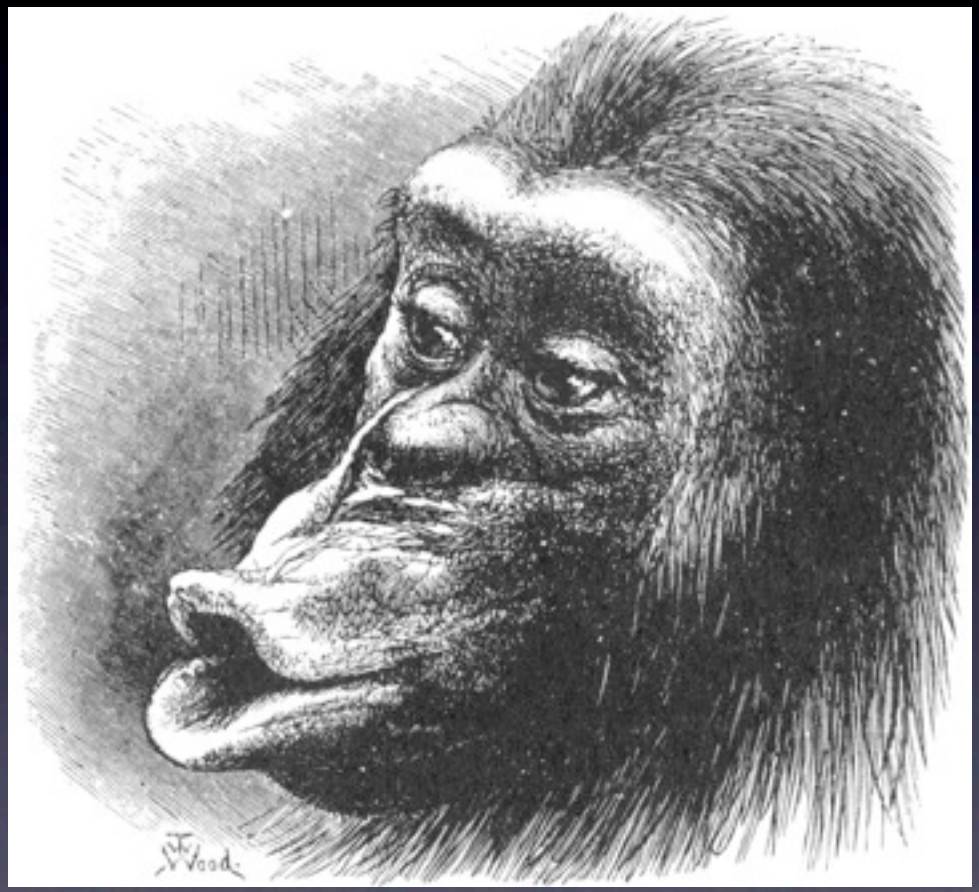
The Evolution and Function of Emotions

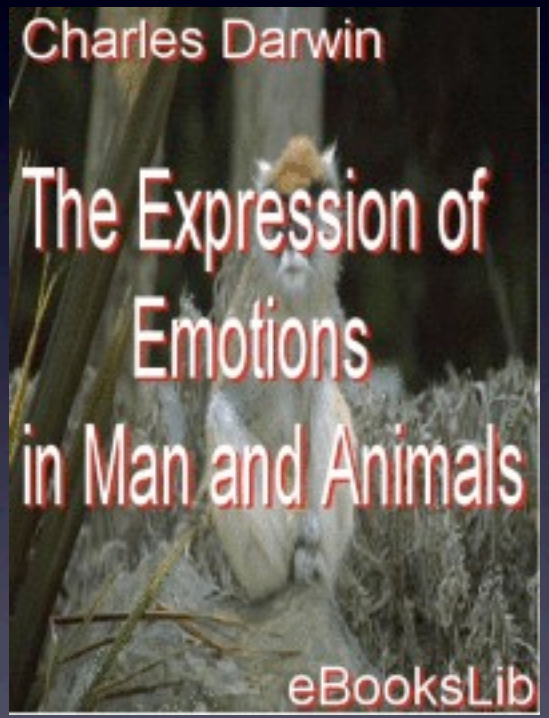


Psychology of Emotion
Lecture 4
Professor David Pizarro

Big question...

