

A History of Knowledge

Oldest Knowledge

What the Sumerians knew

What the Babylonians knew

What the Hittites knew

What the Persians knew

What the Egyptians knew

What the Indians knew

What the Chinese knew

What the Greeks knew

What the Phoenicians knew

What the Romans knew

What the Barbarians knew

What the Jews knew

What the Christians knew

Tang & Sung China

What the Japanese knew

What the Muslims knew

The Middle Ages

Ming & Manchu China

The Renaissance

The Industrial Age

The Victorian Age

The Modern World

What the Modern Age knew

Piero Scaruffi Copyright 2018

<http://www.scaruffi.com/know>

1919-1945: The Age of the World Wars

1946-1968: The Space Age

1969-1999: The Digital Age

*An eye for an eye makes
the whole world blind.*

(Mahatma Gandhi)

We are not shooting enough professors

(Lenin's telegram)

"Pacifism is objectively pro-Fascist."

(George Orwell, 1942)

*"The size of the lie is a definite factor
in causing it to be believed"*

(Adolf Hitler, "Mein Kampf")

*What good fortune for governments
that the people do not think*

(Adolf Hitler)

What the Modern Age knew

- Bibliography

- Paul Kennedy: The Rise and Fall of the Great Powers (1987)
- Jacques Barzun: "From Dawn to Decadence" (2001)
- Gregory Freeze: Russia (1997)
- Andrzej Paczkowski: The Black Book of Communism (1999)
- Peter Hall: Cities in Civilization (1998)
- Edward Kantowicz: The World In The 20th Century (1999)
- Paul Johnson: Modern Times (1983)
- Sheila Jones: The Quantum Ten (Oxford Univ Press, 2008)
- Orlando Figes: "Natasha's Dance - A Cultural History of Russia" (2003)
- Ronald Suny: "The Soviet Experiment" (1998)

What the Modern Age knew

- **Bibliography**
 - **Christian Delacampagne: A History of Philosophy in the 20th Century (1995)**
 - **Gerard Piel: The Age Of Science (2001)**
 - **Peter Watson: The Modern Mind (2000)**
 - **Roger Penrose:The Emperor's New Mind (1989)**

What the Modern Age knew

- Bibliography
 - Jonathan Glancey: 20th Century Architecture (1998)
 - MOCA: At The End of the Century (1998)
 - Eric Rhode: A History of the Cinema (1976)
 - Robert Sklar: Film (1993)
 - Eileen Southern: The Music of Black Americans (1971)
 - Ted Gioia: A History of Jazz (1997)
 - Mark Prenderast: The Ambient Century (2000)
 - Hal Foster et al: Art Since 1900 (2005)

What the Modern Age knew

- **Bibliography**
 - **Peter Selz: Art In Our Times (1981)**
 - **Frederick Hartt: Art**
 - **Marilyn Stokstad: Art History Vol 2**
 - **Hugh Honour & John Fleming: The Visual Arts**
 - **Sam Hunter & John Jacobus: Modern Art**

What the Modern Age knew

- **Bibliography**
 - **Eileen Southern: The Music of Black Americans (1971)**
 - **Ted Gioia: A History of Jazz (1997)**
 - **Alyn Shipton: "A New History of Jazz" (2001)**
 - **Mark Prenderast: The Ambient Century (2000)**

The Modern Age

- 1920: Mahatma Gandhi founds a non-violent liberation movement
- 1922: Mussolini, leader of the Fascist party, seizes power in Italy
- 1928: Alexander Fleming invents penicillin, the first antibiotic
- 1929: the world's stock markets crash
- 1931: the Empire State Building
- 1933: Hitler becomes chancellor of Germany
- 1936: Stalin's purges in the Soviet Union (13 million die)
- 1937: Japan invades China
- 1939-45: World War II (55 million die)
- 1945: the U.S. drops two atomic bombs on Japan
- 1945: the United Nations Organization is founded in New York

The Modern Age

- World Population in 1900
 - China 467 million people
 - Europe 325 million
 - North/ Central & South America 178 million
 - Africa 13.5
- World's largest cities in 1900 (West only)
 - London 6,480,000
 - New York 4,242,000
 - Paris 3,330,000
 - Berlin 2,424,000
 - Chicago 1,717,000

The Modern Age

- The boom of oil
 - 1914-18: World War I is won by oil and the internal combustion engine
 - 1912-18: Oil production in Iran increases 1,000%
 - 1917: The USA accounts for 67% of the world's oil output
 - 1920: British investor Weetman Pearson discovers the largest oil field in the world in Mexico
 - 1920-26: Geologists discover more oil fields than prospectors discovered in all previous decades
 - 1921: Royal Dutch Shell discovers oil in Venezuela

The Modern Age

- The boom of oil
 - 1926: A second oil rush in Oklahoma
 - 1927: Anglo-Persian and Royal Dutch Shell discover oil in Iraq
 - 1929: 78% of the world's cars are in the USA
 - 1929: Venezuela is the second world producer of oil after the USA, and Mexico is third
 - 1929: The Turkish Petroleum Company (TPC) is renamed Iraq Petroleum Company (IPC)
 - 1930: A second oil rush in Texas
 - 1931: The price of oil plunges to \$0.15/barrel
 - 1932: Socal discovers oil in Bahrein

The Modern Age

- The boom of oil
 - 1938: Mexico nationalizes USA and British oil companies (Petroleos Mexicanos)
 - 1938: The Kuwait Oil Company (formed by Anglo-Persian and Gulf) discovers oil in Kuwait
 - 1938: Socal discovers oil in Saudi Arabia
 - 1944: The USA discovers that Arabia, Iraq and Iran hold colossal oil reserves
 - 1944: Socal and Texaco form Aramco

The Modern Age

1900 population

Germany: 56 million

Austria: 46 million

France: 39 million

Britain/Ireland: 41 million

Italy: 32 million

Russia: 135 million

Europe: 400 million

USA: 76 million

Japan: 44 million

1938 population

Germany: 68 million

France: 42 million

Britain/Ireland: 47 million

Italy: 44 million

Russia: 180 million

USA: 138 million

Japan: 72 million

After 1918, Austria is reduced to a small country of 7 million people

The Modern Age

- Shares of the world manufacturing output
 - 1900: Britain 18.5%, Germany 13.2%, France 6.8%, Russia 8.8%, USA 23.6%
 - 1929: Britain 9.4%, Germany 11.1%, France 6.6%, Soviet Union 5.0%, USA 43.3%
 - The USA's output is larger than the combined outputs of the six world powers (Britain, France, Germany, Italy, Russia, Japan)
 - 1938: Britain 9.2%, Germany 13.2%, France 4.5%, Soviet Union 17.6%, USA 28.7%

The Modern Age

- The rise of the USA
 - Only major country to benefit from WW I
 - World's financial center moves from London to New York
 - Largest creditor in the world
 - Largest manufacturing output in the world
 - Largest agricultural output
 - Largest exporter
 - Second largest importer (after Britain)
 - Largest stock of gold
 - Giant domestic market and giant firms
 - but minimal political role

The Modern Age

- The rise of the USA
 - However...
 - The USA used to be a country of family-run companies and ranches
 - Increasing domination of the market by monopolies
 - AT&T
 - Hollywood studios
 - RCA
 - Detroit car manufacturers
 - Top scientists complete their studies in European universities, reputed to be superior to US ones

The Modern Age

- The rise of the USA
 - Cars
 - 1914: Ford doubles the salary of workers, reduces their work-hours and gives them a share in the company's profit, thus solving the problem of turnover at the assembly lines and thereby **creating a new class of consumers...**
 - ...but requires his workers (coming from 100 different linguistic communities) to learn English and enforces "moral" domestic habits (**social engineering**)
 - 1917: Ford begins construction of the River Rouge Complex in Dearborn, the largest integrated factory in the world

The Modern Age

- The rise of the USA
 - Cars
 - 1919: Henry Ford acquires the weekly newspaper Dearborn Independent
 - A libertarian opposed to Wall Street and to Jews
 - 1921: Ford owns 61% of the car market in the USA
 - 1924: Half of the cars in the world are Ford Model T
 - 1928: Henry Ford builds Fordlandia, a town in the Amazon rainforest, to provide rubber for car tires, forbidding alcohol, women and tobacco

The Modern Age

- The rise of the USA
 - Cars
 - 1923: Alfred Sloan of General Motors introduces the concept of "planned obsolescence": a new model every year
 - Basically:
 - Ford Model T made the car affordable to the middle class
 - Ford's salaries expanded the middle class
 - Sloan's planned obsolescence created the need for a new car even when the old one is still working fine
 - Style became important
 - Independents cannot keep up with the pace₁₉ of GM

