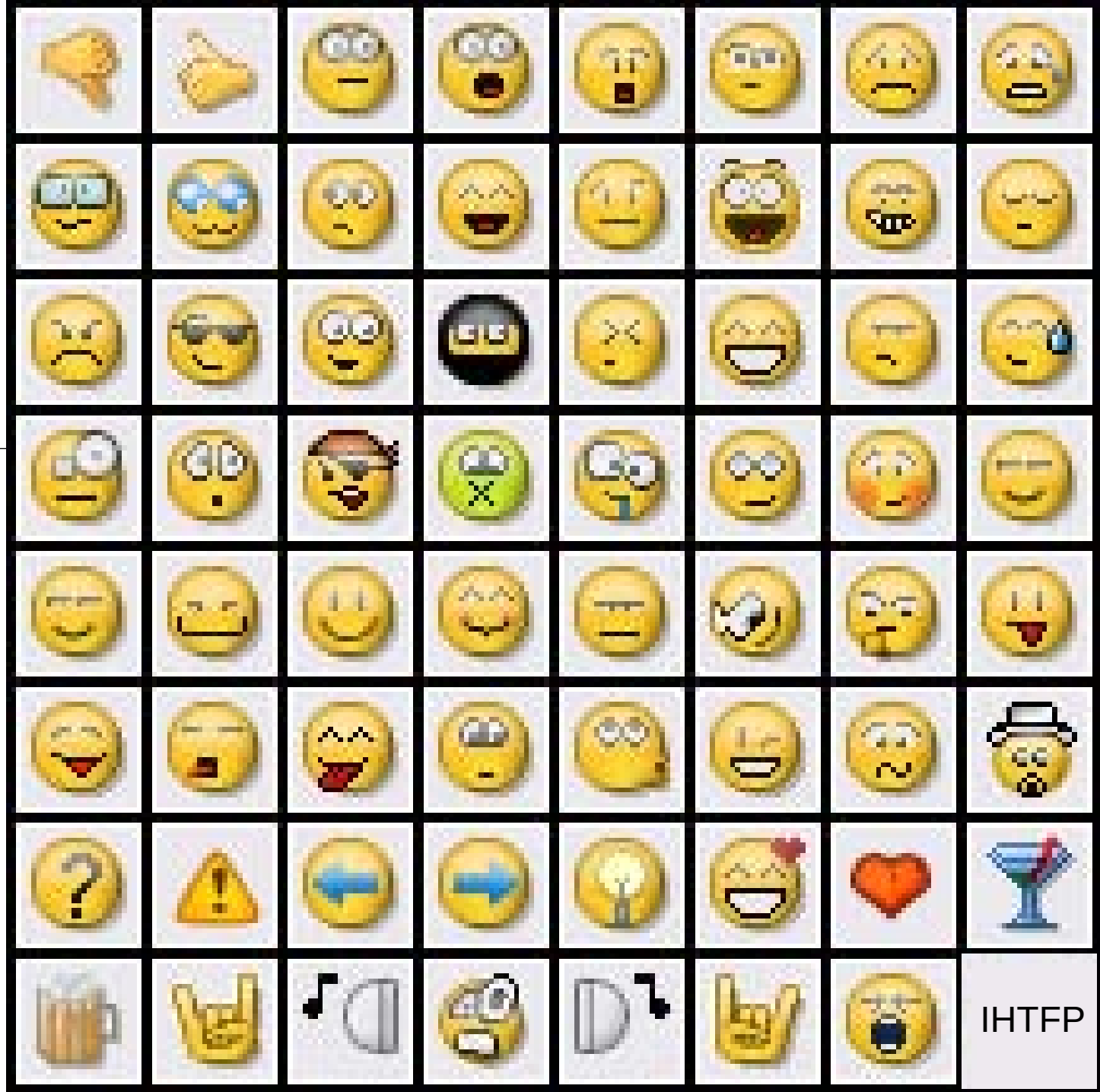
9.01 Introduction to Neuroscience
Fall 2007

