Lecture #10

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Emotion (cont.)

- Examples
  - Emotions
  - Acceptance
  - Anger
  - Anticipation
  - Boredom
  - Disgust
  - Envy
  - Fear
  - Guilt
  - Hate
  - Hope
  - Joy
  - Jealousy
  - Love
  - Regret
  - Remorse
  - Sadness
  - Shame Sorrow
  - Surprise

Brain Structures – Emotion

- Amygdala – two small, round structures located anterior to the hippocampi near the temporal poles. Involved in detecting and learning what parts of our surroundings are important and have emotional significance. They are critical for the production of emotion especially negative emotions (e.g., fear).
- Prefrontal cortex – refers to the very front of the brain, behind the forehead and above the eyes. Critical role in the regulation of emotion and behavior by anticipating the consequences of our actions. Role in delayed gratification by maintaining emotions over time & organizing behavior toward specific goals.
- Anterior cingulate cortex (ACC) – located in the middle of the brain, just behind the prefrontal cortex. The ACC may play a central role in attention, and may be important with regard to conscious, subjective emotional awareness. May also play an important role in the initiation of motivated behavior.
- Ventral striatum – a group of subcortical structures – may be important in emotion and behavior. One part, nucleus accumbens, may be involved in goal-directed positive emotion. Individuals with addictions experience increased activity in this area when they encounter the object of their addiction.
- Insula – may be critical in the bodily experience of emotion – connected to other brain structures that regulate the body's autonomic functions (heart rate, breathing, digestion, etc.). Also processes taste information and may play an important role in the emotion of disgust.

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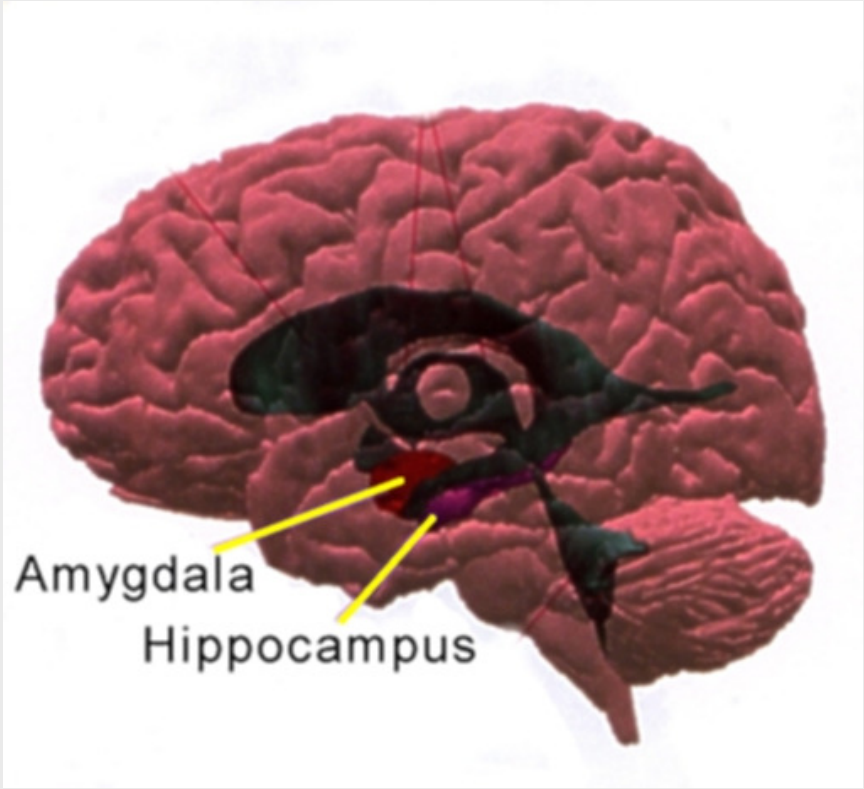
Limbic System



- Collective name for structures involved in emotion & motivation. Integrates emotional states with stored memories of physical sensations.
  - Amygdala: aggression and fear;
  - Cingulate gyrus: Autonomic functions + cognitive and attentional processing;
  - Hippocampus: Required for the formation of long-term memories;
  - Hypothalamus: Regulates autonomic nervous system via hormone production and release;
  - Orbitofrontal cortex: Required for decision making;
  - Parahippocampal gyrus: Plays a role in the formation of spatial memory.

