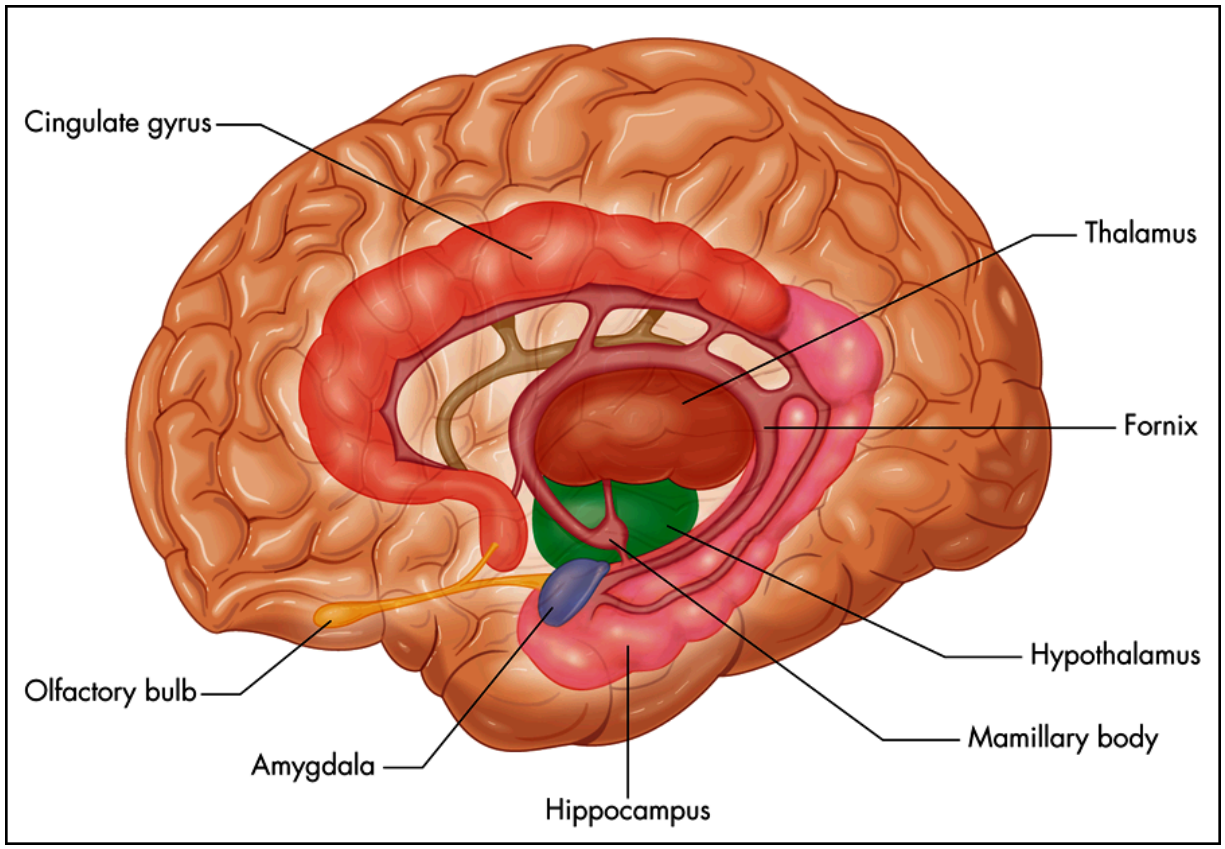
Physiology of Emotion

Chapter 13

The Problem With Studying Emotion

- How do we scientifically study emotions?
  - Identify emotions as observable behavior
    - Separate action from internal feelings
      - Operational definitions
        - » Valence (cognitive labels), observable behavior/physiology
    - Must have consciousness in order to have emotion
      - e.g., absence seizures (brief bouts with epilepsy)
      - Conscious awareness NOT necessary
        - » e.g., implicit memory based on emotion
    - An fully functioning limbic system and autonomic nervous system.

