

## Intellectual, Cultural, and Technological Developments, Part I

### I. Developments in Physics

- A. Relativity Theory (Albert Einstein — 1905) — understanding the Mind of God
- B. Quantum Mechanics — no underlying reality?
  1. Ernest Rutherford (1871–1937) — concept of the nucleus (March 7, 1911)
  2. Marie Curie (1867–1934) – isolation of polonium and radium
  3. Ernst Schrödinger (1887–1961) — wave mechanics; “Schrödinger’s Cat”
  4. Niels Bohr (1885–1962) — matrix mechanics and “quantum weirdness”
  5. J. B. S. Haldane: “my own suspicion is that the Universe is not only queerer than we suppose, but queerer than we can suppose.”
  6. Werner von Heisenberg (1901–1976) – “Uncertainty Principle”

### II. Theories of the Age of the Universe

- A. Religious Interpretations
- B. Estimates Based on Gathered Evidence
  1. Georges Buffon, French Naturalist (1707–1788) = “at least 70,000 years ago”
  2. Abraham Werner, German Geologist (1749–1817) = “a million years ago”
  3. Charles Darwin, English Naturalist (1809–1882) = 300 million years
  4. The Scientific View of Mid to Late Twentieth Century = 6.4 – 20 billion years ago
    - a. Edwin Hubble, American Astronomer (1889–1953)
    - b. Milton Humason (1891–1957)
    - c. Red Shift, Doppler Effect, Big Bang

### III. Philosophy

- A. Existentialism — a philosophy of the individual insofar as that philosophy is based on personal experience
 

“Existentialism represents the perpetual revolt of subjectivity against systems, any system that objectifies and enslaves it.” (Mikel Dufrenne)

  1. Soren Kierkegaard reacts to Hegel’s system
  2. Fedor Dostoevskii reacts to Chernyshevskii’s system
  4. Martin Heidegger – phenomenology
  5. Jean-Paul Sartre. *Being and Nothingness*
    - a. “If God does not exist, then all things are permitted.”
  6. Simone de Beauvoir, *Second Sex*
  7. Czesław Miłosz: “The pressure of the state machine is nothing compared with the pressure of a convincing argument.”

- B. The Significance of Language and the Philosophy of Science (October 25, 1946)
1. Ludwig Wittgenstein, *Tractatus logico-philosophicus*
  2. Karl Popper, *Logik der Forschung (The Logic of Scientific Discovery)* (1935)

C. Logical Basis of Mathematics

1. Bertrand Russell and Alfred North Whitehead, *Principia Mathematica*
2. Kurt Gödel — Gödel's Theorem

IV. Technology

A. Need for Fertilizer → Explosives and Plastics

1. Chilean guano ( $\text{NaNO}_3$ )
2. Haber-Bosch Process – “the most important invention of the 20<sup>th</sup> century”?
  - a. Fritz Haber (1868–1934) – Nobel Prize in 1918 for ammonia synthesis
  - b. Karl Bosch – co-founder of IG-Farben; Nobel Prize in 1931
3. Potassium Nitrate ( $\text{KNO}_3$ ) – fertilizer
4. Nitroglycerin ( $\text{C}_3\text{H}_5\text{N}_3\text{O}_9$ ) and Trinitrotoluene (TNT,  $\text{CH}_3\text{C}_6\text{H}_2(\text{NO})_3$ )

B. Acetylene

1. Henri Moisson (1852–1907) – Nobel Prize in 1907  
(lime + calcium → calcium carbide)
2. Fritz Klatte (1880–1934) synthesized polyvinyl acetate (acetylene + acetic acid)
3. Wallace Carothers (1896–1937) – synthetic polymers
4. New York World's Fair, 1939

C. Telecommunications

1. radio – Marconi transmits radio messages from Cornwall to Newfoundland, 1901
2. television – John Logie Baird transmits recognizable human features by TV

D. Travel and Delivery

1. airplane – Orville and Wilbur Wright credited with first powered flight, 1903
2. rockets – Robert H. Goddard begins rocket experiments, 1914

E. Nuclear Fission

1. Otto Hahn and Fritz Strassman – discovered nuclear fission, 1930s
2. Lise Meitner – demonstrated that enormous energy could come from fission, 1939
2. Albert Einstein – the father of the atom bomb
3. Enrico Fermi (1901–1954) – first sustained chain reaction, 1942
4. J. Robert Oppenheimer (1904–1967) – head of Manhattan Project
5. Why didn't Germany develop the atom bomb?

#### IV Literature

##### A. Poetry

1. T. S. Eliot
  - a. “The Love Song of J. Alfred Prufrock”
  - b. “The Wasteland”
2. Ezra Pound

##### B. Prose Fiction

1. James Joyce
  - a. *Ulysses*
  - b. *Finnegan’s Wake*
2. Franz Kafka (d. 1924)
  - a. *Metamorphosis*
  - b. *The Trial* (1925)
  - c. *The Castle* (1926)

#### V. Music

##### A. Popular

1. Jazz
  - a. Louis Armstrong
  - b. Duke Ellington
  - c. Bessie Smith
  - d. Benny Goodman

##### B. Serious

1. Igor Stravinsky (1882–1971)
  - a. *Firebird*
  - b. *Le Sacre du printemps (The Rite of Spring)* May 29, 1913
2. Arnold Schoenberg – 12-tone row

#### VI. Art

##### A. Cubism

1. Pablo Picasso – *Demaiselle d’Avignon*
2. Marcel Duchamp – *Nude Descending a Stair*

##### B. Fauvism — Henri Matisse

#### VII. Film