

The Ascent of Science 1815-1914



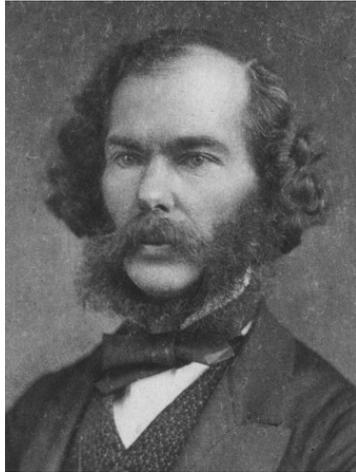
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Introduction



- 19th Century: period of rapid change
- Industrial Revolution
- Population of Europe doubled
- Growth of government
- Democracy and suffrage
- Changes were overwhelming- people turned to the social sciences

Introduction



"Science is penetrating everywhere, and slowly changing man's conception of the world and of man's destiny"

-G.H. Lewes

Introduction

- Before the 19th century, science had not accomplished much nor was it well known
- Education was rare; most people were illiterate
- Science accelerated with the Industrial Revolution
 - Science began to challenge religion

"It is wrong always and everywhere, and for anyone, to believe anything upon insufficient evidence"

-W.A. Clifford

- People looked to psychology to provide an alternative explanation for the soul
 - Popularity of pseudoscientific psychology (i.e. phrenology)
 - Psychology deepened the Victorian "crisis of conscience"

Movements



Movements



- The Romantic Revolt
- Utilitarianism and Associationism
- Positivism
- Parapsychology and Mesmerism

The Romantic Revolt



*Now I fourfold vision see
And a fourfold vision is given to me
Tis fourfold in my supreme delight
And three fold in soft Beulahs night
And twofold Always. May God us keep
From Single vision & Newtons sleep*

-William Blake, 1802

The Romantic Revolt



- Spawned aesthetic fixations with nature, spirituality, mysticism, etc.
- E.g. the freeform painting of Delacroix as a counter to the strict lined painting of Enlightenment artists
- More than just a movement in the arts



-La Liberté guidant le peuple, Eugène Delacroix, 1830

The Romantic Revolt



- Reactionary response to the Enlightenment and the Cartesian-Newtonian worldview
 - “Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them.” David Hume, *A Treatise of Human Nature*
- (Re)valuing intuition and emotion
- Passions could give access to a metaphysical realm that rationality and intellect could not

The Romantic Revolt



- The Romantic understanding of the mind differed from that of the Enlightenment
 - The Enlightenment: conscious experience
 - The Romantics: emotion, intuition, the unconscious and the primordial
- These ideas portend the Freudian conception of the mind
- “In the heart of every man there lives a wild beast.”
 - -Arthur Schopenhauer, *Parerga*
- Schopenhauer’s Will was later adopted by Nietzsche

The Romantic Revolt



- The Romantic mind was free and spontaneous, unlike the deterministic mind of the Enlightenment
- The Romantic understanding of perception followed a similar theme
 - Taylor Coleride: the mind actively casts intellectual light and affects the resulting experience

The Romantic Revolt



- Romanticism also disagreed with the Enlightenment's mechanical understanding of society
 - Society does not operate rationally and intelligently like a machine, nor can it be controlled like a machine
- Edmund Burke: societies are grown, not engineered
 - Customs, mores, norms and beliefs develop organically in society
 - They cannot be forced or artificially developed and to try to snuff them is to snuff the culture itself

The Romantic Revolt



- The 'voluntaristic psychology' of Wundt, James and Freud was soon supplanted by the proponents of reason
- The notion of passions as driving thought and behaviour was (again) replaced with the mechanical and rational understanding

The Continuing Enlightenment



- In spite of the Romantic Revolt, Newtonian thought continued to proliferate
- The Continuing Enlightenment led to the central concepts of 20th century American psychology
- Utilitarianism and associationism are two areas of mechanical and rational thought continued to develop during the Continuing Enlightenment

Utilitarianism and Associationism



- Associationism: theories on how thoughts are composed of the associations between ideas, concepts, memories, etc.
- Utilitarianism: theory focusing on a mathematical understanding of ethics in which one is required to do what will create the greatest amount of pleasure and the least amount of suffering