The Modern Age

- The rise of the USA
 - Cars
 - Ford: family-run; no outside suppliers; focus on one model; a car for the rural world; centralized control; production concentrated at River Rouge; international market via fully-owned subsidiaries
 - GM: run by accountants; relying on outside suppliers; portfolio of models; cars for the urban world; divisional autonomy; production distributed all over the country; international market via acquisitions
 - European manufacturers depend on machine tools from the USA

The Modern Age

- USA
 - Boom of the automobile
 - 1919: General Motors Acceptance Corporation (buy cars on credit)
 - 1920: Ford is producing half the cars built in the world
 - 1920: The USA has one car for every 13 people and Los Angeles has one car for every 5 people (Britain: 1 for every 228, Germany 1 for every 1017)
 - 1927: General Motors passes Ford (style, not just price: the car has become a status symbol)
 - 1929: The USA produces 4.5 million cars a year
 - 1929: 1,000,000 kms of paved roads

The Modern Age

- USA
 - Boom of the automobile
 - Drive-in restaurant: Royce Hailey's Pig Stand (Dallas, 1921)
 - Shopping mall: Country Club Plaza (Kansas City, 1922)
 - Motel: Milestone Motel (San Luis Obispo, 1925)
 - Drive-in chain: Roy Allen's and Frank Wright's A&W Root Beer (Sacramento, 1923)
 - Drive-in movie theater: Richard Hollingshead (New Jersey, 1933)
 - Motel chain: Best Western (California, 1946)

The Modern Age

- The rise of the USA
 - Cars
 - 1926: car manufacturing has become the largest industry in the USA
 - The USA produces about 85% of the world's cars
 - Financial tools to buy cars on credit (later applied to all durable goods)
 - Asphalt as road pavement
 - Rapid decline of the railroads in the USA

The Modern Age

- USA
 - Boom of the automobile
 - Demise of the horse-based economy
 - Agricultural revolution
 - Hay and oats replaced with food for humans
 - 1929: 825,000 tractors
 - Excess of produce
 - Collapse of prices for produce
 - Financial strain on small farms because agriculture becomes capital-intensive (tractors)
 - Displacement of farm workers (especially blacks) replaced by automation
 - Decline of agriculture

The Modern Age

- USA
 - Boom of the automobile
 - Largest USA industry by the mid 1920s
 - Boom of steel, rubber, oil, chemicals (paint)
 - Boom of road construction
 - Gas stations, motels, drive-in joints/theaters
 - Boom of repair and maintenance shops
 - Boom of inter-city commerce
 - Boom of supermarkets and decline of small town's stores
 - Boom of the suburbs and of commuting
 - Boom of credit
 - The car reshapes society

The Modern Age

- USA
 - Boom of the automobile
 - Mass-production techniques expand to other consumer industries
 - Consumer credit expands to other consumer industries
 - The car reshapes the economy

The Modern Age

- The rise of the USA
 - Cars
 - Cars allow people to move to suburbia and alleviate the congestion of cities
 - Cars vastly expand the radius of leisure activities beyond the neighborhood (thereby reducing family life and community life)
 - The “neighborhood” expands to the whole city and even beyond
 - Closed cars encourage all year-round use
 - Los Angeles has the highest car/people ratio (1 car per 2 people in 1929)

The Modern Age

- The rise of the USA
 - Cars and women
 - After the invention of the self-starter, driving a car requires skills, not strength (unlike horse-driven coaches)
 - Closed cars don't require special clothes (80% of cars sold in 1927 are closed)
 - Heating, A/C and automatic transmission are introduced especially for the female customer
 - The car liberates the housewife
 - The electric refrigerator (popularized by General Motors' Frigidaire!)
 - Appliances for cleaning, washing, cooking
 - Instead of a producer of food and clothes, the housewife becomes a shopper

The Modern Age

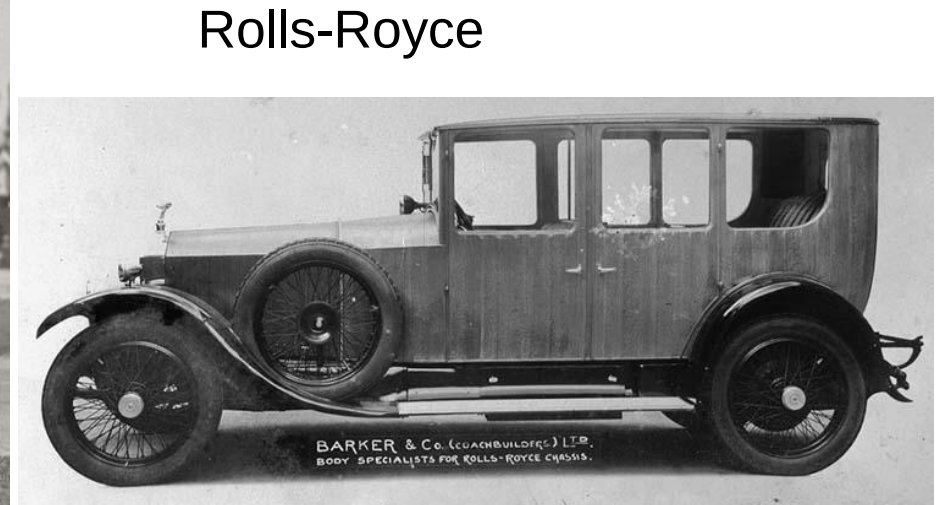
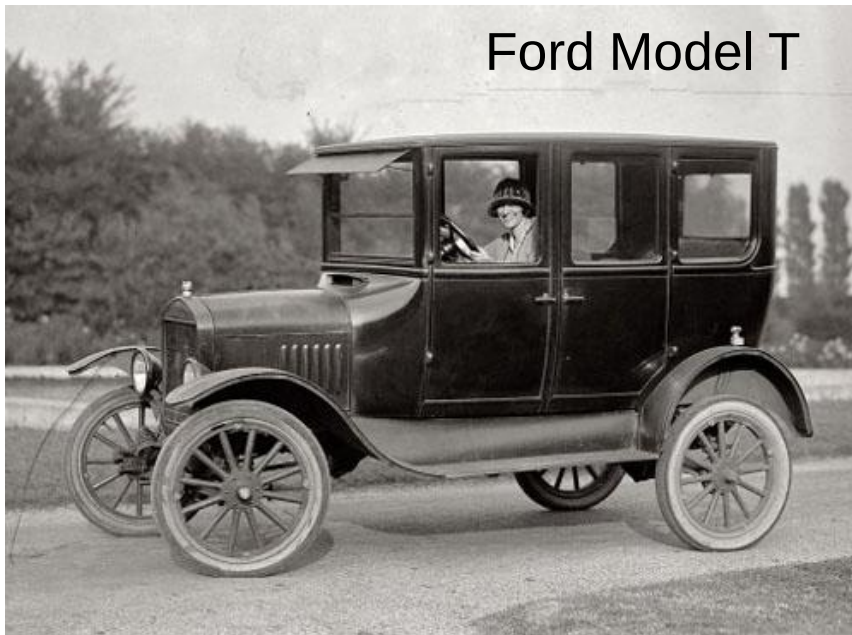
- The rise of the USA
 - Cars
 - In the 1920s cars mostly bought on credit
 - Industrial capacity has grown to the point that supply vastly exceeds demand, and credit is required to convince consumers to buy more cars
 - Mostly replacement (planned obsolescence)
 - The 1920s were driven by a “car boom”
 - Great Depression is a “car bust”
 - During the Great Depression most small companies fail

The Modern Age

- The rise of the USA
 - Cars
 - Technological lead shifts to Europe (late 1930s) and Japan (1950s)

The Modern Age

- The rise of the USA
 - Cars of the 1920s



The Modern Age

- The rise of the USA
 - Cars of the 1930s

Willys



Fiat Topolino



LaSalles



The Modern Age

- The rise of the USA



Elevator garage in Chicago (1936)

The Modern Age

- The rise of the USA
 - Consumerism/ Junk Food
 - 1927: A&P has 16,000 stores
 - 1937: Lay's Potato (by Herman Lay of Atlanta)
 - 1939: A&P introduces pre-packaged meat
 - 1940: Richard and Maurice McDonald open a hamburger joint in San Bernardino
 - 1948: McDonald's (assembly line technique applied to food preparation)

