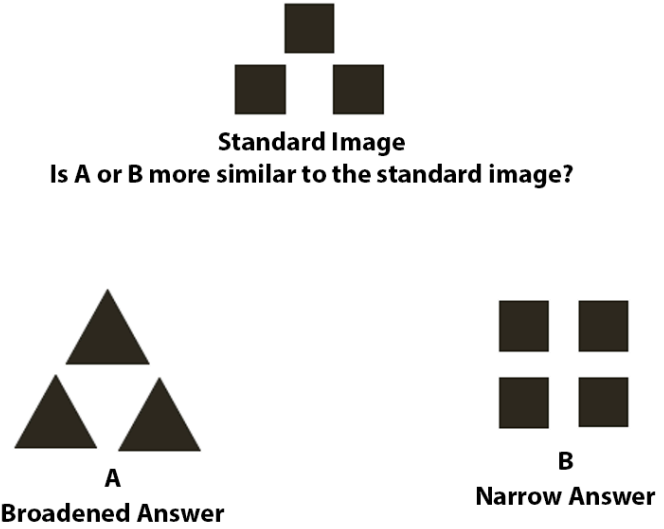
Studies have confirmed the broaden hypothesis by demonstrating that positive emotions cause greater awareness of the visual field and by showing that positive emotions cause people to process information at a more global (vs. detailed) level.

Fredrickson and Branigan (2005) tested the broaden hypothesis in two experiments. In experiment 1, participants were randomly assigned to watch one of five watched film clips to elicit an emotion. Two clips elicited a positive emotion (amusement, contentment/serenity), two clips a negative emotion (anger/disgust, anxiety/fear), and one clip a neutral state. After watching their assigned film clip, participants completed the visual processing task. After completing the experimental tasks, participants reported their subjective feelings.

In the Experiment 1 visual processing task, participants were shown a standard image and two possible response options – A or B (see Figure 24). In the example below, the standard image is three square elements that together make up a triangle. Participants were asked if the standard image was more similar to the A or B figure. The A figure represented broadened attention because globally the standard image shows a triangle. The B answer represented narrowed attention because the narrow/smaller details in the standard image are squares. For each participant, the number of times they selected the broadened answer was summed. Higher scores, therefore, indicate greater broadened processing.

Figure 24

Visual Processing Task (*Fredrickson & Branigan*, 2005)

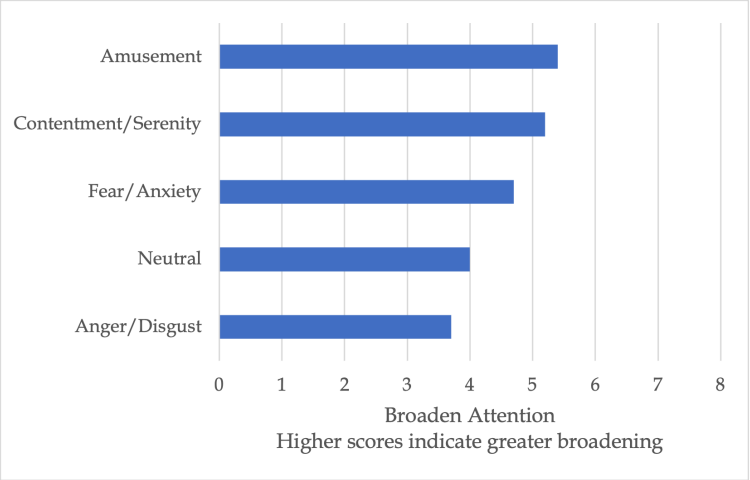


Reproduced from "Positive emotions broaden the scope of attention and thought-action repertoires" by B.L. Fredrickson and C. Branigan, 2005, *Cognition & Emotion*, 19(3), p. 317 (https://doi.org/10.1080/02699930441000238)Copyright 2005 by Psychology Press

Statistical analyses (Figure 25) revealed that the amusement clip resulted in greater broadened processing compared to the neutral clip and the contentment/serenity clip trended toward more broadening than the neutral clip ($p = .064$). Interestingly, the data did not support the belief that negative emotions result in narrowing of attention as the neutral condition did not result in more broadening than the fear/anxiety and anger/disgust clips.

Figure 25

Broadened Processing Scores for 5 Elicited Emotions (Experiment 1; Fredrickson & Branigan, 2005)



Reproduced from "Positive emotions broaden the scope of attention and thought-action repertoires" by B.L. Fredrickson and C. Branigan, 2005, *Cognition & Emotion*, 19(3), p. 323 (https://doi.org/10.1080/02699930441000238)Copyright 2005 by Psychology Press

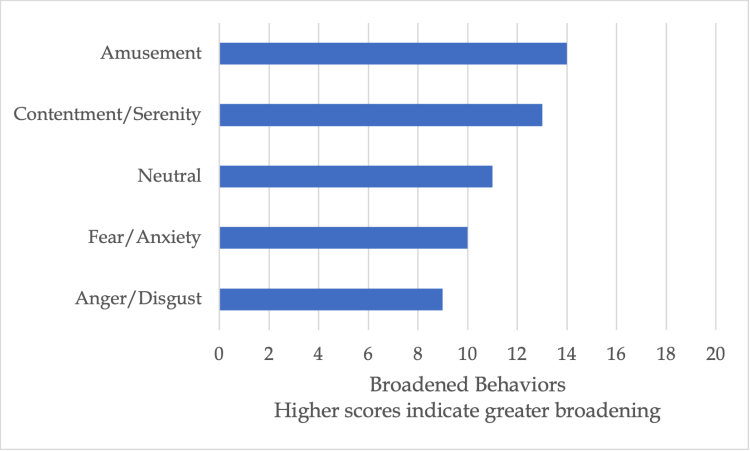
In Experiment 2, the same participants were randomly assigned to one of the remaining four clips they had not viewed. After participants viewed their assigned clip, they provided one or two words to describe their emotion and then completed the Twenty

Statemen Test (TST; Kuhn & McPartland, 1954). In the Twenty Statements Test, participants were instructed to imagine being in the film clip and respond to twenty statements that started with "I would like to ." Higher scores indicated more broadened behaviors. Experiment 2 ended with participants again self-reporting their subjective feelings.

Similar to Experiment 1, Figure 26 shows that the amusement clip resulted in greater broadened behaviors than the neutral clip and the contentment/serenity clip approached significance (p = .109). When both positive (amusement, contentment) clips were added together, they showed more broadening than the neutral clip and the two negative emotion clips added together. Fredrickson and Branigan (2005) stated that findings support the broadening and narrow hypotheses. But, only the anger/disgust clip showed greater narrowing than the neutral clip. The fear/anxiety clip was not different from the neutral clip.

Figure 26

Broadened Behaviors Scores for 5 Elicited Emotions (Experiment 2; Fredrickson & Branigan, 2005)



Reproduced from "Positive emotions broaden the scope of attention and thought-action repertoires" by B.L. Fredrickson and C. Branigan, 2005, *Cognition & Emotion*, 19(3), p. 324 (https://doi.org/10.1080/02699930441000238)Copyright 2005 by Psychology Press

The researchers also coded the participants responses to the Twenty Statements Test and then analyzed differences in answers for the positive, negative, and neutral film clip conditions. Compared to the neutral condition, participants who watched positive film clips exhibited a greater desire for the following approach behaviors:

- Outdoor/nature activities

- Exercise/Sports
- Desire to play
- Desire to have positive thoughts
- Less Desire to Sleep/Rest

Compared to the neutral condition, participants who watched negative film clips exhibited the following desires:

Lowered desire to:

- eat/drink
- reminisce
- complete work/school tasks
- read

Greater desire to be antisocial for anger/disgust clip and to be around others for fear/anxiety clip.

Fredrickson and Cohn (2008) cite additional work that provides examples of broadening thoughts and behaviors. Below, Table 26 lists these examples with the citations.

Table 26

Examples of Broadened Thoughts and Behaviors (Fredrickson & Cohn, 2008)

A table showing examples of broaddened thoughts / behaviors, and a citation for the example

Broadened Thought / Behavior	Citation
Creative thoughts	Isen, Daubman, & Nowicki, 1987
Open to learning new information	Estrada et al., 1997
Improved Verbal Performance	Rowe, Hirsch, & Anderson, 2007
More self-overlap with relationship partners	Waugh & Fredrickson, 2006; Waugh et al., 2006)
Increased Trust	Dunn & Schweitzer, 2005
Reduces "Us versus Them" mindset	Dovidio, Gaertner, Isen, Rust, & Guerra, 1995)
Improved memory for faces of other races and reduced ability to identify physical differences between two races	Johnson & Fredrickson, 2005

Adapted from "Positive emotions" by B.L. Fredrickson and M.A. Cohn, , 2008, In M. Lewis, J.M. Haviland-Jones, and L.F. Barrett Handbook of Emotions (3rd Edition, p. 784-785). Copyright 2008 Guilford Press.

Evidence for the Build Hypothesis

The build hypothesis states "...temporary and transient experiences of positive emotions, by encouraging a broadened range of actions, over time build enduring personal resources" (Fredrickson & Cohn, 2008 p. 785)

To test the build hypothesis, Fredrickson and colleagues (2008) developed a meditation intervention to demonstrate how positive emotions over time can build personal resources, and in turn,

impact life satisfaction. Participants were randomly assigned to a meditation intervention or a control group. For the meditation group, participants were trained in the Loving Kindness Meditation (LKM), which broadens mindsets using the positive emotions of love and compassion. For an example of LKM, visit Fredrickson's Positivity Resonance page. This page includes examples of other meditations she has developed. In LKM, participants started by expressing love and compassion toward the self, then expanded to close others, acquaintances, and strangers. Participants were instructed to practice LKM at least five days per week for eight weeks. Including the baseline period, the study lasted for a total of 9 weeks.

The second independent variable was time. First, baseline measures were completed followed by 8 weeks of experimental meditation or control sessions.

At each time period, several dependent variables were measured. During the 9-week study, participants completed self-report measures of 9 positive emotions: amusement, awe, contentment, joy, gratitude, hope, interest, love, and pride, and 8 negative emotions: anger, shame, contempt, disgust, embarrassment, guilt, sadness, and fear. Using various self-report measures, participants reported on their personal resources. 18 personal resources were divided into four categories – cognitive, psychological, social, and physical. See Tables 27 through 30 for the measures of personal resources. Two outcome measures – depression and satisfaction with life – represented the outcome variables.

Table 27

List of 6 Cognitive Personal Resources Measured (*Fredrickson et al.*, 2008)

A table showing cognitive personal resources and a definition of measure for each of the resources

Type of Cognitive Personal Resource	Definition of Measure
Mindfulness and Awareness	the act of not being mindless or not acting on "autopilot"; focusing attention environment and one's own actions
Agency Thinking	belief that one is able to achieve goals
Pathways Thinking	belief that multiple ways exist to achieve one's goals
Savoring the Present	Enjoying current experiences
Savoring the Past	Enjoying the recall of past experiences
Savoring the Future	Enjoying the anticipation of future good experiences

Table 28

List of 8 Psychological Personal Resources Measured (Fredrickson et al., 2008)

A table showing psychological personal resources and a definition of measure for each of the resources

Type of Psychological Personal Resource	Definition
Optimism	Expecting more good than bad events to happen to oneself
Resilience	Ability to bounce back from challenges
6 Psychological Well-being Measures	Personal Growth, Environmental Mastery, Autonomy, Self-Acceptance, Purpose in Life

Table 29

List of 2 Social Personal Resources Measured (Fredrickson et al., 2008)

A table showing social personal resources and a definition of measure for each of the resources

Type of Social Personal Resource	Definition
Social Support from Close Others	Amount of social support received from close others
Positive Relationships with Others	High trust of others, low loneliness

Table 30

List of 2 Physical Personal Resources Measured (*Fredrickson et al.*, 2008)

A table showing phsyical personal resources and a definition of measure for each of the resources

Type of Physical Personal Resource	Definition
Physical Illness Symptoms	Few symptoms
Sleep Duration	Lots of sleep!

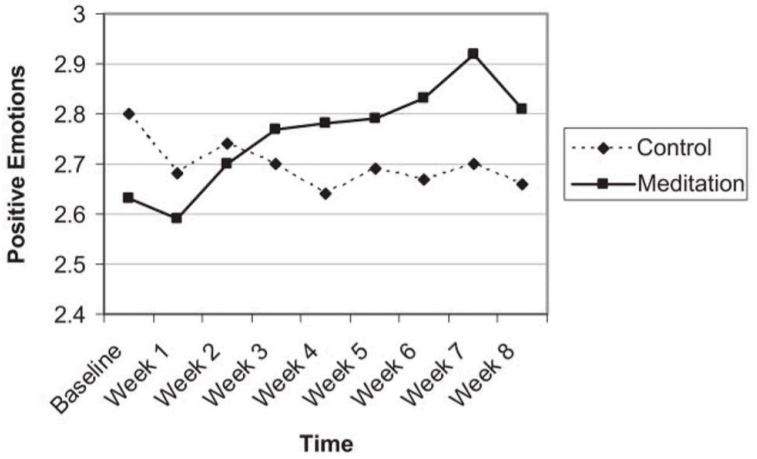
Reproduced from "Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources" by B.L. Fredrickson, M.A. Cohn, M.A., K.A. Coffey, J. Pek, and S.M. Finkel, 2008,*Journal of Personality and Social Psychology, 95*(5), p. 1049-1050 (https://doi.org/10.1037/a0013262) Copyright 2008 by the American Psychological Association.

The first important analysis used time and experimental group as the independent variable predicting the amount of the 9 positive emotions averaged together (Figure 27). Time was a significant predictor of positive emotions for the LKM group, but not the control group. As exhibited in Figure 27, positive emotions increased over time for the LKM group but did not change over time for the control group. Note that week 3 is the first week LKM participants showed greater positive emotions than control participants. This

suggests the effect of meditation on positive emotions does not happen immediately.

Figure 27

Change in Positive Emotion over 9-Week Period for Control and Meditation Groups

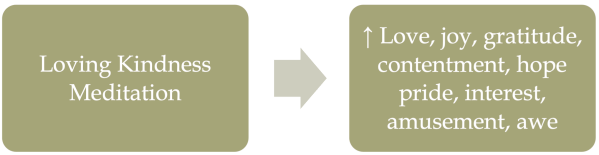


Reproduced from "Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources" by B.L. Fredrickson, M.A. Cohn, M.A., K.A. Coffey, J. Pek, and S.M. Finkel, 2008,*Journal of Personality and Social Psychology, 95*(5), p. 1052 (https://doi.org/10.1037/a0013262) Copyright 2008 by the American Psychological Association.

This same analysis was conducted for the average of the negative emotions. Surprisingly, time and experimental group did not impact negative emotions. Said another way, engaging in LKM did not change the amount of negative emotions people reported. So, LKM increased positive emotions, but did not decrease negative emotions!

Interestingly, further analysis showed that LKM did not significantly increase any specific positive emotion. Instead, LKM increased positive emotion experiences as a group (Figure 28).

Figure 28



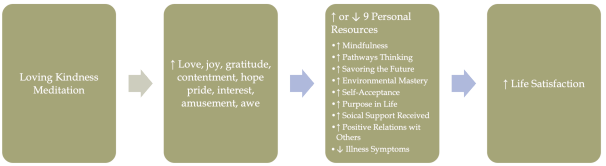
The next analysis evaluated two casual linkages by comparing self-reports as week 8 to self-reports at baseline (Figure 29):

1. Change in Positive Emotions Causing a Change in Personal Resources
2. Change in Personal Resources Causing a Change in Satisfaction with Life

The above two casual linkages were significant for 9 personal

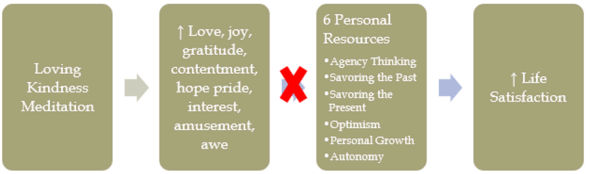
resources: mindfulness, pathways thinking, savoring the future, environment mastery, self-acceptance, purpose in life, social support received, positive relationships with others, and illness symptoms.

