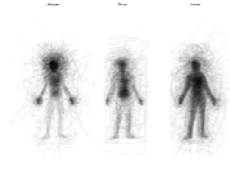


It's all about the body


'emotions use the body as their theatre' --Damasio



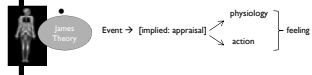
Where do you feel anger? Fear? Love?

William James


- 'Father of Psychology'
- Principles of Psychology, 1890
 - 2 volumes, 1200 pages, 12 years to write
 - James focuses on understanding the 'feelings' aspect of emotions
- Comments on emotion
 - "bodily changes follow directly the perception of the exciting fact and ... our feeling of the same as they occur IS emotion"
 - Typically we think... 'scary thing, I'm scared, I run'
 - James suggests we are wrong ... 'scary thing, heart races, I run **then** I'm scared.



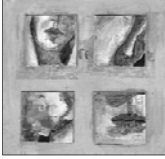
Wm. James, 1842-1910
American Psychologist/ Philosopher



Let's examine the pieces ...




- Appraisal: **Implied** by James but not discussed
 - Refers to automatic, non-conscious, 'bad' 'good' 'irrelevant'
- Physiology/ action: 'bodily changes' in James' words
 - Expressive behavior
 - Physiological changes
 - Instrumental acts
- Feedback from bodies determines feeling stronger than any cognitive component
- Each emotion has a distinct physiology
- Feeling: Phenomenological experience of the emotion
 - Arises from sense of what you notice your body doing



The pieces

Influenced by Evolutionary Theory

- James was a Darwinian; a 'functionalist'
 - All psychological phenomenon contribute to survival
- Bodily changes are evolutionary predispositions 'stamped upon the nervous system'
 - This means physiology will be unique for each emotion




Different events prompt different body changes

Carl Lange

James-Lange Theory of Emotion

- Independently published a similar theory about the same time as James
- Detailed the bodily changes that accompanied each emotion (sound familiar?)
- Emphasized the importance of changes in the muscles that impact blood flow (vasomotor changes)




Danish Physician and Psychologist
1834-1900

Strongest Critic: Walter Cannon


- Student of James' at Harvard
- Discovered flight/ fight response

He argued that:

- There are no unique profiles for emotion
 - AR of terror/ rage/ elation were the same (not true)
- Physical changes don't always produce emotion
 - Adrenaline shots didn't produce emotion (but aroused AR)
- AR is too slow to explain rapid emotional feelings
- Offered competing theory



Walter Cannon, 1871-1945
American Physiologist



Both omit discussion of role of cognition and sparked a generation of researchers who focus on the role of cognition in feeling states

Digression: Autonomic Nervous System

- Autonomic Nervous System
- Maintains internal condition of the body
- Sympathetic
 - Activating
 - "fight or flight"
 - mid spinal cord
- Parasympathetic
 - Restorative
 - "rest and digest"
 - upper/ lower spinal cord

More on ANS

- Sympathetic
 - Increases heart rate
 - Constricts blood flow
 - Impedes digestion
 - Constricts pupils
 - Stimulates goose bumps
 - Stimulates glucose release to blood
 - Impedes immune response
- Parasympathetic.
 - Decreases heart rate
 - Facilitates blood flow
 - Including sexual response
 - Facilitates digestion
 - Constricts pupils
 - Stimulates salivation, tears, digestive juices

Studying the ANS

- Measures of Autonomic Response
 - Heart rate/ electrical activity of heart (ECG)
 - Average number
 - length of beats
 - Pre-ejection of beat (bottom to top)
 - Blood Pressure (sys: active/ dias: resting)
 - Finger/ Facial Temperature
 - Breathing rate/ depth
 - Pupil dialation
 - Skin conductance (sweating)
 - Hormone levels in saliva
- Ones in red most sensitive to Para/ Symp differences

Body changes due to chemical shifts

- Hormones
 - Excreted by glands
 - Epinephrine/ adrenaline – activating
 - Cortisol – simulates metabolism, impedes immune system
 - Estrogen – mood enhancing
 - Testosterone – sexual desire, mood enhancing, some anger/ aggression

Cortisol release stimulated by hypothalamus by stress

Back to James & Cannon

Assessing Cannon's critique of specific emotion profiles

- Very early evidence (Ax, 1953)
 - Scared subjects with a machine smoking and shooting sparks
 - Angered subjects with 5 minutes of verbal abuse
 - Found fear and anger differed on 7 of 14 measures of sympathetic nervous system

More

Assessing Cannon's critique of specific emotion profiles

- Contemporary Work (Ekman 1990)
 - Directed facial action task
 - Disgust (and 5 other emotions)
 - Wrinkle your nose, raise upper lip, open mouth and stick out tongue
 - Coached and asked to Hold for 10 seconds

	Anger	Fear	Sad	Disgust	Surprise	Suspense
Heart rate (BPM)	5.6	5.5	4.2	.70	2.4	.23
Heart	.20	-.05	.07	.07	.01	.01
Temperature						
Wettable skin	-.61	.56	-.45	.52	.07	.07
Eyeblink						
Hand weakness	.01	.01	.01	.01	.01	.00

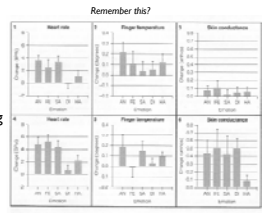
Source: Adapted from Levenson et al. (1990)

- Does this sound familiar? Let's look at the next slide

Physiological Response

Assessing Cannon's critique of specific emotion profiles

- 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)




Remember this?

