Emotional Regulation and Mood disorders

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Lecture 12

Human Neuropsychology
Bio Sci N173 / Psych 163C / Pay Beh 162N

Emotional Regulation and Mood disorders

What is emotion?

Defining Emotion

- **Emotion**—A feeling that differs from a person’s normal affective state (baseline); a biological function of the nervous system.

- Emotions have three central attributes:
  - 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 (**behavioral response**).
Experiencing an Emotion

- **James-Lange Theory**
  - The view that physiological changes occur in response to an event. Emotion is the interpretation of the physiological response.
  
  - **Stimulus**: "It's a man with a gun!"
  - **Response**: Faster heartbeat, dilated pupils, etc.
  - **Emotion**: "I'm afraid!"

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, stimulates the rest of the body to produce the expression of the emotion.
  
  - **Stimulus**: "It's a man with a gun!"
  - **Thalamus**: "It's a man with a gun!"
  - **Emotion**: "I'm afraid!"
  - **Response**: Faster heartbeat, dilated pupils, etc.

Experiencing an Emotion

- **Schachter's Cognitive Model**
  - The view that if the emotional reaction is caused by attribution of environmental conditions to the physiological arousal experienced.
  
  - **Stimulus**: "It's a man with a gun!"
  - **Arousal**: Faster heartbeat, dilated pupils, etc.
  - **Attribution**: "It's a man with a gun!"
  - **Emotion**: "I'm afraid!"
The Papez Circuit

Emotional expression and experience are mediated by a system of interconnected forebrain structures known as the Papez circuit (limbic system).

Primary and Secondary Emotions

Antonio Damasio

- **Primary emotions** — Innate, built-in, hardwired emotions; processed by the limbic system, particularly the amygdala, e.g. fear.

- **Secondary emotions** — The experience of an emotion, the feeling of it, and learning is involved; processed not only by the limbic system, but also the prefrontal areas and somatosensory cortices, e.g. guilt.

What is fear?

- Open question...

- Like memory, this is a construct that is used to describe the seemingly regular relationship of particular sensory inputs and particular motor outputs.
Fear as a defensive system

- Innate danger signals
  - Freezing
  - Flight
  - Fight
  - Analgesia
  - Autonomic arousal

- Learned danger signals

A neural system for fear

- Sensory information comes into the thalamus.
- A subcortical pathway takes unprocessed information directly to the amygdala.
- A cortical pathway brings this information to the neocortex and the hippocampus, where more detailed representations of experience are constructed. Projections from these regions converge on neurons located in the amygdala.

The important nuclei in the amygdala complex and in the midbrain that play an important role in fear behaviors.

- Note that the CEm projects to the midbrain nuclei and can generate fear-associated behaviors.

CEc = lateral capsule of the central amygdala
CEm = medial nucleus of the central amygdala.
Klüver-Bucy Syndrome

- Monkeys with bilateral temporal lobe resections showed hyperorality, hypersexuality, visual agnosia, and a loss of fear (Klüver & Bucy 1937)
- Led to follow up studies that localized the loss of fear to the amygdala (Weiskrantz 1956)

Fearless - The case of S.M.

- 44 year old woman with a rare genetic condition (Urbache-Wiethe) that caused her amygdala to calcify and harden — i.e. amygdala lesion
- Experimenters exposed her to snakes and spiders, took her to one of the world’s scariest haunted houses, and had her watch a series of horror films.
- They also had her fill out questionnaires probing different aspects of fear, from the fear of death to public speaking.
- SM consistently failed to experience fear

BUT she can experience panic (e.g. air hunger), despite the absence of an amygdala! There's more than one kind of fear.
Mood Disorders

- **Major depression** – A type of depressive disorder characterized by a depressed mood of at least two weeks in duration.
- **Dysthymia** – Chronic low-level depression.
- **Bipolar disorders** – A type of affective disorder characterized by episodes of mania and depression that typically continue throughout a person’s lifetime.
- **Cyclothymia** – One of the bipolar disorders characterized by less intense episodes of mania and depression than are seen in the bipolar disorder.
- **Hypomania** – A milder form of mania in which occupational or social functioning is not impaired.

Depression - DSM IV Diagnosis

- Depressed mood or loss of interest in activities for more than two weeks
- Deviates from the person’s baseline (i.e. change from the norm)
- Impaired function: social, occupational, educational
- Specific symptoms such as:
  - Irritability
  - Anhedonia
  - Weight loss/gain
  - Change in sleep habits
  - Fatigue/loss of energy
  - Guilt/feelings of worthlessness
  - Trouble concentrating
  - Suicidal ideation

Mood Disorders: Brain Changes

- Depression is associated with increased levels of stress chemicals – cortisol (glucocorticoids in the brain).
- Glucocorticoids reduce dendritic spines necessary for structural plasticity

Work by Tallie Z. Baram, UCI
Mood Disorders: Brain Changes

- Depression is associated with reduced dendritic spines in the hippocampus.

Mood Disorders: Brain Changes

- Reduced GM volume in orbitofrontal cortex.
- Reduced volume of hippocampus, amygdala, entorhinal cortex, basal ganglia, and thalamic nuclei.

Mood disorders: PET studies

- PET scans reveal lower-than-normal activity during depressive episodes and higher-than-normal activity during manic episodes.
- In depression, the reduction is especially apparent in the left frontal cortex.
- Decreased blood flow and metabolism have also been found in the cingulate gyrus and the basal ganglia of depressed individuals.
Affective Disorders: ECT Treatment

- For drug-resistant depression

Disadvantages

- High relapse rate
- Memory deficits

- A right unilateral ECT may work as well as a bilateral application with fewer side effects.

- A new promising alternative treatment is repetitive transcranial magnetic stimulation (rTMS).