

Lecture 10: Darwinian Influence and the Rise of Mental Testing

I. INTRODUCTION

A. Introduction

- Perhaps the most important scientific theory in the 19th Century is Darwin's evolution
 - 1859: *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*
 - 1868: *The variation of animals and plants under domestication*
 - 1871: *The Descent of Man, and Selection in Relation to Sex*
 - 1872: *The Expression of the Emotions in Man and Animals*
- We will consider the impact of evolution on psychology.

I. INTRODUCTION

B. Change, Progress, and Development

- The late 18th and 19th Century is full of ideas of change, progress, and development.
 - The stability and permanence of thought and ideas of the middle ages gave way to dynamic views of change, progress, and development.
 - Some of these ideas are premised on the perfecting notions of transformations.
 - These ideas are inspired from the industrial revolution (which changed everything) and the Enlightenment
 - Philosophical movement of the 17th and 18th centuries emphasizing scientific rationality and human freedom (French and American revolutions).

I. INTRODUCTION

B. Change, Progress, and Development

- Auguste Comte (1798-1857),
 - French philosopher and founder of sociology and positivism
 - Positivism: only authentic knowledge is that based on actual sense experience.
 - Society undergoes three phases in its quest for the truth according to the universal Law of three stages.
 - Theological: God reigns supreme over human existence.
 - Metaphysical: A time steeped in logical rationalism.
 - Positive: Individual rights are more important than the rule of any one person.



I. INTRODUCTION

B. Change, Progress, and Development

▪ Georg Wilhelm Friedrich Hegel (1770–1831)

- German philosopher, and one of the creators of German idealism.
- Developed dialectics
 - An integrated and developmental account of the relation of mind and nature
 - Mind manifested itself in contradictions and oppositions that is ultimately integrated and united without eliminating either pole or reducing it to the other.
 - Master/slave dialectic

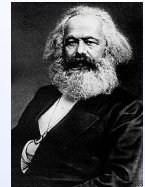


I. INTRODUCTION

B. Change, Progress, and Development

▪ Karl Marx (1818–1883)

- German, credited as the founder of political Communism.
 - Marx argued that capitalism, like previous socioeconomic systems, will produce internal tensions which will lead to its destruction.
- Dialectical materialism
 - Principle of change.
 - Just as capitalism replaced feudalism, communism will in its turn replace capitalism and lead to a stateless, classless society.



I. INTRODUCTION

B. Change, Progress, and Development

▪ Sir Charles Lyell (1797 - 1875)

- Scottish lawyer and was the foremost geologist of his day
 - Published multi-volume *Principles of Geology* from 1830 to 1833
 - Subtitle was "An attempt to explain the former changes of the Earth's surface by reference to causes now in operation",
 - Proposed Uniformitarianism, that the earth was shaped entirely by slow-moving forces still in operation today, acting over a very long period of time.
 - Challenged the geological reality of Noah's Flood and other biblical events.



I. INTRODUCTION

B. Change, Progress, and Development

▪ Thomas Robert Malthus (1766-1834)

- English political economist and demographer who wrote *Essay on the Principles of Population*
 - Proposed that populations size and food supply were kept in balance by events such as war, starvation, and disease.
- Presumed that natural events could and do select who will survive and have children and who will not survive.



I. INTRODUCTION

C. Evolution Before Darwin

- Early Greek Ideas
 - Plato and Aristotle both had a form of evolutionary ideas, but neither one truly believed in evolution.
 - Christian thought added the idea of the divine creation.
 - By the 18th and early 19th century, several prominent people were postulating a theory of evolution—including Darwin's grandfather
- What was missing from these early theories was a mechanism to account for the theory.

I. INTRODUCTION

C. Evolution Before Darwin

- Jean Lamarck (1744 -1829)
 - Early proponent of the idea that evolution occurred and proceeded in accordance with natural laws.
 - The theory of inheritance of acquired characteristics stated that environmental changes during the lifetime of the organism resulted in structural changes in plants and animals
 - These changes would be passed on to the offspring, which in turn enhanced their chance for survival.