What the Industrial Age knew

- USA
 - Air Conditioning
 - 1900: The largest city in Texas is San Antonio with a population of 53 thousand
 - 1902: Willis Carrier invents the air conditioner
 - 1924: The J.L. Hudson Department Store in Detroit is the first air-conditioned store
 - 1925: The Rivoli Theater in New York's Times Square is the first air-conditioned theater
 - 1928: Carrier's air conditioner for private homes



What the Industrial Age knew

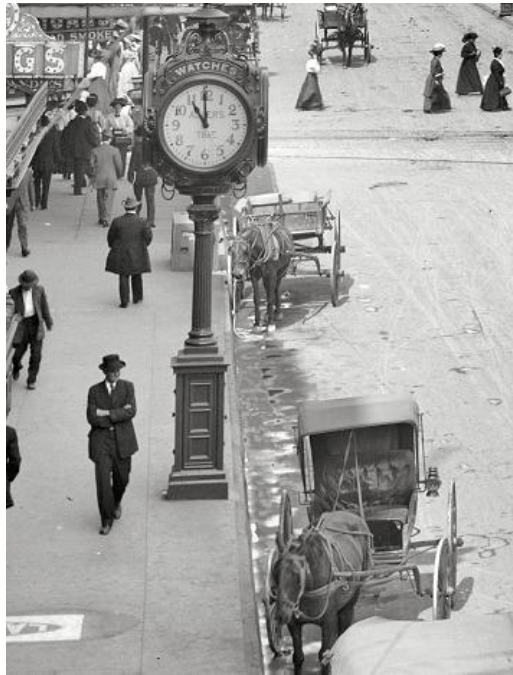
- USA
 - Air Conditioning
 - 1933: Frigidaire exhibits a fully air conditioned home at the World's Fair
 - 1938: Nash introduces the first air conditioned car
 - Air-conditioning enables the population explosion of hot places like Texas



The sidewalk of the 1920s



The gas pump and
the streetlamp



The clock



The mailbox



The hydrant

El Camino Real in the 1920s



The Modern Age

- Coca Cola bottles and vending machines



1910



1916



1917



1959



1980s



1950s



1960s



The Modern Age

- Per capita income in 1914 (and 2000)
 - USA \$377 (\$38,000)
 - Britain \$244 (\$26,000)
 - Germany \$184 (\$27,000)
 - France \$153 (\$26,000)
 - Japan \$36 (\$38,000)

The Modern Age

- The rise of the USA
 - After WWI:
 - Germany keeps interest rates very high to defend its currency
 - USA banks invest capital in Germany
 - Germany uses capital to pay reparation to France and Britain
 - France and Britain use it to repay war debt to USA
 - 1920s: USA's gross domestic product increases 59% and the Dow Jones increases by 400%

The Modern Age

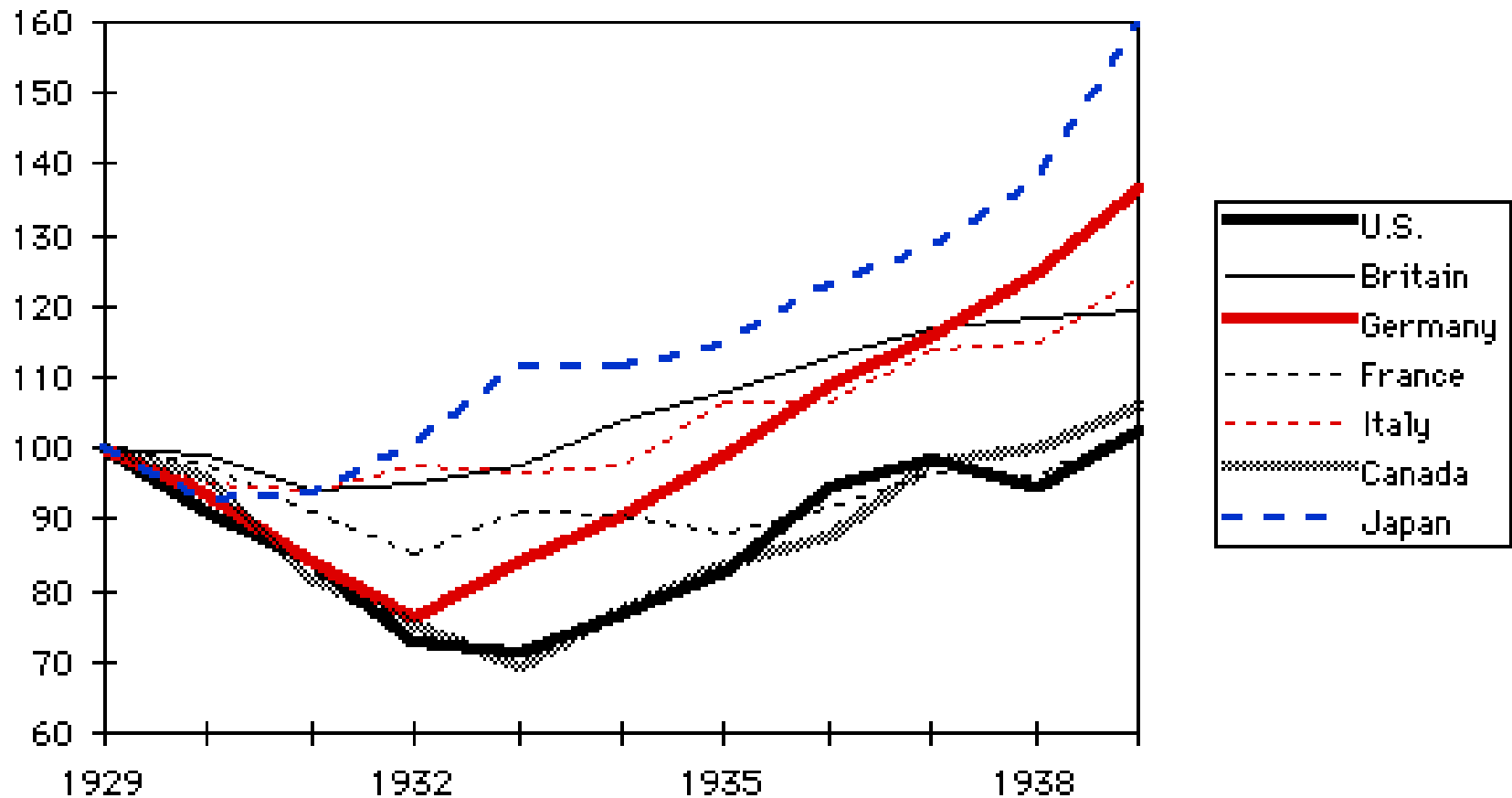
- The stock market crash of 1929
 - Causes
 - Unregulated stock market
 - Stock market ruled by large-scale speculators
 - Artificially high prices
 - Disconnect between a stock price and a company's worth
 - Unethical practices
 - Easy-money policy of the Federal Reserve
 - Ordinary folks bought stocks with borrowed money

The Modern Age

- The stock market crash of 1929
 - End of USA's greatest period of prosperity (relative to the rest of the world)
 - Beginning of the Great Depression
 - Deflation
 - 1930: Protectionist tariffs cause collapse of world trade
 - 1931: Financial collapse of Germany and Britain (that abandons the gold standard)
 - Roosevelt's New Deal (1933)
 - Unemployment still at 14.6% in 1940

The Modern Age

**Real National Product in the Great Depression,
1929=100**



The Modern Age

- New Deal
 - Developing the Far West: water and electricity
 - Industrialization of the Far West: war-related industries in Los Angeles and the Bay Area

The Modern Age

- The rise of the USA
 - Control of world reserves of oil (1936): Britain 524 million tons, USA 93 million
 - Oil production in 1939



The Modern Age

- Harlem Renaissance
 - Entertainment
 - Literature
 - Politics
 - Marcus Garvey
 - 1910: NAACP

The Modern Age

- The Rise of the USA
 - Christian fundamentalism
 - Boom of revival-tent preaching
 - First radio evangelists (Charles Coughlin, 1926-39, strongly anti-communist and anti-semitic)

The Modern Age

- The Rise of the USA
 - Intolerance
 - 1882: Anti-Chinese immigration laws
 - 1894: Anti-Japanese immigration laws
 - 1915: Ku Klux Klan
 - 1920: Mitchell Palmer's "Red Scare"

The Modern Age

- The Rise of the USA
 - Water projects of the New Deal
 - Roosevelt Dam in Phoenix (1911)
 - Hoover Dam on the Colorado (Nevada, 1936), featuring Francis turbines: irrigation and power production
 - Bonneville Dam on the Columbia (Oregon, 1937)
 - Grand Coulee Dam on the Columbia (Washington state, 1942)
 - Shasta Dam on the Sacramento (California, 1945)
 - Central Valley Project (1933) for canals, dams and aqueducts in California
 - Tennessee Valley Authority (1933) for the Tennessee River basin
 - Ogallala Aquifer for irrigating the High Plains (1940s)