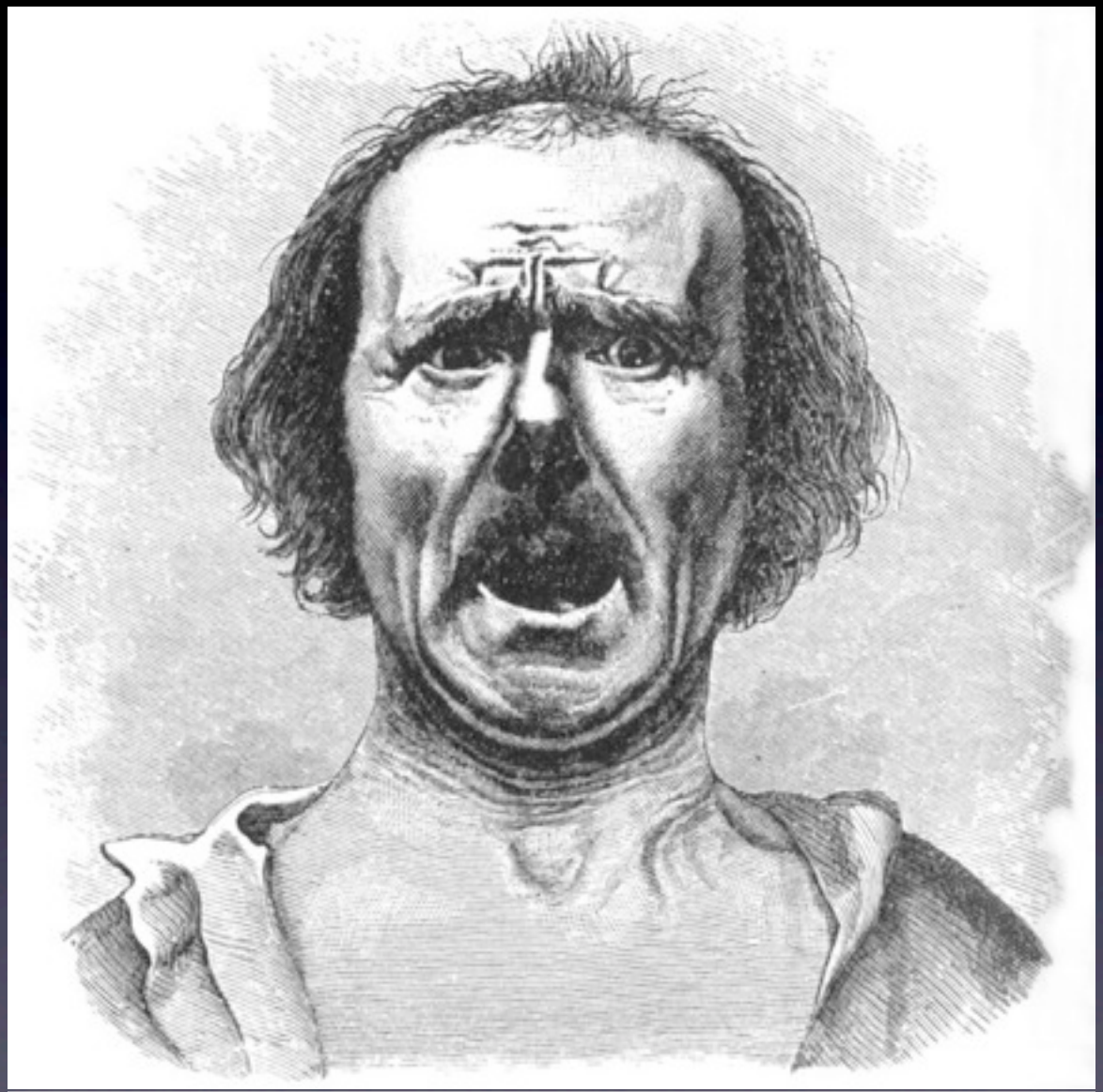
How much of our emotional experience is a product of Evolution by Natural Selection?

What started it all...



