



It came with the package

Evolutionary Theory



Evolutionary

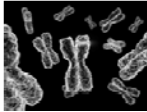
- role in evolutionary history
 - Darwin: Expression of Emotion in Man and Animals, 1859
 - Similarity of human expression to animals
 - Vestiges remain but expression did not evolve to communicate emotion
- Contribute to survival of species & individual
- Having certain emotions assures survival
 - can you think of an example?




Charles Darwin

Thoughts on Evolution

- Genetic information passed from parents
 - There can be mutations
 - Genetic 'accidents'
 - Adaptations
 - 'good' mutations aid survival so propagate
 - 'bad' mutations undermine survival so die out
- Functional: increases chances (responsive to selection pressures)
 - you will survive
 - you will have more, viable offspring
 - your relatives (with your genes) will survive



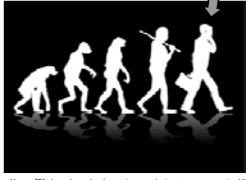
Natural Selection



A characteristic is functionally adaptive only in it's Environment of Evolutionary Adaptedness

EEA


- The social & physical environment that exerted the selection pressures
- Evolution is slow, taking generations to emerge
- Consider the EEA of human emotion as millions of years old
 - Extended family groups living on African Savannah as scavenger-hunter-gathers
 - Emotion evolved to facilitate small group survival, innovation, and connection
 - Can you think of emotions that would have helped?



Has our EEA changed enough to be exerting new selection pressures on emotional life?
(If the EEA changes significantly, the emotion may lose functionality)

Example


- Cooperation
 - We raise food, offspring, seek protection in groups
 - Individuals with emotions that promote cooperation, more likely to succeed in groups & survive/ reproduce
 - Moral emotions may have evolved as a result: gratitude, compassion, love



Testing Evolutionary Assumptions

- What kind of evidence would we want to demonstrate to support evolutionary theory?

- 1 • Emotion must be Functionally Adaptive (FA)
 - In the EEA, led to increased survival (genes)
 - (If the EEA changes significantly, the emotion may lose functionality)*
- 2 • Emotion must be Universal
 - Will be seen in all humans world wide
 - Universal autonomic arousal
 - Universal, recognizable display
 - Universal antecedents
 - Will be present in animals with shared heritage



Rapid Response as FA

Problem solving scripts

- Detecting faces
- Detecting mistakes
- Risk evaluation
- Figuring out internal states of others
- Many, many others

Super-ordinate Neural Programs


- This is What Emotions ARE
- The orient & organize
 - When called for emotions arise
 - and
 - Coordinate scripts
 - Prioritize their importance
- Different emotions have different priorities

How would this be adaptive?

Other Adaptations

Intrapersonal

- Emotion facilitates appropriate behavior to benefit the individual's survival
- Explains many negative emotions: anger, disgust, fear



Adaptations would suggest emotions are useful, functional



Social

- Humans are highly social
- Some emotion facilitates committed, interdependent relationships that benefit survival
- Explains
 - love: commitment to another's well-being;
 - Embarrassment: understanding a violation of social norms

Questions of Universality: Primates

Humans to...	Chimps	Gorillas	Orangutans	Gibbons	monkeys
% shared DNA	98.2%	97.6%	96.4%	94.8%	92.7%


Sibley and Alquist, 1984, Journal of Molecular Evolution
The phylogeny of the homoid species as indicated by RFLP-DNA hybridization.