Figure 29



As shown below in Figure 30, the remaining 6 personal resources did increase life satisfaction, but these personal resources were not influenced by the increase in the experience of positive emotions.

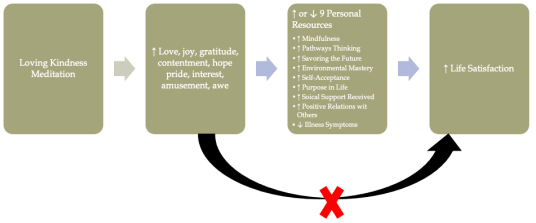
Figure 30



Further analysis showed that although LKM increased positive emotions, an increase in positive emotions did not directly increase

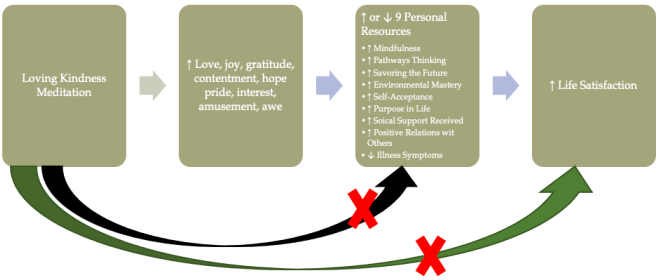
the outcome of life satisfaction (as displayed in Figure 31 with the red X). Why is this important? This means positive emotions alone do not cause an increase in life satisfaction. For positive emotions to impact life satisfaction, the positive emotions must first increase personal resources. Another way to view this finding in that personal resources are mediators between positive emotions and life satisfaction.

Figure 31



Similarly, the experimental condition (LKM vs. control) did not directly increase personal resources or life satisfaction (Figure 32). For LKM to work, it must first increase positive emotions.

Figure 32



Similar analyses were conducted with depression as the outcome (instead of life satisfaction). The broaden and build model was supported, although a few differences exist. The first difference was that significance was not found for the personal resources social support received (displayed with red X's in Figure 33). The second difference was an increase in positive emotions directly caused a decrease in depression. This means positive emotions reduce depression directly AND indirectly by changing personal resources. In line with the above findings for life satisfaction, experimental group did not directly impact change in personal resources or change in depression.

Figure 33

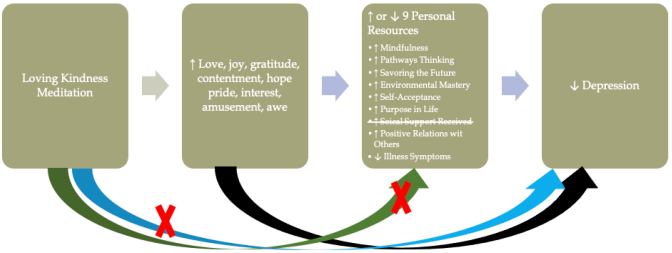
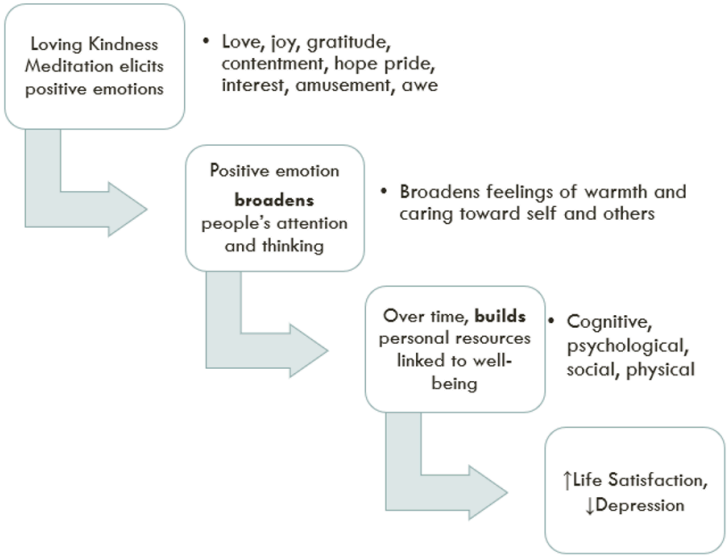


Figure 34 graphically displays the broaden-and-build theory based on the study we just reviewed. Make a note that broadening thoughts/behaviors and buidling personal resources are both mediators of the relationship between increasing positive emotions and increasing satisfaction/reducing depression.

Figure 34

Pictorial Display of Fredrickson et al. (2008) Results for Broaden-and-Build Theory



Table(s) 31 displays the four types of personal resources identified in research.

Cognitive

- Mindfulness and Awareness
- Agency Thinking
- Pathways Thinking
- Savoring past, present, future
- Faster Learning
- Improved IQ
- Developing Goals

Psychological

- Optimism
- Resilience
- Life Purpose
- Self-acceptance
- Environmental Mastery
- Autonomy
- Tranquility
- Using Productive Coping Mechanisms

Social

- More relationships
- Making More Friends
- Higher Quality Relationships
- Social Support Given / Received

Physical

- Reduced Illness
- Better Immune System
- Increased Sleep
- Less Pain
- Faster recovery from Illness
- Undoing Effect of Negative Emotions
- Vagal Tone

Adapted from "Positive emotions" by B.L. Fredrickson and M.A. Cohn, , 2008, In M. Lewis, J.M. Haviland-Jones, and L.F. Barrett Handbook of Emotions (3rd Edition, p. 786-789). Copyright 2008 Guilford Press.

Fredrickson (2013) has theorized that broadened thoughts/actions and personal resources that occur for each unique positive emotion (shown in Table 32). The positive emotions are listed in the order of most frequently experienced to rarely experienced. This

table shows that Fredrickson (2013) views all positive emotions as causing approach behaviors or expanding thoughts. Remember, that earlier we did discuss how some positive emotions might narrow our thinking or result in avoidance behavior.

A table showing a positive emotion, which thoughts or behaviors are broadened, and how it builds personal resources

Positive Emotion	Broadens Thoughts or Behaviors	Builds Personal Resources
Love	Any / all of the below, with mutual care	Any / all of the below, with social bonds
Joy	Play, get involved	Skills gained via experiential learning
Gratitude	Creative urge to be prosocial	Skills for showing care, loyalty, social bonds
Serenity / Contentment	Savor and integrate	New priorities or views of the self
Interest	Explore, learn	Knowledge
Hope	Plan for a better future	Resilience, optimism
Pride	Dream big	Achievement motivation
Amusement	Share, joviality, laugh	Social bonds
Inspiration	Strive toward own higher ground	Motivation for personal growth
Awe	Absorb and accommodate	New worldviews

Note. Listed from most frequently experienced to rarely experienced. "Positive emotions broaden and build," by B.L. Fredrickson, In P. Devine and A. Plant (Eds.) Advances in Experimental Social Psychology, 47, p. 4, 6, Copyright 2013 Academic Press

In this Yale Experts in Emotion video, Barbara Fredrickson discusses how her undoing effect of positive emotions led to the development of the broaden-and-build theory. She also discusses

her view on whether positive emotions are discrete or often co-occur. **Start around 3:00 and end around 13:22.**

Yale Experts in Emotion Video on Barbara Fredrickson

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1574#oembed-1

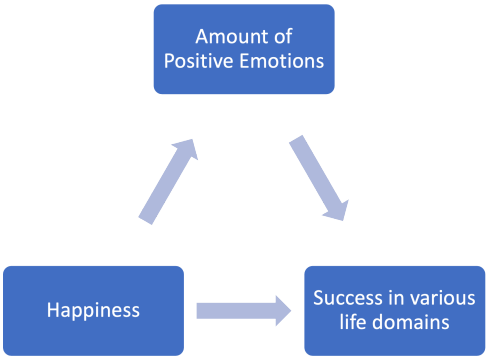
Positive Emotions and Happiness

One of Ekman's primary, universal emotions is happiness. But, happiness researchers (e.g., Fredrickson) claim that happiness is not a basic emotion, but a personality trait. Viewing happiness as a personality trait means people's level of happiness is relatively stable over time and across situations. Some people are generally happy, while others are not. Happiness is a stable, heritable, long-term measure of a person's well-being. For most emotion researchers, joy is the distinct positive emotion. So, how are positive emotions, like joy, different from the trait happiness? First, unlike positive emotions, happiness does not occur in response to a specific event.

Remember, that Fredrickson has identified 10 positive, basic emotions. According to hers and other works (for a review, Lyubomirsky et al., 2005) , experiencing 10 positive basic emotions on a frequent, daily basis is associated with happiness. In fact, Lyubomirksy et al.'s (2005) detailed meta-analysis found that happiness causes several successful outcomes in work, relationships, thinking, coping, etc., and that the relationship between happiness and life success is mediated by the experience of positive emotions (Figure 35). So why are happy people often more successful in a variety of life domains? Because they experience more positive emotions! This fits with the hedonic view of happiness – which suggests that happiness is caused by the experience of many positive emotions and few negative emotions. The other view of happiness is called eudaimonic – we are happy when we feel that our life has purpose and when we achieve goals.

Figure 35

Amount of Positive Emotions Mediates the Relationship between Happiness and Life Success



So, based on the hedonic view of happiness, over time we can increase our happiness by experiencing more positive emotions. Below is a list of positive emotions. What are some interventions we might use to help people experience more positive emotions? Remember, according to the broaden-and-build theory, it doesn't matter which positive emotion we experience! All that matters is that we frequently experience positive emotions.

Joy, interest, contentment, gratitude, awe, amusement, inspiration, pride, hope, love

Do Positive Emotions Always Broaden Our Attention?

The Malleable Mood Effects Hypothesis

Recent work by Clore and colleagues (Hunsinger et al., 2012) provides evidence against the broaden and narrowing hypotheses. Instead, they developed the malleable mood effects hypothesis. This hypothesis suggests that positive emotions maintain our current thinking style, whereas negative emotions change or inhibit our current thinking style. Why? Experiencing a positive emotion leads us to view our current thinking in a positive way. Whereas experiencing a negative emotion causes us to view our current thinking in a negative way, thus resulting in a change to our cognitive style. Stated simply – Clore and colleagues view positive emotions as a "go" signal and negative emotions as a "stop" signal. Table 33 below contrasts the broaden-and-build thinking with the malleable mood effects hypothesis.

Table 33

Two Theoretical Views of How Emotions Influence Thoughts

A table showing emotion groups, Fredrickson's broaden and build theory for that emotion group, and Clore's Malleable mood effects hypothesis.

Emotion Group	Fredrickson's Broaden-and-Build Theory	Clore's Malleable Mood Effects Hypothesis
Positive Emotions	Broadens our attention, thinking, and behaviors	Maintain our current thinking style
Negative Emotions	Narrows our attention, thinking, and behaviors to the treat	Change our current thinking style

Hunsinger et al., (2012) tested their hypothesis with three studies. We will discuss study 3 only. In study 3, all participants first completed a survey. ½ participants were randomly assigned to completed surveys scented with a pleasant fragrance, while the other ½ of the participants completed fragrance-free surveys.

After completing the surveys, participants were randomly assigned to either a happiness or sadness condition. Participants recalled and wrote about either a happy or sad experience. Then, participants completed an impression formation task, in which they read about a woman named Carol and rated her on a list of personality traits related to extraversion and introversion. For ½ the participants Carol was described as an introverted librarian and for the other half as an extraverted saleswoman. For all participants, the story about Carol included 12 introverted behaviors, 12 extraverted behaviors, and 15 behaviors unrelated to introversion-extraversion. So, the impression formation manipulation was simply telling participants Carol was either introverted or extraverted, even though the list of traits remained the same. After participants completed these two tasks, they reported their subjective feelings. The dependent variable was calculated as participants' average extraversion rating of Carol minus participants' average introversion rating of Carol. Thus, higher scores indicate participants perceived Carol as highly extraverted.

Before discussing the results, some clarification is required. The impression formation task assumes that people stereotype librarians as introverted and salespeople as extraverted. Thus, people's default thinking style is considered broad and general. When relying on general stereotypes, people would rate the personality of Carol the librarian as introverted and Carol the salesperson as extraverted, even though the story about Carol includes the same exact behaviors. In this study, the no-fragrance condition is assumed to cause default broad thinking that relies on stereotypes. Conversely, the fragrance condition should cause

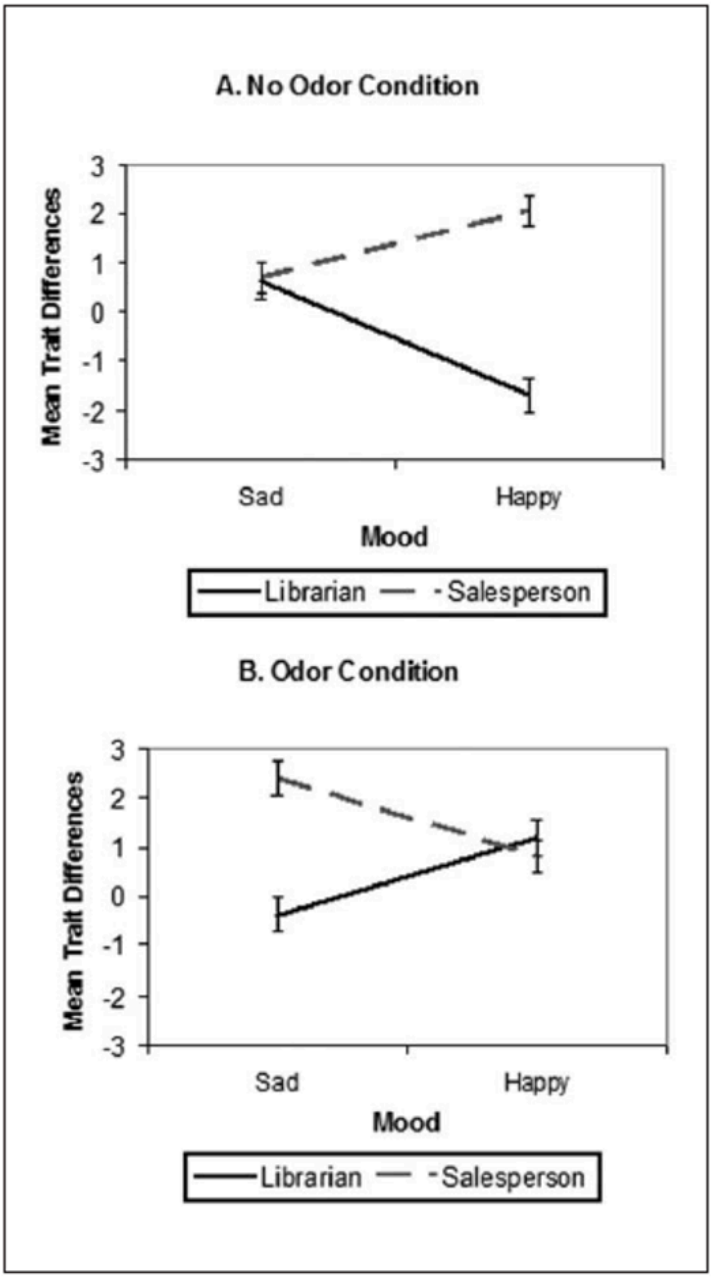
people to focus on their immediate environment and narrow the attention on the fragrance and this narrowed attention is assumed to be carried over to focusing on Carol's specific behaviors.

Hypothesis 1 – Fragrance Condition: The fragrance condition will cause people to narrow their thinking to the current external environment and in turn, to evaluate the specific behaviors of Carol (not the stereotypes). Paying attention to details such as Carol's specific behaviors will make participants less likely to rely on their default stereotypes and more likely to rely on the behaviors listed in the story. Because happy people maintain their current thinking, happy people will *continue* to focus on the specific behaviors and should rate Carol the librarian as having the same personality as Carol the salesperson (because the description included 15 introverted and 15 extraverted behaviors). Conversely, sad people should *change* cognitive evaluations of Carol from detailed to more general stereotypes. Thus, sad people should view Carol the librarian as introverted and Carol the salesperson as Extraverted. This exact finding is displayed in Figure 36 Part B.