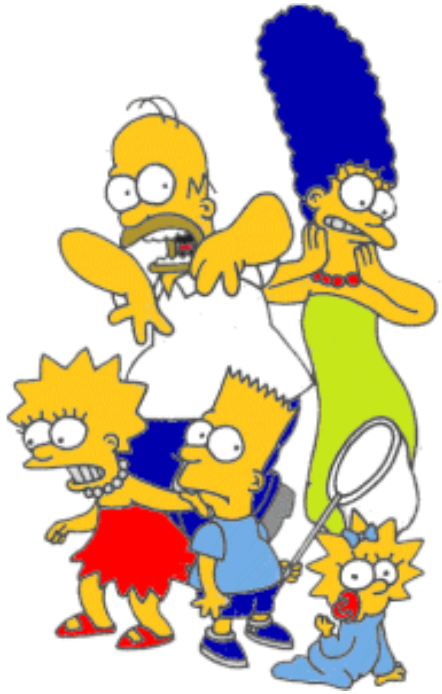
Anatomy of the Limbic System



- Group of interlinked structures:
  - olfactory bulb, hypothalamus, hippocampus, amygdala, and cingulate/ prefrontal cortex

Relationship Between Emotion (Fear) and Readiness for Action:

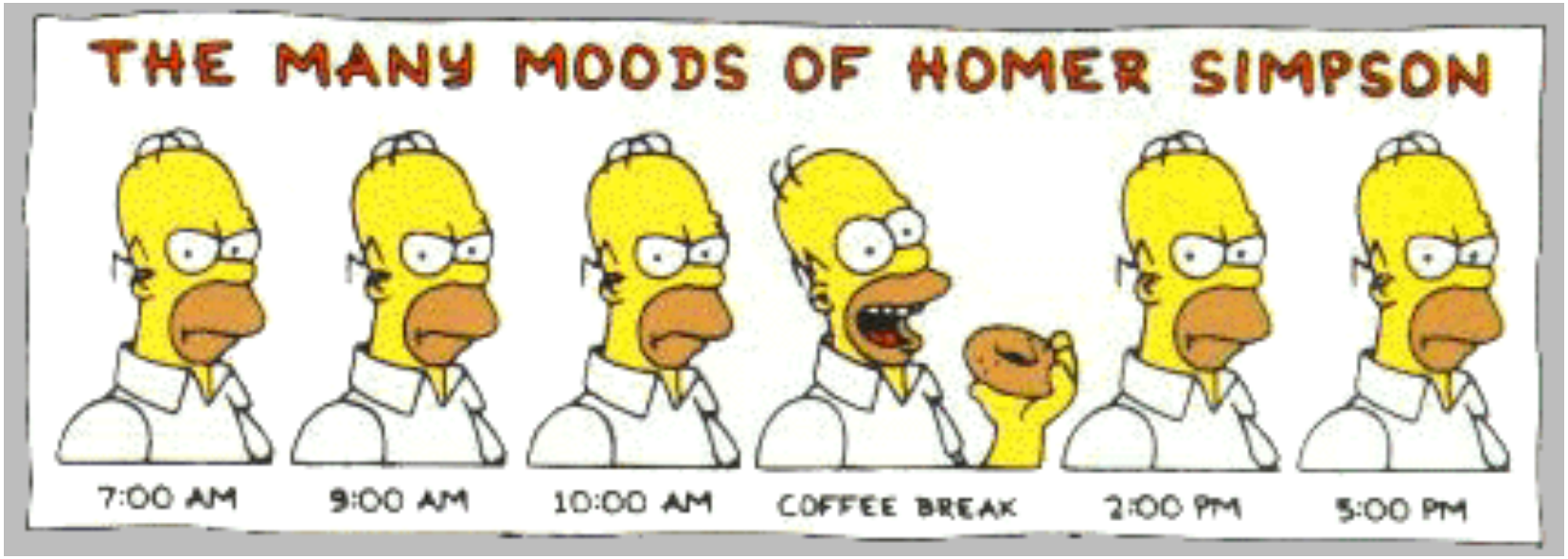
- Requires interplay between autonomic nervous system components
- There are many theories on how this works….