Robert Sapolsky Primates display similar expressions in response to similar situations


Jane Goodall

- Observations of 160 chimps
 - Apprehension at a stranger
 - Fear in response to aggression
 - Annoyance at bothersome juvenile
 - Mourning after a death
- Much emotion is social
 - Establishing hierarchies
 - Repairing relationships
 - Bonding with tribal members
 - Protecting young



Big 6 (or 7 or 8) Basic Emotions

- Ekman's Universals
 - Anger
 - Fear
 - Sadness
 - Disgust
 - Happiness
 - Surprise
 - Contempt



Universal Facial Expression

- Darwin:
 - described emotional display; missionaries in 36 locations like Africa, Borneo, India, Ceylon, New Zealand confirmed them
 - "Is astonishment expressed by the eyes and mouth being opened wide and eyebrows raised?"
- Paul Ekman:
 - Showed six facial expressions and has asked dozens of people from around the world to identify the emotions expressed
 - Accuracy from 60-95%

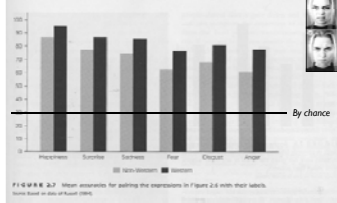





FIGURE 2.7 Mean accuracies for labeling the expressions in Figure 2.6 with their labels, score based on 1000/1000 trials.


FACS: Facial Action Coding System

- Ekman & Friesen
 - Identified exact pattern of muscle movements associated with basic emotions



Facial Elements

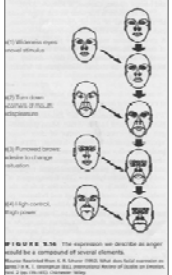
Interesting Application: Grimace Project



Emotion	Main Facial Expression	Muscles of the face
Happiness	Smile	Zygomatic Major
	Wide Eyes	Orbicular Frontalis muscle
Anger	Lifted eyebrows and cheeks	Buccinator muscle
	Frown and lowered eyelids	Procerus muscle
Surprise	Tightening of the jaw and chin	Mentalis muscle
	Eyebrows curved high	occipital frontalis muscle
Sadness	Smile on the forehead	frontalis muscle
	Wide open mouth	Orbicular oris muscle
Sadness	Crossed mouth	Orbicularis oculi muscle
	Corner of the mouth drooped	Depressor labii inferioris muscle


Remember this?

- Component Process Theory (Scherer, 1992)
 - Explains the possible meaning of each element
- Anger has 4 components
 - Unexpected event (widened eyes) also present in anger and fear
 - Displeasure (downturned mouth) also present in sadness and disgust
 - Desire to change situation (frown brows) also present in frustration and concentration
 - Sense of resolve or efficacy (tightened lips) also present in pride




A face you can trust?

- Smiles – when do we smile?
 - When embarrassed
 - When happy
 - When trying to appear happy, but really sad
 - When covering boredom
 - When appeasing
 - When flirting
- We obey cultural display rules
 - Timing, place, intensity
 - Learned rules
- HOWEVER
 - Micro-movements are tiny, nearly imperceptible facial movements that aren't under conscious control/ can't be masked (Ekman)
 - Example



Expanding Ekman

- Know emotion from:
 - A face in motion
 - Body posture
 - Gaze, tone of voice
- Research
 - Faster, more accurate ratings with face & voice together/ face & posture together
 - Detect from voice alone pretty well
 - Gaze
 - Toward a feared object
 - Down, if sad



Same face, different body

Robert Plutchik

links emotion to action

- Humans have typical/ prototypical/ adaptive emotional reactions to their environments

Prototypical Behaviors	Purpose	Emotional Response
Incorporation (taking in)	Taking in food/ stimulation	* Joy/ ecstasy
Connection	Reproduction/ Bonding	* Acceptance/ trust
Rejection	Expel what is harmful	* Disgust/ loathing
Protection	Avoiding danger	* Fear/ terror
Destruction	Removing barriers to goals	* Anger/ rage
Reintegration	Healing from loss	* Sadness/ grief
Orientation	Contact with novelty	* Anticipation/ interest
Exploration	Learning new things	* Surprise/ amazement

Plutchik, 1984: Structural Psychoevolutionary Theory of Emotion

Plutchik's Color Wheel of Emotion

Basic emotions vary in intensity
More differentiated at higher intensities

The diagram shows a central circle with eight primary emotions: joy, surprise, sadness, anger, fear, anticipation, disgust, and anxiety. These are arranged in a circle. Between them are secondary emotions: love (joy + trust), awe (surprise + fear), grief (sadness + anger), rage (anger + anticipation), contempt (disgust + anger), submission (fear + anticipation), aggression (anger + disgust), and terror (fear + disgust). The outer ring shows more complex emotions like admiration, submission, aggression, and terror.

