Courtney, Ryan & Tess

THE ASCENT OF SCIENCE 1815-1914

Introduction

THE ASCENT OF SCIENCE 1815-1914

SETTING THE SCENE

- **The Industrial Revolution transformed the face of Europe:**
  - As populations shifted rapidly from rural to urban living (and working), Europe's GDP grew, population doubled and government quadrupled
  - The state began to play more of a role in guiding peoples' lives
  - Bigger governments also became more democratic

SETTING THE SCENE

- **Science began to challenge religion as the central worldview:**
  - **Previously, science was respected, but hadn't yet accomplished much**
  - **Science led to Industrialization, and now the pace of change itself had shifted**
  - **Electricity, dyes, factories, railroads, shopping, and literacy changed how *everything* worked**

SETTING THE SCENE

- **Science began to challenge religion as the central worldview:**
  - **These shifts led science to be recognized as its own sort of religion**

W. A. Clifford (1845-1879):

People “have a universal duty of questioning all that we believe”; “it is wrong always and everywhere, and for anyone, to believe anything upon insufficient evidence”.

- **Comte even went as far as wanting a scientific Religion of Humanity to replace the worship of God**

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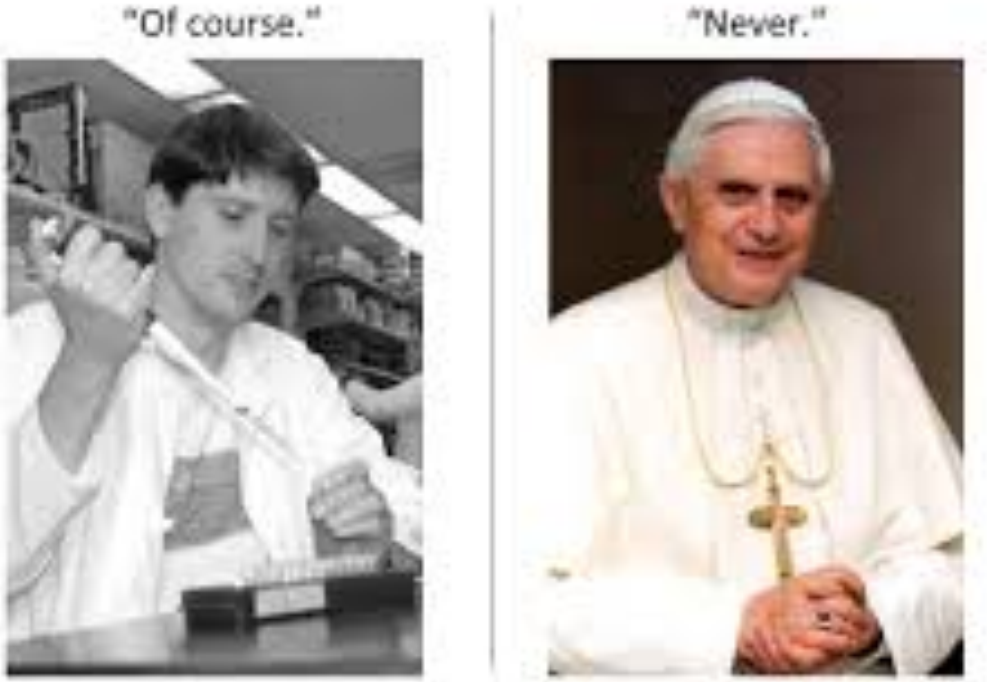
SETTING THE SCENE

"If I were able to **PROVE**, beyond a shadow of a doubt, with mountains of irrefutable facts proving them correct and you completely wrong, would you switch sides?"



SETTING THE SCENE

- **Psychology's impact:**
  - **Stepping in where religion was failing, people focused on psychology to learn about the soul.**
  - **Psychology also offered the people of the 19th century alternative, secular ways of thinking about the mind and human behaviour**

Leahey (p. 197):

" [Psychology] was shaped by religious yearning even as it undermined religious beliefs."

FIGHTING THE ENLIGHTENMENT

- **All romantics believed there was more in the universe than atoms and the void, and by unleashing passion and intuition, one might reach a world beyond the material**
- **They took psychoactive drugs, and were concerned with unconscious:**
  - **the primal and chaotic home of feeling and intuition which pushes humanity to strive for something better**
  - **(This foreshadows Freud)**

The Reassertion of Emotion and Intuition

MOVEMENTS

FIGHTING THE ENLIGHTENMENT

- **To the romantics, the mind was free and spontaneously active**
- **The will was thought of as a wild beast, and the romantics worshipped heroes who asserted their will and did not bow to the way of the world**

The Reassertion of Emotion and Intuition

FIGHTING THE ENLIGHTENMENT

- **Mind is not passive: it "casts intellectual light, actively reaching out and shaping the resulting experience."**
- **Romantics rejected the mechanical conception of society**
  - **"Scientific planning can kill a culture"**
- **But… the romantic movement was ultimately defeated by the continuing enlightenment**

