

WHY PSYCHOPHYSIOLOGY AND SOCIAL NEUROSCIENCE?

BACKGROUND

HISTORY

Advantages and challenges of the biological approach

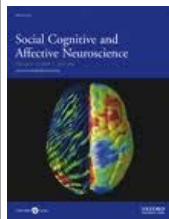
Books



Journals and Societies

Society for Social Neuroscience

<https://s4sn.org/drupal/>



SOCIAL & AFFECTIVE NEUROSCIENCE SOCIETY

<http://wih.harvard.edu/~scanlab/SANS/conference.html>



Social Neuroscience uses many approaches and techniques

- Patient studies
 - Lesions
 - Diseases
- Peripheral psychophysiology
 - Electromyography (facial, muscular, startle, etc).
 - Skin conductance
 - ANS – heart rate, blood pressure
 - Hormonal studies (e.g., cortisol, oxytocin)
- Central physiology
 - fMRI
 - PET
 - Eeg
 - TMS



Definitions

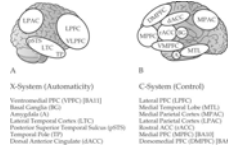
- **Social Neuroscience** is a discipline concerned with "the mapping of the relationships between psychological and physiological events."
- SN -- integrative field that examines how nervous (central and peripheral), endocrine, and immune systems are involved in sociocultural processes
- SN -- comprehensive attempt to understand mechanisms underlying social behavior by combining biological and social approaches (Cacioppo & Berntson, 2002).

Why do it?

Better access into mechanisms (e.g., social cognition, emotion)

Social perception and thinking

- Faces
- Theory of mind -- tpj, sts
- Self – mpfc
- Reflexive vs. Reflective elements



Emotions:

- Arousal – SCR, Valence – EMG, Motivation – CVS

Central questions of emotion:

- Emotion/Cognition interaction – fMRI of vmPFC
- Embodiment – e.g. TMS of somatosensory cortex

Causal interventions!

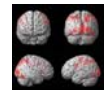
- Testing causal links in theories,
- Anti-depressives, anti-anxiety.
- Memory-improvement drugs.
- Neurolocalization (surgery-prep, but also basic knowledge).
- etc

Avoid problems associated with traditional measures (self-reports, RTs)

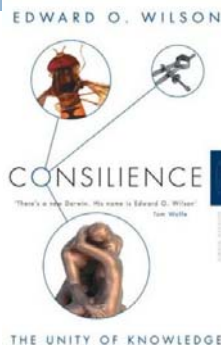
- Social desirability (e.g., I will say I like it because I should like it)
- Folk psychology (e.g., If I bought it, I must like it).
- Verbalizability/ Introspection -- many processes are non-reportable either due to their stage in processing chain, subtlety, speed, etc. (e.g., I can't report on my HR)
- Obtrusiveness
- Subjective/ Interpretation-driven

Advantages continued . .

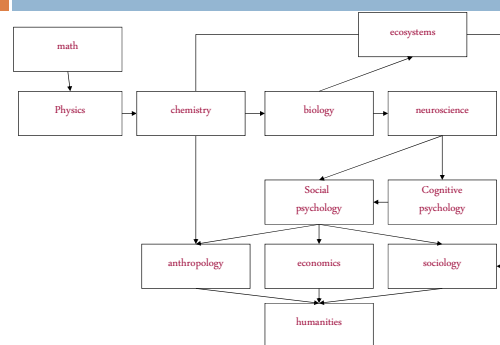
- However, notice that many other implicit measures have similar advantages (RTs)
- But, many of them do not offer:
 - On-line data collection (dynamic change)
 - Long, continuous, subtle events measurable
 - Multidimensional (RTs are one-dimensional)
 - Tap into bodily responses (often a specific one)



Fuller, more comprehensive, interdisciplinary understanding.



Consilience



History

□

Erasistratos (250 BCE). Doctrine of the Pulse:



Doctrine of humours

On the Temperaments,
Galen (131–201 AD)



Humour	Season	Element	Organ	Qualities	Ancient name	Modern	MBTI	Ancient characteristics
Blood	spring	air	liver	warm & moist	sanguine	artisan	SP	courageous, hopeful, amorous
Yellow bile	summer	fire	gall bladder	warm & dry	choleric	idealist	NF	easily angered, bad tempered
Black bile	autumn	earth	spleen	cold & dry	melancholic	guardian	SJ	despondent, sleepless, irritable
Phlegm	winter	water	brain/lungs	cold & moist	phlegmatic	rational	NT	calm, unemotional

Phrenology

- pseudoscience.
- Developed by German physician Franz Joseph Gall in 1796
- The cranial bone conformed in order to accommodate the different sizes of these particular areas of the brain in different individuals.
- 27 individual 'organs' that created one's personality



Modern Phrenology?

