Class 17 Emotion – 10/24

- **Recap... And some answers...**
  - Innate or learned?
    - Fear conditioning
  - Voluntary or involuntary? (conscious/ unconscious)
    - James-Lange theory
    - Fast/slow routes
  - Emotional expression Vs. emotional experience
    - Hypothalamus (shame rage)
    - Amygdala (stimulation studies)
  - Do animals have emotions?
    - Fear, aggression
    - Neural systems: Limbic system, Amygdala and prefrontal cortex
  - Adaptive behavior or communication?

- **Facial expressions**
  - Emotions have social values. Communicate
    - Emotional expression Vs. emotional experience (do animals express emotion? Do they experience emotion?) what about robots?
      - Internal state: depression, sad (health)
      - Immediate past experience: fear
      - Immediate future intents: anger
      - Context information: comedians, emoticons
    - How much can one trust an emotional expression?
      - Innate (involuntary) Vs. Learned (voluntary)

- **Darwin’s theory**
  - The expression of emotion in man and animals (1872)
  - Same basic features for aggression (teeth, snarl)
    - Human (facial) emotional expression have evolved from that of animals.
  - In different cultures (islands): different languages but same emotional expressions. Also same understanding of nonverbal emotion sounds.
  - Blind children produce the same expression as normal children
    - Innate component
  - Other mean of expressing emotions: voice/tone, body posture...

- **Some emotional expressions are innate**
  - The baby follows the mother’s facial expressions
  - 1-month old
    - Happy, sad, surprised
  - Works with moms, not with strangers (nor dads)
  - Works less with other facial expression
Starting at 1 year old, emotional expressions are more intense if in a social group.

- **Facial expressions: physiological basis**
  - True and “fake” facial expressions: individual facial muscles
  - Duchenne: Electrical stimulation of facial muscles
  - Acting: Stanislavski “system” and “method acting”. Decompose the script and internalize the character’s emotion.

- **Basic emotional expressions**
  - 6 basic emotional expressions: each produced by specific muscle combinations
    - Surprise
    - Anger
    - Sadness
    - Disgust
    - Fear
    - Happiness
  - FACS: Facial Action Coding System: a way of measuring elementary muscle contractions that make up emotional expressions
  - The production of the correct FACS for an expression can sometimes elicit the emotion in the subject (feedback theory). Botox may “blunt” the experience/feeling of certain emotions, prevent muscle contraction.

- **Neural bases: facial paresis**
  - Right hemisphere damage (motor cortex or facial nerve)
    - Volitional Facial Paresis
  - Left hemisphere lesion (insula cortex, thalamus)
    - Emotional Facial Paresis
  - Two different neural system for voluntary (“fake”) and spontaneous (“real”) facial expressions

- **Asymmetry of the face**
  - (Usually) the left side of the face is more expressive than the right side
  - Right hemispheric dominance for (facial) expression

- **Asymmetry of the facial expression**
  - Most emotional expression starts on the left side of the face (in monkeys)

- **Monkey facial expression... Like humans?**
  - Neutral, lip smack, threat, fear, yawn (courtesy gothard lab, UA)

- **Lateralization of emotion**
  - Hemispheric specialization of facial expression recognition:
    - Left hemisphere: words, speech, meaning
      - Emotion from “meaning”
    - Right hemisphere: facial expressions, tone of voice
      - Emotion from “prosody”
  - Sex difference in emotion processing? Yes, there are some differences
    - Women recognize emotion better than men, and women use less of their brain. Women’s brains have a better connection between hemispheres.

- **Emotional Lateralization: empathy/simulation?**
- Recognition of emotion is impaired in patients with right somatosensory cortex damage (not visual cortex, or amygdala or prefrontal cortex)
- Recognition of emotion may involve "internal simulation" of emotions.
  - Mirror system (premotor cortex, in frontal lobe)

**Amygdala damage in humans**
- Are there specialized brain areas for specific emotional expressions?
  - Amygdala: specialized for fear and danger
  - Patients with amygdala damage can depict many emotional expression, but not fear
- Blind patients can recognize facial expressions -> Subcortical route for emotional visual information
- Expressing emotions Vs. recognizing emotions
  - Most amygdala patients can express emotions, but cannot recognize them. Amygdala is not responsible of the expression of facial emotion but is in recognition

**Insular cortex: disgust**
- Insular cortex: contains the primary gustatory cortex
- Activated by sight and experience of disgust
- Disgust: a protection signal (personal and species)

**Emotional expressions: Summary**
- Emotions: Fast and simple ways of communicating a general state and general intentions. Face, voice and body posture
- Which expressions?
  - 1872: Darwin there is something innate about facial expressions. Expressions are useful means of communications
  - P. Ekman, FACS and the 6 emotions. Voluntary Vs. Involuntary expressions.
- Hemispheric differences
  - Right Vs. Left activation
  - The expression of emotion is not symmetric on human faces
  - The production of emotion is not symmetric in monkeys
  - Volitional facial paresis (primary motor cortex) Vs. emotional facial paresis (frontal cortex)
  - Some emotions activate specific brain areas (fear, disgust)
  - Can robots have emotions?