The Reassertion of Emotion and Intuition

MOVEMENTS

JAMES MILL (1773-1836)

- **The mind is a "tinkertoy"**
  - **A passive, blank slate receptive to simple sensations**
  - **These sensations are joined together to create more complex sensations or ideas**

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The Continuing Enlightenment

JAMES MILL (1773-1836)

- **The mind is a "tinkertoy"**
  - **A passive, blank slate receptive to simple sensations**
  - **These sensations are joined together to create more complex sensations or ideas**
- **BUT:**
  - **Mill is the founder of utilitarianism**
  - **What might this mean for free will, reasoning, or attention?**
  - **Mill practiced his theories through the education of his son**

JOHN STUART MILL (1773-1836)

- **J. S. Mill eventually abandoned early utilitarianism's hedonism by introducing it to romanticism in the creation of libertarianism. To J. S. Mill:**
  - **The natural is better than the manufactured**
  - **A person's independent growth should be nurtured**
- **J. S. Mill recognized that the social sciences were, in principle, the same as the natural sciences and should use the same methodologies**
  - ***(A System of Logic: Ratiocinative and Inductive, 1843)***

JOHN STUART MILL (1773-1836)

- **J. S. built on his father's associationism, believing that the combination of some atomic ideas can create new complex ideas with properties not found in their parts**

"Colour fusion" is an example of J. S. Mill's ideas

JOHN STUART MILL (1773-1836)

- **He did not accept intuitionism nor voluntarism. In J. S. Mill's view, "One does not choose to see the white spinning disk; the experience is forced on one's perception by the conditions of the experiment." (Leahey, p. 200)**

POSITIVISM

- **Newtonian science applies the Newtonian spirit to the study of human nature and human affairs**
- **Described by Auguste Comte (1798-1857)**
  - **Comte was a public writer who wanted to bring about political and social change**

POSITIVISM AS SOCIAL THEORY

- **Comte described human history in 3 stages:**
  1. **Theological: People explained phenomena through religious and supernatural entities.**
     - Plato and Descartes (dualists) thought theologically, regarding the soul as nonmaterial and immortal entity.
     - People believed that the soul guided behavior
     - Priests and the clergy ran the government

POSITIVISM AS SOCIAL THEORY

- **Comte described human history in 3 stages:**
  2. **Metaphysical: Phenomena still explained by the unseen.**
     - These events were no longer thought of as divine, like angels, demons and Gods of the Theological stage
     - The soul in this stage was no longer considered immortal, but still as an unseen essence
     - Governing body was made up of aristocrats and philosophers, such as Plato and Aristotle