I. INTRODUCTION

C. Evolution Before Darwin

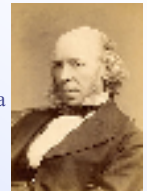
- Herbert Spencer (1820 –1903)
 - Spencer applied his view of evolution to everything in the universe, including the human mind and societies.
 - Through evolution, differentiation occurs and systems become increasingly complex and move toward perfection.
 - Coined the phrase, “survival of the fittest, which was later used by Darwin as a key explanatory concept in evolution.



I. INTRODUCTION

C. Evolution Before Darwin

- Spencer-Bain principle
 - Application of evolutionary theory to selection of behavior.
 - Proposed that the probability of a behavior occurring in the future is a function of whether it is followed by a pleasurable event or a painful event.
 - Cornerstone of Behaviorism (Thorndike and Skinner).
 - Proposed that propensities for various behavioral responses could be passed to offspring (Lemarkian)



I. INTRODUCTION

C. Evolution Before Darwin

- Survival of the fittest
 - Applied to societies and entities within societies (businesses)
 - These entities evolve and those which are "more perfected", survive and those, which do not, do not survive.
 - Social Darwinism.
 - Compatible with the capitalism and individualism in the US at the time
 - If natural forces were allowed to operate freely, societies and individuals would approximate perfection.
 - Dangerously misconceived Darwin
 - Evolution not perfected progress



II. DARWIN

A. The Man

- Charles Darwin (1809 – 1892)
 - Feb. 12th was his 200th birthday.
 - He was 5th of 6 children of a wealthy society doctor and financier
 - As a student he was interested in natural history
 - In 1828, as a Cambridge student he became a friend of botany professor and naturalist John Stevens Henslow.
 - Henslow nominated Darwin as the *gentleman naturalist* and travel companion to Robert FitzRoy on the HMS *Beagle*



II. DARWIN

B. Voyage of the Beagle

- The voyage of the Beagle
 - During the 5-year expedition, he was to collect artifacts supporting Biblical creation.
 - During the voyage he collected hundreds of specimens and made hundreds of observations.
 - He also read the book *Principles of Geology*, which made him start doubting the Biblical account.



II. DARWIN

B. Voyage of the Beagle

- The voyage of the Beagle
 - With all of these observations, Darwin's ideas of evolution were in their infancy.
 - Reading Malthus's *Essay on the Principles of Population* provided him with the mechanism/principle to complete the formulation of the theory.
 - The principle was *Natural Selection*.



II. DARWIN

C. The Theory of Evolution

- The Natural Struggle for Survival
 - More offspring than can survive within a given environment.
 - Species variability results in individual differences in characteristics with some more conducive to the organism's survival within *particular environmental conditions* (environmental pressure) than others.
 - Fitness defined solely in terms of ability to survive and reproduce
 - Not a progression toward perfection
 - Evolution just happens due to environmental pressures.



II. DARWIN

C. The Theory of Evolution

- The Theory of Evolution
 - Darwin's writings
 - His initial book, *On the Origin of Species* referred to humans very little
 - *The Descent of Man* makes case for humans being a product of evolution.
 - *The Expressions of Emotions in Man and Animals* is most directly related to psychology.
 - He argues that human emotions are remnants of animal emotions that had once been necessary for survival.
 - Launched modern comparative psychology.



II. DARWIN

D. Impact

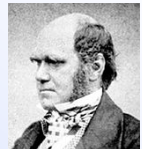
- Impact
 - The theory was revolutionary
 - Still affects the thinking and research of social and biological scientists and philosophers today!
 - Changed the traditional view of human nature and our place in the universe.
 - Conflict with the church due to Darwin's estimates of the earth's age
 - Continuing debate with educators regarding the teaching of evolution.