Emotions (cont.)

- Descartes – mind is a reasoning machine.
- Spinoza – reason is shot through with emotion.
- Current research on the neural circuitry of emotion suggests that emotion makes up an essential part of human decision-making, including long-term planning, and that Spinoza's view may be closer to the truth.

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Perception Processes

- Analyze raw features of stimulus
  - Word (letters)
  - Symbol (e.g., color, shape, and size)
  - Sound (e.g., loudness and pitch)
- Unitization
- Bottom-up feature analysis
- Top-down processing

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Unitization - example

- 7 letters
  - goodjob
  - blsafzp
- Police siren

- Rapid processing – whole units

Top-Down – Example

- "Turn the machine XXX when the red light indicates failure"
- The fourth word is illegible (poor bottom-up)
- Context of the surrounding words allows us to guess that the word is probably "off"

Another Example

- Scrolling messages viewed in a small window can present a tradeoff between bottom-up and top-down processing. If words within sentences are presented – context is available

Then it may be better to use small text

One More Example

- If random digits are displayed within the same space, top-down processing cannot assist
- Use bottom-up processing
- Make digits larger to help

72184

64992

Final Example

- Like phone numbers, letters in an email address should also be larger
- Lack of standardization of email addresses removes context

Adam Humfac Adamjhumfa@xxx.yyy 444-455-2995

Is a better design than is

Adam Humfac adamjhumfa@xxx.yyy 444-455-2995

Perception Guidelines

- Maximize unitization by using familiar representations
- Promote top-down processing – provide context if possible
- Maximize bottom-up processing – size

Perception

- Perception is assumed to be relatively automatic. However, as the duration of the perceptual process increases, we speak less of perception and more of comprehension, which is less automatic.

Memory

- Working Memory, STM – Relatively transient – limited to holding a small amount of information that may be rehearsed or "worked on" by other cognitive functions
- Long-term Memory, LTM – Permanent storage of information

Short-term Memory

- Items in current focus of attention
  - Holds 7 ± 2 items
  - Half life of 3 items is about 7 seconds
  - All items gone in 18 seconds
- Amount of information stored in STM depends on what we know about the items
- People can remember in STM:
  - Many familiar concepts
  - Few unfamiliar concepts
- Example: can you remember this sentence?
  - “Wir kann mit Zug zu Euch kommen.” (155 bits)
  - “We can take the train to your place.”

Short-term Memory

- Looking up a phone number and then holding it in working memory until we have completed dialing
- Remembering the information in the first part of a sentence as we hear the later words and integrate them to understand the meaning

More STM Examples

- "Holding" subsums while we multiply two two-digit numbers
- Constructing an image of the way an intersection will look from a view on a map

Limits of Short-term Memory

- Capacity
- Time
- Confusability and Similarity
- Attention and Similarity

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Long-Term Memory

- We constantly maintain information in working memory for its immediate use, but we need a mechanism for storing information and retrieving it at later times, this is called long-term memory.

Basic Mechanisms

- Strength
  - Rehearsal
- Information transferred from STM to LTM through
  - Rehearsal
  - Association with concepts already in LTM – e.g., link to other items or tie to existing loci
- Forgetting
  - Decay & interference

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Organization of Information in Long-Term Memory

- **Episodic memory**
  - Events & experiences in serial form
  - Helps us recall what occurred
- **Semantic memory**
  - Structured record of facts, concepts & skills
  - One theory says it's like a network
  - Another uses frames, schemas, & scripts

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