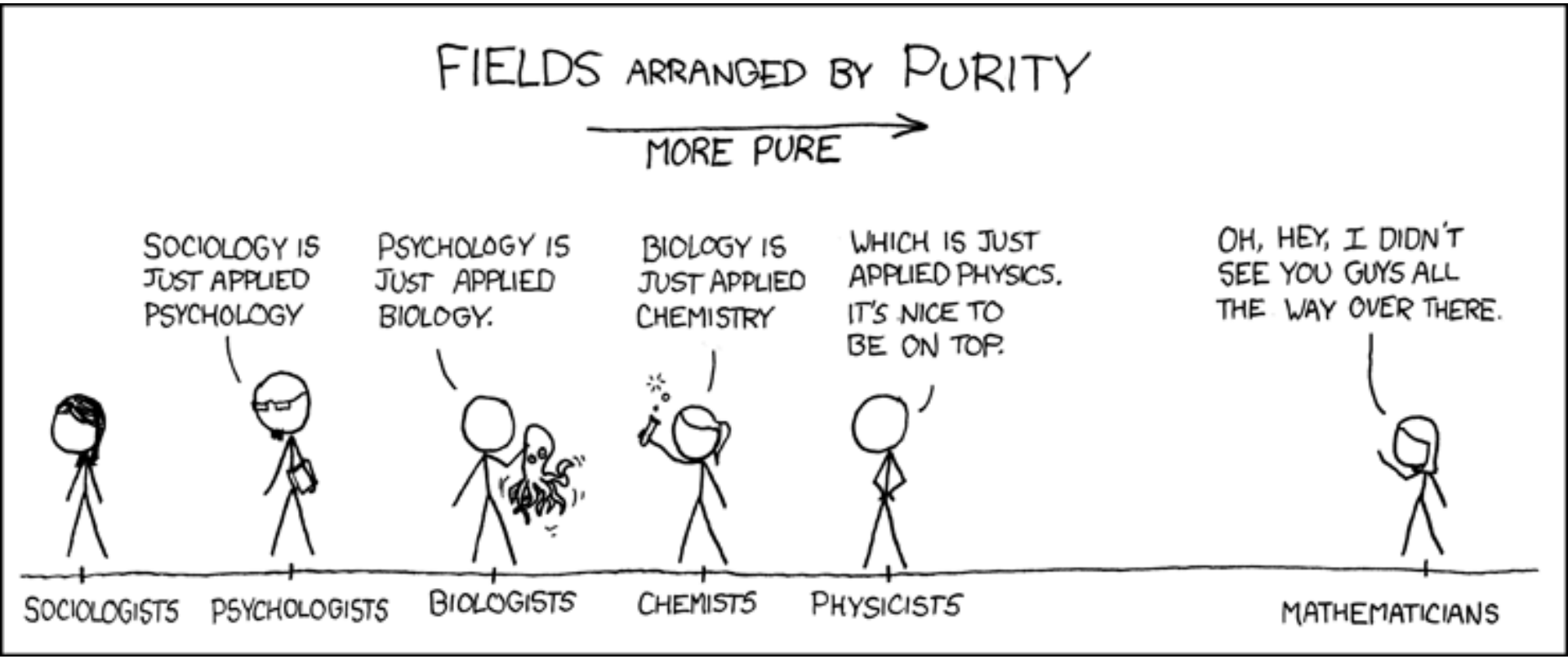
POSITIVISM AS SOCIAL THEORY

- **Comte described human history in 3 stages:**
  3. **Scientific: no longer believed in unseen entities.**
     - "Represented the triumph of the philosophy of positivism"
     - Positivist science does not concern itself with hypotheses that explain causation
     - Provide mathematical principles
     - In this final stage, scientists were the governing structure
     - Homo sapiens were considered the only power

POSITIVISM AND PSYCHOLOGY

- **“Psuche logos”: proclaimed dependence on the unseen construct that was the soul**
  - **This meant that the study of psychology was metaphysical and religious**
- **Comte described Science as a hierarchy**
  - **All sciences used a single set of methods used to predict and control, beginning at physics and ending with the complex science of sociology**
  - **This idea became logical positivism**

POSITIVISM AND PSYCHOLOGY



A Philosophy of and for Science

MOVEMENTS

POSITIVISM AND PSYCHOLOGY

- **Comte believed that science could be socially useful.**
- **German psychologists wanted psychology to be a pure science, staying away from the practical "psychotechnics"**
- **French, American and English psychologists believed that psychology should be socially useful**

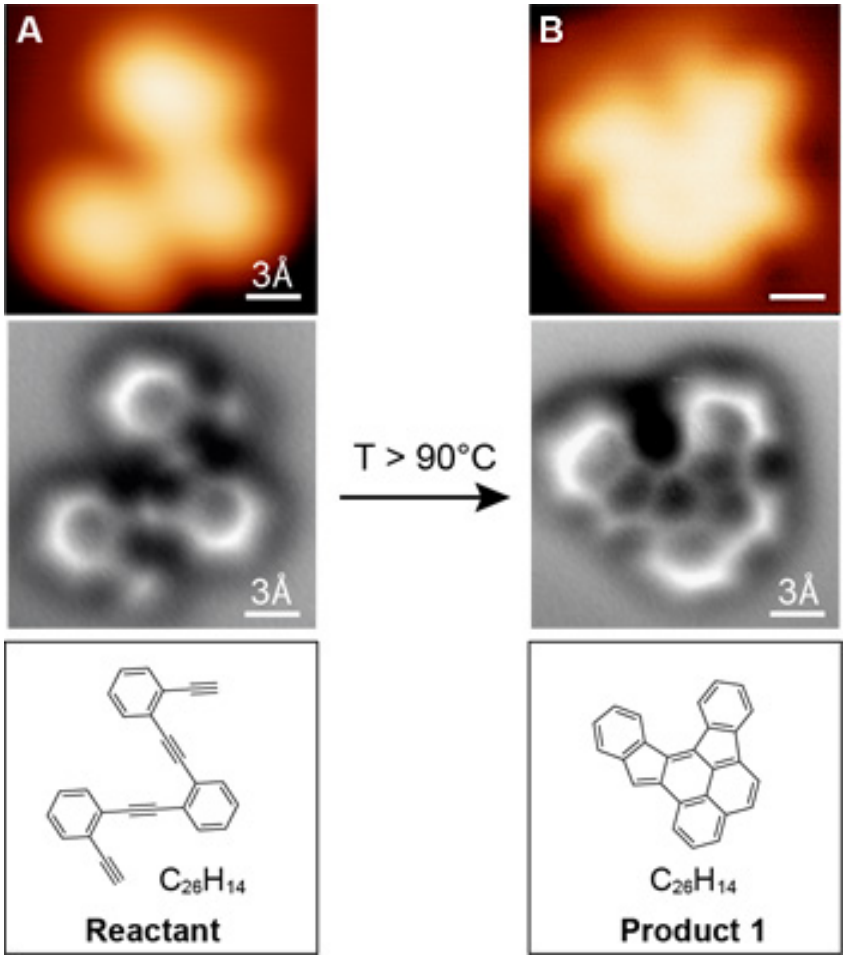
A Philosophy of and for Science

POSITIVISM AS A PHILOSOPHY

- **Ernst Mach (1838-1916)**
  - German physicist
  - Believed positivism to be a foundational philosophy for science
  - Viewed human consciousness as a collection of sensations
  - Goal of science is an economical ordering of sensations
  - "Scientific concepts had acquired metaphysical accretions in the course of their development and that the best way to strip them off and reduce the concepts to their sensory base was to study their historical development"

