1. **Introduction to the Study of Emotion**

   **Darwin**, study of evolution of expression of emotion
   
   Emotional expression, like other behaviors, are products of evolutionary selection/factors (e.g. survival of fittest, natural selection)
   
   That emotional expressions evolved from behaviors that signaled what the animal was likely to do next (a form of communication)
   
   That such signals benefited the signaler (and maybe the signal receiver who was a close relative of the signaler)

   That very clear signals were of greater benefit than ambiguous ones… and hence that “opposite” emotions (e.g. fear and aggression) were composed of very different (“opposite”) behaviors (so that they would never be mistaken for each other)

   Early studies of emotional expression in **humans**

   **James-Lange theory**: “I am crying so I must be feeling sad”

   That cognitive perception of loss --- autonomic & somatic responses --- feelings

   **Cannon-Bard theory**: That cognitive perception of loss --- leads to both autonomic/somatic responses and the feelings of sadness simultaneously

   How it appears of most people”: The cognitive perception of loss --- feeling of sadness --- autonomic/somatic responses (“I feel sad, so I cry”)

   modern biopsychology view: that cognitive perception (frontal lobes), feelings of emotion (limbic system* & frontal lobes), and autonomic/somatic behaviors (limbic system, hypothalamus, somatic & autonomic NSs) **all interact with each other**, not a linear relationship

   *amygdala, mammilary bodies, hippocampus, fornix, cingulate gyrus, septum, olfactory bulbs, & hypothalamus
EMOTION, STRESS & HEALTH (p.2)

e.g. Kluver-Bucy Syndrome
damage to anterior tips of temporal lobes (esp. amygdala)
hyperorality (indiscriminate eating)
hypersexual (indiscriminate mating)
repeatedly explore/investigate what should be familiar objects (esp. orally)
total lack of fear, extreme tameness (altered dominance hierarchy)

2. **Emotions and Autonomic Nervous System**
Are different emotions (e.g. sadness vs. fear) associated with the same or different ANS responses?
James-Lange theory predicts **different, unique ANS responses**
Cannon-Bard theory predicts all emotions are associated with the **same general ANS arousal pattern** that prepares the S for action

This question has been very difficult to answer experimentally…why? The evidence seems to indicate that the answer lies in the middle, some specificity + some generality; some individual differences + some across individual generalities

e.g. **role of ANS responses in “Lie Detection”/Polygraphy**
record HR, GSR, breathing rate, etc.
assumption: when S tells a lie that ANS responses with show greater emotional arousal
test results run by a skilled examiner can be useful, but they are far from infallible (& are still, thus, inadmissible in a court of law)
Why?…

**Control question technique** (control questions vs. target questions)
In mock-crime studies, the average success rate is about 80%

**Guilty knowledge technique** (control questions vs. specific information questions that only the guilty party would know about)
3. **Emotions & Facial Expressions**
   As Darwin predicted, people of different cultures do indeed make very similar facial expressions in similar situations/expressing similar emotions & can thus correctly identify different emotions via facial expression in others (even in strangers from other cultures, races, sex, ages, etc.)

   Research indicates that there are **at least six “primary” emotions** expressed via facial expression: surprise/startle, anger/aggression, sadness, disgust, fear/anxiety, and happiness

   There is evidence that what facial expression you display can influence your emotional tone/experience…so be careful how your face looks…put on a “happy face” to feel happier

   Detection of “false” emotions or lies via facial expressions
   Ekman, 1985, “microexpressions” that last 5/100\(^{th}\) of a second, express the S’s true emotion, break through the false expression, can be detected by skilled observers

   Note: people in conversations with one another tend to mimic each other’s facial expressions, even though are not usually consciously aware of this and even if they are not aware of what the other person’s facial expression was
4. Stress & Health

All stressors (stimuli/situations that S considers a threat), whether psychological or physical elicit a **similar core physiological responses**

These physiological responses are of themselves not harmful to one’s health as long as they occur briefly, in acute situations.

In fact, these responses are adaptive and have positive survival value.

But…if these responses occur for long periods of time, become **chronic**.

then they can harm one’s health.

Why are they chronic? The environment? The person?

**The Stress Response (Selye)**

Hypothalamic - Anterior pituitary - Adrenal cortex system

(CRF)               (ACTH)                  (glucocorticoids)

high levels of glucocorticoids in the blood stream are used as an important measure of “stress”

associated with **depression**, with **impaired immune system** function,

increased **ulcers** in GI tract, **lower levels of testosterone** (e.g. as seen in cases of “subordination stress” in males)

**The SNS Stress Response**

Hypothalamic – Sympathetic NS – Adrenal medulla system

(epinephrine & nor-epi)

associated with high **cardiovascular reactivity, HBP**

associated with **anger, rage, hostility**

both of these stress responses if chronic can lead to physical illnesses and to psychological problems

*e.g. Ss showing more stress before surgery recovery more slowly*
5. **Psychoneuroimmunology: Stress, the Immune System & the Brain**

Stress can reduce a person’s resistance to infection.

Stress reduces the IS’s ability to function (e.g. fewer T cells, fewer B cells, Fewer NKCs).

Many events can --- lowered IS function

e.g. **inescapable, unpredictable** electric shock or loud noise
repeated social defeats
overcrowding
the odor of stressed conspecifics
maternal separation….all in animal models

final examinations
chronic sleep deprivation
divorce
bereavement
caring for a relative with Alzheimer’s disease (severe chronic illness)…
all in humans

“**learned helplessness**” (& depression)
“mastery training” & improved IS functioning
sense of **control** over adverse events, sense of **resources** at one’s disposal
**attribution theory** (Seligman)

note: T & B lymphocytes both have RSs for glucocorticoids
these cells also release neuropeptides
cytokines are released by both neurons and by lymphocytes
(thus, **close relationships/communications between NS and IS**)

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note: **stress & the hippocampus**
hippocampal neurons have very high # of glucocorticoid RSs
high stress levels (even only a few hours) --- structural changes in
hippocampal neurons (e.g. dendrite shrinking, decreased neurogenesis,
increased neuron loss)…esp. in males
6. **Fear & the Amygdala**

    amygdala is made up of many subregions/nuclei
    the “amygdaloid complex”
    amygdala receives inputs from all sensory systems
    seems to “analyze” the emotional significance of each sensory stimulus
    and to learn/retain that information

    seems to be the neural basis of fear, anxiety, “panic attacks”

    amygdala --- PAG (periaqueductal gray) --- defensive responses/postures
    amygdala --- hypothalamus --- SNS responses

    if amygdala is destroyed --- S cannot exhibit any learned fear conditioning
    e.g. **Urback-Wiethe disease** – progressive calcification of amygdala
    loss of ability to recognize the facial expression of fear
    cannot describe fear-inducing situations
    cannot draw fearful facial expressions