

Emotions, Aggression and Stress

Chapter 15

1

Emotion

Emotion is a complicated psychological concept that includes wide range of observable behaviors, expressed feelings and changes in bodily state.

Due to the nature of its complexity they have been hard to study except now we are having a better understanding of them.

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Aspects of Emotions

There are four different aspects of emotions:

1. **Feelings:** In many cases emotions are feelings that are very private and subjective.
2. **Actions:** Emotions can consist of actions such as defending or attacking in a threat related situation.
3. **Physiological arousal:** Emotional state can be constellations of bodily states.
4. **Motivational programs:** Emotions can be motivational programs that coordinate responses to solve specific adaptive problems. Motivated to seek pleasure and avoid pain.

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Theories of Emotion

Common sense view suggests that when we are confronted with an emotion arousing stimulus we experience an emotion which leads to a bodily response.

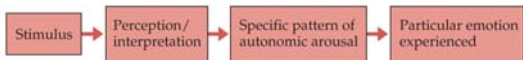


Bear → Fear → Run

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James-Lange Theory

James-Lange theory of emotion suggests that whenever we see an emotion arousing stimulus we experience a bodily reaction followed by an emotion.



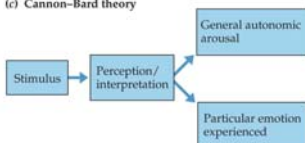
Bear → Run → Fear

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Cannon-Bard Theory

Cannon-Bard theory of emotion suggests that whenever we see an emotion arousing stimulus we experience a bodily reaction and the emotion simultaneously.

(c) Cannon-Bard theory

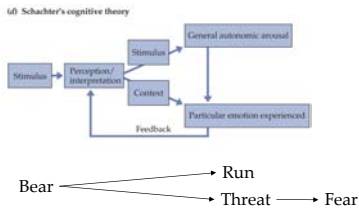


Bear → Run
Bear → Fear

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Schachter-Singer Theory

Schachter-Singer theory of emotion suggests that we experience emotions based on autonomic arousal and the way we label the emotion.



How many Emotions?

Plutchik (1994) suggests that there are eight basic emotions. But other investigators do not completely agree as to how many basic emotions are there.



Facial Expression and Emotions

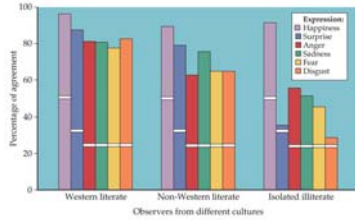
According to Keltner and Ekman (2000) there are eight emotions based on facial expression.

Where Keltner and Ekman (2000) suggest contempt and embarrassment Plutchik (1994) included adoration and vigilance.



Emotions Across Cultures

Six facial expressions seem to be universally recognized across cultures. However there are some differences; emotions like surprise and disgust are not recognized by isolated groups.



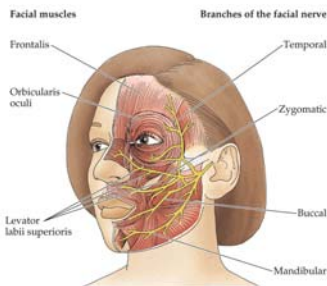
Cultural Context in Emotion

Culture plays a significant role in determining emotional expression. Model below outlines the effect of culture on emotions.



Production of Facial Expression

Superficial and deep muscles attached to the skin act as sphincters changing the shape of the mouth, eyes, or nose. Frontalis wrinkles the forehead and raises the eyebrow.



Bell's Palsy

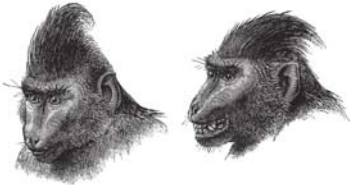
Viruses can affect facial nerve affecting one half of the face with paralysis, leading to Bell's Palsy. Emotional expressions become meaningless in such a condition.



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Evolution and Emotions

Emotions have adaptive value. Emotion of fear calls for shifts in perception, attention, cognition and action that focuses on avoiding danger and seeking safety along with physiological preparations for fighting or flight.