A Philosophy of and for Science

POSITIVISM AS A PHILOSOPHY



A Philosophy of and for Science

MOVEMENTS

POSITIVISM AS A PHILOSOPHY

- **Yet, positivism was controversial**
- **Wundt was critical of positivism**
  - **He thought that unperceived mental processes explained the conscious experience**
- **William James admired Mach; positivism was consistent with James' Darwinian pragmatism.**

POSITIVISM AS A PHILOSOPHY

- **B.F. Skinner; radical behaviorism, applied Comte's vision to psychology, defining his own idea of what psychology should be**
- **Skinner's main goal for science was for science to find lawful relations between variables in order to predict and control them**

A Philosophy of and for Science

TWO MOVEMENTS

- **Doubt in religion and the growing authority of science in the 19th century turned people towards science to explain and support their religious beliefs**
- **Two movements arose: mesmerism and psychical research**

MESMERISM

- **Mesmer tried to convince the medical establishment that “animal magnetism” (the passing of an invisible bodily fluid from one body to another) explained telepathy, clairvoyance, and precognition**
- **Some physicians began to use mesmerism as a cure for various diseases and as an anesthetic**

MESMERISM

http://www.youtube.com/watch?v=LUzZOGTkOtM#t=81

Naturalizing the Supernatural

MESMERISM

- Mesmerism was transformed to hypnotism (credit to James Braid, 1795-1860) once people uncovered the truth: the trance was due to psychological control of one person over another
- Braid called the hypnotic state “nervous sleep” that depended on the physical and mental condition of the patient

SPIRITUALISM AND PSYCHICAL RESEARCH

- **Psychical (mental) researchers sought to find adequate evidence of the immortality of the soul; Sidwick and Myers founded the Society for Psychical Research in 1882.**
- **Focused on Freud's hysteria, Myers believed it demonstrated the power of purely mental activity over the body, and that a hysteric's symptoms express unconscious desires**

Naturalizing the Supernatural

SPIRITUALISM AND PSYCHICAL RESEARCH

- **Like Freud, Myers formulated a theory of the unconscious, which Myers called the "subliminal self"**
- **It enables us to communicate with a spiritual world that transcends the material one. (demonstrating the separability of soul and matter)**

- Advances in physiology
- Advances in psychological experimentation

FRANZ JOSEPH GALL (1758-1828)

- **Up until now, psychology was (usually) part of philosophy**
  - **E.g., the philosophy came first**
- **Gall reversed this approach, and is now considered the founder of cognitive neuroscience**
- **He compared the brain and mental activity to the stomach and digestion and to the lungs and respiration**

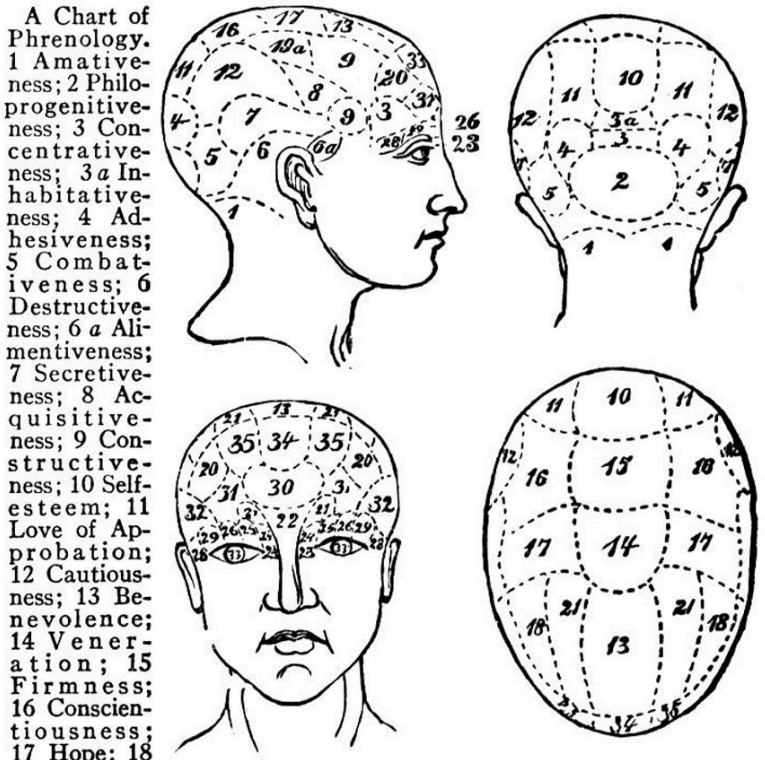
FRANZ JOSEPH GALL (1758-1828)