Theories of Autonomic Activity and Emotion

- When a Frightening Event Occurs:
  - Commonsense View:
    - Emotion causes response
    - Respond physiologically and behaviorally
  - James-Lange Theory:
    - Response to event causes emotion
    - Locked-in Syndrome is an example
  - Cannon-Bard Theory:
    - Both response and emotions occur simultaneously but independently.
    - This enables variability between different people's emotional response
  - Schachter-Singer Theory (two-factor theory):
    - Similar to Cannon-Bard Theory
    - change in physiological response determine quantity of emotion, but cognitive appraisal needed to determine the type of emotion

The Effects of Stress on Emotion



Stress is defined as a nonspecific response of the body to any demand made upon it (like working at a nuclear power plant)

Targets for Stress: autonomic system (rapidly) and hypothalamus/pituitary/adrenal cortex, or HPA axis (slowly)

Stages of Stress
(aka General Adaptation Syndrome)

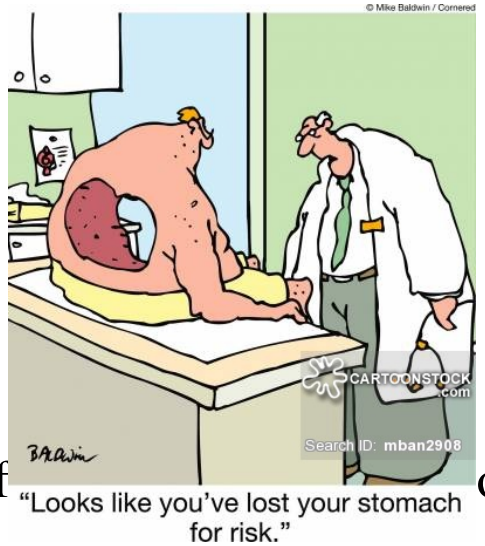
- Occurs in three phases
  - Alarm reaction (to stressor)
    - Sympathetic nervous system activity
    - Mobilize resources for immediate recovery (short-term stress)

  - Resistance
    - Cope with stress
    - Autonomic functions maintained
    - Hormones released for sustained stress (long-t

  - Exhaustion
    - Sympathetic nervous system starts to fail (really long-term stress)
    - Body's reserves depleted
    - More susceptible to illness

Disorders Related to Stress

- Involving autonomic nervous system
  - Psychosomatic Illnesses
    - "stress to the system"
    - Ulcers
    - Heart Disease
  - Voodoo Deaths
    - overwhelming emotions stop heart
    - Implicated with excess parasympathetic activity af once during overwhelming helplessness



- HPA effects
  - Immune system
  - Heart Disease
  - Memory loss

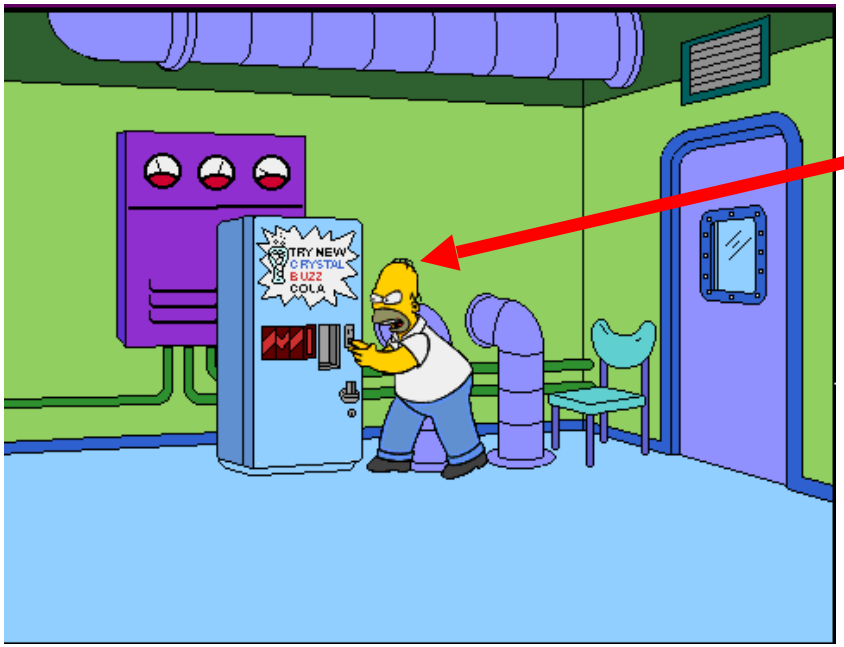
http://www.youtube.com/watch?v=BUSn1mrQU_Q