Emotion

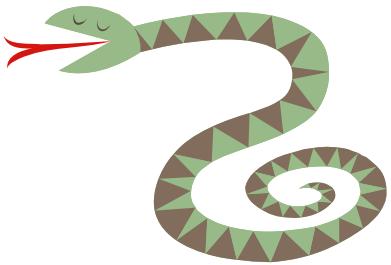


David Purger

9.01 Review

12/15/07

Theories of emotion



Sensory stimulus

Stimulus perceived

Cannon-Bard

James-Lange

Emotional experience (fear)

Emotional expression (somatic, visceral response)

Anatomical basis

- “Limbic system”
  - Cingulate cortex, hippocampus, thalamus, fornix
- Amygdala
  - In medial temporal lobe
  - Lesions reduce fear and aggression
  - Activated when viewing fearful faces
  - Stimulation produces fear (and other emotions)
  - Fear learning: can train animals to produce amygdalar response to conditioned stimuli
    - Recall of emotions → enhanced amygdala response

Aggression

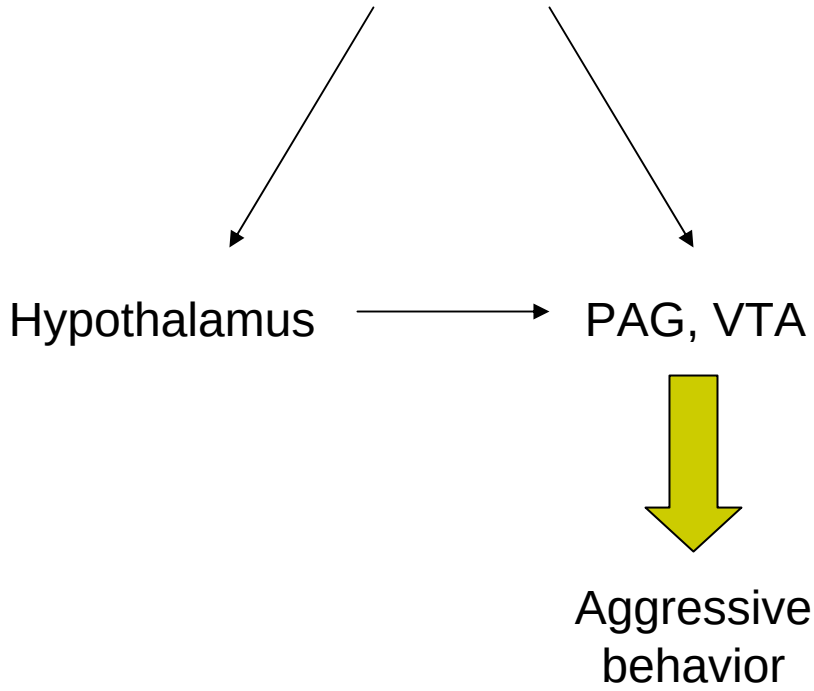
- Predatory (for food)
  - Few vocalizations
  - Violent attacks to head/neck
  - *Evoked by stim. of lateral hypothalamus*

- Affective (for show)
  - Vocalizations
  - Threatening/defensive posture
  - Sympathetic NS activation
  - *Evoked by stim. of medial hypothalamus*

- Sham rage
  - Unwarranted aggression
  - *Evoked by stim. of posterior hypothalamus (when cerebrum removed)*

Neural Circuit for Aggression

- Cortex → Amygdala



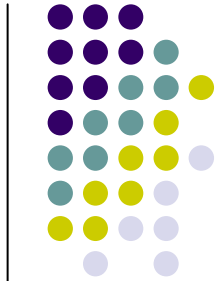
Serotonin

- Drugs that block synthesis/release (hinder turnover) of serotonin increase aggressive behavior
- Serotonin receptor agonists decrease aggressive behavior

Attachment

- Mother-infant bonding
  - Created by imprinting, oxytocin release in mother during childbirth/breastfeeding
- Pair bonding
  - Oxytocin released by females, vasopressin released by males induce attachment

Experiments



- Lesions
- Stimulation
- Pharmacology
- Scans (fMRI)
- Behavioral studies
- Neuroeconomics