- **Gall also challenged the empiricism and associationism of his time:**
  1. The empiricists believed that experience was the proper approach to science, and yet empirical psychologists were themselves speculating, offering no concrete observations
  2. The philosopher-psychologists used “mere abstractions” to categorize the areas of psychology they were interested in (e.g., imagination, memory, attention) – none of these were specific enough to explain behaviour or individual difference
  3. Where speculative philosophers tried to determine the domains of the mind from sensation and association, Gall suggested that different capacities should be located in different areas of the brain and wanted to define those faculties through anatomy

FRANZ JOSEPH GALL (1758-1828)

- **Phrenology**
  - **Despite Gall's insight into neuroscience, the techniques of his time were unable to help him answer the questions he asked**
  - **He decided to pursue a related hypothesis: that well-developed mental faculties would correlate with "well-developed" parts of the brain**

FRANZ JOSEPH GALL (1758-1828)



A Chart of Phrenology. 1 Amativeness; 2 Philoprogenitiveness; 3 Concentrativeness; 3 *a* Inhabitativeness; 4 Adhesiveness; 5 Combativeness; 6 Destructiveness; 6 *a* Alimentiveness; 7 Secretiveness; 8 Acquisitiveness; 9 Constructiveness; 10 Self-esteem; 11 Love of Approbation; 12 Cautiousness; 13 Benevolence; 14 Veneration; 15 Firmness; 16 Conscientiousness; 17 Hope; 18 Wonder; 19 Ideality; 19 *a* (Not determined); 20 Wit; 21 Imitation; 22 Individuality; 23 Form; 24 Size; 25 Weight; 26 Coloring; 27 Locality; 28 Number; 29 Order; 30 Eventuality; 31 Time; 32 Tune; 33 Language; 34 Comparison; 35 Causality. [Some raise the number of organs to forty-three.]

Understanding the Brain and Nervous System

TOWARD THE SCIENCE OF PSYCHOLOGY

FRANZ JOSEPH GALL (1758-1828)

- **Phrenology**
  - **Nativistic**
  - **Comparative**
  - **Materialistic**
  - **Behaviouristic**
  - **Functional**
- **The “first objective psychology” (Leahey, p. 207)**
  - **Also the first that really focused on individual differences**

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  - **Scientifically, experimentally-minded psychologists began to search for the localization of functions in the brain...**

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    - **…and found that Gall's system didn't work terribly well**
      - **… or at all, really**
        - **"The entire system was violently rejected as a sham and fraud…" (Leahey, p. 207)**

FRANZ JOSEPH GALL (1758-1828)

- **Phrenology's impact:**
  - **Scientifically, experimentally-minded psychologists began to search for the localization of functions in the brain…**
  - **Pseudoscientifically, the idea took off.**
  - **Johann Caspar Spurzheim (1776-1832) used phrenology to create the first pop psychology, and "bump reading" spread throughout the US**

JEAN-PIERRE-MARIE FLOURENS (1794-1867)

- Gall's biggest critic, and a pioneer in experimental brain research
- Used lesioning and ablation; discovered the functions of lower parts of the brain
- Believed the hemispheres acted as a unit, with no localization of function
- Flourens was influenced by Cartesian dualism: if the soul is unitary, so are the hemispheres
- Because of Flourens' status, his theory of "mass action" remained unquestioned for decades

MAGENDIE (1783-1855) & BELL (1774-1842)

- **Discovered afferent and efferent nerves**
- **Magendie took this theory further, experimenting on living animals to prove it**

BROCA (1824-1880)

- **Broca's patient, Tan, had damage in the left frontal lobe when autopsied**
- **Broca had opposed Gall's theories but accepted this as evidence for the localization of function**

FRITSCH & HITZIG (1870)

- **Electrical stimulation of the cerebrum elicited movement; different parts control different movements**

NEW FRONTIERS

- The findings of Fritsch and Hitzig influenced the mapping of the brain, leading to sensory and motor function areas being located
- Reflex theory became a new challenge for the field of psychology:
  - The Cartesian theory of consciousness was that brain connects stimuli and responses, the mind connected ideas.
  - Now, reflex theory connected the mind and brain
- A challenge: how much does the brain do without consciousness?
  - (Leahey, p. 208) "the nature and causal status of consciousness remain a puzzle even today"

INVENTING METHODS FOR PSYCHOLOGY

- **Newtonian science relies heavily on quantitative measures; without quantitative measurement laws are not created**
- **In the 19th century, there was a growing emphasis on experimentation**
- **New experimental and mental measurements opened the path for psychology.**