Hypothesis 2 – The No Fragrance Condition: The no-fragrance condition will cause people to rely on their default stereotypes. Because happy people *maintain* their current thinking and sad people change their thinking, in the no-fragrance condition happy people should rely on broad stereotypes and rate Carol the salesperson as more Extraverted than Carol the librarian. Because sad people *change* their current thinking style, they should be less likely to rely on stereotypes and more likely to focus on the behaviors in the description of Carol. Thus, in the no-fragrance condition sad people should show no differences in the traits they rate for the librarian and salesperson. This exact finding is displayed in Figure 36 Part A.

Figure 36

The Impact of Emotion and Odor Condition on perceptions of Carol's Traits (Hunsinger et al., 2012; Study)


A. No Odor Condition
Mean Trait Differences
3
2
1
0
-1
-2
-3
Sad
Happy
Mood
Librarian
Salesperson
B. Odor Condition
Mean Trait Differences
3
2
1
0
-1
-2
-3
Sad
Happy
Mood
Librarian
Salesperson

Reproduced from "Sometimes happy people focus on the trees and sad people focus on the forest: Context-dependent effects of mood in impression formation," by M. Hunsinger, L. M. Isbell, and G.L. Clore, 2012, *Personality and Social Psychology Bulletin*, 38(2), p. 227 (https://doi.org/10.1177/0146167211424166) Copyright 2012 by Society for Personality and Social Psychology.

Malleable Mood Effects Hypothesis vs. Broaden-and-Build Theory

Both these theories share similarities and differences, which I describe below.

1. Both theories demonstrate that positive emotions do broaden our thoughts. The malleable mood effects hypothesis suggests the positive emotion-broadening link occurs only if our dominant thinking was broad before the positive emotion occurs. Conversely, if we were focused on details and then experienced a negative emotion, this negative emotion would cause us to show more broadened thinking.

2. Both theories suggest that negative emotions narrow our thinking and attention. The broaden-and-build theory suggests negative emotions focus our attention on the threat. The malleable mood effects hypothesis says this narrowing can be on any details in our environment, not necessarily threats. Further, the malleable mood effects hypothesis shows that negative emotions narrow our thinking only if we were thinking more broadly and generally before the negative emotion occurred. Positive emotions can help us to maintain

narrowed thinking as well.

3. Both theories provide interventions for reducing stereotypes. The broaden-and-build theory provides evidence that positive emotions cause people to include others in their self-concept and to view fewer differences between ingroups and outgroups. The malleable mood effects hypothesis suggests that whether people reduce their stereotypes depends on 1) thinking style before the emotion and 2) whether people experience a positive or negative emotion.

4. The main difference between these theories is timing. The broaden-and-build theory suggests that positive emotions cause broadened thinking and doesn't necessarily consider our mindset before the positive emotion. Whereas malleable mood effects adds a third variable – our dominant thinking style prior to experiencing any emotion.

The Dark Side of Positive Emotion

June Gruber, Iris Mauss, and their colleagues have done extensive work on the consequences of experiencing positive emotions. (Below, in the Yale Expert in Emotion video Gruber interviewed Mauss about happiness). This section is based on their article "A *dark side of happiness? How, when, and why happiness is not always good*" (Gruber, Mauss, & Tamir, 2011), which is a great and interesting read about this topic.

Also, in 2011 Gruber did a TEDxCambridge talk called The Dark Side of Happiness: June Gruber at TEDxCambridge 2011

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1753#oembed-1

In Gruber and colleagues' (2011) review article on this topic article, they define happiness as the presence of positive emotions and the absence of negative emotions.

Their first argument is that the outcomes of high happiness are not greater than experiencing moderate happiness. So, just because someone is extremely happy all the time doesn't mean they will acquire more friends, more social support, more work success, etc., than someone who experiences moderate happiness. Further, they state that high happiness, as defined by lots of positive emotions and few to zero negative emotions, could be life threatening. Negative emotions protect our survival and someone who only

experiences positive emotions might engage in more risk-taking behaviors. Gruber and colleagues (2011) even suggest that experiencing too many positive emotions and not enough negative emotions are hallmarks of mania and antisocial personality disorder.

Their second argument is that happiness is only appropriate and advantageous for certain contexts or eliciting events. Although happiness causes success in a variety of domains, it is most likely happiness causes success in environments that are safe and not threatening. In threatening situations, it would be more beneficial to experience a negative emotion that increases adrenaline and arousal. For instance, if you are playing an important lacrosse game, being happy is less likely to help you win the game than being angry. The beneficial outcome of happiness depends on the context. Similar to the Hunsinger et al., (2012) study we discussed above, Gruber and colleagues point out that happy people rely on their accessible thoughts to make a decision – so if they are currently thinking about a stereotype, they would be more likely made judgements based on stereotypes. Finally, Gruber and colleagues point out that positive emotions do elicit more social support and improve relationships, but only to a point. If we are constantly happy, then close others may not know when we are in need of help (often conveyed by sadness), and we may miss important opportunities to increase our status and resources (often caused by anger).

Their third argument is that people incorrectly pursue higher levels of happiness. Gruber et al., (2011) summarize a few studies that suggest when we seek higher levels of happiness and place emphasis on achieving happiness we experience fewer positive emotions, reduced well-being, and an increase in mental health symptoms. What a conundrum! In our attempts to become happier, we actually make ourselves less happy! Related to this argument, Gruber and colleagues question whether happiness is achieved when people should seek to reduce their negative

emotions or when people simply accept their negative emotions! In one recent study (Shallcross et al., 2010), people who were more likely to accept negative emotions reported fewer depressive symptoms three months later. What do these findings reminds you of? Maybe mixed emotions? From what we know now, it seems like the Eastern view of comfort with mixed emotions of happiness and sadness might increase our happiness more so than the Westernized view of increasing positive emotions and reducing negative emotions.

In the below Yale Expert in Emotion Video, Iris Mauss discussed how people who strongly value happiness experience more disappointment and less happiness when they are not happy.

Start the video around 11:15 and stop around 20:50.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1753#oembed-2

In her fourth and final argument, Gruber and colleagues consider whether the presence of certain positive emotions and the absence of negative emotions may simply be detrimental to our own and others' well-being. As we discussed earlier, hubristic pride causes negative outcomes such as aggression, stereotyping, and shame (review chapter here). Interestingly, they also identify the absence of guilt, embarrassment and shame as detrimental to well-being and social connections. If we cannot experience shame and guilt, then will we know we did something wrong? If we do not apologize for our wrongdoings, how will this impact our close relationships? In this same argument, Gruber and colleagues suggest that when we experience positive/negative emotions that contradict our cultural norms, then we might experience consequences instead of

favorable outcomes. Gruber and colleagues identify three cultural differences in the way Easterners and Westerns are expected to experience emotions. I've added a fourth that we have discussed – which is valence! We have covered these earlier in the semester, so let's test your knowledge here !

Drag and drop the word into the correct drop zone for each emotional experience for both easterners value and westerners value.

Incorrect answers will result in a point deduction.

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https://psu.pb.unizin.org/psych425/?p=1753#h5p-21

Summary of Positive Emotions

We have covered a lot about positive emotions! Before summarizing, I would like to discuss some current challenges with investigating positive emotions (as compared to negative emotions).

The first problem is that researchers disagree on the number of discrete positive emotions. And some researchers use different names for the same emotion. For instance, are contentment, tranquility, and serenity the same emotions? We just don't know yet! Similarly, some positive emotions might include negative feelings, so should they be considered positive or mixed emotions? Or are these emotions positive because people avoid a potentially negative outcome? Some of these may be awe, hope, relief, and nostalgia.

We may not know these answers yet because it's harder to investigate positive emotions than negative emotions. And thus, we simply know less about the component changes of distinct positive emotions. As we saw in physiological changes, positive emotions just show less physiological changes than negative emotions. We have fewer distinct behavior changes for discrete positive emotions. Studies on cognitive appraisals include a large number of appraisal dimensions that vary greatly across positive emotions. Positive emotions cause approach behavior, but might also cause avoidance behaviors. Component changes just are not as clear cut as negative emotions.

Broaden-and-build theory gave us lots of information on how positive emotions improve our life satisfaction, but Gruber and colleagues also outlined the negative outcomes of positive

emotions. So, what level of positive emotions is best for our happiness and satisfaction? Early work by Fredrickson and Losada (2005) suggested a ratio of 3 positive to 1 negative emotion to achieve happiness, but this has since been debunked by a graduate student (Brown et al., 2013).

To watch Fredrickson's TED talk on this positivity ratio, watch this 2011 video from the Greater Good Science Center.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1757#oembed-1

For an interesting read about how the study was debunked, read The Scientist's article, "Positivity Ratio Debunked: Two Psychologists and a Physicist Take Down a 2005 Paper Proposing a Gauge to Human Happiness"

For Fredrickson's retraction of her findings and her correction to Fredrickson and Losada (2005), read the Fredrickson and Losada (2013) abstract here.

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End of Chapter Assignments (Chapter 13)

Match each Definition to the Emotion Label

Match each emotion label to the correct definition.

Incorrect answers apply a penalty, and are shown when you submit to check your answers.

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https://psu.pb.unizin.org/psych425/?p=2348#h5p-19

Cognitive Appraisal

For each cognitive appraisal, select the positive emotion that would cause this specific appraisal and drag it into the corresponding cognitive appraisals drop box. Incorrect answers apply a penalty, and are shown when you submit to check your answers.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2348#h5p-20

CHAPTER 14 - EMOTION REGULATION

Chapter 14 Learning Objectives

- What is the definition of emotion regulation (ER)?
- Why do people regulate their emotions?
- Differentiate between the five broad categories of emotion regulation in the process model of emotion regulation: situation selection, situation modification, attentional deployment, cognitive change, and response modulation.
- Why is expressive writing an effective attentional deployment strategy?
- Discuss the evidence for expressive writing as a treatment for 1) depression and anxiety, and 2) test anxiety.
- Compare and contrast the types of cognitive change strategies. Which of these strategies (rumination, distraction, and reappraisal) are effective?
- Compare and contrast the types of response modulation strategies.
- Explain expressive suppression. How does expressive suppression impact our memory, our expressions, and our self-reported negative emotions? How does expressive suppression impact our relationship interactions?
- Discuss the outcomes of suppressing and reappraising positive emotions.
- Explain emotional thought suppression. How does thought suppression impact our thoughts and our self-reported negative emotions?
- Compare the consequences of suppression and reappraisal. Explain the difference between sub-vocal monitoring, the rebound effect, and regulatory depletion.
- How do the effects of suppression vary with culture?
- According to Webb's (2012) meta-analysis, which emotion

regulation strategies work the best?
- How does our brain change during emotion regulation in general?
- Compare and contrast how our brain changes during reappraisal and suppression.

Defining Emotion Regulation

Emotion regulation occurs when people try to control or change any of the emotion components associated with an emotion experience, either consciously or unconsciously.

People regulate their emotions when they influence (Gross, 2008):

- Which emotions they have
- When they have emotions (i.e., situations)
- How they experience emotions (i.e., arousal or valence)
- How they express emotions (verbal and non-verbal behavior)
- How long they experience emotions (i.e., duration)

Gross (2015a, 2015b) identifies two ways people regulate emotions – intrinsic and extrinsic. Intrinsic emotion regulation occurs when we try to regulate our own emotions. Extrinsic emotion regulation occurs when we try to regulate another person's emotions. In fact, we could engage in intrinsic and extrinsic regulation at the same time. For example, when we try to calm a friend in distress, we are trying to regulate the friend's emotions (extrinsic) and also trying to reduce our negative emotions as well (intrinsic)! Figure 1 provides examples of emotion regulation strategies based on the valence of emotion, whether the goal is to decrease or increase emotion, and whether the regulation is intrinsic or extrinsic. In this chapter, we will focus on intrinsic emotion regulation.

Figure 1

Examples of Extrinsic and Intrinsic Emotion Regulation Categorized by Valence and Increasing or Decreasing Emotion

Negative Emotions

A table for negative emotion examples of emotion regulation

Emotion Regulation	Decrease	Increase
Intrinsic	After a fight with a friend, exercising to reduce one's own anger.	Before a big trial, a lawyer increases her negative feelings.
	Telling a child who hurt himself to take deep breaths.	
Extrinsic	A therapist helps a client to think about her job loss in a more positive way to reduce negative emotions.	Before a big game, a coach gets his players angry.

Positive Emotions

A table for positive emotion examples of emotion regulation

Emotion Regulation	Decrease	Increase
Intrinsic	Your adversary at work loses a big account and you cover your smile with your hand.	After winning a prize, you jump up and down to feel more joy!
Extrinsic	–	After your child wins a soccer game, you take them for ice cream. A therapist asks her client to think of the most positive event from the week.

Adapted from "Emotion regulation: Current status and future prospects," by J.J. Gross, 2015a, *Psychological Inquiry*, 26(1), p. 5 (https://doi.org/10.1080/1047840X.2014.940781). Copyright 2015 by Routledge.

Why Do People Regulate Their Emotions?

People regulate their emotions for a variety of reasons.

Hedonic Motivation

Hedonism is the seeking of pleasure and avoidance of pain. Applied to emotion regulation, people are motivated to feel positive emotions and to avoid negative emotions. To be motivated hedonically, a person's current emotional state must be different from the emotional state they desire. People in Western cultures (vs. Eastern) would be more likely to regulate their emotions for hedonic reasons. Remember, Eastern individuals are more comfortable feeling mixed and negative emotions.

Performance-Improving

Performance-improving emotion regulation occurs when people are motivated to increase or decrease their emotions as a tool to improve performance in a certain situation. To increase positive emotions toward an upcoming exam, a student might take smaller practice quizzes (which actually works! Small tasks that cause pride create positive emotions toward similar assessments).

Pro-social Motivation

Pro-Social regulation occurs when we control our emotions within a relationship context. We might hide disappointment we experience after opening a gift from a partner that we do not like. Perhaps a loved one is nervous, and we try to express positive emotions to calm their nerves. When we engage in extrinsic regulation, this would most likely fall in this category.

Self-Protection Motivation

People are motivated to show or experience emotion to protect either their own physical or psychological safety or the safety of another. For example, people might pretend to show a certain emotion to protect their own safety. We might elicit empathy in other people to get them to acquire resources or help.

Impression Management Motivation

People are motivated to show or hide emotions to maintain a favorable impression of the self. Why? Well, remember one of the two motives in social psychology is to maintain our self-esteem. How do we maintain our self-esteem? By getting people to like us and view us favorably. When we follow emotion norms, this would follow under impression management motivation. Emotion norms tell us how we should behave and express our emotions based on culture, gender, social role, and job status.

Table 1 provides a summary of the 5 motivations for regulating emotion.

Table 1

5 *Motivations for Emotion Regulation*

A table showing a reason for regulation, the definition, and an example

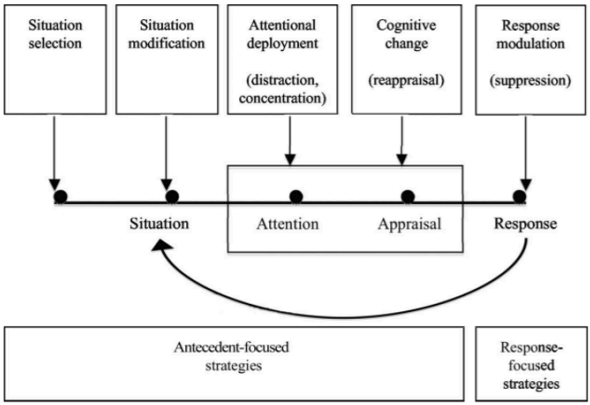
Reason for Emotion Regulation	Definition	Example
Hedonic	Seek positive emotions, avoid negative emotions	After receiving a poor exam grade, going to a comedy show with friends.
Performance-Improving	Feel a specific emotion to improve performance	Listen to calming music before a swim meet
Pro-Social	Emotion regulation within a relationship context	When your friend is sad, redirecting their attention to a funny joke.
Self-Protective	Feel a specific emotion to protect the self or close other	Express anger toward a threatening individual
Impression Management	Experience or express an emotion to maintain a favorable view of the self	Smile when we do not receive an award during a ceremony

Process Model of Emotion Regulation

James Gross is an emotion researcher who focuses on emotion regulation. Gross (1998, 2002) developed the process model of emotion regulation (see Figure 2). This model identifies five emotion regulation strategies that occur during different time points in the emotion experience: situation selection, situation modification, attentional deployment, cognitive change, and response modulation. Gross (1998) further divides these strategies into antecedent-focused and response-focused. Antecedent-focused regulation occurs before the emotion is fully experienced or during the emotion experience, whereas response-focused regulation occurs after the emotion has completely developed. So, with response-focused people have already "responded" to the eliciting event and thus have experienced all the emotion component changes. Within response-focused, people can regulate their emotions by trying to change any of the emotion components. They might change their facial expressions and vocal tone, suppress their thoughts, increase or decrease their physiological arousal, and even change their subjective feelings.