Utilitarianism and Associationism



- James Mill combined these two notions into a theory of mind as a passive, blank slate that receives input via sensations and synthesizes complex ideas through the association of these sensations
- Because responses (ideas, behaviour, etc.) were determined by input, voluntary control did not play a part in this conception of the mind
 - Will is an illusion
 - Reason is the association among ideas
 - Attention is an awareness of the current preoccupation of the mind

Utilitarianism and Associationism

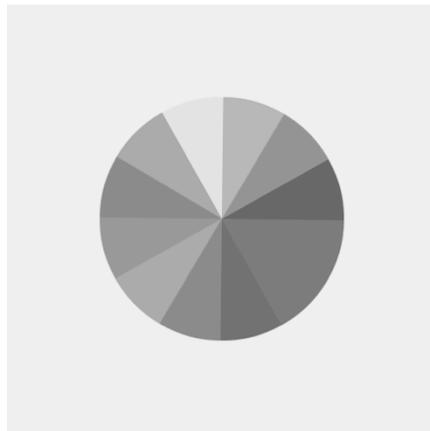


- An understanding of the mind as a blank slate gives education ultimate power
 - He tested this hypothesis on his son, John Stuart Mill
- J.S. Mill went on temper his father's utilitarian theories with romanticist notions of naturalism and denied that humans were machines
- He sought to enhance utilitarian associationism, not deny it
 - He refuted 'voluntaristic psychology'

Utilitarianism and Associationism



- John Stuart Mill drew a parallel from chemistry to update his father's beliefs about the mind
- As the compounding of atoms could create novel forms with novel characteristics, so could the compounding of sensations



Utilitarianism and Associationism



- John Stuart Mill's conception of the mind still did not attribute these complex and novel ideas to autonomy or voluntary control
- His arguments remained scientific and did not resemble the mystic or spiritual aspects of the Romantics
- He also argued that the social sciences were as important as the physical and that they should employ the same methodology

Positivism



- The Enlightenment saw the application of Newtonian thinking to the study of human nature
 - This solidified during the 19th century in the positive philosophy of Auguste Comte
- Comte described human history as passing through three phases, characterized by how people understood the world around them
 - Theological
 - Metaphysical
 - Scientific

Positivism



- **Theological stage**
 - Phenomena explained by positing unseen and supernatural forces or entities
 - Cartesian dualism
- **Metaphysical stage**
 - Phenomena explained by positing unseen forces or essences, without predicating religious beliefs
 - Aristotelian Form
- **Scientific stage**
 - Phenomena are explaining using mathematical principles based on observable forces, without any reference to the unseen

Positivism



- Comte also proposed that each stage would be ruled by a corresponding type of government
- **Theological**
 - Religious authority figures who have the most contact with the deity (or deities)
- **Metaphysical**
 - Philosophers who are in touch with metaphysics and aesthetics
- **Scientific**
 - Scientists, or more specifically, sociologists

Positivism



- The scientific stage would mark the end of religion, superstition and metaphysics
- Science would triumph and thus the only thing to worship would be humans themselves

Positivism



- Comte held a number of reservations about psychology in its then-current form
- Psychology then was at best metaphysical and at worst religious
 - Psuche-logos posits the existence of a soul
- A positivist psychology would have to be neurophysiological
 - Newtonian prediction and control

Positivism



- Positivism was controversial but had an appreciable impact on psychology
- B.F. Skinner applied Comte's Newtonian vision of psychology to develop radical behaviourism, which proposed that people could be completely controlled if one comprehended the influential conditions
- Skinner also detested references to unobservable mental processes
- Similar to Comte, Skinner called for a scientifically-ruled society

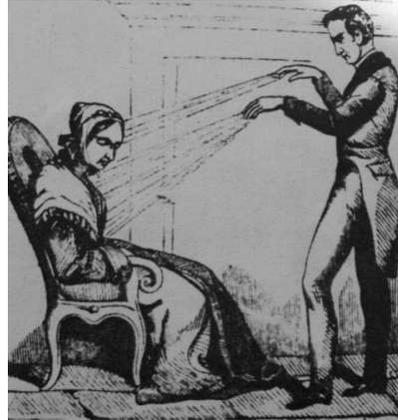
Naturalizing the Supernatural



- As science grew and religious doubt deepened, people began to seek scientific justifications for traditionally religious beliefs
 - Mesmerism
 - Psychical research
- The two wanted to "naturalize the supernatural."
 - -J.B. Rhine