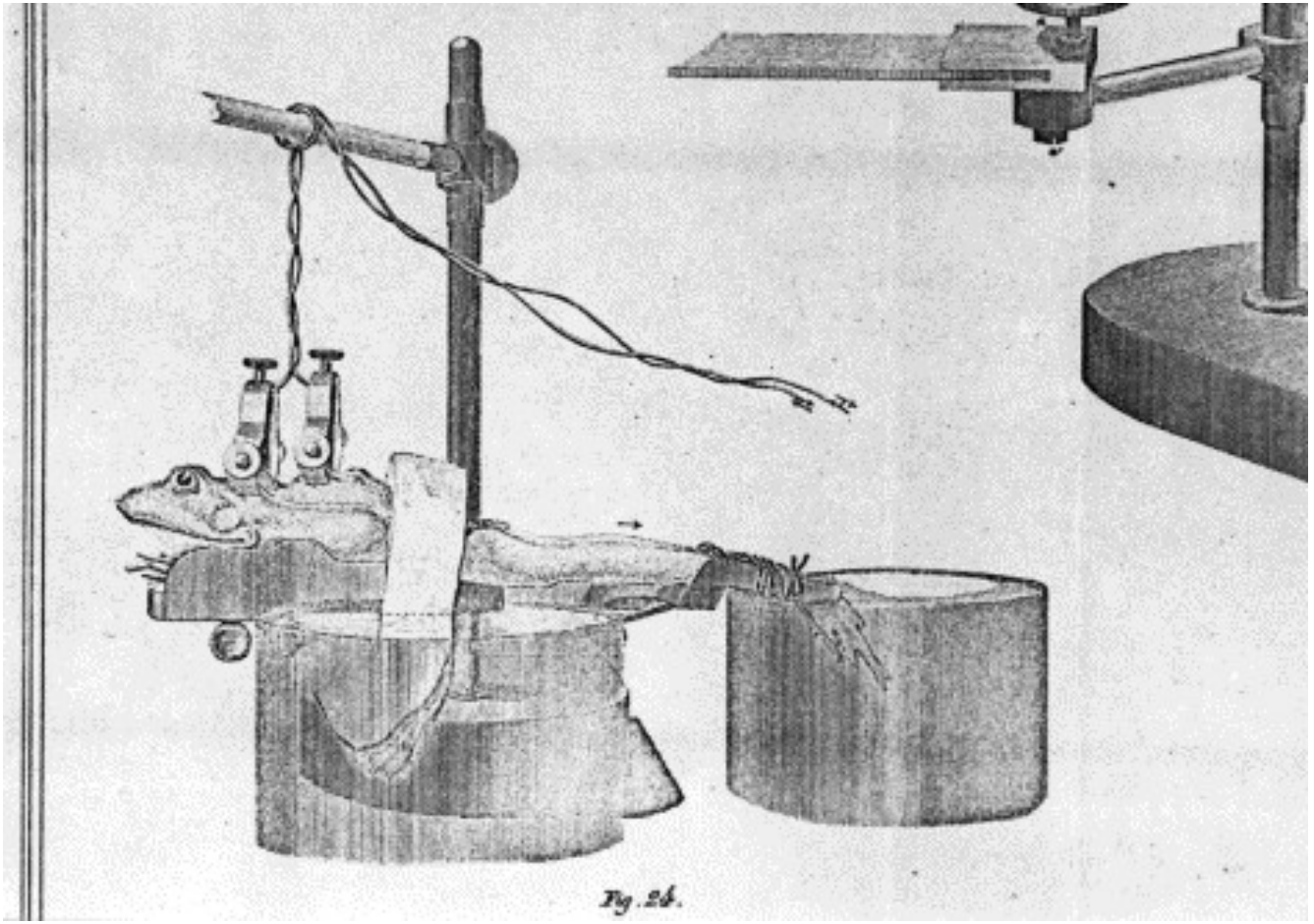
EXPERIMENTAL PSYCHOLOGY

- **Mental Chronometry was the first quantitative way of measuring mental processes**
- **In 1850, Herman von Helmholtz used reaction times to measure the speed of nerve conduction**
  - **Helmholtz stimulated the motor nerve of a frog's leg at different points measuring how long it took for the muscle to respond**

The Emerging Reflex Theory of the Brain

TOWARD THE SCIENCE OF PSYCHOLOGY

EXPERIMENTAL PSYCHOLOGY



The Emerging Reflex Theory of the Brain

TOWARD THE SCIENCE OF PSYCHOLOGY

EXPERIMENTAL PSYCHOLOGY

- **F.C. Donders (1818-1889)**
  - Believed the time between a stimulus and its response could be used to quantify the speed of mental processes
  - Broke it into simple reaction times- i.e., the amount of time it takes for someone to notice a light bulb comes on. Compound reaction times- two lights and two switched.
  - Compound reactions involve having to discriminate or make a judgment about what occurred and responding to it appropriately
  - This measurement technique was used in Wundt's lab, bringing the concept of mind into the laboratory