Look at Figure 2. Which strategy occurs earliest in the emotion experience? Which occurs last? Although this model depicts the timing of regulation, Gross (2008) points out that the regulation processes can occur simultaneously. For example, if you meet your friend for coffee to discuss an argument you had with your parent, you are actively selecting to go to coffee and while at coffee also trying to consciously lower your arousal level.

Figure 2
Process Model of Emotion Regulation

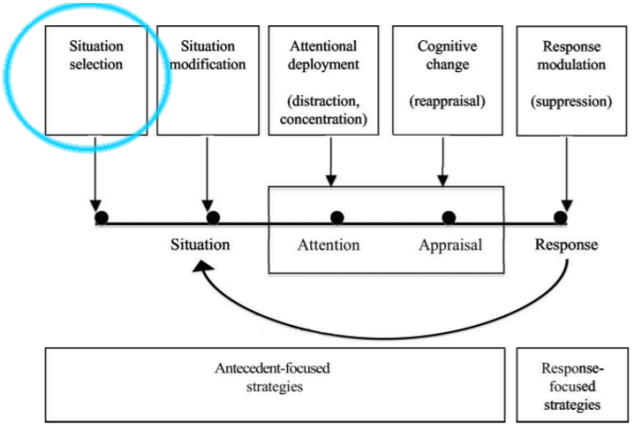


Reproduced from "Emotion Regulation: Conceptual Foundations," by J.J. Gross and R.A. Thompson, 2007, in J.J. Gross (Ed.), Handbook of Emotion Regulation, p. 10, Guilford Press. Copyright 2007 by Guilford Press.

Antecedent-Focused Emotion Regulation

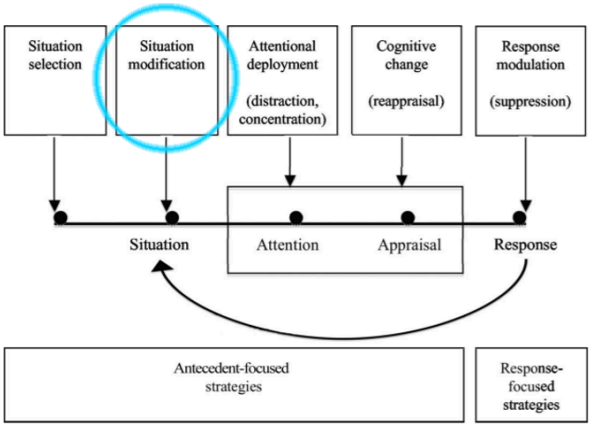
Antecedent-focused emotion regulation occurs before or during the emotion experience. Antecedent-focused strategies occur when we alter the eliciting event (situation selection, situation modification) or when we alter our cognitions (attention deployment, cognitive change). Situation selection is the strategy that occurs earliest in the emotion experience, whereas cognitive change occurs later in the emotion experience. Below, we will discuss each strategy in turn.

Situation Selection



During situation selection, we choose between two or more situations; we seek out, avoid, or change situations based on the emotions we desire to have and/or the emotions we do not want to have. When we engage in situation selection, we are predicting the emotions we will experience in a variety of situations and making a decision about which situations to enter or avoid based on our prediction of our emotions. How do we predict our emotions? We might recall how we felt in a similar situation or look to others' emotional experiences in the same situation. Keep in mind that we enter into many situations without predicting our emotions. For example, going to class or going to a doctor's appointment would not be considered situation selection because we are NOT entering those situations with the goal to elicit a certain emotion.

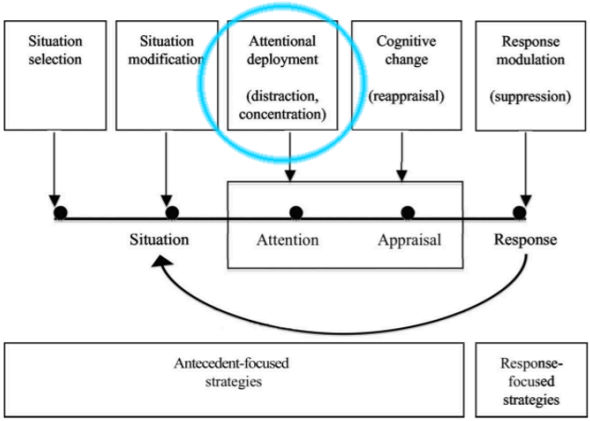
Situation Modification



Once a situation is selected, the situation can be modified to alter

the emotional impact. Situation modification occurs when people are already experiencing an event but try to change aspects of the external environment to alter their emotional experience. For example, you might be nervous about giving a speech in class, so you ask your friends to sit in the front row so you can look at them. Gross (2008) points out that there may not be a clear delineation between situation selection and situation modification. This is because altering the situation could cause us to enter a new situation – essentially causing situation selection!

Attention Deployment



When weighing the importance of different aspects of a situation, we may direct attention to one component. Attention deployment occurs when people shift their attention toward or away from the emotional experience. Thus, attention deployment occurs after we are already experiencing the eliciting event. With attention

deployment, we do not change any aspect of the external environment (as we do with situation modification). Instead, we are altering focus to the external environment or internally to our own thoughts and feelings. Several types of attention deployment exist (Gross, 2008; Webb et al., 2012):

1. **Physical withdrawal of attention:** This occurs when people remove their attention on the external environment. For example, by covering our eyes during a scary movie or covering our ears when a fire truck drives by.

2. **Distraction** (sometimes called redirection) "focuses attention on different aspects of the situation or moves attention away from the situation altogether" and "may also involve changing internal focus, such as when individuals invoke thoughts or memories that are inconsistent with the undesirable emotional state" (Gross & Thompson, 2007, p. 13). In addition, distraction could be positive or neutral (Webb, 2012). Positive distraction occurs when we shift our attention to something positive, whereas neutral distraction occurs when we shift our attention to a neutral aspect. Gross (2008) divides distraction into internal and external redirection.

    - **Internal redirection of attention or internal distraction:** This occurs when someone tries to change their focus themselves. They could achieve this redirection in two ways. First, by shifting their focus to a different aspect of the situation, such as when having blood drawn move their attention from the needle to a pleasant piece of artwork hanging on the wall. A second way would be by shifting their focus to their own internal thoughts and emotion. For example, when someone is having their blood drawn, they might try to focus their attention away from the

needle and pain to thoughts of an upcoming vacation. In the literature, these techniques are often called distraction. Internal distraction could be positive or neutral.

- **External redirection of attention or external distraction:** This occurs when someone or something else in the external situation tries to redirect our attention. For instance, when a child is hitting their sibling, a parent might try to direct their attention away from the sibling and to a toy. Similar to above, external distraction could be positive or neutral.

3. **Concentration** refers to emotion regulation strategies that "draw attention to [the] emotional features of a situation" (Gross & Thompson, 2007, p. 13). Sometimes this strategy is called confrontation, especially in a therapeutic context. Researchers divide concentration into three categories (Ward et al., 2012): 1) experiential, 2) analytical, and 3) a combination of experiential and analytical.

    - **Experiential processing** occurs when people concentrate on their feelings and "experiences" regarding the emotion experience.
    - **Conceptual-evaluative or Analytical Processing** occurs when people concentrate on the causes, meanings, and outcomes of the emotional event. In the literature, this type of processing is called problem-focused coping. Rumination is a type of concentration during which experiential processing occurs. **Rumination** occurs when we focus our attention inward to consciously think about to our feelings and thoughts about an emotional experience. With rumination, we are essentially reliving the prior emotional experience, similar to a recurring

emotion episode. For example, when we continue to think about a breakup, we experienced then night before.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=1775#h5p-22

Expressive Writing - One Type of Confrontation

Let's talk about two studies that investigate the effects of confrontation.

James Pennebaker developed an expressive writing paradigm to investigate the effects of using writing to confront past eliciting events that were emotional and significantly important to one's life. In the basic laboratory study, participants are randomly assigned to an expressive writing or control group. In the writing group, participants come to the lab 3 to 5 days each week and spend 15 to 30 minutes each day writing about their "...very deepest thoughts and feeling about an extremely important emotional issue that has affected you and your life" (Pennebaker, 1997, p. 162). Participants pick the topic and may write about the same or different topics each day. Participants in the control group write about neutral topics. The dependent variables include a variety of psychological and physical outcomes.

Studies using the writing paradigm have found a variety of psychological and physical benefits (for the citations, review Pennebaker (1997)). Compared to control groups, writing groups showed better physical health – fewer doctors' visits from pre-writing to post-writing, and better immune system functioning (more t-cells and natural killer (NK) cells, more Epstein-Barr antibodies after mono, and more Hepatitis B antibodies after receiving vaccine), and improved grades (Pennebaker & Francis, 1996; Pennebaker, 1997). Directly after writing, participants showed reduced skin conductance, reduced heart rate, and reduced corrugator activity. The writing group also showed better psychological health – better memory, more positive mood, and self-reported higher well-being. Psychologically, writing resulted in less self-reported negative feelings and depressive symptoms for

people who typically suppress their emotions (Gortner et al., 2006). Finally, several behavioral outcomes occur after writing – including drinking less alcohol, receiving better grades in college, and missing less work. Overall, these findings suggest that we all should start a diary!

Pennebaker developed a linguistic coding system to further analyze the words participants use in their writing. The coding system (LIWC) categorized words into negative emotion words, positive emotion words, causal words (because, reason) and insight words (understand, realize). The number of words used in each category predicted physical health, but not mental health. Results indicated that:

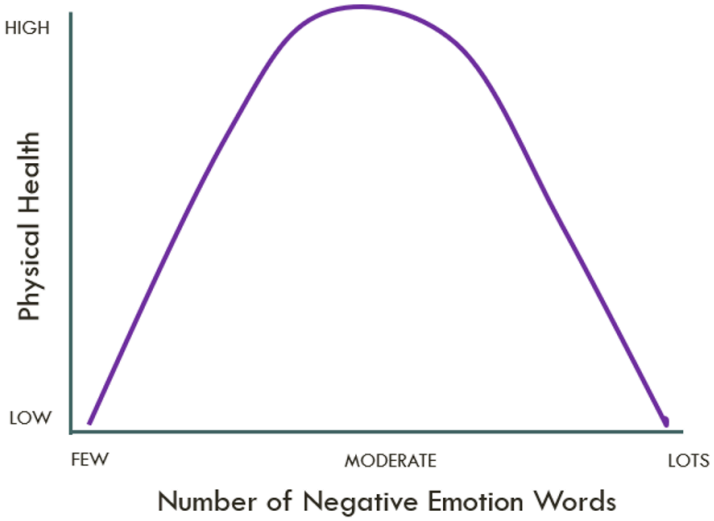
- 1) Number of positive emotion words was positively correlated with better physical health.
- 2) A curvilinear relationship explained the relationship between negative emotions words and physical health. (see Figure 3)
- 3) Over time as participants increased the amount of causal and insight words as they wrote, they showed better physical health (Pennebaker et al., 1997).
- 4) Participants who started with messy and unclear writing that became clearer and more logical over time showed increases in physical health.

What do you think is happening when people write? Think about why people report the highest physical health when they are using a moderate number of negative emotion words. It might be that people who suppress would tend to use few negative words, but now the task of writing about emotions reduces suppression and its negative effects on health. It could be that when people write and use a moderate number of negative words they are effectively confronting and even re-appraising the situation. Maybe people with lots of negative emotion words do not have the working memory to confront or are using the strategy of rumination – and

focus too much on their current feelings instead of changing their thoughts about the upsetting eliciting event.

Figure 3

Curvilinear Relationship between Amount of Negative Emotion Words and Physical Health



Impact of Expressive Writing in a Therapeutic Context

A recent study (Graf et al., 2008) applied the writing paradigm to therapeutic treatment for individuals suffering from depression and anxiety. In this study, students receiving treatment were randomly assigned to a writing or control group. Participants wrote for 20 minutes each week for a period of two weeks. Their therapists were blind to their clients' assigned condition. Below are the instructions each group received about writing.

Emotional disclosure group: "During each of the two weekly writing sessions, we want you to write about the most stressful and upsetting experiences of your entire life for 20 minutes. You can write on different topics each week or the same topic for the 2 weeks. This might be an experience from your childhood or something that is currently weighing on your mind. The important thing is that you write about your deepest thoughts and feelings about an emotional issue. You may or may not want to discuss your writing or the themes of your writing with

your therapist. This is your choice. Your writing will be kept completely confidential. Don't worry about spelling, sentence structure, or grammar" (quoted form Graf et al., 2008, p. 393; instructions adapted from Pennebaker et al., 1998).

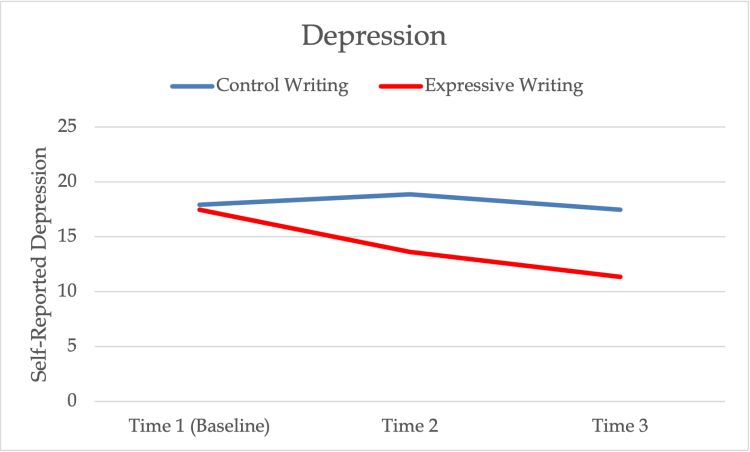
Writing control group: "During each of the two weekly writing sessions, we want you to write about your plans for the rest of today for 20 minutes. You may or may not want to discuss your writing or the themes of your writing with your therapist. This is your choice. Your writing will be kept completely confidential. Don't worry about spelling, sentence structure, or grammar" (quoted form Graf et al., 2008, p. 393; instructions adapted from Pennebaker et al., 1998).

Over the two-week period, expressive writing participants showed a greater reduction in self-reported depression, anxiety, and stress

(see Figures 4-6). Clients in the expressive writing reported greater satisfaction with therapy compared to control clients. Further, therapists reported that they discussed the writing more with clients in the intervention than control group and that their intervention clients achieved greater insight than control clients (remember, the therapists were blind to the conditions!).

Figure 4

Influence of Writing Type on Self-Reported Depression Over Time



Adapted from "Written Emotional Disclosure: A Controlled Study of The Benefits of Expressive Writing Homework in Outpatient Psychotherapy," by M.C. Graf, B.A. Gaudiano, and P.A. Geller, 2008, *Psychotherapy Research*, 18(4), p. 394 (https://doi.org/10.1080/10503300701691664) Copyright 2008 by Routledge.