Mesmerism

- The use of an unseen force exerted by all animals to induce trance and heal
- Franz Mesmer asserted the medical validity of his ideas, despite engaging in the occult
 - Clairvoyance, telepathy, precognition
- It was plain to many that the active mechanism was not invisible fluid



Mesmerism

- Mesmerism was eventually recognized as being a psychological phenomenon and not a physical or physiological one
- James Braid renamed mesmerism 'neurohypnotism,' based on the psychological nature of the trance state
- Hypnotism was understood, not as being due to the flow of magnetic fluid between bodies, but due to mental ('psychical') state
- James Braid was met with scepticism in the medical community though and the advent of chemical anesthetics rendered it mostly redundant

Psychical Research



"The progress of science 'has in all ages meant, and now than evermore means, the extension of the province of what we call matter and causation, and the concomitant gradual banishment from all regions of known thought of what we call spirit and spontaneity.'"

Quoted by *A History of Science*

"I shall not commit the fashionable stupidity of regarding everything I cannot explain as a fraud."

C.G.Jung, quoted on the homepage of the Society for Psychical Research

Psychical Research



- The ascent of science had cast considerable doubt on the existence of an immortal soul
- Some scientists, no doubt disillusioned by the notion of a body as a machine, sought to find evidence for a soul
- Frederic Myers and Henry Sidgwick collected and published data in support of the existence of an immortal soul
 - Society for Psychical Research

Psychical Research



- Myers' *Human Personality and Its Survival of Bodily Death* is an early exploration of abnormal psychology
 - Sleep, hysteria, messages from departed spirits
- He conceived of hysteria as the expression of the 'subliminal self'
 - Freud's unconscious
- The subliminal self indicated the body's contact with a transcendental, spiritual realm

Psychical Research



- Myers' research was scientifically-conducted but ultimately guided by occult notions
- Psychical research persists today, as does the Society for Psychical Research
- Parapsychology studied paranormal and spiritual phenomena
- Most contemporary psychical research is conducted privately and receives little scientific acknowledgement
- The Raymond Cass Foundation

Toward the Science of Psychology



Understanding the Brain and Nervous System



- Until the 19th century, psychology had been studied primarily within the field of philosophy.
- In the early 19th century, it became widely acknowledged that the field should move in a more scientific direction.
- Improvements in the understanding of physiology and ways to test mental functioning made this possible.

Franz Joseph Gall (1758-1828)



- Focused primarily on physiology.
- First serious proposal that the brain was the organ of the soul.
- To understand the soul, research had to be done on the brain.
- Now seen as the founder of cognition.

Franz Joseph Gall (1758-1828)



- Gall attempted to challenge French empiricism and associationism, with emphasis on sensationism.
- Even Hume's science of human nature was full of abstractions and not testable.
- Condillac had attempted to derive the mind's faculties from sensation and association, which Gall reacted against.

Franz Joseph Gall (1758-1828)



- Gall knew that some animals in the Greater Chain of Being had more developed brains, and that these animals had higher functioning.
- He believed that the brain had innate functions tied to specific anatomical locations – he sought to correlate anatomy and function.

Franz Joseph Gall (1758-1828)



- Gall had no methods with which to test his theory on humans.
- He was ethically opposed to lesioning animals for his research.
- His hypothesis that more brain development meant higher functioning led him to develop his own method: phrenology.
- http://www.youtube.com/watch?v=80dZ71Km6_g#t=68

Franz Joseph Gall (1758-1828)



- Gall's method was nativistic, materialistic, behavioristic, functional, comparative, and focused on individual differences.
- It was the first method of objective psychology, as it did not involve introspection in any way.
- His system inspired other scientifically-minded people to further explore brain anatomy and function, although it was completely incorrect.

