Emotions, Aggression and Stress

Chapter 15

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.

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.
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.

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.

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.
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

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.

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.

Development of Emotions

<table>
<thead>
<tr>
<th>Birth</th>
<th>Distress and Pleasure</th>
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<tbody>
<tr>
<td>3 months</td>
<td>Joy, happiness (smiling), sadness and disgust.</td>
</tr>
<tr>
<td>4-6 months</td>
<td>Anger, surprise.</td>
</tr>
<tr>
<td>7-8 months</td>
<td>Fear</td>
</tr>
<tr>
<td>8-9 months</td>
<td>All primary emotions present.</td>
</tr>
<tr>
<td>18-24 months</td>
<td>Embarrassment, empathy and envy (self-awareness).</td>
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<tr>
<td>2-3 years</td>
<td>Evaluating emotional behavior against a standard.</td>
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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 reactivs developed shyness and phobias as they grew older.

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.

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.
Papez’s Circuit

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

Klüver-Bucy Syndrome

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

Electrical Stimulation

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

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.

Emotions and Other Brain Areas

<table>
<thead>
<tr>
<th>Basic emotion</th>
<th>Key brain areas</th>
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<tbody>
<tr>
<td>Seeking/expectancy</td>
<td>Nucleus accumbens–ventral striatal area; mesolimbic–mesocortical outputs (see Figure 43); lateral hypothalamus–periaductal gray</td>
</tr>
<tr>
<td>Fear</td>
<td>Central and lateral amygdala to medial hypothalamus and dorsal periaductal gray</td>
</tr>
<tr>
<td>Panic</td>
<td>Anterior cingulate; bed nucleus of stria terminalis; dorsomedial thalamus; dorsal periaductal gray</td>
</tr>
<tr>
<td>Happiness/play</td>
<td>Dorsomedial thalamus; parafascicular area; ventral periaductal gray</td>
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</table>
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.

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.
Emotional Pictures

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

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.

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.
Brain Regions and Emotions

Hormones and Aggression

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

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.

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

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.
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.

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.

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.
Interactive System

Interaction between a number of systems.

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.

Prolonged Stress

<table>
<thead>
<tr>
<th>TABLE 15.3 The Stress Response and Consequences of Prolonged Stress</th>
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<tr>
<td>Principal components of the stress response</td>
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<tr>
<td>Mobilization of energy at the cost of energy storage</td>
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<tr>
<td>Increased cardiovascular and respiratory stress</td>
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<tr>
<td>Suppression of digestion</td>
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<tr>
<td>Suppression of growth</td>
</tr>
<tr>
<td>Suppression of reproduction</td>
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<tr>
<td>Suppression of immunity and of inflammatory response</td>
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<tr>
<td>Arthritis</td>
</tr>
<tr>
<td>Neural responses, including altered cognition and sensory thresholds</td>
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Source: Sapolsky, 1994.