Figure 5

Influence of Writing Type on Self-Reported Anxiety Over Time

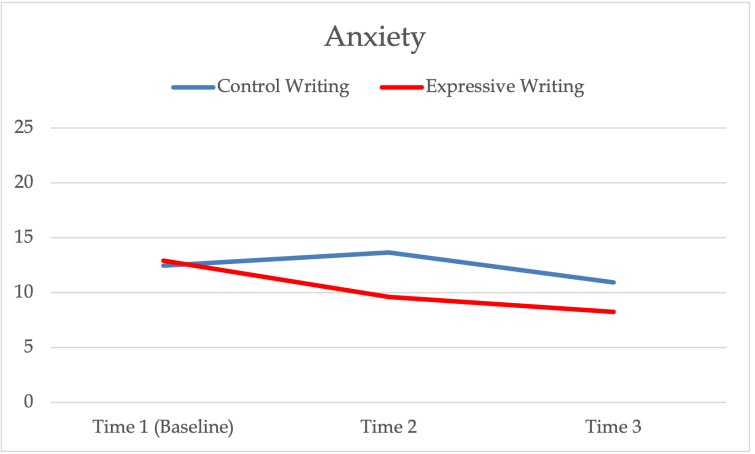


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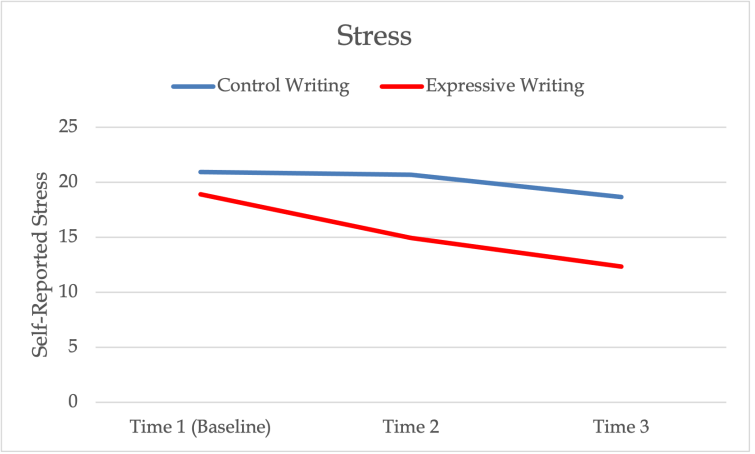
Figure 6

Influence of Writing Type on Self-Reported Stress Over Time



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Psychotherapy," by M.C. Graf, B.A. Gaudiano, and P.A. Geller, 2008, *Psychotherapy Research*, 18(4), p. 394 (https://doi.org/10.1080/10503300701691664) Copyright 2008 by Routledge.

For those of you interested in how expressive writing could be used in a therapeutic setting visit Pennebaker's article here.

Impact of Expressive Writing in Academic Context

In a more recent study (Park et al., 2014), researchers investigated how confrontation in writing reduces the impact of test anxiety or math performance. Procedures are depicted in Figure 7 and the variables included are described below.

Math Anxiety Quasi-IV: Before the laboratory study, participants completed a self-report prescreen measure on their anxiety toward math tests. Based on their scores, students were divided into High Math Anxiety (HMA) or Low Math Anxiety (LMA) participant groups.

Within-Subjects IV: High and Low Working Memory Demand on Math Tasks: Researchers manipulated the amount of working memory that was used on arithmetic tasks (think algebra 1!). High demand math problems were more complex and included higher numbers whereas low demand included more simple operations and lower numbers. High demand math problems require more working memory, whereas low demand tasks require less working memory. Participants were shown the arithmetic calculations on a computer screen and asked to click one of two keys that indicated whether each math problem was solved correctly or incorrectly. When participants completed the math test, half the problems were high demand and half were low. Thus, all participants received high and low demand problems.

Between-Subjects IV: Control or Expressive Writing Group: In the control group, participants were instructed to wait for the researcher to return with documents. Participants in the writing group were instructed to write about their thoughts and feelings toward the upcoming math test they would take in the laboratory. Specifically, researchers instructed participants to (Park et al., 2014, p. 106):

"Please take the next 7 minutes to write as openly as possible about your thoughts and feelings regarding the math problems you are about to perform on the Excel spreadsheet. In your writing, I want you to really let yourself go and explore your emotions and thoughts as you are getting ready to start the second set of math problems. You might relate your current thoughts to the way you have felt during other similar situations at school or in other situations in your life. Please try to be as open as possible as you write about your thoughts at this time. Remember, there will be no identifying information on your essay. None of the experimenters, including me, can link your writing to you. Press the enter key at the end of every sentence to start a new sentence in the next row. When I knock on the door please stop writing and cover up the text so that I can't see what you wrote."

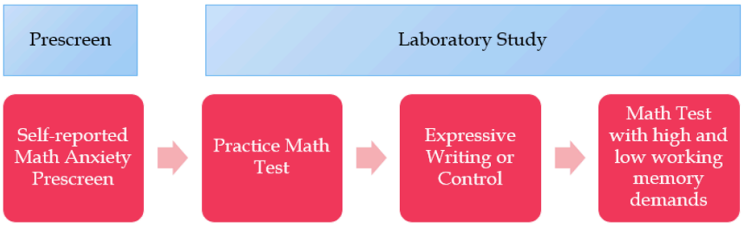
After both groups waited 7 minutes, they completed the math exam.

For the procedures, all participants first completed a practice math test meant to increase their anxiety on the test. Then, participants were divided into the control or expressive writing group.

Composite Math Performance Dependent Variable: Math performance was measured as error rates. An error rate occurs when participants select the wrong answer – either by indicating the answer was correct when it was actually wrong OR the answer was wrong when it was actually correct. Beyond performance, researchers measured participants' reaction time to correct answers. Shorter times indicated participants were faster to indicate whether the math answer was wrong or right. Researchers created a composite math performance score. For this composite, higher numbers indicate poorer performance. In other words, higher numbers indicate the participant had many errors and had a slow reaction time.

Figure 7

Procedures from Park et al. (2014)



Adapted from "The Role of Expressive Writing in Math Anxiety" by D. Park, G. Ramirez, and S.L. Beilock, 2014, *Journal of Experimental Psychology: Applied*, 20(2), p. 105-106. (https://doi.org/10.1037/xap0000013). Copyright 2014 by the American Psychological Association.

Figure 8 displays the results. Let's look at the results for the high working memory math task on the right portion of the figure. Remember, in the high working memory task, the math questions were more complex and thus required more working memory to complete. Three important findings:

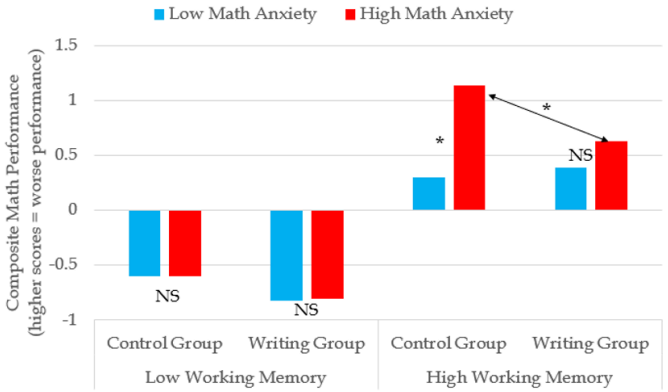
1. In the control task, math anxious participants performed significantly worse on the math test than low anxious participants. This finding confirms what we already know – that anxiety impairs performance on tests.
2. In the expressive writing group, performance was not different between the high anxious and low anxious participants. This means that after writing about thoughts and feelings about an upcoming event, anxious participants now are performing the same as low anxious participants. In other words, expressive writing is a good intervention for test anxiety! And writing closes the performance gap between students who experience and do not experience test anxiety. This finding is important for a second reason – it shows that expressive writing does not

harm the performance of low anxious participants. There have been some suggestions that expressive writing for non-anxious students could actually increase their anxiety before the exam, having the reverse effect. But this finding suggests that assumption is not true.

As indicated by the arrow in Figure 8, high math anxiety participants performed significantly better on the exam after writing versus doing nothing before the exam. This finding is important because it shows that writing doesn't just eliminate the gap between anxious and non-anxious students, but writing will also improve the performance on the test.

Figure 8

Influence of Math Anxiety, Writing Group, and Working Memory on Math Performance



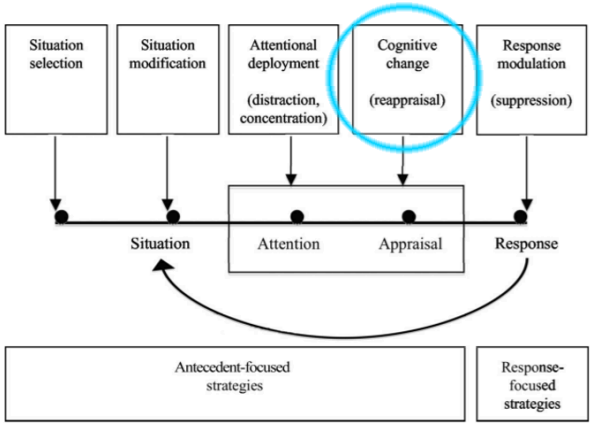
Adapted from "The Role of Expressive Writing in Math Anxiety" by D. Park, G. Ramirez, and S.L. Beilock, 2014, *Journal of Experimental Psychology: Applied*, 20(2), p. 108 (https://doi.org/10.1037/xap0000013). Copyright 2014 by the American Psychological Association.

Now, let's look at the left portion of Figure 8. The left position represents low working memory math problems – those problems that are easier and thus require less working memory. For both the control and writing groups, we do not see significant differences between low and high math anxiety participants. In other words, all four participants groups are performing well on the simple math problems. Why is this important? Well, these nonsignificant findings tell us that math anxiety is more detrimental to performance on tasks that requires LOTS OF working memory. In other words, it's not that test anxiety is going to affect performance on every single test and problem. Test anxiety is going to affect performance on DIFFICULT problems that require more working memory and more time to answer the problem.

These nonsignificant findings also give us some information about why confronting our emotional feelings and thoughts is a successful emotion regulation strategy. With confrontation, we are thinking about and processing our thoughts and feelings about the eliciting event – in this case the exam. What seems to be happening is that participants experiencing test anxiety are ruminating about their anxiety and negative emotions while taking the exam – which requires attentional resources. Because of the rumination, participants have less working memory capacity to actually think about the questions. By encouraging an effective regulation strategy before the exam, that frees up working memory space to actually focus on the math problems. As a note, work also suggests simply engaging in the type of thinking in these studies results in similar benefits (Rivkin & Taylor, 1999). In this study, participants were asked to think about a current stressor in their lives. Then, students were randomly assigned to think about and visualize their emotions about this event, to simulate ways to resolve the stressor, or a control group not given instructions. Participants who visualized their emotions reported more positive emotions, more active coping and better psychological well-being right after the manipulation and up to 1 week later. Interestingly, differences in physical symptoms were not found between groups.

Let's discuss one more finding from this study. Park et al. (2014) analyzed the words the highly anxious participants used when engaging in expressing writing. They found that for anxious participants, a greater use of anxious, cause, and insight words was associated with better performance on the math task. These findings tell us that during the expressive writing, anxious participants were confronting and thinking about their negative emotions toward the upcoming test. In addition, the insight words suggest that participants might have been re-appraising the math test.

Cognitive Change



Cognitive changes occurs when we select which of several potential emotional meanings will be attached to a situation. Then, later this meaning gives rise to subjective feelings, and behavioral and physiological changes. Cognitive change occurs when we alter our cognitive appraisals and changing these cognitive appraisals changes our emotional experiences.

According to Webb et al. (2012), several types of cognitive change exist:

1. **reappraising the emotional stimulus:** interpreting the emotional event in a more positive way.
2. **reappraisal using perspective-taking:** participants interpret the emotional event from a new perspective. This new perspective could be as a neutral observer or from the viewpoint of another individual.
3. **reappraising the emotional response:** sometimes called accepting the emotions. When reappraising the emotional

response, people might interpret their feelings and try to accept their emotions instead of judging them (remember we talked how accepting negative emotions might cause happiness!).
4. a **combination** of the prior 3 cognitive change strategies.

Gross (1998) agrees that reappraisal is a type of cognitive change. He further identifies other types of cognitive change discussed below. Take note that many of these cognitive change strategies are derived from Sigmund and Anna Freud's work on defense mechanisms.

1. **Denial** occurs when we do not accept the occurrence of the eliciting event. Typically, denial occurs when people do not acknowledge a negative event that has occurred.
2. **Intellectualization** occurs when we think about the rational, non-emotional parts of the eliciting event. During intellectualization, people are not thinking about or appraising their emotion responses to the eliciting event.
3. **Downward social comparison** occurs when we compare our situation to someone worse off, causing us to interpret our situation as more positive than before the comparison. Downward social comparison also increases our self-esteem (positive feelings toward the self) and reduces our negative emotions.

Let's look at a study that compares the effects of several cognitive change regulation strategies. In one study (Denson et al., 2012) participants first completed baseline emotion measures. Then, participants recalled a time they felt anger toward another person within the last year and wrote down details of the event. Then, participants were randomly assigned to engage in spontaneous regulation (control), rumination, reappraisal, or distraction for 20 minutes. In the control condition, participants were told to write about their thoughts, but were not given and instructions about

regulating their emotions. Below are the instructions each group received (Denson et al., 2012, p. 357-358):

Rumination: "I want you to write about it in a way that brings to mind the causes and consequences of the event. Try to think about the reasons for and the causes of the event, what it means that it happened the way it did, and the future implications of the event. Try to think about why people acted the way they did and what the event means to you."

Reappraisal: "I want you to think about it in a different, more objective and positive way. Try to think about some positive aspects of the event, such as lessons you have learned, and ways that you could improve in the future if the same event were to arise. Also, try to think about factual, nonemotional details, such as where and when the event occurred."

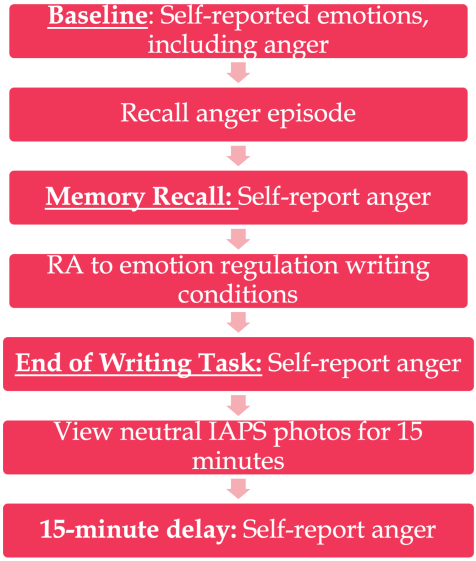
Distraction: "Please describe the layout of the UNSW campus as you see it in your mind and how you would describe it to someone who has never been here before. Please write a thorough and detailed description."

Spontaneous Regulation: "I would like you to write about whatever is on your mind in this moment. It can be anything at all. Please describe all the things that you are thinking about, as well as the way in which you are thinking about them."

Anger was measured at four different time points (see Figure 9 below).

Figure 9

Procedures from Denson et al. (2012)

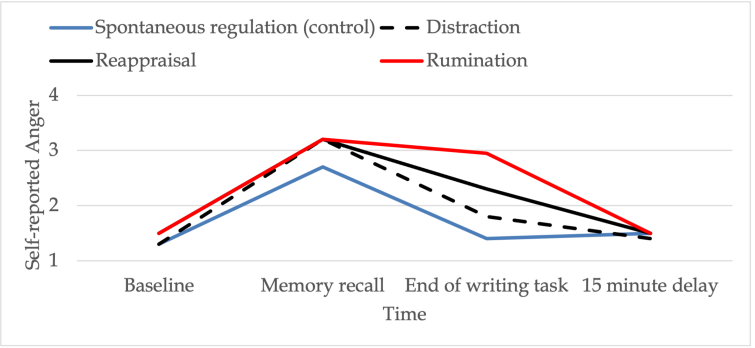


See Figure 10 for the findings. Participants who ruminated did not show a change in their anger levels, but those in the other conditions reported their anger decreased from the time they recalled the anger episode to after they engaged in the regulation writing strategy. Interestingly, people who ruminated and reappraised had more anger emotion words in their writing compared to the other conditions. Participants who ruminated used more negative emotion words than all other conditions, whereas participants who reappraised used more positive emotion words versus other conditions. Finally, ruminating caused more past tense verbs and rumination more future tense verbs. This finding shows that when we ruminate, we focus on our past feelings and thoughts,

whereas reappraisal causes people to think about the future and how to solve the eliciting event. Taken together, these findings suggest that reappraisal includes thoughts about negative emotions that are later transferred into positive emotions. It may be that people turn their negative emotions into positive ones when they think about the future, instead of focusing on the past event. Rumination causes more negative emotions because participants are thinking about the emotions and thoughts of the past event, instead of focusing on ways to overcome the problem in the future.