Jean-Pierre-Marie Flourens (1794-1867)



- Flourens discovered the functions of many lower brain areas using lesions and ablations.
- He argued the cerebrum did not have functions tied to anatomical locations.
- He was a dualist, and believed that the hemispheres worked in mass action, just as the soul acted as one unit rather than small disconnected segments.
- Unitary cerebral action remained the primary theory for decades.

Renewed Support for Gall



- François Magendie proved in 1822 that afferent and efferent neurons exist in the spinal cord.
- This theory was incorporated into theories about the brain's functioning: the brain may have areas for sensation and for action.
- Further support for Gall's theory was found by Pierre Paul Broca found in an autopsy of a speech-disordered patient that he had brain damage in left frontal lobe.

Renewed Support For Gall



- Critics of this new version of Gall's theory still remained, including those who tried to stimulate the brain to produce movement, and failed.
- In 1870, Gustav Fritsch and Eduard Hitzig found that electrical stimulation, rather than poking, prodding or pricking, caused movement to occur. They also found that some areas seemed to be involved in controlling movements, not just creating them.

Reflex Theory



- More scientists began to map brain function, leading to “new phrenology.”
- The new understanding of the brain led to it being seen as a reflex machine, in which the cerebrum associated sensation and action to produce behaviour.
- This was similar to the Cartesian theory of consciousness, in which the mind connects stimuli and responses, forming ideas.
- Reflex theory was a candidate to make the connection between mind and brain

Reflex Theory



Two main problems stemmed from reflex theory:

- How could behaviour caused by consciousness be distinguished from behaviour caused by the brain? It was too hard to tell them apart.
- It was possible that consciousness was an unimportant byproduct of brain activity that simply hadn't been selected against (the automaton theory of mind).

Systems for Measuring Mental Functioning



- Newtonian conception of science dictates that there cannot be laws without measurement. It was therefore important to find systems for measuring mental functioning.
- Those systems were found in astronomy and physiology by F. W. Bessel and Hermann von Helmholtz.

F. W. Bessel



- In astronomy, measurements of size and speed of the planets and stars depended on accurately noting the time at which they passed directly overhead.
- Astronomers would use the eye-and-ear method, but there were disagreements between astronomers over the results.
- F. W. Bessel investigated the difference in other astronomers' perceived transit times.

Hermann Helmholtz



- Helmholtz measured the reaction time of frogs by stimulating their efferent neurons in the spinal cord and documenting the time it took for them to twitch.
- Previously, it had been thought that neurons acted infinitely quickly, or at least at immeasurable speed.
- Helmholtz clocked impulse speed at 26 m/s.

F. C. Donders



- Donders combined the research of the Bessel and Helmholtz.
- Helmholtz had been measuring reaction time in its simplest form, whereas Bessel had unknowingly been measuring human judgment in much the same way.
- Donders realized that by using mental chronometry, one could infer the speed of complex mental processes.

Mental Chronometry



- Donders would first administer a simple reaction time test.
- Next, he would administer a complex reaction time test.
- The difference in the speed of the responses would represent the speed of the judgment that was required for the second task.
- Mental chronometry was a quantitative method of measuring psychology - which was needed to establish it as a Newtonian science.

Theodore Fechner (1801-1887)



- Prior to Fechner, philosophers had believed that the mind could not be mathematically predicted.
- Although one cannot directly measure personal experiences, Fechner realized that he could measure them in pairs, relative to each other. By manipulating the absolute values of the stimuli and their relative difference, he was able to indirectly measure personal experiences.

Theodore Fechner (1801-1887)



- Fechner found that $S = k \log R$, where S is sensation strength, R is relative stimulus magnitude and k is a constant that varies based on the sense being tested.
- Although others had used similar methods before him. It was Fechner who first applied psychophysics to the mind-body problem, and who identified that by using antecedent control one could manipulate the contents of the mind to measure subjective experiences.
- Wundt would use antecedent stimulus control and extract quantitative data from personal experiences in ways inspired by Fechner.

Mental Testing



- The mental test was fundamental to the founding of applied psychology, but were invented for the education system.
- At the end of the 19th century, new industries and businesses needed more educated employees. Governments around the world began offering universal education, then compulsory education.
- Those governments wanted to establish standards and tests for achievement.