II. DARWIN

D. Impact

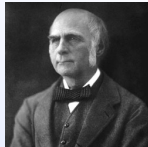
- Impact
 - Influenced all areas of psychology.
 - Played a significant role in the development of Functionalism (next lecture) and subsequently of Behaviorism (two weeks).
 - Evolutionary Psychology has also used Darwin's definitions to account for human social behaviors and cognitive processes.



III. FRANCIS DALTON

A. Introduction

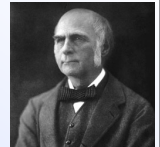
- Francis Galton (1822 - 1911).
 - Half-cousin of Darwin
 - English, anthropologist, eugenicist, psychometrician, and statistician.
 - First to apply statistical methods to study human differences and inheritance of intelligence.
 - Founded *Psychometrics* (the science of measuring mental faculties) and *Differential Psychology*.
 - Introduced use of questionnaires to collect data; Coined term eugenics and phrase "nature versus nurture;" Developed correlation.



III. FRANCIS DALTON

B. Achievements

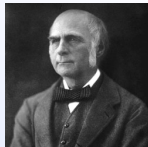
- Heritability and Eugenics
 - Potential for high intelligence was inherited.
 - Believed that the potential for high intelligence was inherited, but it must be nurtured by a proper environment.
 - This contributed to the nature-nurture controversy.
 - Evidence of inheritance of human abilities led to his advocating of eugenics, or selective breeding.
 - Thought the government should support marriages of desirables.



III. FRANCIS DALTON

B. Achievements

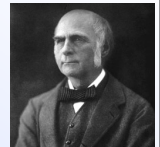
- Developed the "anthropometric laboratory"
 - Developed in response to his desire to measure the individual differences among humans
 - Collected data on more than 9,000 humans.
 - Believed sensory acuity was related to intelligence and could therefore be used as a means to measure intelligence.



III. FRANCIS DALTON

B. Achievements

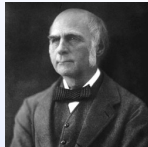
- Data analytic techniques
 - Initially examined loads of data using scatter plots to observe the correlation between variables.
 - Mathematical formulation for the correlation coefficient later developed by Pearson
 - He also observed a regression toward the mean
 - This states that data points on a particular variable will tend to cluster around the mean for that characteristic.



III. FRANCIS DALTON

B. Achievements

- Contributions of Galton: A list of firsts:
 - 1) The study of the nature-nurture question
 - 2) The use of questionnaires in research
 - 3) The use of word-association tests
 - 4) The conduction of twin studies
 - 5) The study of imagery
 - 6) The development of correlational techniques



IV. INTELLIGENCE TESTING MOVEMENT

A. Introduction

- Evolution theory gave rise to testing of individual differences in mental abilities.
 - Ironical that a theory of the origin of the species as a whole has a legacy of individual differences.
 - Intelligence testing is probably one of the things that Psychologists can point to as evidence of scientific progress.
 - Psychometrics remains a viable part of modern psychology.
 - Psychometrics is the field of study concerned with the theory and technique of educational and psychological measurement, which includes the measurement of knowledge, abilities, attitudes, and personality traits.

IV. INTELLIGENCE TESTING MOVEMENT

B. James McKeen Cattell

- James Cattell (1860 – 1944)
 - Student of Wundt
 - Developed early Galtonian-type tests in the U.S.
 - These tests used measure of basic processes of mind developed in Leipzig
 - Correlational analysis indicated little relation among the tests and little correlation between the tests and success in college
 - With these negative findings, the interest in mental testing faded.



IV. INTELLIGENCE TESTING MOVEMENT

C. Alfred Binet

- Alfred Binet (1857 – 1911)
 - French psychologist who explored complex, higher-order processes that vary by age.
 - Developed the Binet-Simon (with Theodore Simon) intelligence scale.
 - It was a valid means to distinguish between normal children and those with mental deficiencies.
 - Binet believed that intelligence was diverse set of abilities rather than one overarching ability.