Figure 10

Self-Reported Anger Over Time for Four Emotion Regulation Groups



Adapted from "The Effects of Analytical Rumination, Reappraisal, and Distraction on Anger Experience," by T.F. Denson, M.L. Moulds, and J.R. Grisham, 2012, *Behavior Therapy*, 43(2), p. 360 (https://doi.org/10.1016/j.beth.2011.08.001). Copyright 2011 Association for Behavioral and Cognitive Therapies.

Response Modulation

Response Modulation occurs after the emotion has already developed. During response modulation, people any of the emotion components. Table 2 outlines the types of emotion regulation.

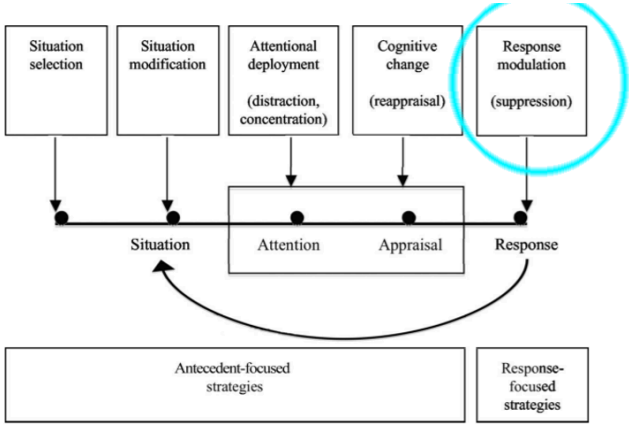


Table 2

Response Modulation Emotion Regulation Strategies

A table showing a type of response modulation, the definition for that type, and examples for that type

Type of Response Modulation	Definition	Examples
Changing Subjective Feelings/ Physiological Arousal	Changing the valence or activation of our consciously felt emotions	• Using alcohol/drugs/food • Physical exercise, deep breathing, biofeedback • **Emotional Suppression:** trying to quash consciously felt emotions
Changing Behaviors	Changing the behaviors caused by the original emotion. Includes changing facial expressions and vocal changes.	• **Expressive Suppression/ Behavior Suppression:** reducing facial expressions, body changes, and vocal changes to decrease current felt emotion • **Expressive Amplification:** exaggerate emotional expressions to increase or amplify current felt emotion
Changing Thoughts	Suppressing or increasing thoughts to change emotion	• **Emotional Thought Suppression**: trying not to think about eliciting event or emotion • **Amplifying thoughts:** increasing focus on our thoughts about the emotion

Response Modulation - Expressive Suppression

Expressive Suppression occurs when during or after an emotion experience, a person tries to hide or inhibit the facial expressions that match their emotional experience (Gross & Levenson, 1993). For instance, you would be suppressing your facial expressions if you were disappointed in a present your parents gave you. Your true emotion is disappointment, but you show either a neutral or joy expression on your face.

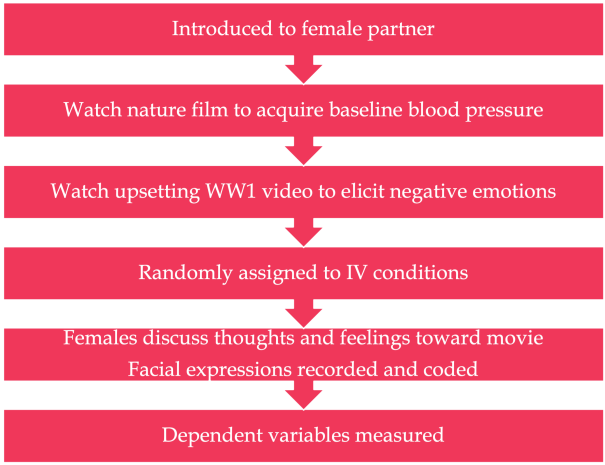
Many studies compare the impact of expressive suppression to cognitive appraisal.

Overall, research suggests that expressive suppression is detrimental to our own and our close others' physical and psychological health and can even reduce relationship satisfaction. Specifically, suppression increases SNS arousal, increases self-reported negative emotions, and reduces self-reported positive emotions.

Let's discuss a study that evaluated the effects of suppression and reappraisal on people and their partners. In this study (Butler et al., 2014), female participants were matched with another female participant they did not know ("the dyad"). After being introduced, the female dyads watched a 6-minute neutral film clip during which baseline measures of blood pressure were taken. Then, all participants watched a 16-minute documentary war film meant to elicit negative emotions. In pilot testing, this film caused participants to feel disgust, anger, and sadness. Figure 11 displays the procedures.

Figure 11

Procedures from Butler et al. (2014)



After the war video and before holding the conversation, participants were randomly assigned to conditions in two independent variables. As a dyad, participants were assigned to either a suppression dyad, reappraisal dyad, or control dyad. After being assigned to a dyad, each female in the dyad was assigned to the regulator or unrestricted role. In the suppression/reappraisal dyads, during the conversation only one partner would be instructed to suppress/reappraise their facial expressions (the regulators) and the other partners would not be given instructions ("uninstructed"). Suppression regulators were told "to try to behave in such a way that your partner does not know that you're feeling anything at all," and "to try not to show any emotion in your face or your voice" (Butler et al., 2014, p. 8). Reappraisal regulators were told ""to try to look on the bright side," and "to try to find anything positive you can in the film or the conversation" (Butler et al., 2014, p. 8). In the control dyads, the regulator and the uninstructed partner were told "to try to act normally" (Butler et al., 2014, p. 8). The second independent variable was whether each partner in

the dyad was a regulator or unrestricted. The below independent variables are depicted in Figure 12.

Figure 12

Display of Two Independent Variables (Butler et al., 2014)

A table showing two independent variables for types of partner, and three different types of regulation for each of the types of partners.

Types of Partner	Suppression Dyads	Reappraisal Dyads	Control Dyads
Regulators	Suppression Regulator	Reappraisal Regulators	Control Regulator
Uninstructed	Suppression Uninstructed	Reappraisal Uninstructed	Control Unrestricted

Dependent variable measures included:

- **Coding** for facial expressions and verbal behaviors during conversation. Categorized as positive emotion expression or negative emotion expression.

- **Dial-reported emotion experience:** Participants watched a video of themselves during the conversation. As they watched the conversation, they continuously turned a dial to indicate the valence of their felt emotion on a bipolar scale ranging from negative to neutral to positive.

- **Physiological Measures:** Changes in blood pressure, interbeat interval (IBI), and skin conductance from baseline

Now, let's look at the results!

Dial: Both reappraisers and the partners of reappraisers reported more positive valence on the dial (compared to suppressors, suppressor partners, and control participants).

Positive Expressive Behavior: Suppressors and partners of suppressors spent the least amount of time expressing positive emotions (compared to reappraisers, reappraiser partners, and control participants).

Negative Expressive Behavior: Both control participants and reappraiser partners spent more time expressing negative emotions (compared to suppressors, suppressor partners, and reappraisers).

These findings provide some good insights about emotion regulation. First, reappraisal reduces felt negative emotions and increases felt positive emotions, a finding that has been replicated in prior work (Butler et al., 2003, for a review see Gross, 2015a). Conversely, suppression can increase negative emotion and decreases positive emotion of the suppressors (Butler et al., 2003). It should be noted here that sometimes suppression doesn't change the emotion at all compared to the control (Butler et al., 2003; Gross, 2015a; Richards et al., 2000, 2003). Regulation of course will also affect our expressive behavior. If we are trying to not show an emotion, then suppression should reduce the expression of positive and negative emotions, as was found here and in other studies (Butler et al., 2003, Gross, 2015a; Richards et al., 2003). On the flip side, when we engage in positive appraisal our expression should also become positive, as was found in this study.

In this study, differences in physiological measures across the groups was not found. But prior work has found that suppression causes an increase in blood pressure for people who are suppressing and also the partners of suppressors (Butler et al., 2003). And this increase in blood pressure is the greatest for the partner of the suppressor!

Suppression is detrimental to our interactions with other people. In a similar study, Butler et al. (2003) compared unrestricted

suppression to unrestricted control participants. Remember, neither of these groups of participants are consciously regulating their own emotions. But the unrestricted suppression participants are interacting with a partner who is engaging in suppression. Unrestricted suppressors, compared to unrestricted controls, didn't report a change in their own emotions, but did report less liking, less rapport, and less desire to be friends with partner who was suppressing (maybe because of their increased blood pressure!).

Taken together, what do these findings mean? Well, expressive suppression has a detrimental impact on our own and partners' physiology. Also, suppression may not be an effective regulation strategy because in this study suppressors' negative emotions increased instead of decreasing. Suppression also caused people's partners to view them in a negative way. So, this suggests suppression can also impact our own health, but also our relationships, which of course impact our health as well! Yikes!

Other studies have found that suppression hinders our memory (for a review, see Gross, 2015a). In fact, in a similar study to the one above, suppressors reported they felt more distracted during the conversation than control and reappraisal groups (Butler et al., 2003). Why? Well, suppression requires constant cognitive effort, leaving less working memory available to process the conversation and respond appropriately. Let's review two studies that evaluated how regulation affects our memory.

One study (Richards & Gross, 2000) evaluated the effects of suppression and reappraisal on memory. Participants were told they would be viewing slides of people with severe injuries. Participants were randomly assigned to suppress their expressions, reappraise from the perspective of a detached medical doctor, or to watch (control) during the slide show. Then, they viewed one individual on each slide. While watching each, participants heard information on the injured person's name, occupation, and type of injury. After watching the slides, participants were given a

nonverbal and verbal memory test. For the nonverbal memory test, participants were shown four different versions of each slide and asked to pick the slide they saw earlier. For the verbal memory test, participants were shown the slides again and asked to write down the information they heard while viewing each individual on the slide. Table 3 overviews the main findings with a description that follows.

Table 3

Impact of Regulation on Dependent Variables (*Richards & Gross, 2000*)

A table showing dependent Variables, and also suppressor and reappraisal IV conditions compared to control condition.

Dependent Variables	**Suppressors vs. Control**	**Reappraisers vs. Control**
Self-reported Negative Emotions	No Difference	Less than control
Coded Amount of Negative Emotion Facial Expression	Less than control	Less than control
Nonverbal Memory Test	No Difference – Same Performance	Performed Better
Verbal Memory Test	Poorer Performance	No DDifference – Same Performance

Adapted from "Emotion Regulation and Memory: The Cognitive Costs of Keeping One's Cool" by J.M. Richards, J. M. and J.J. Gross, J. J., 2000, *Journal of Personality and Social Psychology*, 79(3), p. 417 (https://doi.org/10.1037/0022-3514.79.3.410) Copyright 2000 by the American Psychological Association.

Overall, these findings show that suppressing impairs verbal memory, but not nonverbal memory. Why? Well, a concept called sub-vocal monitoring might help us to understand. Sub-vocal monitoring occurs when people direct their attention inward to

think about their facial and bodily expressions. During suppression, people are thinking, "Am I showing a negative emotion on my face? Can people see my emotions?" So, because we are thinking about our emotional behaviors, we have less working memory to process and encode the verbal information that accompanies the slide. Why did reappraisers perform better on the nonverbal memory test? Well, researchers suggested that because reappraisers were asked to view the slides as a detached medical professional that this prompt caused them to focus on the type of injuries presented in the photos.

I would like to look at suppression and reappraisal within one more context – a romantic relationship. In this study (Richards et al., 2003), participants in romantic relationships discussed a recent conflict in the laboratory. This is a common method used to elicit negative emotions in the lab. The procedures and variables were similar to the Butler et al. (2014) study discussed above and shown in Figure 13 below. Below, is the same graphical depiction of independent variable conditions that we discussed above. For this study, participants completed a task before the conversation, during which their regulation was manipulated. Suppression participants were told to not show emotions during the discussion and then asked to spend two minutes listing the major issues of the conflict they were about to discuss. Reappraisers were asked to list the positive aspects of their relationship and partner. Control participants were given no instructions about regulation and were asked to list the major issues of conflict, like the suppressors did.

Table 4

Display of Two Independent Variables (Richards et al., 2003)

A table showing two independent variables for types of partner, and three different types of regulation for each of the types of partners.

Types of Partner	Suppression Dyads	Reappraisal Dyads	Control Dyads
Regulators	Suppression Regulator	Reappraisal Regulators	Control Regulator
Uninstructed	Suppression Uninstructed	Reappraisal Uninstructed	Control Unrestricted

Let's look at one dependent variable from this study – memory. For the memory test, participants were asked to spend 10 minutes writing down exactly what they and their partners said during the conversation. Then, their descriptions were coded into conversation pieces and emotion pieces. Conversation pieces were measured as the percentage of actual conversation ideas each participant recalled from the discussion. Emotion pieces were measured as the percentage of the discussion that participants recalled focused on emotion. For conversation pieces, reappraisers recalled significantly more ideas about the conversation compared to suppressors. Neither of these groups significantly differed from the control, suggesting the reappraisal improves memory and suppression hinders memory. Interestingly, the suppressors recalled more emotions about the conversation compared to the control group. The reappraisers did not differ from the control or suppressor group. So essentially, suppression causes us to remember our emotions from an event but prevents us from remembering the actual topics discussed! Whereas reappraisal helps us to remember the conversation, but not our emotions! Why? Well, it might be that reappraisal causes a change in thoughts, which then changes our emotion!

Suppression

- Didn't remember the

conversation!
- Remembered the emotions felt during the conversation!

Reappraisal

- Remembered the conversation!
- Didn't remember the emotions felt during the conversation!

In the Yale Experts in Emotion, James Gross explains that the brain physiology of individuals diagnosed with social anxiety disorder (SAD) does not differ in healthy controls. Instead, difficulty engaging in cognitive appraisal may be an underlying cause of SAD. In fact, Gross suggests that individuals with SAD may simply need a instruction or cue to start the cognitive reappraisal process.

Watch from 11:24 – 18:00.

Earlier in this video Gross distinguishes between emotion generation and emotion regulation.

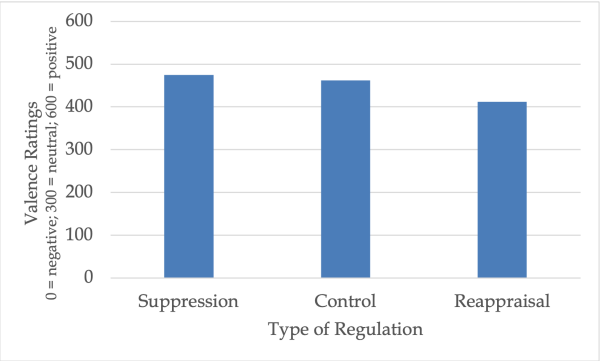
One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1804#oembed-1

Suppressing and Reappraising Positive Emotions

Most of the studies reviewed take a hedonic perspective – viewing people's goal as reducing negative emotions and increasing positive emotions. Cognitive reappraisal does appear to achieve this goal, while suppression either does not change emotion experience or increases negative and reduces positive emotions. More recent work has investigated the effects of suppressing positive emotions and reappraising positive experiences. In one study (Lalot et al., 2014) participants watched four film clips meant to elicit positive emotions. Before the clip, they were given regulation instructions. While watching the film, participants were instructed to suppress emotions, reappraise from the perspective of an observer instead of the perspective of the character, or simply to watch (control). Figure 14 shows the findings for self-reported valence, measured on a bipolar scale from 0 = negative emotion, 300 = neutral, to 600 = positive emotion. Results showed that reappraisal reduced felt positive emotions compared to the suppression and control groups. The suppression and control groups did not differ in self-reported valence, supporting prior work showing suppression doesn't always affect our self-reported emotion.