Mental Testing in Britain



- Sir Francis Galton (1822-1911) was Darwin's cousin and interested in the evolution of mental traits, particularly intelligence. He traced lineages to see how they were inherited.
- He also looked at examination scores to see if scoring poorly on one examination correlated with scoring poorly on all of them, and he found a strong correlation. In the process, he developed a formula that his student Pearson would later perfect and name the Pearson product-moment correlation.

Mental Testing in Britain



- Galton believed that there was a general intelligence, a claim that remains controversial; today his followers believe that intelligence is controlled by the single psychometric factor g .
- Galton then moved on to testing intelligence himself. He used head size and measures of sensory acuity to measure intelligence in his own anthropometric laboratory, one of the three most important settings for psychology: the laboratory, the anthropometric laboratory and the mental clinic.

Mental Testing in Britain



- Galton was also the first psychologist to use the fee-for-service model of private practice.
- Although his was the first intelligence test, it was a poor one. Head size barely correlates with intelligence, and sensory acuity is not intelligence.
- However, Galton had a great deal of influence. Students of Wundt, such as James McKeen Cattell (who coined the term mental test) were inspired by him and came to work with him.

Mental Testing in France



- Alfred Binet (1857-1911) developed a more effective and enduring method of intelligence testing, which included high-level cognitive skills.
- He and his coworker Victor Henri began the practice of individual psychology. They studied their subjects in amazing depth in a clinical setting. Together they wrote "La Psychologie Individuelle," which would become an important early document in applied psychology.

Mental Testing in France



- He was commissioned by the French government to develop a diagnostic system for the mentally subnormal, especially those on the borderline of mental functioning.
- It was a practical test, that compared the performance of an individual to the performance of other children her age. If she did worse, she was subnormal. Subnormal children could then be removed from classrooms and given special education.

Mental Testing in France



- Binet's test was much better than Galton's.
- Lewis Terman translated the test to English and standardized it on large numbers of children, lending the new Stanford-Binet test scientific merit.

Mental Testing in Germany



- William Stern (1871-1938) introduced the concept of the intelligence quotient.

$$\frac{\text{Mental Age}}{\text{Actual Age}} \times 100\% = \text{IQ}$$

- The term remains in use today when referring to intelligence tests even though the method is no longer used.

Mental Testing



- Mental testing had a profound influence. It began as an important tool in early applied psychology, but is now a social force that is used by employers as well as all levels of the education system.
- Mental testing alone has a greater effect on the life of the average Joe than the rest of the field of experimental psychology.

Philosophy to the Threshold of Psychology



Philosophy to the Threshold of Psychology



- Alexander Bain
- Hippolyte-Adolphe Taine
- German Psychology
- Hermann Lotze
- Hermann von Helmholtz

Alexander Bain



- Aimed to unite psychology and physiology (1851)
 - *The Sense and the Intellect* (1855)
 - *The Emotions and the Will* (1859)
- Ancient idea
 - Müller's *Elements of Physiology* (1842)
 - ✦ Role of the brain- associate sensory/ motor
- Bain's unified psychology= philosophy of associationism and sensorimotor physiology
- Guided studies on the cerebral hemispheres

Alexander Bain



- Extremely influential to the field of psychology
- Mind (founded 1874) is still in existence
- Remained a philosopher- did not do experiments
- Associationism remained preevolutionary



Hippolyte-Adolphe Taine (1828-1893)

- French philosophical psychologist
- *On Intelligence* (1875)
- All ideas, independent of how abstract they may seem, can be reduced to sensations which can be associated with each idea
- Conscious sensations are aggregates of weaker, fleeting sensations that are barely conscious

Hippolyte- Adolphe Taine

- Dual-aspect psychophysical parallelism
- Reverse is not true
- Brain is an unspecialized organ that associates stimulus and response
- Emphasis on psychology as naturalistic
- Rejected Catholic psychology (study of the soul)