IV. INTELLIGENCE TESTING MOVEMENT

D. William Stern

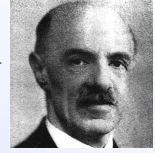
- William Stern (1871 – 1938)
 - William Stern introduced the term mental age and a new formula for the intelligence quotient.
 - $IQ = MA/CA$
 - Believed that mental orthopedics could prepare disadvantaged children for school.
 - The orthopedics consisted of exercises that improve a child's will, attention, and discipline
 - These abilities were ones Binet thought were necessary for effective education.



IV. INTELLIGENCE TESTING MOVEMENT

E. Charles Spearman

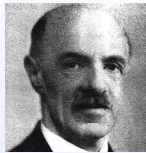
- Charles Spearman (1863 -1945)
 - Developed factor analysis
 - A complex statistical technique based on correlations between elements (questions) which identifies a set of related elements or factors
 - Based on factor analysis he proposed a two-factor theory of intelligence.
 - The two-factor theory consists of a specific factor and a general factor (G).



IV. INTELLIGENCE TESTING MOVEMENT

E. Charles Spearman

- Charles Spearman (1863 -1945)
 - His conclusions about the nature of intelligence are important for three reasons:
 1. He emphasized the unitary nature of intelligence in contrast to Binet's emphasis on diversity.
 2. Spearman viewed intelligence as being largely inherited, which Binet rejected.
 3. Spearman's conception of intelligence was embraced by the new testing movement in the U.S. rather than Binet's.



IV. INTELLIGENCE TESTING MOVEMENT

F. Cyril Burt

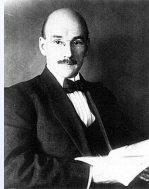
- Cyril Burt (1883 – 1971)
 - Burt is known for his studies on the effect of heredity on intelligence.
 - His "research findings" caused a scandal in the area of heritability of intelligence.
 - Burt was accused of having fabricated and falsified his data on intelligence testing for which he was later acquitted in the court of scientific opinion.
 - Hereditary basis of IQ verified by twin studies and adoption studies.



IV. INTELLIGENCE TESTING MOVEMENT

G. Henry Goddard

- Henry Goddard (1866 -1957)
 - Translated the Binet-Simon scale into English.
 - He studied the relationship between family background and intelligence.
 - Goddard and several leading scientists urged that those with mental deficiencies be sterilized and/or segregated from the rest of society.
 - States actually passed sterilization laws which continued until 1970s.
 - This also led to the mental testing of immigrants, which in turn was very controversial.
 - The policy led to an increase in deportation.



IV. INTELLIGENCE TESTING MOVEMENT

G. Lewis Terman

- Lewis Terman (1877 – 1956)
 - Adopted the Binet-Simon into the Stanford-Binet test.
 - Average score for children of different ages to be 100.
 - Contended that intelligence was largely inherited
 - Agreed with many of the ideas of Goddard.
 - Conducted a longitudinal study on gifted children that continued for more than 80 years.
 - The primary results were: *The gifted child becomes a gifted adult.*



IV. INTELLIGENCE TESTING MOVEMENT

H. Robert Yerkes

- Robert Yerkes (1876 -1956)
 - Changed computation of IQ.
 - He organized the testing program for the army in World War I.
 - Developed the Army Alpha test for literate people and the Army Beta for those who were illiterate.
 - Following WWI intelligence level was deteriorating
 - Yerkes, Goddard, and Terman claimed problem due to immigration and “intellectually inferior” people were reproducing at a faster rate than normal or above-normal people.



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IV. INTELLIGENCE TESTING MOVEMENT

I. Modern Views of IQ

- Remains some tension in the modern view of IQ
 - On of the one hand, research supports IQ as a genetically determined (40% - 80%) basis of social mobility.
 - Herrnstein & Murray's (1994) *Bell Curve* asserted many of the claims of psychologists of a generation earlier.
 - On the other hand, research recognizes a critical role played by early experience and education in IQ and its development.
 - Such research was the basis of Head Start in the 1960s and continues to be considered one of the most successful social programs.