The Modern Age

- The Rise of the USA
 - Water projects of the New Deal
 - Spur industrialization of the Far West
 - Spur rapid population of the Far West

The Modern Age

- The Rise of the USA
 - California/aerospace
 - 1921: Donald Douglas founds an aircraft-building company in Los Angeles
 - 1925: Claude Ryan founds an airline in San Diego and builds the Ryan M1
 - 1926: Allan Loughead, Jack Northrop and Kenneth Jay found Lockheed in Los Angeles to build aircrafts
 - 1927: Charles Lindbergh's "Spirit of St Luis" (first New York - Paris flight) is a Ryan

The Modern Age

- Aerospace
 - Science of aerodynamics mainly developed by Ludwig Prandtl at Gottingen (Germany)
 - "Fluid Flow in Very Little Friction" (1904)
 - Institute for Flow Research (1925)
 - 1930: Prandtl's pupil Theodore von Karman moves to the California Institute of Technology
 - 1944: Karman and others found the Jet Propulsion Laboratory (JPL)

The Modern Age

- Aerospace
 - The jet engine replaces the piston engine
 - 1926: Alan Arnold Griffith's "An Aerodynamic Theory of Turbine Design"
 - 1937: Frank Whittle's turbojet engine (Britain)
 - 1939: Ernst Heinkel's He 178, the world's first jet airplane, fitted with Hans von Ohain's turbojet engine
 - 1942: Messerschmitt Me 262, the world's first jet-fighter aircraft



First Flight Around the World (1924)

On April 6, 1924, eight U.S. Army Air Service pilots and mechanics in four airplanes (the *Seattle*, *Chicago*, *Boston*, and *New Orleans*) left Seattle, Washington, to carry out the first circumnavigation of the globe by air. The *Chicago* and *New Orleans* completed the journey 175 days later after making 74 stops and covering about 27,550 miles.

The Modern Age

- The Rise of the USA
 - California/aerospace
 - 1934: The USA mandates the dissolution of firms that are both aircraft manufacturers and transportation firms (Air Mail Act)
 - 1935: Douglas launches the 21-passenger DC3 that makes air travel common for passengers
 - 1938: The DC3 carries more than 90% of all commercial traffic in the USA
 - 1939: Southern California has the majority of the aircraft industry of the USA and Douglas airplanes carry more than 90% of civilian air passengers

The Modern Age

- The Rise of the USA
 - California /aerospace
 - 1945: The industrial output of the Los Angeles area is second only to the Detroit area
 - Uniquely in history, Los Angeles has been industrialized in a short period of time and largely by government intervention

The Modern Age

- The Rise of the USA
 - California
 - Bechtel builds the San Francisco's Bay Bridge (1936), its first overseas project (Venezuela, 1940), Marin City (1942, for guest worker housing), oil refineries, chemical plants
 - Kaiser builds the first integrated steel mill in the Pacific states (1942 in Fontana, near L.A.) and thousands of cargo ships in Richmond and other Bay Area shipyards (1942-45) causing a population boom
 - 1937: John McCone creates Bechtel-McCone-Parsons (BMP) to build oil refineries (Richmond, 1937) and power plants
 - 1940s: Kaiser's corporate welfare programs are among the most generous in the USA

The Modern Age

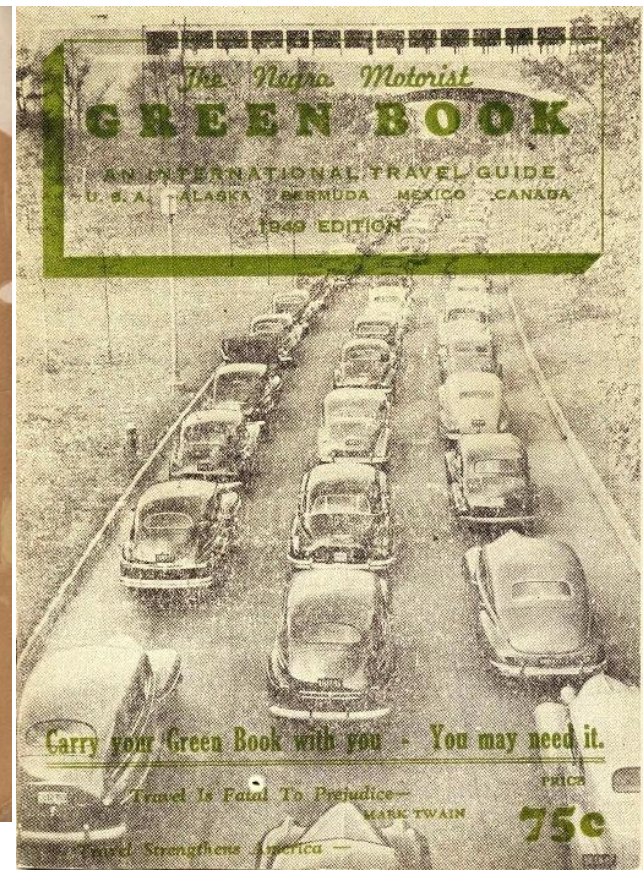
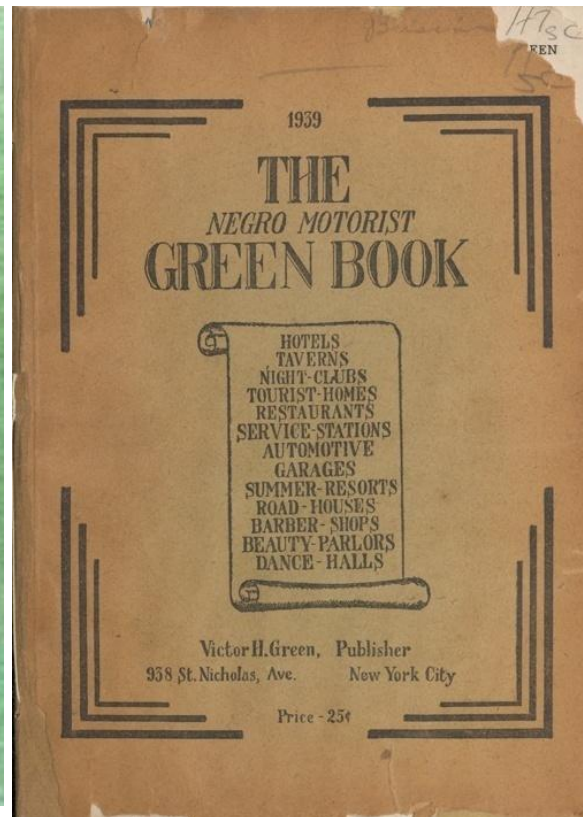
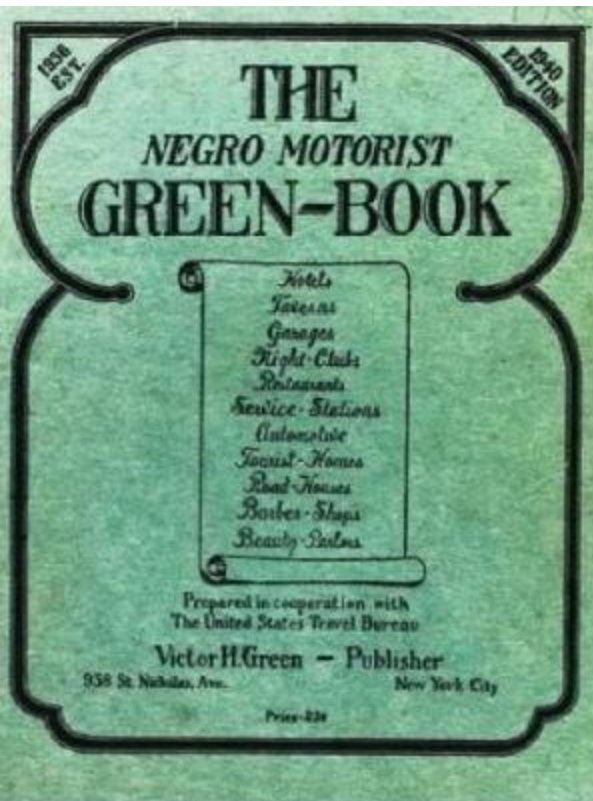
- The Rise of the USA
 - California
 - 1940: The first freeway opens (the Pasadena freeway in Los Angeles)
 - 1941-5: San Diego becomes a major naval base during World War II
 - 1952: Los Angeles' aircraft industry employs 160,000 people, the movie industry employs 31,000
 - 1958: California is the main recipient of military contracts in the USA
 - Berkeley, Stanford and CalTech are three of the main engineering schools in the world

