Emotion

Exhausted  Confused  Ecstatic  Guilty  Suspicious  Enraged  Ashamed  Cautious  Shy  Depressed

Angry  Hysterical  Frustrated  Sad  Confident  Overwhelmed  Hopeful  Lonely  Lovestruck  Jealous

Embarrassed  Happy  Mischievous  Disgusted  Frightened  Bored  Surprised  Anxious  Shocked  Shy
Overview

- Basic concepts
- Theories of emotion
- Universality of emotions
- Brain basis of emotions
- Applied research: microexpressions
happy, sad, angry, joyful, moping, nervous, mad, bored, irate, content, raging, awestruck, infatuated, seething, brave, timid, doubtful, sorrowful, terrified, resentful, heart-broken, elated, agreeable, scared, jealous, exhausted, furious, grief-stricken, sorrowful, captivated, disappointed, anxious, disgusted, frustrated, surprised, enthralled, depressed, (550 words)
Definition of Emotion

• Emotions are biologically-based responses to situations that are seen as personally relevant. They are shaped by learning, and usually involve changes in peripheral physiology, expressive behavior, and subjective experience.
Emotion vs. Mood

• *Mood* - diffuse, long-lasting emotional states

• *Emotion* - immediate responses to a specific object or situation
Dimensions of Emotion

- **Arousal**
  - High: excited, tense
  - Low: calm, lethargic

- **Valence**
  - Positive: elated, contented
  - Negative: sad, gloomy
Two Major Questions

• What is the relationship between our subjective experience and the underlying physiological state?

• What role does the interpretation process play in the identification of emotion?

• Three major theories:
  – James-Lange Theory
  – Cannon-Bard Theory
  – Schachter-Singer Two-Factor Theory
The James-Lange Theory proposes that we feel emotion (such as fear) after we notice our physiological responses to a stimulus event (seeing a snake).

“We feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we strike, cry, or tremble because we are sorry, angry, or fearful”  William James
Can peripheral body events influence emotions?

- Saussignan's (2002) experiment testing the facial feedback theory of emotion asked some subjects to hold a pencil between their teeth in such a way that their lips being pulled back like they would in a full-faced smile, and others were asked to hold a pencil between their lips in a way which prevented smiling.

- Alteration of facial expression can lead to changes in the subjective experience of emotions. The person on the left (pen in mouth) is more likely to report feeling happy than the person on the right (pencil on lip).
• Video stills from a study by Ekman and his colleagues (1983). They induced a man to make a fearful expression by instructions: (a) “Raise your brows and pull them together,” (b) “now raise your upper eyelids,” and (c) “now stretch your lips horizontally, back toward your ears.”
Problems for James-Lange

• Many emotions have very similar bodily changes, e.g., fear and rage—faster heart rate, increased in blood sugar, dilated pupils, hair stands erect.

• Changes in internal organs occur much more slowly than our experience of emotion.
The Cannon-Bard theory claims that we feel emotion at the same time that our bodies respond.
Schachter-Singer Two Factor Theory

- Our interpretation of an emotional event leads us to put a cognitive label on that event based on context (such as, “I am afraid”).
- Then, our body’s physical around and cognitive label for the event combine to create our actual experience of emotion.
Testing the Two Factor Theory

- Participants injected with adrenaline or placebo
- Some were informed of the effects of the injection
- Exposed to an euphoric or angry environment
- Results: those who were not informed of the effects of the injection attributed emotion to environment and experienced the contextually appropriate emotion.

Schachter and Singer, 1962
Further Evidence: the creaky bridge experiment

• Those who met the attractive investigator in a scary situation were more likely to call for a date.

• The arousal state can be misinterpreted—misattribution of arousal.

Dutton & Aron, 1974
Are emotions universal?

Match the faces to the emotional states of

- Disgust
- Fear
- Anger
- Happiness
- Sadness
- Surprise
Emotions across species
Comparison of blind and sighted athletes who just lost a match for a medal.
Isolated New Guinea tribe

- Ekman and Friesen (1971) tested tribesmen of Papua New Guinea.
- Observed that members of an isolated culture could reliably identify the expressions of emotion in photographs of people from unfamiliar cultures.
- Concluded that the expressions associated with some emotions were basic or biologically universal to all humans.
Six basic emotions
(Ekman et al. 1960s)

Match the faces to the emotional states of
• Disgust
• Fear
• Anger
• Happiness
• Sadness
• Surprise
Recognition of Emotions

<table>
<thead>
<tr>
<th></th>
<th>Western</th>
<th>Non-Western</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td>79%</td>
<td>62%</td>
</tr>
<tr>
<td>Disgust</td>
<td>81%</td>
<td>69%</td>
</tr>
<tr>
<td>Fear</td>
<td>77%</td>
<td>63%</td>
</tr>
<tr>
<td>Happy</td>
<td>95%</td>
<td>87%</td>
</tr>
<tr>
<td>Sadness</td>
<td>87%</td>
<td>75%</td>
</tr>
<tr>
<td>Surprise</td>
<td>87%</td>
<td>78%</td>
</tr>
</tbody>
</table>
Functional purpose of expressions

• Expressions clearly serve communicative purposes but where did the particular expressions come from? *Do they serve an adaptive function for the sender?*

• Susskind et al. (2008): expressions can enhance/decrease sensory acquisition
  – Fear: eyes have wider field of view, faster eye movements, increased air velocity and nasal capacity
  – Disgust: smaller field of view, decreased nasal air flow
Brain Basis of Emotion