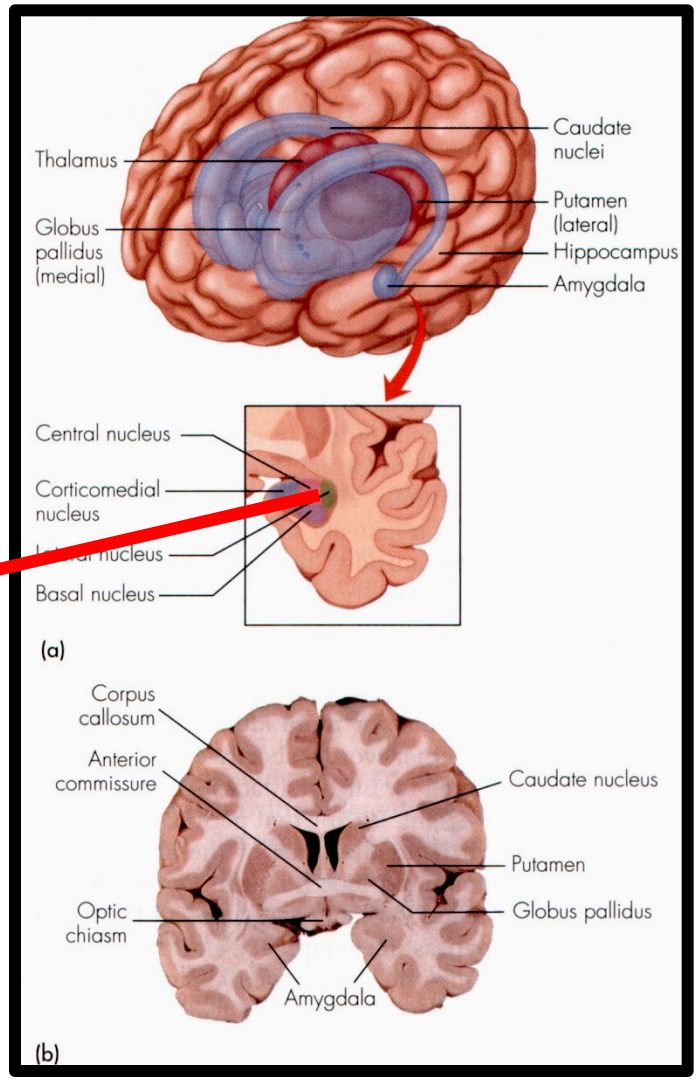
The Brain and Emotion: The Hypothalamus

- Testosterone facilitates activity of ventromedial hypothalamus (VMH)
- Stimulate VMH - ⇑aggressive behaviors
  - Behavior dependent on what area is stimulated

Brain Areas for Aggression: The Amygdala

- Stimulation in amygdala
  - Aggressive, affective attacks
  - Higher association w/fear





Clinical Significance in Regards to the Amygdala and Aggression

- Rabies
  - attacks the temporal lobe (where amygdala is located)
  - leads to furious, violent behavior
- Focal seizure (seizure originating) from amygdala
  - increase in aggressive behavior
- Temporal lobe epilepsy
  - Possible increase in aggression
- Lesion/removal of amygdala
  - Tameness, placidity (decrease in aggression)
- Kluver-Bucy Syndrome