

Biopsychology  
Tuesday October 25<sup>th</sup>, 2016

## Facial Expressions

Emotions have social value and help with communication  
Emotional Expression is different than Emotional Experience  
Can this occur in animals? Robots?  
Internal state → e.g. depression  
Immediate past experiences → e.g. fear  
Immediate future intent → e.g. anger  
Context info → e.g. comedians, emoticons

Innate (involuntary) versus Learned (voluntary)

Darwin's Theory → The expression of emotion in man and animal (1872)  
Same basic features for aggression (showing teeth, snarl) → human facial expression (emotional)  
Innate → In different cultures (islands) there are different languages, but the same emotional expressions. Also the same understanding of nonverbal emotional sounds  
Innate → For example, Blind children produce the same expressions as seeing children  
Other means of expressing emotion → voice, posture  
Some emotional expression is innate like Happy, Sad, and Surprise (e.g. a one month old infant can understand and perceive his or her mother's facial expression; this does not work with strangers or dad)  
Starting at one year old, emotional expressions are more intense in a social group → context info

Physiological Basis

True and 'fake' expressions → individual facial muscles  
Acting → Stanislavski 'system' and 'method acting' decompose the script and internalize the character's emotion  
Duchenne → the electrical stimulation of facial muscles

Basic Emotional Expression (Ekman)

6 primary emotions → Happy, Sad, Anger, Surprise, Fear, and Disgust  
each is produced by specific facial muscle combinations  
FACS → (Facial Action Coding System) way of measuring elementary muscle contractions that make up emotional expressions  
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 emotions

Neural Basis

Facial Paresis

Right Hemisphere damage (motor cortex/facial nerve) → elicited smile is left side paralysis, but the natural smile can contract (Volitional Facial Paresis)  
Left Hemisphere damage (insular cortex, thalamus) → elicited smile can contract, but the natural smile has paralysis on the right side (Emotional Facial Paresis)  
Therefore, two different neural systems for fake and real 'emotional' expression

### Asymmetry of the Face

Usually the left side of face is more expressive than the right side  
Right hemisphere is dominant for facial expression  
Most emotional expressions start on left side of face (monkeys)  
Monkey facial expression can be like Humans → have the same basic emotions, but not the same expression  
Monkeys have lipsmack, neutral, threat, fear, and yawn (stress)

### Lateralization of Emotion

Hemispheric specialization of facial expression recognition:  
Left hemisphere → words, meaning, speech  
Right hemisphere → facial expression, tone of voice 'prosody'

### Differences in the Sexes

Women use small amount of the brain for recognition and can register emotional expression before identifying it as a face  
Men use more of their brain for recognition and recognize that they are looking at a face before the emotional expression on it  
Women's brains are much more connected between the two hemispheres and can convert emotions to words better, but men are specialized in each hemisphere

### Empathy/ Stimulation

Recognition of emotion is impaired in patients with right somatosensory cortex damage (not visual cortex, amygdala, or prefrontal cortex)  
Recognition of emotion may involve 'internal stimulation'  
Mirror systems → (premotor cortex, in frontal lobe)

### Amygdala Damage

Specialized area for specific emotional expression?  
Amygdala → fear and danger → damage can depict other emotional expressions, but not fear  
Blind patients can recognize facial expressions → subcortical route to emotional visual information  
Most amygdala patients can express, but not recognize  
Amygdala is not involved in expression, but in recognition

Insular Cortex → Disgust

Contains primary gustatory cortex (taste)

Activated by sight and experience of disgust

Disgust → protection signal (personal and species)

Significant Summary

Emotions → fast and simple way of communicating a general state and intentions (e.g. face, voice, posture)

Darwin → something innate about facial expressions and they are useful for communication

Expression is not symmetric in humans

Productions are not symmetric in monkeys

Cat Lyons

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