The Modern Age

- The Rise of the USA
 - California
 - World War II has the side effect of revolutionizing the economy of California and of integrating California with the national industrial complex
 - World War II accelerated western migration, California's population growing from 7 million in 1940 to 10.5 in 1950 (in 1962 California passes New York state)
 - Unlike Texas, California's wealth does not come anymore from natural resources but from the industrial and service economies

The Modern Age

- The Rise of the USA
 - Racism
 - “The Negro Motorist Green Book” (1936)



The Modern Age

- The Rise of the USA
 - Power of the press
 - Robert McCormick (Chicago Tribune)
 - Joseph Patterson and Cissy Patterson (New York Daily News)
 - William Randolph Hearst

The Modern Age

- Computing
 - Vannevar Bush
 - Differential Analyzer (1931): an analog computer to solve differential equations for engineering and physics problems (eg power transmission)
 - Babbage's machine failed because computation tended to die out as the mechanical parts ran out of power
 - Bush remedied that by inserting mechanical amplifiers

The Modern Age

- Computing
 - Alan Turing
 - Universal Machine (1936)
 - Claude Shannon
 - The application of Boolean algebra to electronic circuits (1937)
 - Konrad Zuse
 - The Z3 (1941), a programmable electromechanical computer, the first Turing-complete machine
 - Tommy Flowers
 - The Colossus (1943), the first all-electronic digital computer but not general purpose

The Modern Age

- Computing
 - Vannevar Bush
 - No mechanical computer could achieve great speed. Solution: electronic amplifiers (vacuum tubes) instead of mechanical ones
 - Rockefeller Differential Analyzer (1942) to calculate ballistic tables during World War II (a 100-ton machine with 2000 vacuum tubes)
 - “As We May Think” (1945): hypertext (the “memex”)

The Modern Age

- Pessimism
 - Oswald Spengler: "Decline of the West" (1918)
 - Sigmund Freud: "Civilization and its Discontents" (1930)

The Modern Age

- The New Isms
 - Lenin and Stalin: communism
 - Mussolini: fascism
 - Hitler: nazism

The Modern Age

- European dictators
 - Russia, 1917: Vladimir Lenin
 - Hungary, 1920: Miklos Horthy
 - Italy, 1922: Benito Mussolini
 - Russia, 1924: Jozef Stalin
 - Portugal, 1932: Antonio Salazar
 - Germany, 1933: Adolf Hitler
 - Greece, 1936: Ioannes Metaxas,
 - Spain, 1939: Francisco Franco
 - Romania, 1940: Ion Antonescu

The Modern Age

- British Empire
 - The sole superpower after end of Austrian and Ottoman empires, French humiliation, Russian revolution and Great Depression in the USA
 - 58 countries
 - 400 million people
 - 36 million square kms

The Modern Age

- British Empire
 - Britain and its dominions are "equal in status" and "freely associated" in a Commonwealth of Nations (1926)
 - Britannia the pacifier
 - Britain replaces the alliance with Japan with an alliance with the USA (1922)
 - Cinema, radio and gramophone promote the values of the British Empire (royal ceremonies, military parades, speeches, mythology)

The Modern Age



"Britannia Pacificatrix" (1919)

Sigismund Goetze's Mural Decoration At The Foreign Office In London

Britain shakes hand with America, wearing the cap of Liberty and holding the scales of Justice

Italy carries the 'fasces' emblem of the Roman Law

France holds a sword to the 'Scrap of Paper' and the broken Crucifix

Japan carries the wild cherry-blossom

Russia in mourning at the extreme left

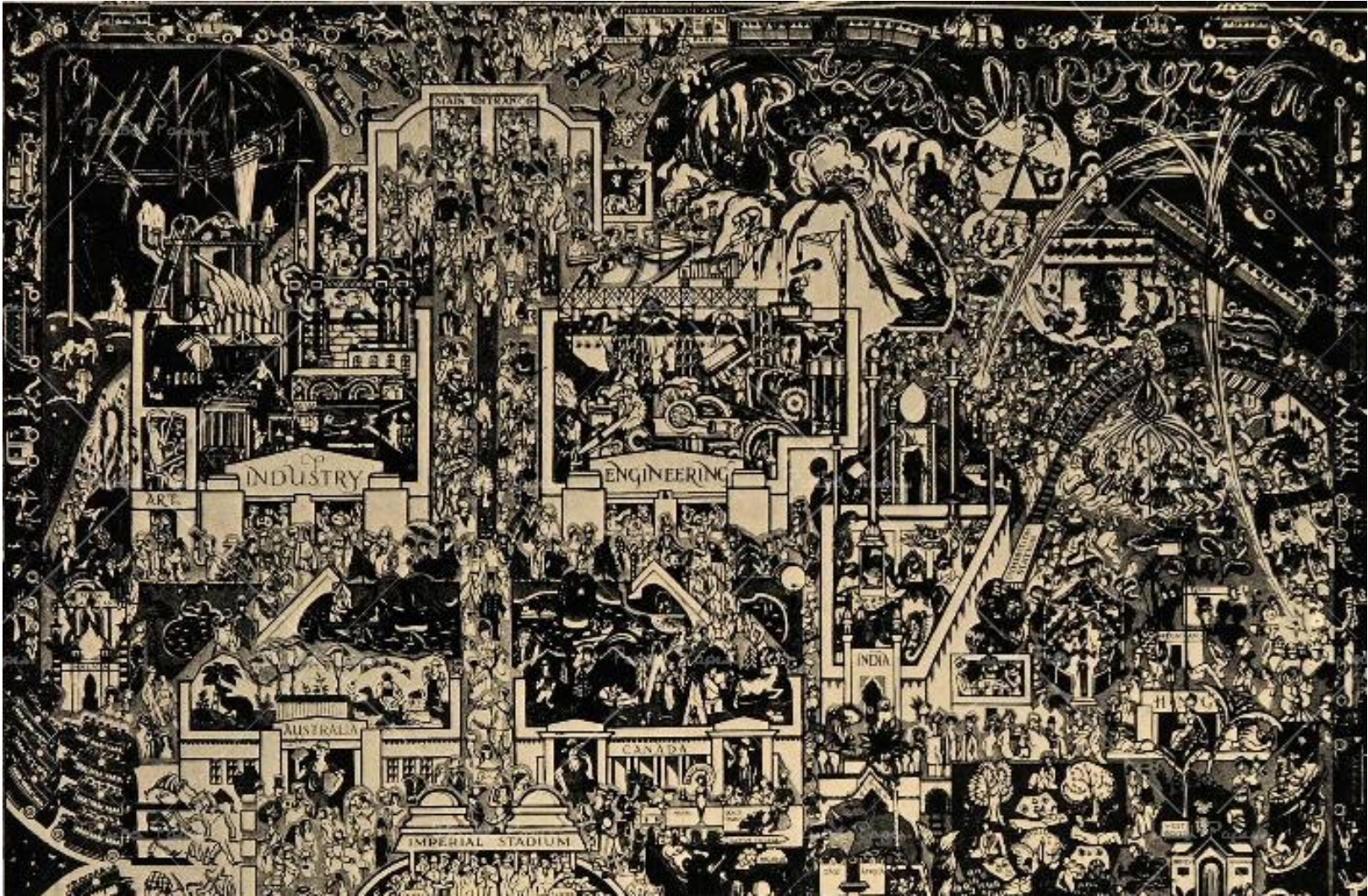
To the right the colonies: South Africa, Canada, Australia, New Zealand, India, Arabia

The Modern Age



British Empire Exhibition 1924

The Modern Age



Poster for the British Empire Exhibition 1936

The Modern Age

- British Empire
 - No more a benevolent empire after Indian, Irish and Boer insurrections
 - Anti-imperialist movement (Orwell, 77% of Britons in 1939)
 - Influence of USA (liberal) and Soviet (socialist) rhetorics

The Modern Age

- British Empire
 - A political experiment
 - Very few British administrators control huge populations (1200 British administrators and 1000 cops for the whole of Africa)
 - Britain controls the local elites through customized administrative systems
 - Symbol of racial/class discrimination: the Club that limits “gentlemanliness” to British men

The Modern Age

- British Empire
 - The balance of power in the Far East shifting towards Japan
 - Britain's inability to stop Italy's invasion of Abyssinia (Ethiopia) shows the Mediterranean is no longer controlled by Britain
 - Italy's invasion of Ethiopia (1935) shows Africans that Britain is impotent
 - The Munich conference (1938) shows Europe that Britain is impotent
 - Fragile pretension to be still a global empire
 - The "Colonel Blimp" syndrome: character over competence