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Development of Emotions

Birth	Distress and Pleasure
3 months	Joy, happiness (smiling), sadness and disgust.
4-6 months	Anger, surprise.
7-8 months	Fear
8-9 months	All primary emotions present.
18-24 months	Embarrassment, empathy and envy (self-awareness).
2-3 years	Evaluating emotional behavior against a standard.

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Individual Differences

1. Individual differ in their responses to emotions. Even infants show this difference in emotional behavior.
2. Research has shown that emotional behavior during early childhood continues into adulthood.
3. Children who were *high reactivess* developed shyness and phobias as they grew older.

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Autonomic Responses

Where facial expressions can be observed visceral responses are concealed. An electronic device that can measure such responses is called the *lie detector*.



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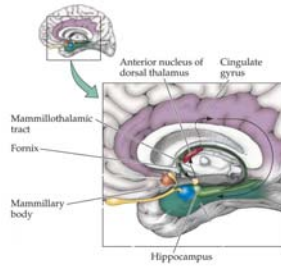
Brain and Emotion

Decorticate dog (cerebral cortex removed) expressed *sham rage*. Snarling, barking, and growling without a well-directed attack.
Conclusion: Cerebral cortex inhibited emotion.

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Papez's Circuit

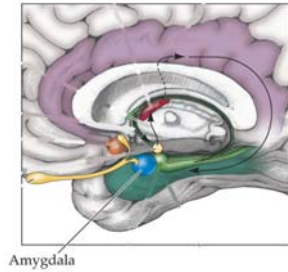
Papez's circuit is a series of pathways across brain nuclei that get disconnected leading to breakdown of emotional processes. These nuclei are shown in the figure.



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Klüver-Bucy Syndrome

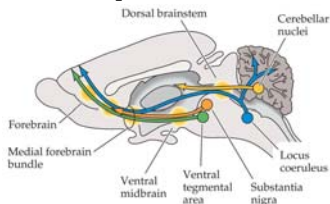
Klüver and Bucy carried out temporal lobe surgery and removed the amygdala, which led to monkeys becoming more social, friendly, with decreased anxiety, and expressed no signs of fear.



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Electrical Stimulation

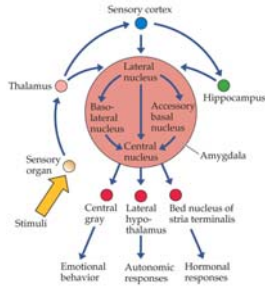
Olds and Milner (1954) placed electrodes in the medial forebrain bundle (rats) which led them to press a lever indefinitely for pleasure delivered by the electrode's electrical shock. This came to be known as the pleasure center.



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Amygdala and Fear

Removal of amygdala leads to reduction of fear. In particular, if central nucleus is lesioned the same effect is produced. Patients with bilateral damage to amygdala show marked impairment in recognizing fear (photos) than other emotions.



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Insula and Disgust

fMRI studies show that insular cortex lights up when people experience disgust. Patients with insular cortical damage result in an impairment of recognizing disgust as an emotion than other emotions.



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Emotions and Other Brain Areas

Basic emotion	Key brain areas
Seeking/expectancy	Nucleus accumbens-ventral tegmental area; mesolimbic mesocortical outputs (see Figure 4.3); lateral hypothalamus-periaqueductal gray
Fear	Central and lateral amygdala to medial hypothalamus and dorsal periaqueductal gray
Panic	Anterior cingulate; bed nucleus of stria terminalis; dorsomedial thalamus; dorsal periaqueductal gray
Happiness/play	Dorsomedial thalamus; parafascicular area; ventral periaqueductal gray

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Hemispheres and Emotions

Left and right hemispheres of the brain process emotions differently. If left hemisphere is put under sedation by using barbiturates (sodium amytal) it results in depression (sadness) and if the right brain is sedated it results in smiling and a feeling of euphoria.