Similarity of response profiles is striking
•Statistically the same

Meta-Analysis

Assessing Cannon's critique of specific emotion profiles

- John Cacioppo, 2000
 - There is evidence of unique profiles
 - Happiness: less arousal than negatives
 - Fear, anger, sadness: higher heart rate
 - Anger: higher BP than fear
 - Disgust: lower heart rate than other negatives




Will the pieces ever fit together?

The evidence endorses unique physiological profiles for emotions
But it provides unclear, incomplete information on specific profiles

One marker at a time

Are there unique emotion profiles?

- Heart Rate
 - Previous studies
 - Embarrassment: heart rate decreases (Leary, 1994)
 - Amusement: heart rate increases (Ruch, 1993)
- Blush
 - Embarrassment and fear: higher blood flow, cheek temperature, finger conductance in embarrassment (Shearn, 1990)




Results are more clearly supportive at this level

Back to James & Cannon... again

Are physical responses too slow to explain rapid response emotion?

- Measures of body responses
 - Blush: 15 seconds after event, feeling is felt far more quickly (Janig, 2003)
 - Facial expression: 1/5 second after event (Cannon, 2009)
 - True even if trigger events are not registered consciously
- Measures of Neuronal Firing (Kawasaki, 2001)
 - Fear/ Joy: 120 milliseconds after event (implanted electrodes, Kawasaki, 2001)
 - Anger: 200-300 milliseconds (EEG, Schupp, 2004)
- Seems our brains fire very rapidly and bodily responses vary in rapidity



Back to James & Cannon... again

Can emotion arise without physiological arousal?



- Cannon's research on animals
 - Cats with sympathetic NS severed from cortex display emotional behavior
- Research on Injury
 - Spinal cord injuries
 - Hohman, 1966 – site of injury predicted emotion/ more paralysis less emotion
 - Chwalski, 1988 – paralysis reduced intensity of emotion only
 - Bermond, 1991 – no loss in emotional experience
 - All based on memory and subjective reports
- Research on Disease
 - Pure Autonomic Failure – feel emotion less intensely
 - Locked-in syndrome – damage to pons & medulla, lose all muscular control
 - Limited information: tranquil, calm

Inconclusive answers – are subjects talking about bodily feeling or cognitive appraisal aspects of feeling?

Back to James & Cannon... again

Are we sensitive enough of our bodies to sense feeling state?


- Tracking heart beat
 - Computer records subject heart rate
 - Plays back exact replica
 - or a modified replica
 - Ask subjects to identify their own
- Mixed results, lots of individual variation
 - Men are better at this than women
 - Any idea why?
 - Men have stronger, longer lasting physiological reactions
 - Women rely on more social cues to ascertain emotion
 - Women equally accurate predicting own state in real life situations

more...

Are we sensitive enough of our bodies to sense feeling state?

- Cannon: people are insensitive to their bodies
 - During surgery, people do not feel intestines when cut or burned
- Emotional Response Coherence
 - Self reports of emotion related to physiological change
 - Very weakly correlated, lots of individual variation
 - Controlling for within subjects differences in how they define the 'tipping point' (chapter 4, pg. 94)
 - Amusement and Sadness: physiological profiles mirrored self reports




How plugged in are we to ourselves?

Facial feedback

Are we sensitive enough of our bodies to sense feeling state?

- Changes in Facial Expression alter feelings
 - Zajonc (1989) – blood constriction caused by facial muscles changes temperature which the brain experiences as emotion 'oo' sound, opposite of smiling, increases temp, unpleasant feelings
 - Hennenlotter (2009) – paralyzed from muscles temporarily with botox Brain responses to angry photos were weaker
 - Larsen (1993) – induced frown with golf tees rated events more negatively
- Maybe James was right...
 - James 'The Gospel of Relaxation'
 - Boston Normal School
 - "If our spontaneous cheerfulness be lost, sit up cheerfully, look around cheerfully, and act and speak as if cheerfulness were already there. If such conduct does not soon make you cheerful, nothing else on that occasion can." (James, 1899)

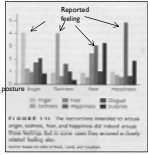



Facial expression is an important component of feeling

Body feedback

Are we sensitive enough of our bodies to sense feeling state?

- Changes in body posture alter feeling
 - Berkowitz (2003) – holding arms raised leads to aggression
 - Stepper & Strack (1993) – subjects asked to slump in chairs (elevating or lowering a desk) slumping led to more negative emotion
 - Flack (1999) – induced facial expression and postures for four emotions (under false guise) subjective ratings of emotion corresponded closely to induced emotions


Putting it all together...

Muscular changes trigger motor cortex which triggers ANS

Typically impact global good/bad ratings, more bodily feedback/ more specificity of rating

Conclusions

- James-Lange is more correct
 - IF
- Appraisal is explicitly added into the equation before bodily responses



As we move on to discussion of the brain we will come to understand this is greater detail