The Modern Age

- Percentage of national income spent on defense in 1937

– USA	1.5%
– Britain	5.7%
– Germany	23.5%
– France	9.1%
– Italy	14.5%
– Soviet Union	26.4
– Japan	28.2%

The Modern Age

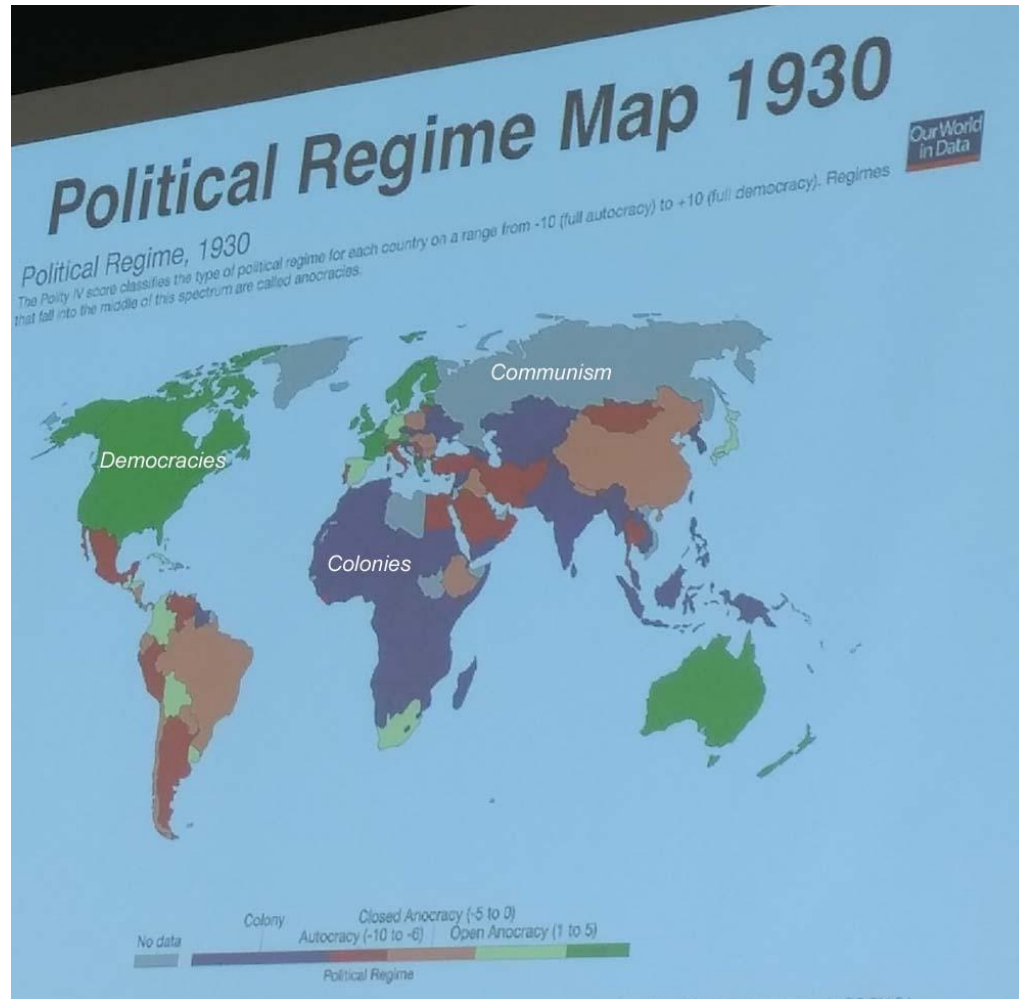
- A century of political experiments
 - Self-destruction of the nation state (replaced by multinational states, melting pots, free-trade areas, federations, totalitarian bureaucracies)
 - Nazifascism (Italy 1922, Germany 1933, Spain 1939, Latin America 1930s, Far East 1945)
 - Communism (USSR 1917, China 1949, Indochina 1975, Cuba 1959, Arabs 1961, Subsaharan Africa 1974)
 - Islamic nationalism (Iran 1979, Afghanistan 1996)

The Modern Age

- A century of political experiments
 - The USA model (multiparty system, liberal economy, free trade, globalization): Anglosaxon world (1900s), western Europe (1945), Far East (1980s), Latin America (1990s), eastern Europe (1991), Subsaharan Africa (2000s)
 - One-party capitalism: China (1978), Arabs (1970s), Subsaharan Africa (1990s)

The Modern Age

- A century of political experiments



The Modern Age

- The Russian revolution
 - A vision of Russia as a leader not a follower
 - Until 1698: Russia isolated from Europe (except for religion borrowed from Byzantium)
 - 1698-1917: Imitating the West (trailing in the economic revolution)
 - 1917-1991: Antagonizing the West (leading the proletarian revolution)



The Modern Age

- The Russian revolution
 - Still largely a peasant society
 - Only 1.6 million factory workers in 1922, 43% of them women
 - The party encourages peasants to migrate to the cities where they can become workers (5.6 million by 1926, out of 147 million Soviet citizens)
 - Social status is inverted: Proletarians and peasants have higher social status (and privileges such as voting rights) than aristocrats, kulaks, bourgeoisie or priests

The Modern Age

- The Russian revolution
 - Land expropriation creates millions of small farmers
 - Dual power: the Communist Power (egalitarian, socialist, atheistic) but also the village commune, often run by the old kulaks (patriarchal, capitalist, religious)
 - Technically, the state owns the land; in practice, the communes do
 - 400,000 communes in 1926 representing 20 million households
 - Peasants prefer the Communists over the old system because of the land expropriation, not because of ideological beliefs
 - Communists needed the peasants to win the civil war, and the rural soviets evolved from the peasant committees

The Modern Age

- The Russian revolution
 - The intelligentsia is mostly opposed to the Bolsheviks (Stravinsky, Chagall, Horowitz emigrate - Gorky, Mayakovsky, Blok remain)
 - 1922-28: Expulsion of reluctant intellectuals
 - 1928-31: Class war against enemies of the Communist Party also includes control of writers (“engineers of the soul”) and scientists
 - Preferred forms of art to reach the masses (mostly illiterate outside the big cities):
 - Public poetry
 - Cinema

The Modern Age

- The Russian revolution
 - Economy
 - Oil from Azerbaijan
 - 1926: The average Soviet citizen enjoys more security, better health care and more socioeconomic equality than ever
 - 1927: Economic crisis
 - 1928: Stalin launches a program of rapid industrialization and collectivization (and education)
 - 1931: The Soviet Union has become the main buyer of British and US machinery

The Modern Age



- The Russian revolution
 - Lenin's Marxism:
 - One-party system: the Communist Party makes decisions for the entire country
 - Dictatorship of the proletariat
 - Democratic centralism: decisions made by a majority of members of the central committee are binding for the entire party
 - NEP (New Economic Policy)

The Modern Age



- The Russian revolution
 - Stalin's Marxism-Leninism:
 - Single centralized institution (a vast, pervasive bureaucracy) in charge of every aspect of life (“nomenklatura” system)
 - Mobilization of all human and material resources to generate economic power (crash industrialization) which generates political and military power
 - Industrialization, urbanization, collectivization
 - Large terror apparatus
 - Export of “revolutions” (starting with China)
 - An ideological empire (annexations)

The Modern Age

- The Russian revolution
 - Lenin's terror
 - The Cheka is 15 times bigger than the Tsarist secret police by 1920 (250,000 people)
 - No public trial required for dissidents
 - The Cheka operates concentration camps
 - 50,000 death sentences by 1920
 - Persecution of categories not individuals (priests, teachers, ...)
 - Self-determination of Russian subjects branded as "bourgeois"
 - Basically rebuilds the Tsarist empire, but without the counterweight of church, aristocracy, bourgeoisie

The Modern Age

- The Russian revolution
 - Lenin's terror
 - Unlimited power of the state
 - Party membership required for any significant post
 - Labyrinthine hierarchy of party bureaucracy
 - A highly disciplined machine of state control
 - All opposition banned in 1921
 - Dissidents given three choices: silence, exile, gulag
 - Unions become a state organ (strikes are illegal)
 - Stalin the perfect bureaucrat

The Modern Age

- The Russian revolution
 - Lenin's terror
 - Marx provides a detailed analysis of the capitalist economy but not of the socialist one
 - Lenin clueless about economy
 - Lenin obsessed with control not production
 - Centralized planned economy
 - Focus on statistics
 - Collapse of industry and agriculture (5 million die in the winter of 1921-22)
 - The model for the Soviet economy is the German war economy: highly methodical and disciplined