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Hemispheres and Emotions

TABLE 15.2 Some Clinical Syndromes Associated with Cerebrovascular Disease

Syndrome	Clinical symptoms	Location of associated lesion
Indifference reaction	Undue cheerfulness or joking, loss of interest	Right parietal or temporal lobe
Major depression	Depressed mood, loss of energy, anxiety, restlessness, worry, social withdrawal	Left frontal lobe; left basal ganglia
Pathological laughing and crying	Frequent, usually brief laughing and/or crying; social withdrawal secondary to emotional outbursts	Bilateral hemispheric lesions, with almost any location
Mania	Elevated mood, increased energy, increased appetite, decreased sleep, feeling of well-being, flight of ideas	Right basotemporal or right orbitofrontal region

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Dichotic Listening Tasks

Dichotic listening tasks reveal left-ear advantage for identifying the *emotional tone* of the message and right-ear advantage of identifying *meaning* of the message. Thus it is the right-brain over the left-brain managing emotional content of the message.



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Emotional Pictures

A right-brain advantage has been found for emotion for pictorial stimuli also in normal and split brain patients.

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Right-Left Side of a Face

Left side of the face expresses more emotion than the right side. When pictures were composed of both left sides subjects labeled them as more emotional than right.



(a) Left sides

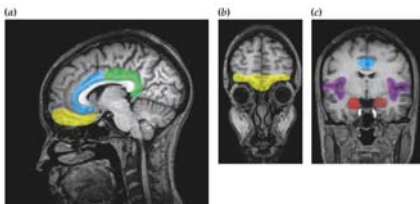
(b) Original

(c) Right sides

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Brain Regions and Emotions

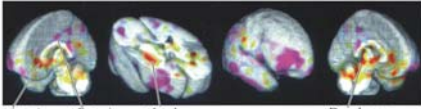
In love insula and anterior cingulate gyrus are stimulated. Other studies in emotion suggest that prefrontal cortex also plays an important role.



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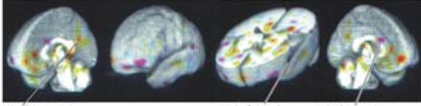
Brain Regions and Emotions

(a) Sadness



↑ Anterior cingulate cortex ↓ Posterior cingulate cortex
 ↑ Insula ↓ Dorsal pons

(b) Happiness

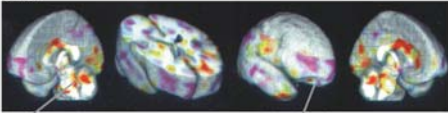


↑ Right posterior cingulate cortex ↓ Left insula ↓ Left anterior cingulate cortex

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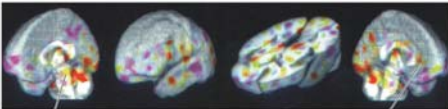
Brain Regions and Emotions

(c) Fear



↑ Midbrain ↓ Orbitofrontal cortex

(d) Anger



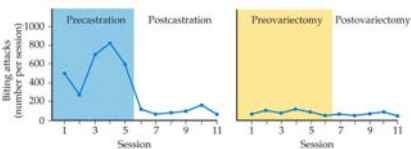
↑ Pons ↓ Left anterior cingulate cortex

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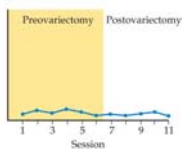
Hormones and Aggression

Aggression is an emotional state that consists of feelings of hate and a desire to inflict harm.
 Androgens affect aggressive behaviors.

(a) Males



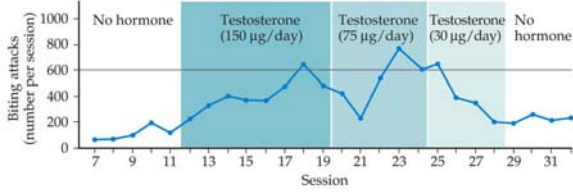
(b) Females



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Hormones and Aggression

(c) Castrated males



Stress

A multidimensional concept that includes the stress stimuli, the processing system and stress responses. **The rate of wear and tear caused by life** (Selye, 1956). Negative emotions are one important source of that wear and tear.

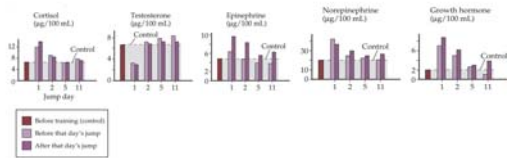
Stress

Selye (1956) talks about three stages of stress and call stress as **general adaptation syndrome**.