Figure 14

Impact of Type of Regulation on Self-Reported Valence

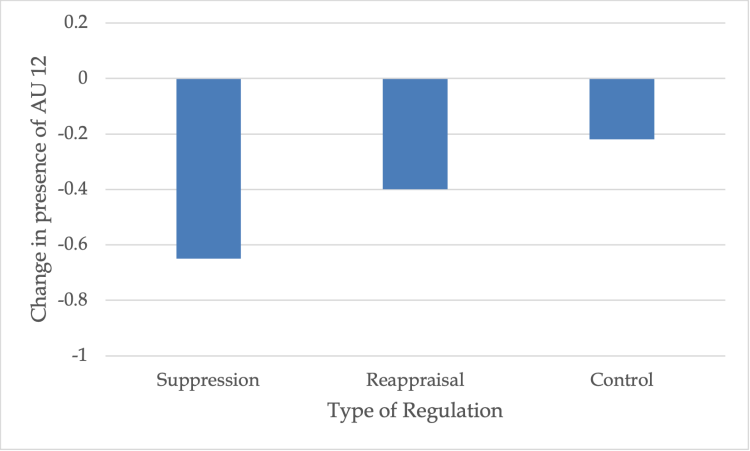


Adapted from "Mindful Regulation of Positive Emotions: A Comparison with Reappraisal and Expressive Suppression" by F. Lalot, S. Delplanque, and D. Sander, 2014, *Frontiers in Psychology*, 5(243), p. 5 (https://doi.org/10.3389/fpsyg.2014.00243). Copyrighted 2014 by the Authors and Open Access.

While participants watched the film, researchers also coded for the presence of two action units– AU12 (lip corner puller) and AU6 (cheek raiser), both components of the Dichenne smile. Figures 15 and 16 display the results for each AU. Overall, all three regulation strategies were significantly different. Suppression resulted in less expression change, while control resulted in the most.

Figure 15

Influence of Regulation Strategy on Presence of AU12 Lip Corner Puller

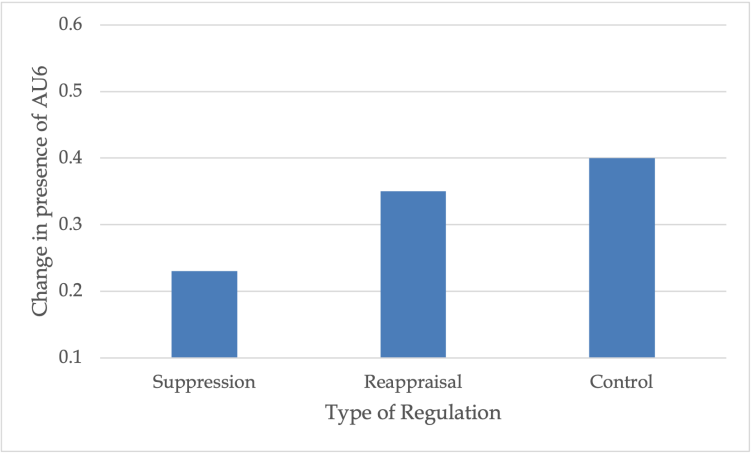


Suppression Change in presence of AU 12: -0.625 Reappraisal Change in presence of AU 12: -0.4 Control Change in presence of AU 12: -0.21

Adapted from "Mindful Regulation of Positive Emotions: A Comparison with Reappraisal and Expressive Suppression" by F. Lalot, S. Delplanque, and D. Sander, 2014, *Frontiers in Psychology*, 5(243), p. 6 (https://doi.org/10.3389/fpsyg.2014.00243). Copyrighted 2014 by the Authors and Open Access.

Figure 16

Influence of Regulation Strategy on Presence of AU6 Cheek Raiser



Supression Change in Presence of AU 6: 0.23 *Reappraisal Change in Presence of* AU 6: 0.35 *Control Change in Presence of* AU 6: 0.4

Adapted from "Mindful Regulation of Positive Emotions: A Comparison with Reappraisal and Expressive Suppression" by F. Lalot, S. Delplanque, and D. Sander, 2014, *Frontiers in Psychology*, 5(243), p. 6 (https://doi.org/10.3389/fpsyg.2014.00243). Copyrighted 2014 by the Authors and Open Access.

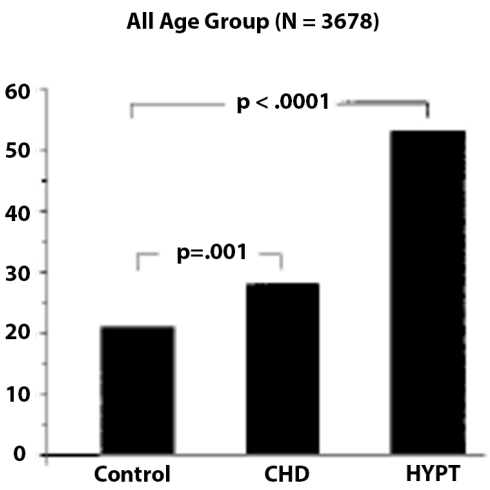
Most of the work on increasing positive emotions focuses on reappraising negative emotion experiences in a neutral or positive light. But some studies have started investigating other ways of increasing positive emotions, such as amplifying arousal or positive valence. Helping people to up-regulate positive emotions might be one intervention for certain psychological diagnoses. For a review of using the process model of emotion to increase positive emotions, please read this review article by Quoidbach et al (2015).

Suppression may be a strategy that individuals diagnosed with depression use more frequently. Some initial work by Gross and colleagues (Ehring et al., 2010) has found that during a sad film

clip, recovered-depressed individuals self-reported that they spontaneously suppressed more during a sad film clip compared to control participants. There was not a difference in reappraisal between the two groups. This indicates that in a sad situation, depressed individuals might automatically fall back on suppression as a strategy to down-regulate their negative emotions. But, when asked instructed to suppress or reappraise during another sad film clip, recovered-depressed and control participants did not show differences in their self-reported emotions after regulating. In fact, both groups reported fewer negative emotions when reappraising versus suppressing. This finding tells us that suppression doesn't result in more negative emotions for depressed individuals. Another study (Flynn et al., 2010) found that expressive suppression was associated with depression for men, but not for women (this means gender moderates the relationship between suppression and depression). This is interesting because men tend to suppress more than women, but women report more depression and negative affect than men. So, for men, suppression is a good predictor of a depression diagnosis. Interestingly, the Type D ("distressed") personality trait describes an individual who has a tendency to chronically suppress their negative emotions. One study (Denollet, 2005) found that approximately 55% of hypertension (HYT) and 28% of congestive heart disease (CHF) patients were high on Type D, significantly higher than the 22% of the control participants with the Type D personality trait (see Figure 17). In another study (Schiffer et al., 2005), participants diagnosed with CHF were recruited. Compared to CHF patients low on Type D, CHF high on Type D exhibited poorer health, and more symptoms of depression. In fact, Type D was a better predictor of health status beyond age, gender, severity of CHF, and cause of CHF.

Figure 17

Percentage of Participant Groups who Score High on Type D



Control, Type D (%): 21
CHD, Type D (%): 28
HYPT, Type D(%): 54

Reproduced from "DS14: Standard Assessment of Negative Affectivity, Social Inhibition, and Type D Personality" by J. Denollet, *Psychosomatic Medicine*, 67(1), p. 93 (https:/doi.org/ 10.1097/ 01.psy.0000149256.81953.49). Copyright 2005 by the American Psychosomatic Society.

Amplification

The research on amplification is not as extensive as the work on suppression and cognitive reappraisal. Whether amplifying our negative emotions has a good or bad outcome depends on 1) the valence of the emotion 2) how much of the emotion we are amplifying and 3) the situation in which we are amplifying. Recall that some work by June Gruber and colleagues (Gruber et al., 2011) suggests that increasing our positive emotions is only good up to

a point. Too much positive emotion could be detrimental because we are not aware of negative eliciting events in our surroundings, because the positive emotions are not appropriate for the situation, or because too much positive emotion might be symptomatic of mania and other disorders. (link back to this webpage here). Similarly, amplifying negative emotion might work when preparing for a soccer game, but people who continuously amplifying their anger experience physical health issues such as cardiovascular disease.

Watch the video "How a Chair Revealed the Type A Video" to learn how cardiologist Friedman and Rosenman discovered the Type A trait from their waiting room chairs.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1809#oembed-1

Response Modulation - Emotional Thought Suppression

Emotional thought suppression occurs when a person tries not to think about thoughts linked to certain emotions. In a classic study by Wegner et al. (1987), researchers tested the effectiveness of thought suppression. All participants were randomly assigned to experience a suppression and expression condition in counterbalanced order. In the suppression part, participants were instructed to *not* think about a white bear. In the expression part, participants were told *to think* about white bears. Initial suppression participants completed the suppression followed by the expression condition. Conversely, participants in the expression condition first thought about white bears, then suppressed thoughts about white bear. See Figure 18 below for a depiction of the conditions. During each task, participants were tape recoded while verbalizing their thoughts and instructed to ring a bell each time they thought about white bears.

Figure 18

Depiction of Independent Variable Conditions (Wenger et al., 1987)

A table showing two tasks, and initial suppression and expression for each task.

Task	Initial Suppression	Initial Expression
First Task	Suppress Thoughts of White Bears	Express Thoughts of White Bears
Second Task	Express Thoughts of White Bears	Suppress Thoughts of White Bears

Figures 19a and 19b displays the number of times the bell was rung over time. Figure 19a represents the number of bell rings after participants completed the first regulation task. Figure 19b displays the number of bell rings after participants completed the second regulation task. In Figure 19b, look at the top blue line labeled "express [after suppression]." This group suppressed thoughts of white bears for 5 minutes, and then expressed thoughts of white bears for the remaining 5 minutes. As can be seen in the graph, after suppressing participants had significantly more thoughts of white bears compared to the other three conditions. Wegner labeled this the rebound effect. The rebound effect occurs when after suppressing our thoughts, the number of thoughts we have about the suppressed thoughts drastically increases. Notice that the rebound effect is not found during the suppression, before expression period. The rebound period is another consequence of suppression. Although we can successfully suppress thoughts for a short time period, inevitably this suppression is going to cause an increase in the exact thoughts we didn't want to have – which might also increase our negative emotions.

Figure 19a

In First Task, Influence of Suppression and Expression on Number of Thoughts Over Time

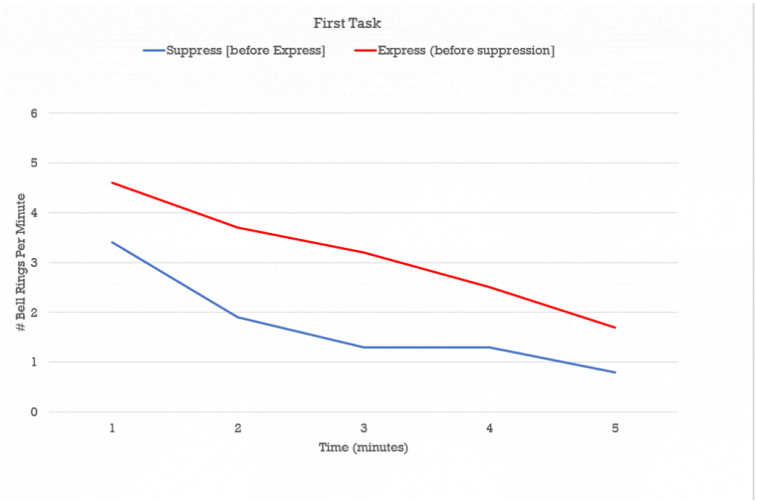


Figure 19b

In Second Task, Influence of Suppression and Expression on Number of Thoughts Over Time

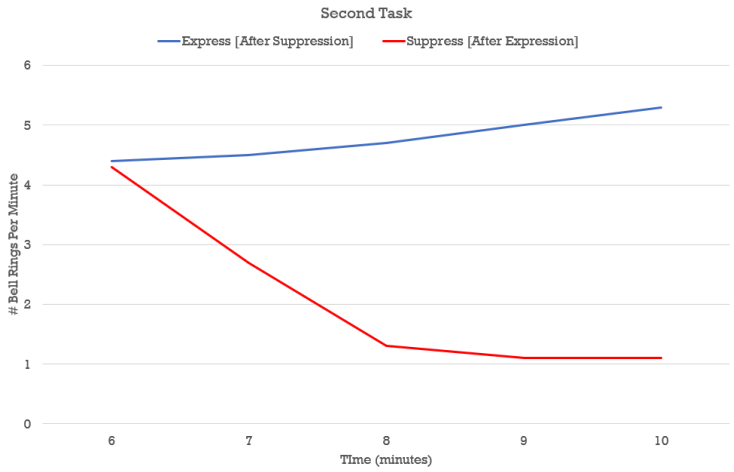


Figure 19

Influence of Suppression and Expression on Number of Thoughts Over Time

Adapted from "Paradoxical Effects of Thought Suppression" by

D.M. Wegner, D.J. Schneider, S.R. Carter, and T.L. White, 1987, *Journal of Personality and Social Psychology*, 53(1), p. 8. Copyright 1987 by the American Psychological Association.

A meta-analysis on 28 thought suppression studies also found that during the initial suppression period thoughts about the target decrease, but then significantly increase after suppression ends (Abramowitz et al., 2001). Interestingly, the rebound effect was not greater for clinical versus nonclinical patients (although only 8 studies included patients recruited from a clinical sample). Some research has suggested that thought suppression may be a symptom of Obsessive Compulsive Disorder (OCD). Research comparing individuals diagnosed with OCD to nonclinical patients found that:

- OCD-diagnosed patients have a tendency to use thoughts suppression more as a coping strategy for unwanted negative thoughts (Amir et al., 1997)
- Show a greater rebound effect (increase in more suppressed thoughts) than nonclinical patients (Tolin et al., 2002b)
- But work out of the same lab found no differences between these two groups in the negative emotions elicited by failing to adequately suppress unwanted negative thoughts (Tolin et al., 2002a)

For an interesting review of the research on thought suppression and OCD, please review this article by Christine Purdon (2004). In this article, Purdon identifies many problems with the research that explain the contradictory findings, one being how the rebound effect is measured (i.e., number of thoughts per 5 minutes, length of one thought per 5 minutes, length of time during expression period).

Comparing Suppression and Reappraisal

In general, research suggests that suppression does not regulate our emotions effectively. Three concepts explain this finding: sub-vocal monitoring, the rebound effect, and regulatory depletion. During sub-vocal monitoring, we focus our attention inward to assess whether we are successfully hiding our emotion. Sub-vocal monitoring occurs when people consciously think about whether they are hiding their emotional expressions during suppression. People might think "Can people see my sadness on my face? Am I frowning?" Because we are thinking about our emotional expressions, that leaves less working memory to process the environment around us, thus impairing memory. Sub-vocal monitoring is one reason that people can only suppress for a short period of time – once we stop thinking about hiding our expressions, then the suppression ends! We talked about the rebound effect, which explains why emotional thought suppression is incorrect. The rebound effect occurs when we experience an increase in the suppressed thought once suppression ends.

Regulatory depletion (sometimes called ego-depletion; Muraven et al., 1998; Baumeister et al., 1998) is a third reason that explains why suppression does not work. This theory states that suppression uses up or "depletes" our cognitive and attention resources. And because our resources are depleted it is harder for us to perform well on tasks after we have just suppressed. Further after suppression ends, we will perform worse on tasks and find it harder to regulate our emotions, because we don't have the cognitive resources. Studies have found that

- After watching upsetting film clips, participants who engaged in expression suppression or expressive amplification

performed worse on a physical endurance task compared to control participants who did not receive instructions (so regulating affected their physical strength; Muraven et al., 1998).
- After suppressing thoughts, participants spent less time working on the anagrams and thus gave up sooner than participants expressing or control participants (so suppressing weakened their cognitive performance; Baumeister et al., 1998; Muraven et al., 1998)
- After suppressing thoughts, participants had more trouble suppressing joyful and amusing facial expressions while watching a funny film clips compared to control participants (so suppressing made it harder to suppress facial expressions; Muraven et al., 1998).

In comparison, why does reappraisal work? Well, there are four main reasons:

- Cognitive reappraisal leaves more cognitive resources to process external environment
- Cognitive reappraisal does not impair memory
- Cognitive reappraisal does not draw attention to the self
- Once reappraisal occurs, self-regulation ends.