The Modern Age

- The Russian revolution
 - Early Soviet inventions (1918-19)
 - Ethnic cleansing (extermination of the Cossacks)
 - Collective punishment (hostages executed in villages)
 - Concentration camps
 - Terror (10,000 dissenters executed in the months of september and october 1918 versus 6,321 dissenters executed by the tsars from 1825 till 1917)
 - Forced confessions (1920)
 - Government policy of spying on citizens
 - Purges of intellectuals (1921)

The Modern Age

- The Russian revolution
 - Stalin's terror:
 - 1927: Power struggle with Trotsky
 - 1928: Class war against enemies of the party (which includes the moderates of the party like Bukharin)
 - 1929: Extermination of kulaks and mass “collectivization” (ten million die and ten million are deported, and ten million will die of famine over the next seven years)
 - 1933: ten million people in gulags (with a 10% yearly death rate)

The Modern Age

- The Russian revolution
 - Stalin's terror:
 - 1936-38: the "Purges"
 - 1936: 5000 party members, 3000 secret police officers, 30000 army officers, 600 writers
 - hundreds of foreign communists in 1937-38
 - dozens of Soviet agents murdered around the world in 1937-38
 - 200 generals in 1937-38
 - Bukharin and Rykov executed in 1938
 - Fabricated plots and forced confessions
 - 1939: 4.5 million people have died in the Purges
 - 1940: Trotsky assassinated

The Modern Age

- The Russian revolution
 - Enemies of the state (victims of Stalin's terror)
 - Kulaks
 - Specialists (engineers, managers, professors)
 - Priests
 - Entrepreneurs
 - Right-wing communists (Bukharin)
 - Left-wing communists (Trotsky)

The Modern Age

- The Russian revolution
 - Stalin's Marxism-Leninism:
 - Dekulakization (1929-32) and...
 - ... enforced collectivization (i.e. confiscation of grain) to pay for...
 - ...accelerated industrialization (feed the towns and pay for foreign machinery)
 - But instead results in depressed agriculture (the kulaks were the most productive farmers), famine, and peasant hostility (the communists have to confiscate ever larger shares of harvest)...

The Modern Age

- The Russian revolution
 - Stalin's Marxism-Leninism:
 - ... and the peasants find themselves with less freedom and less food than in the times of serfdom...
 - ...while the politicians (from the cities) take over the economy of the countryside (eradication of the traditional village structure)...
 - ...and one man assumes totalitarian
 - Relative to the West, the Soviet Union is even more backwards than tsarist Russia
 - Loss of Poland and Baltic states shrink the metallurgic and engineering base

The Modern Age

- The Russian revolution
 - Stalin's Marxism-Leninism:
 - Faith in planned economy vs chaotic capitalist economies (that caused the Great Depression)
 - Persecution of engineers and economists who disagree accused of sabotage (1928-31)
 - Large projects (Magnitogorsk, Stalingrad tractor factory, Turkestan-Siberian Railroad, Dneprostroi hydroelectric power station, Moscow metro)
 - 1928-40: industrial production grows an average of 17% per year
 - 1926-39: 23 million peasants move to cities (Moscow, Leningrad, Kharkiv double in population)

The Modern Age

- The Russian revolution
 - Stalin's Marxism-Leninism:
 - But mostly inefficient and harmful results, and ecological disasters
 - Real wages keep falling until 1936 and workers keep moving in search of better jobs
 - Shared housing and sometimes shared rooming
 - Overcrowded public transportation
 - Poor quality of consumer goods
 - Chaotic economy, despite being planned
 - Blamed on foreign spies and Trotskyist
 - Hostile capitalist countries are about to invade

The Modern Age

- The Russian revolution
 - Stalin's Marxism-Leninism:
 - 1931: Stalin accepts slower pace of industrialization and accepts to pay skilled workers more
 - 1934-39: consumption increases, famines end
 - 1930s: Formation of a generation of Soviet managers that grew up as peasants and workers
 - Stakhanovism (1935) encourage workers to hyper-produce

The Modern Age

- The Russian revolution
 - Stalin's Marxism-Leninism:
 - Famine in Ukraine (the breadbasket of tsarist Russia) that kills 5,000.000 people in 1932-33
 - Famine in the Caucasus
 - Famine in the Volga
 - Famine in Kazakhstan (highest death rate of any republic)
 - But more schools, more clinics and better hygiene

The Modern Age

- The Russian revolution
 - Stalin's terror:
 - Western intellectuals largely condone Stalin's terror
 - The Great Purges greatly weaken the Soviet Union economically, militarily and intellectually
 - Scores of writers exiled or executed or persecuted
 - Hostility towards the avantgarde
 - Hostility towards modern science (Quantum Mechanics and Relativity condemned in 1936)
 - Return to traditional family values (anti-abortion law)
 - Crackdown on religions
 - Mass literacy but Russian becomes the national language even for minorities

The Modern Age

- The Russian revolution
 - The Comintern spreads Stalinism around the world
 - Support for anticolonial movements around the world
 - No friends of the Soviet Union
 - The Red Army is irrelevant in Europe after the purges
 - Tensions with Romania over Bessarabia
 - 1930: Litvinov, a Jew, becomes foreign minister
 - 1931: The Soviet Union is the only country to oppose Japan when it invades China's Manchuria
 - 1932: Anti-war Congress of Amsterdam (pro-Soviet, anti-Japanese)
 - 1933: Surrounded by a hostile Germany (plus Poland, Finland, Baltic states, Hungary and Romania) and a hostile Japan

The Modern Age

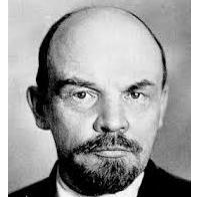
- The Russian revolution
 - 1933: The USA recognizes the Soviet Union
 - 1934: The Soviet Union joins the League of Nations
 - 1934: The Social Democrats win elections in Sweden
 - 1935: The Comintern supports the “popular fronts” (alliances of Communist Parties with Socialist Parties) because the new priority is to fight fascism/nazism not capitalism/democracy
 - 1935: The Soviet Union is the only country to impose sanctions on Italy when Mussolini invades Ethiopia
 - 1936: The Popular Front wins both in France and Spain
 - 1936: The Soviet Union is the only country to help the Popular Front in Spain when Franco stages a coup

The Modern Age

- The Russian revolution
 - 1936: Germany, Italy and Japan form an anti-Comintern alliance
 - 1939: Molotov replaces Litvinov and the foreign policy shifts from defensive to offensive
 - 1939: Treaty with Germany to regain Finland, half of Poland, Bessarabia and Baltic territories
 - The Soviet Union invades Poland (1939), Finland (1939), Lithuania (1940), Latvia (1940) and Estonia (1940), all ruled by pro-German anti-Soviet right-wing dictators
 - World War II legitimizes Stalin's regime

The Modern Age

- Ideologies of mass killings
 - Lenin: Scientific, to create absolute dictatorship (of the proletariat) via absolute violence
 - Stalin: Political, to safeguard and increase his own power
 - Hitler: Racist, to annihilate inferior races
 - Mao: Idealist, to create a just society



The Modern Age

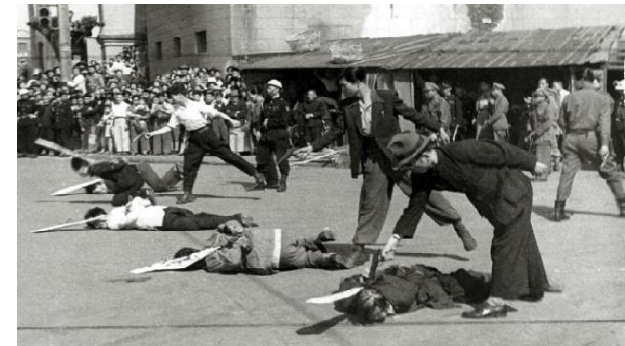
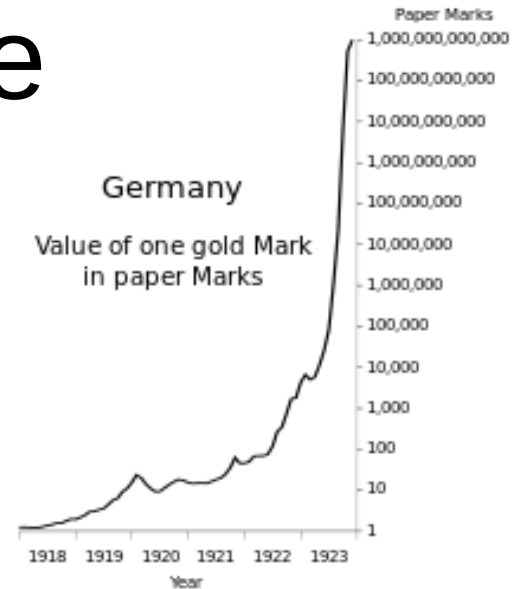
- Ideologies of mass killings
 - Intellectual vanguard to lead the masses
 - Mobilization of the masses
 - It could not have succeeded without the participation of the masses