The Emerging Reflex Theory of the Brain

TOWARD THE SCIENCE OF PSYCHOLOGY

PSYCHOPHYSICS

- **Experimental psychology began with the publication of Elements of Psychophysics, written by Fechner in 1860**
  - **Fechner carried out the first systematic research in experimental psychology**
  - **Before Fechner, the common thought was that the mind could not be subjected to experimental research or mathematical analysis**
  - **Physics includes mathematical manipulation of objects**
  - **In psychology the mind is private, there are no instruments that can measure conscious experience**

PSYCHOPHYSICS

- Fechner manipulated consciousness by controlling the stimuli people were exposed to, making mental experimentation possible
- In Fechner's experiments, participants were asked to compare two weights, tones, colors, etc.
  - Mathematically relate stimulus magnitude: S=klogR
  - His goal was to show that the mind and body were related in measurable ways
- Fechner is credited as the founder of experimental psychology because of these methods

The Emerging Reflex Theory of the Brain

TOWARD THE SCIENCE OF PSYCHOLOGY

EXPERIMENTAL PSYCHOLOGY

- **E.H. Weber (1795-1878)**
  - **Physiologist**
  - **First to ask subjects to distinguish between stimuli**
  - **This is comparable to Leibniz's work. i.e., petite perception and apperception**

MENTAL TESTING

- Early testing was based on phrenology and was invented not for science, but for public education
  - 19th century governments made primary education compulsory caused by the need of new industries and business that occurred in the industrial revolution
  - New schools meant new standards for education, new achievement goals, etc., creating a need to measure children's mental capabilities
- Mental testing directly concerned with individual differences
- There is no normal human mind, just an average one

MENTAL TESTING IN BRITAIN

- **Sir Francis Gaulton (1822-1911)**
  - Charles Darwin's cousin
  - Gaulton conducted experiments on heredity, and his methods were rooted in British empiricism. He believed that "man's natural ability is derived from his inheritance"
  - Devised the Pearson product-moment correlation
  - Found a correlation between exam grades and intelligence, concluding that intelligence is a single mental ability
    - A "g" factor: a single psychometric factor pertaining to intelligence. Gaulton's critics conversely believe in multiple intelligences
  - Gaulton set up an anthropometric lab for mental test administration, but his tests were not considered a success

The Emerging Reflex Theory of the Brain

TOWARD THE SCIENCE OF PSYCHOLOGY

MENTAL TESTING IN FRANCE

- **Alfred Binet (1857-1911)**
  - Binet developed a more effective measure of intelligence
  - He studied law, then psychology, and was co-founder of first psychological institute in France
  - Binet's testing was based on Cartesian emphasis on the highest mental functions
  - Test was developed in 1904 to study the education of the "mentally subnormal", thought to interfere with the education of normal children
  - Binet's tests consisted of several intellectual tasks that could be performed by normal children at various ages
    - Comparing their score to their age determined if they were performing the same as other children their age
  - Henry Goddard adapted this test into English culture, and Lewis Terman standardized it into the Stanford-Binet test

MENTAL TESTING IN GERMANY

- **William Stern (1871-1938)**
  - **Developed the idea of IQ, quantitatively describing children's mental standing compared to their peers**

MENTAL TESTING

- **Mental testing is now a powerful social force**
- **Careers were chosen based on IQ**
- **Some were even forced to be sterilized due to low IQ**
- **Impact of mental testing has been greater than that of experimental psychology**

ALEXANDER BAIN (1818-1903)

- **Alexander Bain united physiology and philosophical psychology in attempts to explain human behaviour in two textbooks**
- **These books were significant because they synthesized the associationism of Hartley & the Mills and the physiology of Johannes Muller**
- **His ideas would later be developed by American pragmatists and would push English researchers to dive deeper into neuroscience**

Philosophy to the Threshold of Psychology

TOWARD THE SCIENCE OF PSYCHOLOGY

HIPPOLYTE-ADOLPHE TAINE (1828-1893)

- **Taine argued that all ideas, no matter how apparently abstract, can be reduced to a collection of sensations associated with each idea's name**
- **He proposed that conscious sensations are simply aggregates of weaker, more fleeting sensations that are only marginally conscious**
- **According to Taine, "every event in consciousness has a corresponding neural event" (Leahey, p. 214) but the reverse is not true**

Philosophy to the Threshold of Psychology

TOWARD THE SCIENCE OF PSYCHOLOGY

Hermann von Helmholtz (1821-1894)

- **Helmholtz was an empiricist and naturalist, and argued that all we know for certain are our ideas or images of the world gathered by experience**
- **To Helmholtz, we cannot know whether our ideas are true, but this does not matter as long as they lead to effective action in the real world.**
- **Ideas and sensations are mental contents that represent reality.**
- **Helmholtz's *theory of unconscious inference*: if visual perception of space is not an innate intuition, we must unconsciously learn to calculate the distance of objects from us.**
- **Helmholtz's work supported materialism and the progress of science.**
- **Him and his proponents believed "no other forces than the common physical-chemical ones are active within the organism." (Kahl, 1971).**