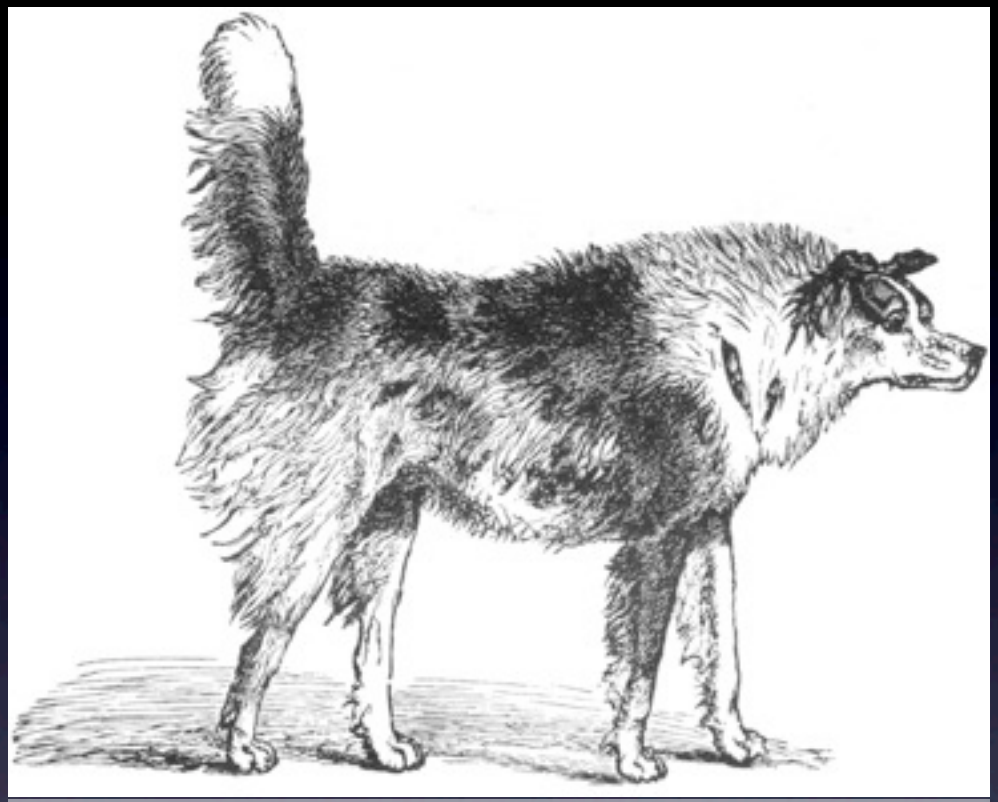
Darwin's book...

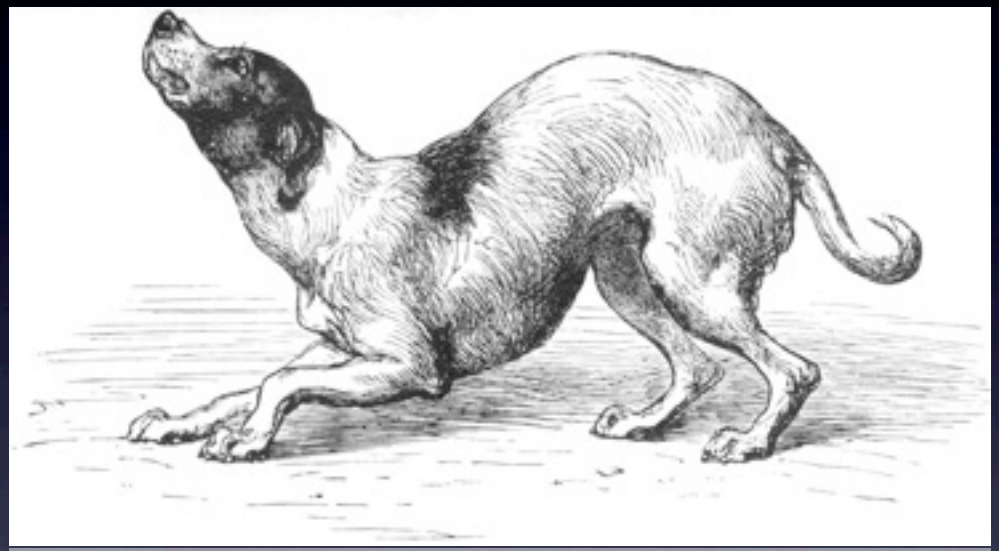
- Immediately a bestseller (selling over 5,000 copies!!)
- First serious scientific treatment of the area
  - hundreds of surveys
  - detailed observation of normal people and "imbeciles"
  - even recording grief expressions in his own family after a death



