DEFINING EMOTION

- Emotion—A feeling that differs from a person’s normal affective state; a biological function of the nervous system.
- A change in physiological arousal, ranging from slight to intense.
- An affective (feeling) response, which may be pleasant or unpleasant.
- The capacity to motivate a specific behavior (a behavioral response).
EXPERIENCING AN EMOTION: JAMES-LANGE THEORY

The view that the physiological changes that occur in response to an event determine the experience of an emotion.

William James 1842-1911

James-Lange Theory

Stimulus
“It’s a bear!”

Response
Faster heartbeat, dilated pupils, etc.

Emotion
“I’m afraid!”
SOME EFFECTS OF SPINAL CORD LESIONS ON EXPERIENCED EMOTIONAL FEELINGS

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ABSTRACT

In structured interviews, 25 adult males with spinal cord lesions at varying levels were asked to compare certain of their emotional feelings before and after injury. The investigator, himself a paraplegic, knew all subjects well. The major findings follow:

1. Significant decreases in experienced feelings of anger, sexual excitement, fear, and an over-all estimate of change were found.
2. A significant increase in feelings of sentimentality was reported.
3. Although spinal cord lesions decrease some emotional feelings, overt emotional behavior may continue to be displayed.
4. Support was offered for the belief that disruption of the autonomic nervous system and its efferent return causes notable changes in experienced emotional feelings. A trend was noted which suggests that the more extensive the disruption, the greater the decrease in some emotional feelings.

DESCRIPTORS: Theory of emotion; ANS: Feelings; Emotions; Spinal Cord Injuries.
EXPERIENCING AN EMOTION:
CANNON-BARD THEORY

The view that an event activates the thalamus, which stimulates the cerebral cortex to produce the feeling component (the experience) of the emotion and, at the same time, the rest of the body to produce the expression of the emotion.

- The emotional expression and experience take place simultaneously by way of thalamic stimulation.
- Visceral changes, somatic changes, and the emotional experience occur at the same time.

CONCLUSIONS

The results of this study support the following conclusions.

1. Individuals with spinal cord lesions report significant decreases in experienced emotional feelings associated with sexual excitement, anger, fear, and an over-all estimate of emotional feeling, as compared to those experienced before injury.
2. Such subjects report a significant increase in emotional feelings related to sentimentality.
3. The data further indicate that in spite of decreases in some emotional feelings, overt emotional behavior may continue to be displayed.
4. Experiences in this study again demonstrate the necessity of insuring the complete cooperation of subjects if investigations using clinical methods are to be valid and meaningful.
5. Substantiation is offered for the belief that disruption of the ANS and its afferent return causes notable disturbances in the mental correlates of emotion. A trend was noted which suggests that the more extensive the disruption is, the greater the decrease in some emotional experiences is.

Feelings of Fear. Four subjects of Group 1 reported a marked decrease in feelings of fear, whereas one reported some decrease, after injury. As an example of the nature of these responses C.N. said, “I sit around and build things up in my mind, and I worry a lot, but it’s not much but the power of thought. I was at home alone in bed one day and dropped a cigarette where I couldn’t reach it. I finally managed to scrounge around and put it out. I could have burned up right there, but the funny thing is, I didn’t get all shook up about it. I just didn’t feel afraid at all, like you would suppose.” W. E. described his feelings this way: “I say I am afraid, like when I’m going into a real stiff exam at school, but I don’t really feel afraid, not all tense and shaky, with that hollow feeling in my stomach, like I used to.”
Cannon-Bard Theory

Stimulus
“It’s a bear!”

Thalamus

Emotion
“I’m afraid”

Response
Faster heartbeat, dilated pupils, etc.

Experiencing an Emotion: Papez Circuit

- Emotional expression and experience are mediated by a system of interconnected forebrain structures known as the Papez circuit.
- Emotional expression occurs through the hypothalamus.
- The cingulate gyrus—the neural area responsible for emotional experience.
**The Papez Circuit**

- Septal nuclei
- Cingulate
- Hippocampus
- Thalamus
- Mammillary body
- Entorhinal cortex

**EXPERIENCING AN EMOTION: MACLEAN—THE LIMBIC SYSTEM**

- Includes
  - amygdala,
  - hippocampus,
  - cingulate gyrus,
  - septum,
  - hypothalamus, and
  - thalamus.

The core feature of MacLean's limbic system theory was the hippocampus, illustrated here as a seahorse. According to MacLean, the hippocampus received sensory inputs from the outside world as well as information from the internal bodily environment (viscera and body wall). Emotional experience was a function of integrating these internal and external information streams. HYP, hypothalamus. (1949) Lippincott Williams and Wilkins.
The limbic system in a rabbit, a cat and a monkey. The top drawings show lateral views of the cerebral cortex of each animal, and the bottom drawings show medial views, with the limbic system in blue.