Philosophy to the Threshold of Psychology

TOWARD THE SCIENCE OF PSYCHOLOGY

MENTAL ILLNESS IN THE 19TH CENTURY

- **Private and public asylums confined and mistreated the mentally ill.**
  - **"The only way [the family has] to manage is by making a hole in the floor of the cabin, not high enough for the person to stand up in, with a crib over it to prevent his getting up … and they give this wretched being his food there and there he generally dies." (Leahey, p. 216, quoting Shorer, 1997)**
- **People were treated (if at all) with heroic medicine**

MENTAL ILLNESS IN THE 19TH CENTURY

- **Proponents of Psychiatry set out in the Enlightenment to reform asylums**
- **"Psychiatry" itself was coined by Johann Christian Reil (1759-1813), who celebrated the introduction of "moral therapy" into asylums in the late 1790s, focused on curing the mentally ill**
- **Moral therapy: free patients to live carefully structured lives, and maybe they'll regain their sanity**

EMIL KRAEPELIN (1856-1926)

- **In Germany, psychiatry took a scientific approach because of the German emphasis on research**
- **Kraepelin was a psychiatrist who became interested in psychology, studying under Wundt**
- **Kraepelin sought out patterns of symptoms and outcomes in case files, developing the first scientifically-informed psychiatric diagnosis: *dementia praecox* (premature dementia, now known as schizophrenia)**

Psychopathology: Psychiatry and Neurology

PSYCHOTHERAPY

- **Neurology, which had been a separate field, eventually merged into psychiatry as the two fields moved towards psychotherapy, an approach that focused on counseling in place of physical treatments**

BIOLOGICAL VS. ROMANTIC PSYCHIATRY

- **Most psychiatrists and neurologists believed that mental health was rooted in biology**
  - **Madness was caused by problems with the brain; lesser problems caused by problems in the nervous system**
  - **Some even recognized a familial pattern to mental illness**

Theoretical Orientations in Psychiatry and Neurology

BIOLOGICAL VS. ROMANTIC PSYCHIATRY

- **The rival view was that mental illness was caused by the patient's history and life circumstances (especially emotions)**
  - **To them, mental illness was a result of passions going out of control**
  - **Treatment from "psychically oriented" romantic psychiatrists consisted of hours of discussion of the patient's emotional lives while trying to instill moral and religious values in them**
  - **This orientation became the predominant approach of psychiatry until the 1970s**

Theoretical Orientations in Psychiatry and Neurology

THE FRENCH "SUJET"

- **Binet distinguished French psychology from the psychology of other cultures:**
  - **"With relatively few exceptions, the psychologists of my country have left the investigations of psychophysics to the Germans, and the study of comparative psychology to the English. They have devoted themselves almost exclusively to the study of pathological psychology, that is to say psychology affected by disease." (Quoted by Plas, 1997)**

THE FRENCH "SUJET"

- **In France, psychology developed in tandem with Medicine**
  - **German psychologists focused on the Platonic "normal, adult, human mind"**
  - **The British focused on comparing human and animal minds**
  - **The French focused on abnormal, non-western, developing minds**
- **French Psychology contributed the term "subject", taken from the medical field. This was commonly used until replaced by "participant" in contemporary psychology**

THE FRENCH "SUJET"

- French psychology was aimed at extensive investigations of single subjects, while German psychology evolved from philosophy and British psychology evolved out of the study of animals and mental testing
- The French explored hypnotism as a cure for hysteria
- A.A. Liebeault (1823-1904):
  - the hypnotic state was an intensification of certain tendencies in ordinary sleep or wakefulness
  - Hypnosis: conscious will lose its usual control over perception and action
- Hypnosis and hysteria regarded as evidence of a pathological nervous system
- Freud took this information into his study of the unconscious and psychotherapy.

THE 19th CENTURY:

"Forceful, optimistic, successful, natural science came to dominate the intellectual world". (Leahey, p. 219)

WHERE DO WE GO FROM HERE?

- **Wundt's *psychology of consciousness***
- **Freud's *psychology of the unconscious***
- **Others' *psychology of adaptation***

CONCLUSION

Questions to think about:

1. How did industrialization influence the progress of science?
2. How did religion influence the development of psychology?
3. What is romanticism? Why did this movement start?
4. Explain the two movements that resulted from religious doubt. (Hint: mesmerism and spiritualism.)
5. Explain Comte's 3 stages of human history. How do they relate to Kahne's scientific paradigm shifts?

CONCLUSION

Questions to think about:

6. How did Gall challenge the empiricism and associationism of his time?

7. Explain why phrenology was a "good" psychology.

8. Compare British, French, and German mental testing. How did mental testing impact the world?

9. Why was Emil Kraepelin influential (and what made him different from other practitioners of his time)?

CONCLUSION