Darwin's 3 principles of emotion

- Principle of *Habit-* animal learns a behavior/ reaction that makes them feel good, they are likely to repeat it in similar situations. (surprisingly "nurture" over "nature")
- Principle of *Antithesis-* An "opposite" situation will lead to an opposite reaction.
- Principle of *Involuntariness-* Many reactions are purely physiological and bypass the "will" entirely





Principle of "antithesis": Threat vs. Submission

Darwin's 3 principles of emotion

- First and third (habit/involuntariness) received bulk of attention.
- But especially the claim that emotions are evolved and transmitted.
- But Darwin's claim was strangely "Lamarckian." Appealed to the inheritance of acquired characteristics.

Darwin's claims stimulated research on:

- Cross-cultural similarities in emotion
- Comparative emotions (i.e, emotion in animals)
- Facial expression
- Functional appraisal theories of emotion

We know more: Basic Neo-Darwinian Principles

- You need an environment to adapt to
- You need reproduction
- You need genetic variability
- Genes that provide a survival advantage more likely to be passed on (dead animals don't have kids)

So are emotions a result of natural selection?

Evolution & Emotion: Distinguishing Claims

- **"Trivial"** Claim: NS led to the current version of humanity, therefore evolution played *some* role in the presence of emotions. (not inconsistent with NS but not necessarily "adaptive").
- **"Weak"** Claim: NS shaped a great deal of human behavior, and most likely shaped some basic emotional reactions due to their adaptiveness.
- **"Strong"** Claim: NS directly shaped basic emotions, as they are *Functional* solutions to adaptive problems present in our evolution.

Senses of "functional"

- Emotions are "functional" in the sense that they help us achieve goals. Guilt makes me repair my social bonds. Nostalgia makes me reconnect with old friends.
- But they are "Functional" only if they aided in either:
  - Survival
  - Reproduction

Environment of Evolutionary Adaptiveness (EEA)

- Environment in which human beings evolved. e.g.,
  - Hunter-gatherer
  - Savannah
  - Strong social hierarchy
- "It is the statistical composite of selection pressures that caused the genes underlying the design of an adaptation to increase in frequency until they became species-typical or stably persistent" (Tooby & Cosmides, 1990)

“Strong” Evolutionary Approach (Tooby & Cosmides)

Emotions as "Programs"