German Psychology



- Struggled with remnants of Kantian idealism
- Wundt studied:
 - Individual consciousness
 - Genetic approach to higher mental processes
 - Human will is the unifying force that influences mental
- Psychology studies concrete individuals
 - German idealists desire Platonic knowledge of a godlike Absolute Spirit
 - No interest in empirical research

Hermann Lotze (1817-1881)



- Leading German philosophical psychologist
- *Outlines of Psychology* (1881)
 - Empiricist view of consciousness
 - Perception is learned through experience
- Still believed that humans and animals possess divine souls
- Rejected materialism in favor of Cartesian dualism

Hermann von Helmholtz (1821-1894)



- Consistent advocate of empiricism and naturalism
- Aside from psychology, also a leading physicist
- Law of conservation of energy
 - Energy can be neither created nor destroyed
- Killed the notion of interactive dualism
 - Divine forces cannot affect matter

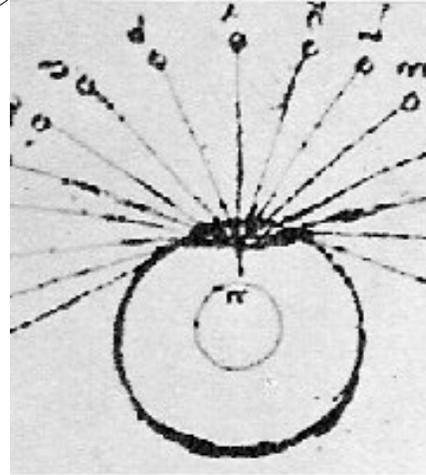
Hermann von Helmholtz (1821-1894)



- Lockean empiricism
 - Ideas can be interpreted through mental content
- The only certainty is in our ideas and perceptions gained through experience in the world
 - No way of knowing if they are true

Herman von Helmholtz (1821-1894)

- Theory of unconscious inference
 - Must learn to calculate distances of objects from ourselves if depth perception is not innate
 - Not aware of these calculations
- Ideas are mental contents that represent reality



Hermann von Helmholtz (1821-1894)

- Theories and research supported materialism
- Physiological studies of sensation led to belief that sensation is dependent on fleshly matter

“Please do not forge that materialism is a metaphysical hypothesis...If one forgets this, materialism becomes a dogma which hinders the progress of science and, like all dogmas, leads to violent intolerance”

Psychopathology



Psychopathology



- Psychiatry and Neurology
- Theoretical Orientations in Psychiatry and Neurology
- French Clinical Psychology

Psychiatry and Neurology

- The “insane” were treated brutally before the 18th century
- Irish politician, 1817

“When a family member goes mad, the only way they have 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 preventing his getting up...and they give this wretched being his food there and there he generally dies”



Psychiatry and Neurology

- Psychiatry result of Enlightenment project
 - Instead of herding the mentally ill into asylums, “warehousing” them, they began to treat them
- Term *alienist* remained widely used instead of psychiatry
- Late 1790s “moral therapy”
 - Curing rather and isolating the insane
 - Moving in the direction of psychotherapy

Psychiatry and Neurology



- Early psychiatrists had good intentions but the number of inmates increased to an overwhelming extent in the 19th century
- Reversed back to warehousing because of high demand

Psychiatry and Neurology



- Emil Kraepelin (1856-1926) German psychologist
 - Undertaking study in Wundt's laboratory
- First scientific diagnosis *dementia praecox* (premature dementia)
 - Now known as schizophrenia
- Deemphasized psychotic symptoms and focused on if the symptoms were associated with the cause and outcome of the disease