• Two important limbic system structures
  – **Insula**
    • receives and integrates somatosensory signals from the entire body.
    • Active when people experience disgust.
    • The insula is also activated in a variety of other emotions, including anger, guilt, and anxiety.
  – **Amygdala**
    • processes the emotional significance of stimuli, and it generates immediate emotional and behavioral reactions.
Animals with Amygdala Lesions

Rats lose fear of cats

In primates, loss of threat appreciation, leading to impaired social fitness

Impaired fear conditioning: intact unconditioned response but failure to learn from warning signals

Blanchard & Blanchard (1972)
Rosvold et al. (1954)
Medina et al. (2002)
Instructed Fear

- Amygdala also responds to the verbally communicated threats without ever directly experiencing adverse event

- Experiment: subjects were told that a yellow square (threat) represents an aversive event (a shock may be given), whereas another (blue square) represents safety (no shock will be given)

- No shocks ever presented (except at the very end of experiment)

Phelps et al. (2001)
Patient SM: “Woman with no Fear”

- Damaged amygdala due to rare genetic disorder (Urbach–Wiethe disease) but spared hippocampus, neocortex

- Impaired fear processing - is reportedly not disturbed at all watching horror movies or observing spiders/snakes

- Poor decision making in life - “too friendly”
  - No sense of personal space
  - Impaired recognition of negative social cues
Patient S.M.’s drawings of basic emotions

HAPPY

SAD

ANGRY

SURPRISED

DISGUSTED

AFRAID
Amygdala and Emotional Memories

• Adaptive purpose of emotion: enhance some memories
• Experiment by Cahill et al. (1996): subjects viewed emotional arousing and neutral film clips. Memory tested three weeks later
• Amygdala activation during encoding predicted later recall

![Graphs showing emotional and neutral film sessions](image)

Larry Cahill
Reading the Mind in the Eyes Test

• Task involves describing the emotional/mental state of a person based on only an image of their eyes

• Test yourself:
  – Or: [http://socialintelligence.labinthewild.org/mite/](http://socialintelligence.labinthewild.org/mite/)

• Score correlates with empathy tests

Distinguishing genuine and false smiles

Test yourself:
https://www.surveymonkey.com/r/SmileRead?sm=IP3TXB16%2BFxZupl1n0jCEScHwUamvmdenuj%2F0kpvxWY%3D
Difficult to inhibit true emotion?

- Darwin (1872, p. 79): “A man when moderately angry, or even when enraged, may command the movements of his body, but . . . those muscles of the face which are least obedient to the will, will sometimes alone betray a slight and passing emotion”
Ekman & Microexpressions

• Ekman argued that aspects of facial expressions are uncontrollable and can betray a deceiver’s true emotion to the trained observer

• Claim: true emotion may be manifest as a microexpression, a fleeting facial expression discordant with the expressed emotion and usually suppressed within 1/5 to 1/25 of a second

• Developed coding systems for microexpressions
<table>
<thead>
<tr>
<th>Emotion</th>
<th>Action Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surprise</td>
<td>Inner + Outer Brow Raise + Slight Upper Lid Raise + Jaw Drop</td>
</tr>
<tr>
<td>Sadness</td>
<td>Inner Brow Raise + Lower Brow + Lip Corner Depressing</td>
</tr>
<tr>
<td>Happiness</td>
<td>Cheek Raise + Lip Corner Pulling</td>
</tr>
<tr>
<td>Fear</td>
<td>Inner + Outer Brow Raise + Upper Lid Raise</td>
</tr>
<tr>
<td>Disgust</td>
<td>Nose Wrinkle + Lip Corner Depressing + Lower Lip Depressing</td>
</tr>
<tr>
<td>Contempt</td>
<td>Slightest Lip Corner Puller + Slightest Dimple</td>
</tr>
<tr>
<td>Anger</td>
<td>Lower Brow + Upper Lid Raise + Lid Tightened + Lip Tightened</td>
</tr>
</tbody>
</table>
1. eyebrows down and together
2. eyes glare
3. narrowing of the lips

1. drooping upper eyelids
2. losing focus in eyes
3. slight pulling down of lip corners
Ekman on microexpressions

https://www.youtube.com/watch?v=_ojT2k6Cwss

Do a test: http://www.microexpressionstest.com/micro-expressions-test/

More examples:
https://www.youtube.com/watch?v=bu3ayOWHX0w
https://www.youtube.com/watch?v=QLgU7FTVkc8
Scientific basis for microexpressions?

• Porter & Ten Brinke (2008) study
  – Happiness/sadness/fear/disgust inducing pictures
  – participants were shown a picture (e.g. happy) and respond with genuine (e.g. happy) or faked expression (e.g. fear)
  – Microexpressions were coded

• Findings:
  – Inconsistent microexpressions occurred more frequently in faked expressions – especially in lower face region
  – However, microexpressions are not reliable enough to distinguish genuine vs. faked expression
TSA’s SPOT program

• Based on Ekman’s claims, since 2007, the U.S. transportation agency has trained hundreds of “behavior detection” officers in Screening of Passengers by Observation Techniques (SPOT) program

• Detect suspicious facial and behavioral indicators
  – Too much fidgeting
  – Gazing down
  – Cold stare
  – Widely open staring eyes
Effectiveness of SPOT

• A 2013 GAO report found no evidence that SPOT program is effective

• Metaanalysis across 400 deception studies showed that people are 54% accurate in detecting deceptive behavior (barely better than chance)

• Training people does not improve performance