Social Perception



- | | |
|--------------------------------------|--|
| 1 posterior superior temporal sulcus | 5 amygdala |
| 2 fusiform "face" area | 6 inferior parietal lobule |
| 3 extrastriate "body" area | 7 ventrolateral PFC – pars opercularis |
| 4 occipital "face" area | 8 ventrolateral PFC – pars orbitalis |

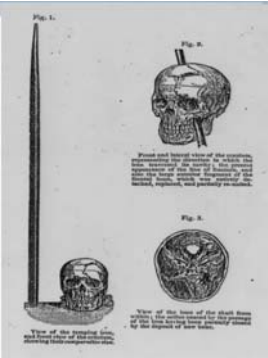
A few famous cases

Phineas Gage

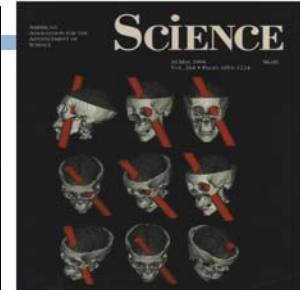
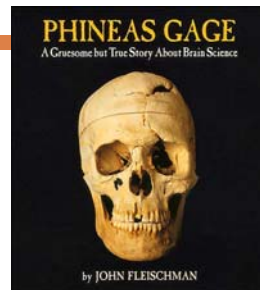
- Before Accident
 - Loyal & trustworthy
 - Dedicated to job and community
 - 25 years old
- Nature of Accident (13th. September 1848)
 - Walked away unassisted
 - No loss of language



Phineas Gage



Phineas Gage



- Damasio Analysis (Damasio, *et al.*, 1994)
 - Reconstruction from skull measurements
 - Ventromedial damage in both hemispheres
 - No dorsolateral damage

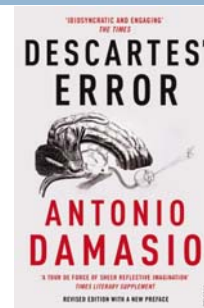
After the accident

- Capricious, childish, obstinate
- Offensive language
- Insensitive to external cues (e.g., weather)
- A new plan everyday (e.g., work vs. travel)
- Extensive wanderings



- The equilibrium or balance, so to speak, between his (Gage's) intellectual faculties and animal propensities seems to have been destroyed. He is fitful, irreverent, indulging at times in the grossest profanity ... impatient of restraint or advice when it conflicts with his desires.

John Harlow, 1868



Modern cases of Phineas Gage
Damage to the Orbitofrontal/ Ventromedial Prefrontal Cortex –
an area involved in liking emotion and cognition

Overlap of lesions in the VM patients (n = 13).

Red indicates an overlap of four or more patients.

Story of Elliott.

Prefrontal Lobotomy

Lobotomy anatomy
In a lobotomy, nerve fibers in the brain are cut, often leaving a patient apathetic and childlike.

Transorbital lobotomy
Stylus is pushed through the eye socket ...

... then it is rotated to cut the brain.

SOURCE: New England Journal of Medicine

- Moniz was awarded the Nobel Prize for Medicine, for his innovations in eurosurgery – 1936 paper describing lobotomy.
- Freeman -- "ice-pick" lobotomy 1945
- "With the patient rendered unconscious by electroshock, an instrument was inserted above the eyeball through the orbit using a hammer. Once inside the brain, the instrument was moved back and forth; this was then repeated on the other side"
- 3,500 operations, including Rosemary Kennedy
- lobotomized 25 women in a single day

A few famous cases -- Tan

- Paul Broca - French surgeon and anthropologist (1824-1880).
- Studied Aphasia. Developed the concept of functional localization by cerebral convolution.

Brain of "Tan" – Broca's patient unable to speak.
Lesion due to syphilis.

A few famous cases – H.M.

- HM. (1953) -- bilateral resection of the medial portion of the temporal lobes

MRI scan of "H.M."

NOTE THE RESULTS OF HIS BILATERAL MEDIAL TEMPORAL LOBE RESECTION AND THE REMOVAL OF THE HIPPOCAMPUS

http://thebrainobservatory.ucsd.edu/hm_live.php

Split-brain patients of Mike Gazzaniga (1970-ties)

- Commissurotomy – pioneered by Roger Sperry

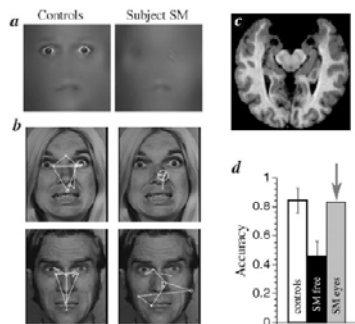
You need a mirror to see, clean out the chicken wire.

<http://www.youtube.com/watch?v=ZMLzP1VCANo>

Patients with Amygdala Damage of R. Adolphs, L. Phelps (SM, SP)

- Effect on fear, trustworthiness, eye fixations.

Amygdala's role in social perception



Summary:

- Phineas Gage (13th. September 1848)
 - Elliot
 - Lobotomy
- Tan – aphatic patient of Paul Broca - (1824-1880) -- the concept of functional localization by cerebral convolution.
- HM. (1953) -- bilateral resection of the medial portion of the temporal lobes
- Split brain (1961) – commissurotomy. Roger Sperry. Mike Gazzaniga
- Amygdala damage – SP, SM (1980-ties and 90-ties).