Sympathetic NS prepares the body for intense activity, “fight or flight” and other stress-related behaviors. It is the “crisis management” center.

Emotions and the Autonomic NS

The parasympathetic nervous system is the long-term survival center, promoting rest by decreasing heart rate, digestion, and other functions that keep an organism alive in the long-term.

Emotions

Anyone who has ever felt elated or terrified knows how the body is involved in our emotions, but how important is the body’s reactions in feeling those emotions?

- Do you first experience emotion psychologically before your body reacts physiologically?
- Or does the physiological arousal occur first which leads you to experience emotional feelings psychologically?

Common sense suggests that one feels sad and therefore one cries, one feels happy and so one laughs.

The James-Lange theory reverses this process.

- Theory states that a person’s interpretation of a stimulus evokes the autonomic changes directly before the psychological experience of emotion is the individual’s perception of those physiological changes.

James-Lange Theory

William James and Carl Lange proposed an idea that was diametrically opposed to the common-sense view. The James-Lange Theory proposes that physiological activity precedes the emotional experience.

Theories of Emotion

Problems with James-Lange Theory

- What if we take the physiological feedback of the body away?
  - Animals deprived of visceral nerves feel emotions
- If emotions come from physiological reactions why is it that emotions seem to occur in a split second. Emotions occur too quickly to be based on judgments of physiological responses
- What if we increase the activity of the sympathetic NS, shouldn’t that make people feel emotional? Injections of adrenalin did not cause emotions to happen

Cannon-Bard - you run while you become afraid.

- Frightening information sent to cortex and autonomic system at the same time, leading to experiences of fear, and arousal.
- Helps to explain immediacy of some emotions.

Cannon-Bard Theory

Walter Cannon and Phillip Bard questioned the James-Lange Theory and proposed that an emotion-triggering stimulus and the body’s arousal take place simultaneously.

Theories of Emotional Reactions
James-Lange Theory Revisited

Cannon-Bard explanation well accepted but there is still unexplained results.

People who have less physiological arousal will experience less emotion, which supports James-Lange.

- Some medical conditions cause people to feel little physiological arousal, called pure autonomic failure, the ANS stops regulating the internal organs.
  - People with disorder recognize situations that call for strong emotions (fear, elation) but they report that their emotions are much less intense.
  - People with spinal cord injuries show lesser emotions depending on how far up the spinal cord the injury has occurred.
  - Taking drugs that relax a person also reduces emotions.

It appears that some facets of emotion better explained by James-Lange.

Two-Factor Theory

Stanley Schachter and Jerome Singer proposed yet another theory which suggests our physiology and cognitions create emotions. Emotions have two factors—physical arousal and cognitive label.

Theories of Emotional Reactions

Stanley Schachter pointed out that neither the James-Lange or the Cannon-Bard theories explained what kind of emotion that we feel when we are physiologically aroused.

- The physiological reaction may determine the intensity of the emotion, but Autonomic response responds as a system, and is too diffuse to differentiate all the emotions we are capable of.
- Schachter agreed that the person’s cognitive appraisal of the situation determines the emotion that we experience.

Schachter and Singer Study of Emotions

Does type of emotion felt depend on autonomic arousal or the person’s cognitive interpretation of that arousal?

- Three groups of participants
  - Group 1: Subjects injected with adrenaline but misinformed about the effects. Given no reason for their physiological response.
  - Group 2: Subjects injected with adrenaline and correctly informed about the effects. Given a reason for their physiological response.
  - Control group no information and no adrenaline
- All groups placed with a confederate who acted happy or angry.
- Results
  - Group 1, Misinformed Subjects placed with a confederate who acted angry or happy were more likely to act the same way.

Related findings

- If you met attractive person of the opposite sex in the middle of a high bridge, would you be more likely to fall in love (Dutton and Aron)?
- Emotions where there is no arousal. “Fake heartbeat” experiment.
- Risk takers interpret emotional arousal as pleasant, “an adrenalin rush.”
Physiological Similarities

Excitement and fear involve a similar physiological arousal. What differentiates fear from excitement may be how we interpret the situation.

Amygdala and Fear Emotions

Because fear is such an important emotion in our survival it shouldn’t surprise you that there is a special mechanism in the brain devoted to it. The amygdala plays a key role in appraising the situation as to whether it is one that should be feared.

- Monkey experiment in which fearful stimulus was sent to the amygdala in one eye but not the other. Monkey only afraid when the amygdala received this information.
- When the amygdala is damaged, a person’s ability to experience fear is impaired.
- Damage to the amygdala also diminishes the ability to recognize feelings in faces of other people, and an impairment in the ability to distinguish between, anger, disgust and surprise.

Appraising Fear

Two pathways

- Slow pathway is used when we use our memories and cognitive processes to determine if something is dangerous for us. This may also stimulate our amygdala so that we see that as a fearful thing to do. But do we always have the luxury of doing that.
- Fast pathway. There are times when we have to act immediately or we won’t survive. We can’t wait for an extended appraisal.

The Amygdala and Fear

Capgras Syndrome

What if when you looked at your mom, you didn’t experience the normal emotions you associate with her. Would you still love her.

Capgras syndrome

- People have damage to the neural connections between the temporal lobe, where people face is identified, and their limbic system, where emotions are generated.
- Since the normal positive emotions are not generated to family members, the patient concludes that it must be an imposter although it looks like the person.
- One Capgras sufferer told her doctor, "He looks exactly like my father, but he really isn’t. He’s a nice guy, but he isn’t my father. . . . Maybe my father employed him to take care of me, paid him some money so he could pay my bills" (Hirstein & Ramachandran, 1997, p. 438).