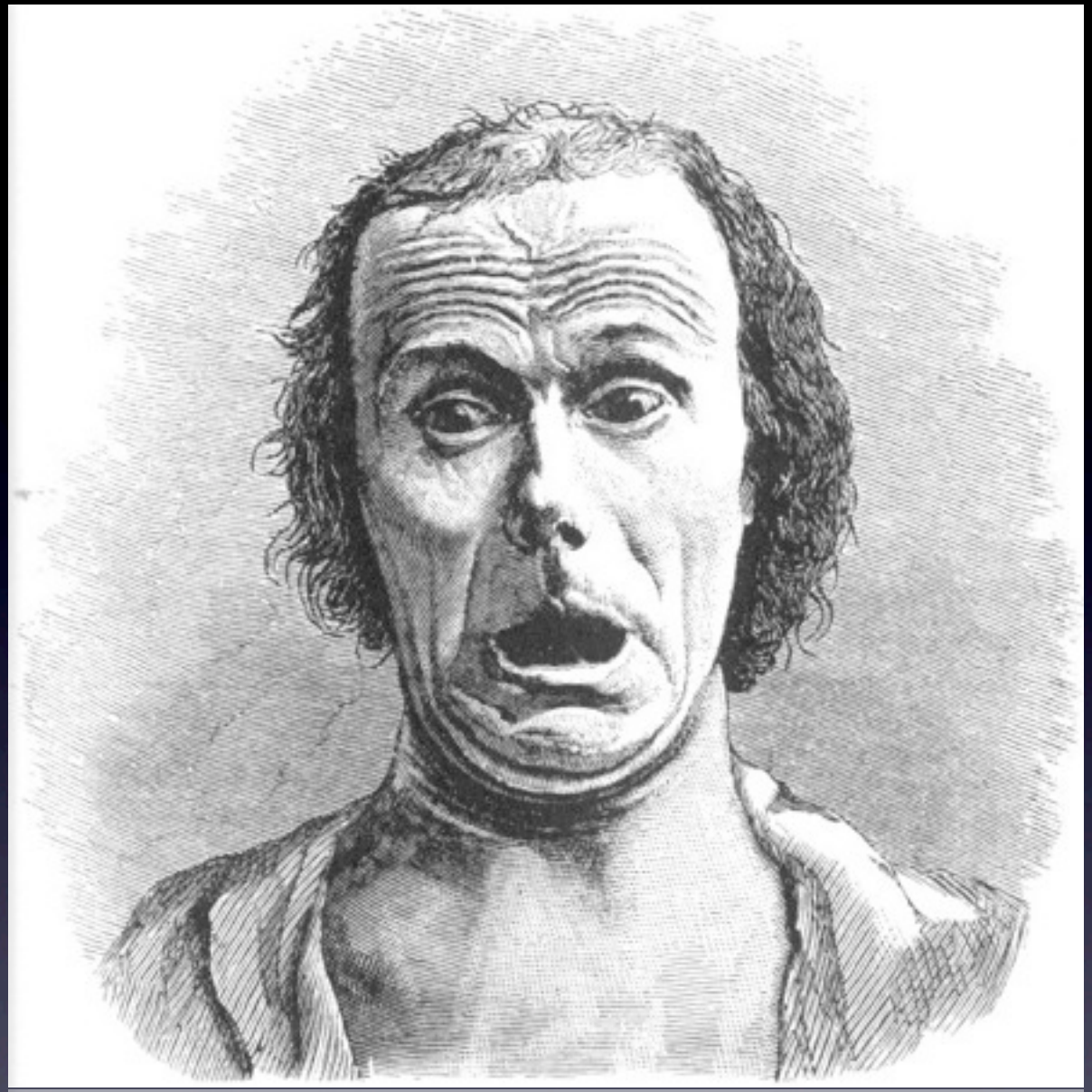
- Mind is composed of a variety of modules, or mini-computers. (mental "organs")
- They evolved to solve certain recurring evolutionary "problems"
- They are instantiated by certain reliable triggers in the environment
- Some programs have the authority to "override" other programs.
  - Example: "Fear" program overrides "Sleep" program.

Conditions for emotion to evolve

- Must have recurred ancestrally
- Could not be negotiated successfully unless there was a superordinate level of program coordination (needs an "interruptor")
- Eliciting situations had a rich and reliable repeated structure
- Had recognizable cues signaling their presence
- An error would have resulted in large fitness costs

So what do the "emotion programs" do?

1. Shifts in perception and attention
2. Priorities shift
3. Physiological responses, and judgmental/ memory processes change



Fear as Prototypical Emotion

Recurrent Situation in EEA

- E.g., being alone at night and hearing cues associated with human or animal predator.
- Individuals with a fear response more likely to survive.
- How?

1) Shifts in perception/ attention occur

- Creaks and rustling leaves all of a sudden are more vivid.
- “Signal detection” threshold shifts. More likely to assume the worst.

Twig or Snake?

2)Goal/Motivational Changes occur

- Safety becomes higher priority than rest
- Other goals take back-seat (e.g., resting, eating, attracting mate)
- “Focusing” of current goals--no longer thinking about future or past

3) Information-gathering is initiated

- Where are my relatives?
- Is there someone else around who can protect me?
- Is there a place I can go to get a better view?

4) Emotion-specific memory is activated

- Where is that tree I climbed the last time?
- Did I make anyone mad enough to come after me?

5) Specialized fear mechanisms are initiated

- Fear-conditioning occurs (mediated by amygdala activation)
- If threat is real, brain changes associated with PTSD can occur

6) Specific Physiological Responses Initiated

- Fight/Flight response.
  - Increased blood flow to peripheries
  - Increased oxygen intake
  - Cortisol/Adrenaline released/HPA axis activation

Summary: Fear “Program”

- Superordinate program that coordinates the activation of a number of sub-programs
- Development of such a program ensured survival for those who possessed it.
- Lacking this response made you die earlier, thus not able to reproduce.

What constitutes evidence of evolutionary origin?

- Present across cultures
- Innate (not necessarily present at birth)
- Universal elicitors
- Plausibly accounted for by mechanisms of NS
- Differential adaptiveness across sexes