Plutchik's 'Secondary' Emotions

Complex	Blend Basic	Opposite
Aggressiveness	Anger + Anticipation	Alarm!
Optimism	Anticipation + Joy	Disappointment
Contempt	Disgust + Anger	Submission
Alarm!	Fear + Surprise	Aggressiveness
Love	Joy + Trust	Remorse
Remorse	Sadness + Disgust	Love
Disappointment	Surprise + Sadness	Optimism
Submission	Trust + Fear	Contempt

Plutchik (and related theories)

We learned this in the first lecture

- Conceptual Ordering of emotion terms by subjects verifies the Emotion Color Wheel (Plutchik, 1984)
- This is true across cultures
- Language/ Concepts of emotions are Universal
- Subjects provided simple experiences associated with basic emotions. The emotion could be guessed from the actions taken (Frijda, 1986)
 - Action tendencies
- Emotions have universal/ prototypical/ survival related actions linked to them

Cognition/ Appraisal

- Emotion and Cognition are inextricably linked, so shouldn't appraisals also be Universal?
- How might we test this?
- Klaus Scherer, 1997
 - 37 countries, 5 continents
 - Situations for 7 emotions
 - Rate each situation for
 - Novelty
 - Pleasantness
 - Goal obstruction
 - External causation
 - Immortality
 - Relevance for self esteem

Appraisal Profiles Are Remarkably Similar! Universal

Physiological Response

- Robert Levenson, Paul Ekman, Karl Heider, Wallace Friesen, 1992
- Compared indigenous community in Indonesia & young Americans
- Held facial expression of anger, fear, sadness, disgust, happiness (based on Ekman FACS knowledge)

Similarity of response is striking
Statistically the same

Replicated using 'relived' emotional memories
No statistical difference between Asian and American skin conductance

A little back story


- Study (Fritz Strack, 1988) of people who lost control of their hands
 - Hold pencil in mouth
 - In teeth (activates muscles used for smiling)
 - In lips (does not)
 - Those in teeth condition
 - Rated cartoons as funnier
 - Felt happier
- A number of studies have replicated this:
 - Clench teeth, angry; slouch, less pride; frowning; angry; smile, happy; gaze into another's eyes, liking
- Explain this please!!!
 - sensations provided by emotional expressions, vascular changes, and other changes in the face are the source of the feelings of emotion

Will this work?

Conclusions

- at least 6 basic emotions universally expressed facially
- Conceptual understanding of emotions is Universal
- prototypical actions associated with each
- prototypical appraisals with each
- Some level of prototypical physiology with each

- Animal ancestors with shared genetics demonstrate similar patterns




A few pieces start to come together

From the Evo. Perspective

- Researchers tackle new emotions
- Speculate about the adaptive value
- Delineate the facial expressions
- Predict likely antecedent causes
- Predict likely actions
- **Hypotheses, right**

- **One Example: Embarrassment**
(UC Berkeley, 2011)
- Emotion of appeasement to keep one connected to the social group
- Making a mistake that might lead to ostracism
- Lowering of status which promotes trust: associated with altruism



WE CAN START TO ANSWER SOME OF THESE QUESTIONS

- What is and what is not an emotion? How are moods and feelings different?
- Is there emotion-specific physiology?
- Are there universal antecedents to emotion? Universal emotions?
- What is the function of emotion?
- Can emotion be unconscious? Can we control it?
- What is the relationship between cognition/ learning/ memory and emotion?
- How does emotion develop and can we alter our emotional responses as adults?
- How can we foster our own happiness and other positive states?