Frontal Lobes and Emotions

Would you make better decisions if you were like Spock in StarTrek and you didn’t experience human emotions but relied on your logical thinking?

The frontal lobes connection to the limbic system play a role in the emotions we feel.

- People who experience more positive moods show a greater degree of left hemisphere involvement.
- People who show negative emotions show greater involvement of the right hemisphere.

Would we be better off if we would cut off the emotional connection of our frontal lobes so that we could make unemotional “better” decisions.
Emotions and Decisions

Demasio’s Elliot
- Damage to the ventromedial prefrontal cortex
- Shows almost no emotional expression, no impatience, frustration, joy, or anger.
- Problem: He can consider various courses of action and outcomes, but can’t seem to choose one.

Demasio argues if you can’t imagine happy and sad consequences you will make terrible decisions.
- Why do you not drink before driving?
- Why do you cook your hamburger before eating it?
- Would you marry X if you didn’t “love” him or her.
- Why did you choose Gustavus?

Brain and Moral Decisions

Work of Antonio Demasio, University of Iowa.
- Compared 6 people with ventromedial prefrontal brain damage
- 12 people no brain damage
- 12 people with brain damage in other areas.
- No differences when
  - Scenarios involving no moral content, e.g., how to run a tractor to harvest turnips.
  - Scenarios that did not require participant to harm someone else, e.g., Decisions to classify personal expenses as business to get an income tax reduction.
  - All members rejected scenarios that harmed others for personal benefit, e.g., killing a newborn if it couldn’t be cared for. They have a moral compass.
- However VMD patients about 3 times more likely to sacrifice someone else for the greater good, e.g., pushing someone off bridge.

Treatment For Post-Traumatic Stress

Problem in many mental disorders is the inability to forget emotionally charged material. This is especially true in PTSD.
- Emotional trauma leads to over-consolidation of strong emotional memories, and encouragement to relive the experience is likely to have a negative effect.

If emotional reaction can be blocked it can reduce the consolidation of the highly emotional memory

Propranolol-blocks stress hormones such as adrenaline
- Drug given 4 times a day for 10 to people who had experienced traumas serious enough for them to be treated at the emergency room.
- Control group given placebo pills
- 3 months later when they listened to tapes of themselves describing incident, over half of the control group experienced strong responses to tape but none of the experimental group.

Is this an ethical treatment?

Leon Kass, former chairman of the President Bush’s Council on Bioethics, objected to propranolol’s use on the grounds that it mediates away one’s conscience.
- “It’s the morning-after pill for just about anything that produces regret, remorse, pain, or guilt.”

Trolley Car Dilemma

- The two alternatives are logically the same, one person dies to save a larger number of people but you are more comfortable flipping switch then throwing him off the bridge.
- People are willing to make this decision if they can safeguard their emotions.
Facial Expressions

Paul Ekman’s work

- People experience the same basic emotions (anger, disgust, fear, happiness, sadness & surprise) and they recognize them in others.

The Face of Emotions

The function of facial expressions in all primates is communication, especially communication of emotions.

- Facial expression of emotion is much more likely to occur in the presence of other people.
- Facial expressions of emotion are more likely to indicate a person’s true internal state than simple statements and other indicators.

Are the same emotions present in all cultures?

- Some people develop facial expressions in the absence of opportunities to observe and imitate others, children who are born deaf and blind.
- Researchers have found a large amount of evidence that there is indeed a set of basic emotions: happiness, sadness, fear, disgust, anger and surprise.
- Interpretation of these emotions by facial expression is done easily and fairly accurately across cultures.

Subtlety of Facial Expression

Women are better able to read emotional cues in others, and express emotions more intensely and openly.

- Checkout your yearbook picture.

The Duchenne smile—True enjoyment smile, hard to produce voluntarily

- False smile can be distinguished from true enjoyment smile.

Paul Ekman’s Facial Feedback Hypothesis

Each basic emotion associated with unique facial expression

- Interestingly, facial patterns also correlated with different physiological responses. Sensory feedback from our facial expression contributes to our emotional feelings.

Revisiting James-Lange. Facial expression can alter emotional experience
**Emotional Intelligence**

<table>
<thead>
<tr>
<th>Self-Awareness</th>
<th>Social Awareness</th>
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<tbody>
<tr>
<td>Able to perceive one’s own emotions and how you are affected by them.</td>
<td>Able to perceive and recognize the emotions of others. Empathy.</td>
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<table>
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<tr>
<th>Self Management</th>
<th>Relationship Management</th>
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<tbody>
<tr>
<td>The ability to control one's emotions and use them in achieving legitimate goals.</td>
<td>The ability to know how to act in beneficial ways in emotional situations.</td>
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**The Emotional Brain**

**Emotional regulation**
- typically turn negative into positive
- may sometimes need to “cheer down” as well as “cheer up”

**Reappraisal**
- thinking can change feeling
- shown photo of woman crying at funeral
  - amygdala became active
- asked to reappraise and imagine woman is at wedding
  - cortex became active and then amygdala deactivated

**Lie Detection and Sympathetic NS**

Because of our socialization we are often experience fear and anxiety when we lie. If we measure reaction of sympathetic nervous system can we tell when a person lies.

**Detecting Lying**

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<th>Problem:</th>
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<tbody>
<tr>
<td>- SNS reacts in not just fear of being detected.</td>
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<tr>
<td>- In situation where your truthfulness is in question there may be other reasons for reacting emotionally. False positives.</td>
</tr>
<tr>
<td>- Some people are not emotional when lying. False negatives.</td>
</tr>
</tbody>
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![Graph showing lie detection results](image-url)