But I don't want to leave you with the impression that cognitive reappraisal *always* works. Current work (Troy et al, 2013) suggests the effectiveness of cognitive reappraisal depends on the context. This study found that positive reappraisal was effective in reducing depressive symptoms for people experiencing uncontrollable stress. But for people experiencing controllable stress, cognitive reappraisal actually increased depressive symptoms. Why would reappraisal increase depressive symptoms in a stressor we can control? Well, researchers suggested that in controllable stress, the presence of negative emotions would motivate us to solve the

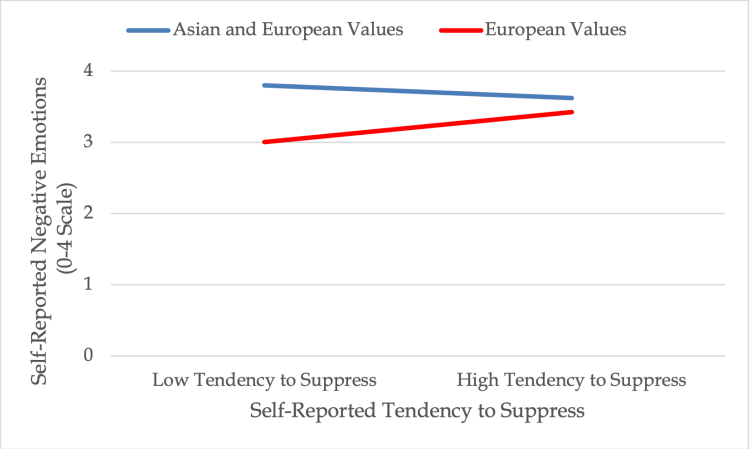
problems. But cognitive reappraisal might eliminate the negative emotions and in the process we experience more depression because we didn't solve the stressor!

Cultural Differences in the Consequences of Expressive Suppression

A recent study (Butler et al., 2007) investigated whether culture changes the consequences of suppression. In this study, female participants self-reported their cultural values on a scale that ranged from -3 – European values only to +3 – a combination of European and Asian values (called "bipolar values"). Cultural values were positively correlated with self-reported suppression, indicating that holding people who hold both Asian and American values have a tendency to engage in suppression. This means without being instructed, Asian American women will have a tendency to engage in expressive suppression. Figure 20 shows the relationship between tendency to suppress and the tendency to experiences negative emotion for women holding European values and women holding bi-cultural values. This findings shows that suppression does not significantly increase negative emotions for individuals who ascribe to bi-cultural values.

Figure 20

Influence of Trait Suppression and Self-Reported Cultural Values on Tendency to Experience Negative Emotions

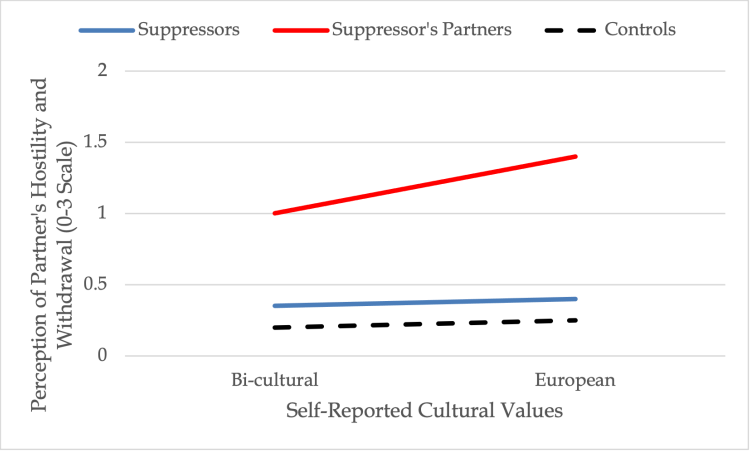


Adapted from "Emotion Regulation and Culture: Are the Social Consequences Oof Emotion Suppression Culture-Specific?" by E.A. Butler, T.L. Lee, T. L., and J.J. Gross, 2007, *Emotion*, 7(1), p. 36 (https://doi.org/10.1037/1528-3542.7.1.30) Copyright 2007 by the American Psychological Association.

A follow-up study assigned the same women with European and bi-cultural values to suppression or control dyads as in prior studies. Both groups watched upsetting film clips and either suppressed or watched (control). Results showed that when European value participants suppressed, their partners perceived them to be more hostile and withdrawn compared to the partners of bi-cultural suppressors (see Figure 21). In addition, suppressors with European values spent more time showing hostile and unresponsive facial expressions compared to suppressors with bi-cultural values (Figures 22 and 23). What does this tell us? Well, people with European values tend to exhibit facial expressions during suppression that have a detrimental impact of their relationship interactions. This provides early support to some researchers views that suppression might be more detrimental to the health and relationships of people raised in Western countries, but not East Asian countries.

Figure 21

Interaction between Cultural Values and Regulation Group on Perceptions of Hostility and Withdrawal of Partners

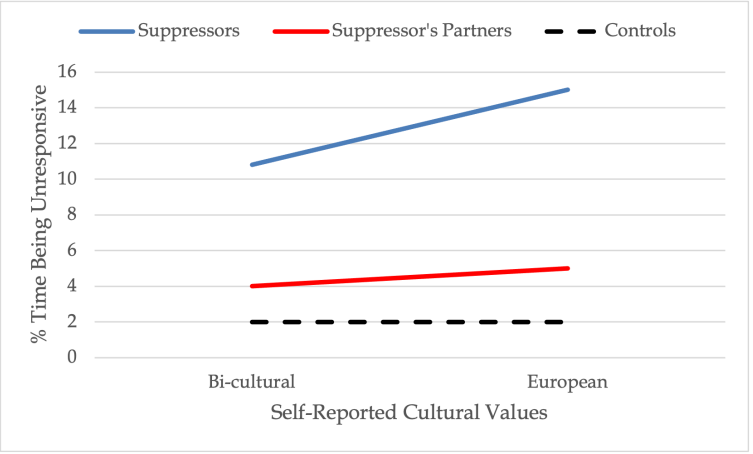


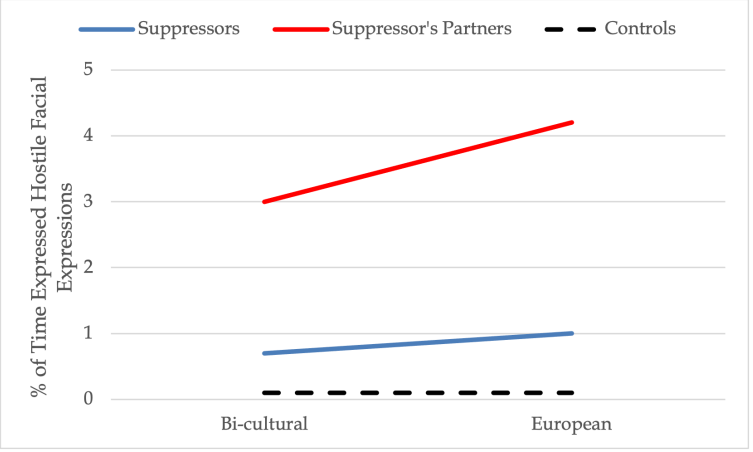
Adapted from "Emotion Regulation and Culture: Are the Social Consequences Oof Emotion Suppression Culture-Specific?" by E.A. Butler, T.L. Lee, T. L., and J.J. Gross, 2007, *Emotion*, 7(1), p. 42 (https://doi.org/10.1037/1528-3542.7.1.30) Copyright 2007 by the American Psychological Association.

Figure 22

Interaction between Cultural Values and Regulation Group on Percent

of Time Expressing Unresponsive Facial Expressions





Adapted from "Emotion Regulation and Culture: Are the Social Consequences Oof Emotion Suppression Culture-Specific?" by E.A. Butler, T.L. Lee, T. L., and J.J. Gross, 2007, *Emotion*, 7(1), p. 43 (https://doi.org/10.1037/1528-3542.7.1.30) Copyright 2007 by the American Psychological Association.

Which Emotion Strategies Work Best?

Let's talk about a meta-analysis that compared the three broad categories of emotion regulation (Table 4). Across the emotion outcomes, attentional deployment was not an effective regulation strategy because it did not alter subjective feelings, physiological measures, or behavioral measures. Cognitive change effectively regulated subjective feelings and behavioral expressions, but not physiological measures of emotion. Response modulation was only effective in regulating behavioral expressions of emotion. Response Modulation resulted in changing physiological measures but in the opposite direction. So, if response modulation was supposed to reduce physiological arousal, it actually increased physiological arousal.

Table 4

Impact of Three Emotion Regulation Strategies across Three Emotion Outcomes (Webb et al., 2012)

A table showing an emotion regulation strategy, and 3 emotion outcomes (Self-reported Subjective Feelings, Physiological Measures, Behavioral Measures) for that strategy.

Emotion Regulation Strategy	Self-reported Subjective Feelings	Physiological Measures	Behavioral Measures
Attentional Deployment	NS	NS	NS
Cognitive Change	*d* = .45 medium	NS	*d* = .55 medium
Response Modulation	NS	*d* = -.19 Small, negative	*d* = .90 Large

Note. + Cohen's d indicates the emotion regulation strategy successfully increased or decreased emotional outcome in expected direction.

– Cohen's d indicates emotion regulation strategy did not result in predicted emotion outcome. For instance, if ER strategy was meant to increase anger, a – Cohen's d would indicate that the strategy did not increase anger – it either decreased anger or resulted in no change.

Adapted from "Dealing with Feeling: A Meta-Analysis of the Effectiveness of Strategies Derived from the Process Model of Emotion Regulation," by T.L. Webb, E. Miles, and P. Sheeran, 2012, *Psychological Bulletin*, 138(4), p. 791 (https://doi.org/10.1037/a0027600). Copyright 2012 by the American Psychological Association.

Finally, across all emotion outcomes, cognitive change was significantly more effective in altering the emotion outcomes compared to attention deployment and response modulation. Response modulation was more effective than attentional deployment.

Researchers also compared ER strategies within each category. For attention deployment, distraction effectively regulated emotions (d =.27) whereas concentration was ineffective in regulating emotions (d = -.26). Interestingly, both positive distraction and neutral distraction were effective in regulating emotions and were not significantly different from each other. This means that distracting oneself by thinking about something positive or neutral has the same impact on our emotional experiences.

Emotion Regulation and the Brain

Recently, work has turned to assess the effect of various emotion regulation strategies on the brain. Table 5 shows the general brain areas that become more and less activated during emotion regulation. In general, strategies that require conscious processing such as reappraisal and suppression will activate brain areas linked to executive control. Structures that are often activated during an emotional experience, such as the insula and amygdala, will become deactivated.

Table 5

Changes in Brain Structure Activation During Emotion Regulation

A table showing what Emotion regulation activates.

Emotion Regulation Activates
Inferior Parietal Cortex
Prefrontal Cortex

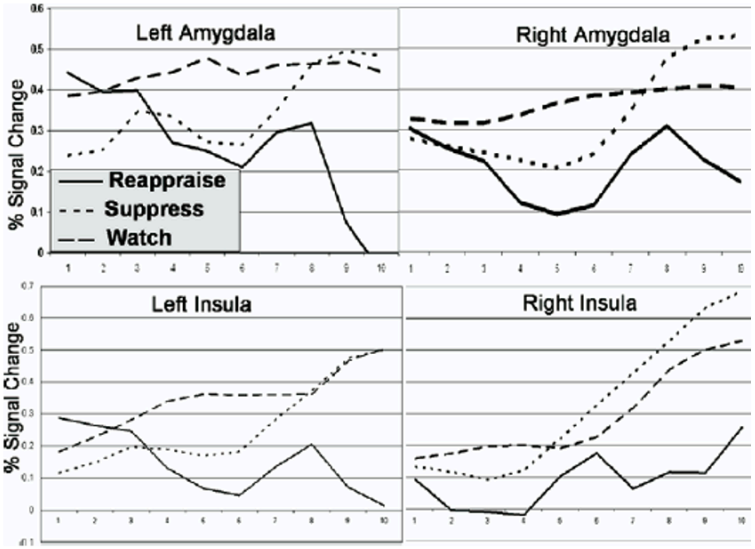
A table showing what emotion regulation deactivates.

Emotion Regulation Deactivates
Amygdala
Insula
Orbitofrontal Cortex

One study (Goldin et al., 2008) tested the effects of suppression and reappraisal on various brain structures. While watching 15-second neutral and negative film clips, participants were assigned to simply watch (control), suppress facial expressions, or reappraise in an objective manner, all while submitting to fMRI scans. During the negative clip, reappraisal and suppression both activated the prefrontal cortex (PFC), but at different points in time. Reappraisal activated the PFC between 0 and 4.5 seconds of starting the clip, while suppression activated the PFC between 10.5 and 15 seconds. This finding supports the process model of emotion which states that cognitive reappraisal occurs before suppression. Over time, reappraisal decreased activation in the amygdala and insula, but suppression activated the amygdala and insula. So, this finding suggests that suppression does not effectively deactivate the brain structures associated with intense emotions. Figure 24 shows how activation in the amygdala changed over time. This study might also exemplify the rebound effect found for thought suppression, such that expressive suppression might temporarily down-regulate our negative emotions, but over time we experience even more of a negative emotion.

Figure 24

Influence of Type of Emotion Regulation on Activation of Amygdala and Insula



Reproduced from "The Neural Bases of Emotion Regulation: Reappraisal and Suppression of Negative Emotion," by P.R. Goldin, K. McRae, W. Ramel, and J.J. Gross, 2008, *Biological Psychiatry*, 63(6), p. 580 (https://doi.org/10.1016/j.biopsych.2007.05.031) Copyright 2008 by the Society of Biological Psychiatry.

In the video below, Dr. Kevin Ochsner discusses how emotion regulation activates various parts of the brain. He also discusses how current work on the brain and regulation has refused earlier work, particularly on the amygdala.**Watch Dr. Ochsner from 3:10 to 8:45.**

From 14:38 to 21:35, Dr. Ochsner discusses maladaptive emotion regulation and disorders, focusing on his research in borderline personality disorder and substance abuse.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://psu.pb.unizin.org/psych425/?p=1831#oembed-1

Summary of Emotion Regulation

In this chapter, we reviewed the process model of emotion regulation, which categorized strategies into antecedent-focused and response-focused strategies. Antecedent focus strategies include situation selection, situation modification, attention deployment, and cognitive change. Response modulation strategies occur when we try to change any aspect of the emotional experience after our emotional experience has already occurred.

In general, research suggests concentration, distraction, and cognitive reappraisal are efficient strategies to down-regulate our negative emotions. In fact, confronting our negative emotions through writing reduces depressive symptoms, reduces test anxiety, and improves grades and health. Depending on whether the cognitive reappraisal is neutral or positive, this strategy may reduce negative emotions, increase positive emotions, and even improve our memory of an event. Conversely, suppression tends to be an inefficient strategy that hinders memory, reduces performance, increases negative emotion and thoughts, and leads our conversation partners to view us in a negative way. But, remember that the positive outcomes of reappraisal depend on the context. Also, suppression seems to be less detrimental to individuals ascribe to East Asian cultural values.

Most of the research focuses on suppression and reappraisal. In the future, more work should be conducted on other emotion regulation strategies. Although some work has identified how our brain reacts to emotion regulation strategies, more work is needed to determine how the brain and even our physiology changes when we employ specific emotion regulation strategies.

Chapter 14 References

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- **In the Yale Experts in Emotion on James Gross discusses the brain physiology of individuals diagnosed with social anxiety disorder (SAD) does not differ in healthy controls. Instead,**

difficulty engaging in cognitive appraisal may be an underlying cause of SAD. In fact, Gross suggests that individuals with SAD may simply need a instruction or cue to start the cognitive reappraisal process. Watch from 11:24 – 18:00. Earlier in this video Gross distinguishes between emotion generation and emotion regulation

- Experts in Emotion 14.1 — James Gross on Emotion Regulation
- Video: **Lisa Feldman Barrett on Emotion Regulation Video 1.2 – Start at 14:40; End at 16:20**
- Experts in Emotion 1.2 — Lisa Feldman Barrett on What is an Emotion

End of Chapter Activities (Chapter 14)

Which Appraisals Occur with each Emotion?

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://psu.pb.unizin.org/psych425/?p=2322#h5p-21

Name that Regulation Strategy!

Drag the regulation strategies into the correct boxes to indicate each strategy used in the scenario.

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SANDBOX

Sandbox

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This is where you can add appendices or other back matter.

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