Darwin’s drawings. Drawings and photographs used by Darwin to illustrate cross-species similarities in emotion expression — in this case, anger/aggression.

*Tim Dalgleish*, The Emotional Brain, Nature 2004
EXPERIENCING AN EMOTION: SCHACHTER’S COGNITIVE MODEL

The view that if unable to identify the cause of physiological arousal, a person will attribute it to environmental conditions.

- Because internal arousal may not actually be produced by a particular environment, but just experienced at that time in that particular setting, it is possible to misattribute arousal to the environment when, in reality, something else is responsible.
- A stimulus causes arousal, and our emotional feeling depends on how we label the stimulus.
CLASSIC SCHACHTER-SINGER STUDY

Participants who were uninformed about the cause of their arousal felt either euphoric or angry depending on the actions of the confederate.

Misinformed participants exposed to a euphoric confederate experienced their arousal as euphoria;

Informed participants were little affected by the actions of the confederate.

EMOTIONS AND AGGRESSIVE BEHAVIOR

- Aggression—A behavior motivated by the intent to harm a living being or an inanimate object.
  - Determining intent can be difficult.
  - Many different behaviors can be considered aggressive and aggression can occur in a variety of situations. Therefore, there seem to be different types of aggression with different neurological bases.
  - Moyer identified eight types of aggression:
    - Fear-induced, instrumental, intermale, irritable, maternal, predatory, sex-related, and territorial.
IRRITABLE AGGRESSION

An attack on almost anything without making attempts to escape.

- Most prevalent, and most studied, form of human aggression.
- Includes pain-elicited aggression—aggression triggered by a physically or psychologically painful injury.
- In its mild form, irritable aggression may involve an overt display of annoyance. In extreme cases, it may involve destructive, uncontrollable rage.

### Table 12.2

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>Fear-induced</td>
<td>An animal cornered and unable to escape from danger becomes aggressive.</td>
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<tr>
<td>Instrumental</td>
<td>An animal emits an aggressive behavior to obtain a desired goal.</td>
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<tr>
<td>Internmale</td>
<td>A male threatens and then attacks a strange male of the same species.</td>
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<tr>
<td>Irritable</td>
<td>A frustrated or angry animal attacks another animal or object.</td>
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<tr>
<td>Maternal</td>
<td>A mother assaults a perceived threat to her young.</td>
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<tr>
<td>Predatory</td>
<td>An animal stalks, catches, and kills its natural prey.</td>
</tr>
<tr>
<td>Sex-related</td>
<td>A male becomes aggressive when encountering sex-related stimuli.</td>
</tr>
<tr>
<td>Territorial</td>
<td>An animal defends its territory against intrusion.</td>
</tr>
</tbody>
</table>
Neural Influences on Irritable Aggression

- Klüver-Bucy syndrome—A disorder produced by bilateral temporal lobectomy, characterized by placidity, socially inappropriate sexual activity, compulsive orality, a decreased ability to recognize people, and memory deficits.

In research, aggression has been associated with:

- Intense temporal lobe activity
- Decreased activity in the prefrontal cortex
- Focal abnormalities in the left temporal lobe
- Atrophy of the amygdala
DISEASE AND IRRITABLE AGGRESSION

- Some diseases have been associated with aggressive behavior:
  - Brain tumors (particularly in the temporal lobes), e.g. case of Charles Whitman
  - Epilepsy
  - Viral encephalitis

BRAIN ACTIVITY AND IRRITABLE AGGRESSION

- Abnormal EEG activity has been associated with violence, particularly in the temporal lobes.
  - Increased delta activity in the temporal and parieto-occipital areas
  - Decreased alpha activity in the temporal and parieto-occipital areas
  - Focal abnormalities in the left hemisphere
HORMONAL INFLUENCES ON IRRITABLE AGGRESSION

- Evidence has shown that testosterone affects aggression:
  - Testosterone level is high in groups with heightened aggression.
  - Males of most species exhibit more aggressive fighting and threatening behavior than females.
  - The elimination of testosterone reduces displays of aggression.
  - Testosterone administration reinstates the antisocial behavior of castrated males.

SEROTONIN AND IRRITABLE AGGRESSION

- Research indicates that low serotonin levels are associated with male aggression in both humans and nonhuman primates.
SEROTONIN LEVEL AND SURVIVAL IN MALE MONKEYS

Fear-Induced Aggression

An aggressive behavior that is a defensive reaction occurring only when the organism feels threatened and perceives escape to be impossible.

- Fear motivates attempts to escape and, if escape fails, aggression often arises. This aggressive behavior continues until the aversive event ends or the animal is no longer able to fight.
Brain abnormalities associated with fear-induced aggression include:

- Lesions of either the anterior third of the temporal lobe or the prefrontal cortex severely disrupts fear-induced aggression in rhesus monkeys.
- Lesions on the septum induced a temporary increase in the tendency to escape and an increased aggressive response to threats in rats.