1. **The alarm reaction:** Initial response to stress
2. **The adaptation stage:** successful activation of the appropriate response systems and the reestablishment of homeostasis
3. **The exhaustion phase:** characterized by increased susceptibility to disease.

Stress and Hormones

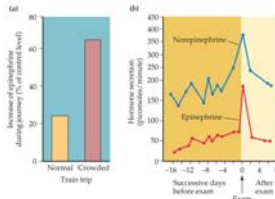
During a parachute training Ursin et al., (1978) found that changes in hormones levels before and after paratroopers jumped.



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Stress and Hormones

Hormone levels (epinephrine and norepinephrine) change as a result of commuter train crowding and thesis exams for doctoral program.



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Individual Differences

Why do individuals differ in their response to stress? One hypothesis focuses on early experience.

Rat pup that were handled by humans early on handled stress better than those that were left alone. Later studies suggested that all those pups handled by humans were licked longer by their mother leading to [stress immunization](#).

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Medicine

Psychosomatic medicine emphasizes psychological factors in physical disease.

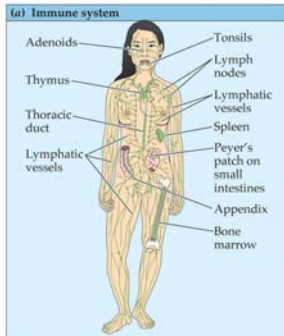
A broader field that has arisen from this is called **health psychology** (behavioral medicine) that encompass all factors like emotions, stress, and bodily conditions related to disease.

Psychoneuroimmunology

A new field (1980) that recognizes psychological and neurological factors in affecting the immune system.

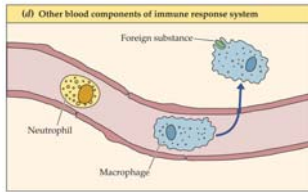
People with more positive emotions tend to generate more antibodies (during cold) than those with negative emotions.

Immune System



Immune System

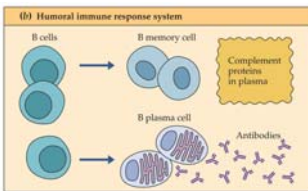
Blood contains white cells that fight invaders like viruses, bacteria etc. Phagocytes (microphages, and neutrophils) engulf and destroy such invading germs.



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Immune System

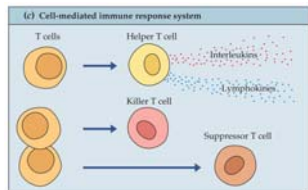
Phagocytes need help from other white blood cells (lymphocytes) that tell them what to attack. B lymphocytes (bone marrow) produce antibodies (immunoglobins) tag them to invaders and then phagocytes kill them.



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Immune System

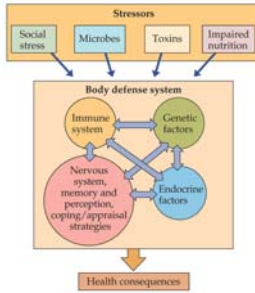
T lymphocytes (thymus glands) can act as killer cells forming an attack on body's foreign substances. Special T lymphocytes secrete cytokines which regulate B lymphocytes and phagocytes.



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Interactive System

Interaction between a number of systems.



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Immunosuppression

Corticosteroid hormones released from adrenal cortex suppresses the immune response. But why?

Sapolsky in his book *Why Zebras Don't Get Ulcers* (1994) suggests that suppression of immune response to acute stress is evolutionary. The animals needs to flee before healing themselves.

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Prolonged Stress

TABLE 15.3 *The Stress Response and Consequences of Prolonged Stress*

Principal components of the stress response	Common pathological consequences of prolonged stress
Mobilization of energy at the cost of energy storage	Fatigue, muscle wasting, steroid diabetes
Increased cardiovascular and cardiopulmonary tone	Hypertension (high blood pressure)
Suppression of digestion	Ulcers
Suppression of growth	Psychogenic dwarfism, bone decalcification
Suppression of reproduction	Suppression of ovulation, impotency, loss of libido
Suppression of immunity and of inflammatory response	Impaired disease resistance
Analgesia	Apathy
Neural responses, including altered cognition and sensory thresholds	Accelerated neural degeneration during aging

Source: Sapolsky, 1992.

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