Psychiatry and Neurology

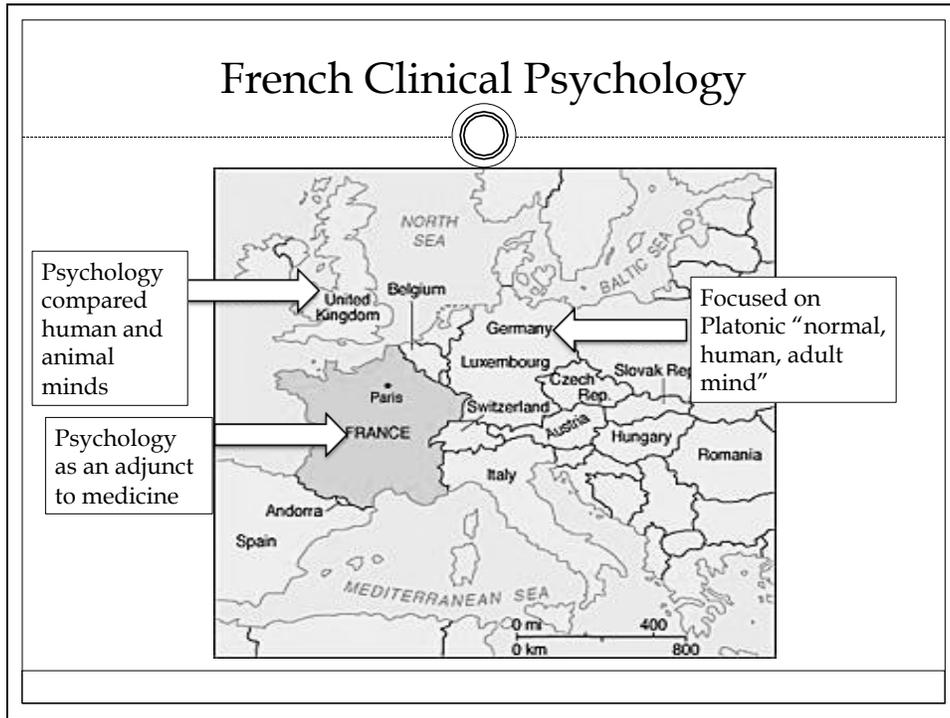


- Problems not as severe as “madness” were treated by neurologists
- By the end of the century, neurology was integrated with psychiatry
- Movement towards psychotherapy in these fields
- Therapeutic, one-on-one relationship between psychiatrist and patient in structured asylum environment
- Talking helps

Theoretical Orientations in Psychiatry and Neurology



- Neurologists and psychiatrists believed that madness was caused by problems in the brain, and lesser issues such as hysteria were caused by issues in the nervous system
 - Genetic basis to insanity
- Rival view of Romantic Psychiatry
 - Cause of mental illness was due to patient’s psychological history and circumstances
 - Related to emotional lives
 - Did not consider biological view; madness stems from passions beyond normal control
 - Cure: instill religious values



- ### French Clinical Psychology
- Concentrated on abnormal, non-Western and developing minds
 - Neuroscience used natural examples of, damage to the brain and nervous system caused by accident or disease, to label normal functioning
 - Subject → Participant
 - Focused on hypnotism as treatment for hysteria

French Clinical Psychology



- Two theories associated with hypnotic trance
 - Nancy School
 - ✦ Hypnotic state is an intensification of particular tendencies during ordinary sleep or wakefulness
 - ✦ In hypnosis, conscious loses it's control over perception and action and the orders from hypnotist pass unconsciously to perception and action
- Salpêtrière Hospital School
 - Hypnotic orders are used to remove hysteric symptoms, and therefore the ability to hypnotize can be found only in abnormal patients
 - Hypnosis is a diagnostic criterion for hysteria

Conclusion



- 19th century- century of conflicts that has led to our conflicts (urban poverty, sexual morality, flux of religion)
- Central conflict between new scientific naturalism and older beliefs in spiritual realm
- Science feared to dehumanize humans
- 19th century three founding forms of psychology:
 - Wundt: psychology of consciousness
 - Freud: psychology of unconscious
 - Various psychologists: psychology of adaptation

Essay Questions



- What was the reactionary movement in aesthetics and science present throughout the second half of the 18th century and the first half of the 19th century? What were its main contributions? What themes did it follow in both its artistic and intellectual exploits?
- The ideas of Franz Joseph Gall and how they were received show an interesting trend in the way that scientists viewed the functions of different regions of the brain. Describe Gall's theory and methods, their reception and the effect they would have on the future of psychology.

Essay Questions



- In which ways did the ascent of science, in concert with the Industrial Revolutions affect the modern world today? In which way did it effect religion?
- How has psychopathology evolved since the 18th century? What, and who, are the most significant contributors to the introduction of psychotherapy?