The Modern Age

- Economics of mass killings
 - A strategy for economic self-sufficiency:
 - Nazi Germany needs the agricultural products of Eastern Europe (notably Ukraine) and the oil fields of the Caucasus to complement its industrial growth with an adequate agrarian economy
 - The Soviet Union needs rapid industrialization and urbanization (more likely to the West than to the East) to complement its agrarian economy
 - A vision of economic development legitimized mass extermination
 - Economic planning required a politics of mass murder

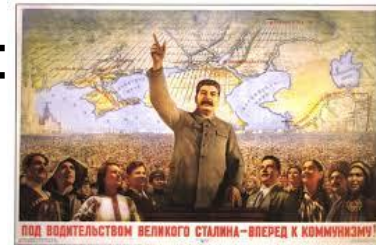
The Modern Age

- An age of starvation
 - Russia: Civil war and Communism
 - Germany: WWI reparations
 - USA: Great Depression
 - China: Civil War
 - Indian famines (Mumbai 1905, Bengal 1943)
 - Latin American famines (Brazil 1915)
 - African famines (Rwanda-Burundi 1928)



The Modern Age

- Communism
 - Similar to French enlightenment: contempt for superstition
 - Similar to ancient monumental civilizations: slave labor on a mass scale Similar to religion, with the State replacing God and focus on this life instead of the Afterlife: paradise on Earth (have faith in the communism ideal) or else hell on Earth (condemned to the gulags)
 - Colossal bureaucracy to run the "paradise" for workers and farmers
 - Citizens to serve the state, not viceversa (like in absolute monarchies)



The Modern Age

- Communism
 - The state has no obligation to provide services to the citizen or to respect her/his private life
 - No human rights
 - In theory egalitarian, in practice never a female leader in any communist country
 - Capitalism is a self-organizing system, communism is a centrally-organized system

The Modern Age



- Fascism
 - Mussolini's putsch inspired by Lenin's
 - Mussolini improves Italy's infrastructure
 - Industrial boom
 - Contrast with the hunger and terror of Lenin's Russia
 - Mussolini lenient on Jews
 - Mussolini's contempt towards Hitler's barbaric style

The Modern Age

- Fascism
 - 1935: Invasion of Ethiopia
 - 1936: British sanctions against Italy, that turn Italy into an enemy
 - 1936: Italy sends 50,000 soldiers to fight in Spain against the Republicans
 - 1937: Italy joins the Anti-Comintern Pact and leaves the League of Nations
 - 1939: Italy annexes Albania
 - 1940: Tripartite Pact with Germany and Japan

The Modern Age



- Nazism
 - Berlin one of the cultural capital of the world
 - Cinema
 - Theater
 - Opera
 - Weimar
 - Walter Gropius: “total art”
 - Bauhaus for architecture
 - Literature
 - Mann
 - Jewish writers: Kafka, etc

The Modern Age



- Nazism
 - Economic meltdown caused by public debt but blamed on Treaty of Versailles
 - Bismark had raised money for wars by offering bonds and then paying the debt with the loot, but WWI did not bring any loot only the bonds
 - Hyper-inflation
 - Government, landowners, industrialists who are able to repay their debts with worthless paper benefit from hyper-inflation
 - Economic boom of Weimar republic: 1925-29
 - Germany builds up industrial monopolies in steel, rubber, coal, etc
 - The monopolies get control of Germany and bring Hitler to power

The Modern Age



- Nazism
 - Germany builds up industrial monopolies in steel, rubber, coal, etc
 - The monopolies get control of Germany and bring Hitler to power
 - Hitler supported by industrialists like the Krupps (steel), the Kirdorfs (coal), Thyssens (steel), Voeglers (steel), Schnitzlers (I.G.Farben chemistry), Rostergs and Diehns (potash), Schroeders (bankers)

The Modern Age



- Nazism
 - Romantic myth of the “Volk”
 - Lenin believes in historical determinism (the Proletariat), Hitler believes in biological determinism (the Aryan race)
 - Hitler believes that the German race will rule the world once it is cleansed of “impurities” (Jews)
 - Hitler’s vision: German expansion to the East (Soviet Union), a medieval mission

The Modern Age

- Nazism
 - Jews dominate communism
 - Jews dominate capitalism

The Modern Age

- Nazism
 - Automobile
 - Autobahn
 - Volkswagen
 - Synthetic oil from coal
 - Imports of oil from Soviet Union

The Modern Age

- Nazism
 - Hitler's political plan: personal (not class) lawless dictatorship
 - Hitler's economic plan: rearmament at all costs
 - One-party state (like in Russia)
 - Large-scale terror regime (like in Russia)
 - Gangster-like elimination of opponents (like in Russia)



The Modern Age

- Nazism
 - 1933: Germany repudiates the Treaty of Versailles
 - The fear of (domestic) communism put Hitler in power
 - The fear of (Soviet) communism helps Hitler appease Britain
 - 1939: Pact Of Steel with Mussolini
 - 1939: Non-aggression Pact with Stalin
 - Hitler's real target is the Soviet Union

The Modern Age

- Fascism and Nazism
 - Nationalistic
 - Racist
 - Anticommunist
 - Anticapitalist
 - Antipacifist
 - Antidemocratic
 - Envious of imperial powers (Britain, France)
 - Reaction to perceived “decadence” of the nation
 - Celebration of the state and strategy of expansion of the state
 - Rising during the Great Depression of 1929-39

The Modern Age

- Fascism and Nazism
 - Mussolini's ambition: the Mediterranean
 - Hitler's ambition: Russia
 - “What India was for England, Russia will be for us”
 - “The Slavs are a mass of born slaves who feel the need of a master”

The Modern Age

- Strategies of social evolution
 - Nazism: racist, inegalitarian
 - Communism: internationalist, egalitarian

The Modern Age

- Strategies of economic development
 - Nazism: militarizing a modern industrial economy
 - Communism: modernizing, industrializing and urbanizing a agricultural economy

The Modern Age

- Strategies of world domination
 - Fascism/nazism: empire builders
 - Communism: spread of the communist revolution
 - 1920s/1930s: popular insurrections (Germany, France, Spain, Eastern Europe)
 - All failed
 - 1950s/1960s: decolonization (Eastern Europe, China, Indochina, North Korea, Cuba, Africa)
 - Mostly successful

The Modern Age

- Global industrialization
 - Western Europe and USA: Commerce and capitalism preceded industrialization
 - Soviet Union and Third World: Industrialization (eg five-year plans) before or without commerce and capitalism

The Modern Age

- Women's liberation
 - 1906: Female suffrage in Finland
 - 1913: Female suffrage in Norway
 - 1917: Mobilization of women for the war
 - 1919: Millicent Garrett Fawcett's "The Women's Victory"
 - 1919: Female suffrage in Germany and Holland
 - 1919: Margaret Sanger founds the National Birth Control League
 - 1920: Female suffrage in the USA and Canada
 - 1928: Female suffrage in Britain
 - 1930s: Militarization of women in Germany and USSR
 - 1944: Female suffrage in France



The Modern Age

- Japan
 - Meiji modernization (1868-1912)
 - Taishō democracy (1912-26)
 - Shōwa militarism (1926-45)

The Modern Age

- Japan
 - Economic boom 1905-13, mostly driven by military expenses
 - Economic boom 1915-20, fueled by World War I and by maritime trade to replace European shipping destroyed in the war
 - 1919: Land under cultivation peaks at 6 million hectares until 1945
 - Stagnation of 1920-1932 (collapse of the banking system in 1927, Great Depression of 1930)
 - 1920s: Yawata Steel Works is the world's most extensive internationally integrated iron and steel complex
 - The first country to build an iron and steel industry based on imported raw materials (China, Korea)

The Modern Age

- Japan
 - Economic boom of 1932 fueled by devaluation of yen (cheaper exports) and military expenses
 - Most exports are manufactured goods, competing with European goods
 - Economy controlled by a small number of business leaders, the "zaibatsu" (Mitsui, Mitsubishi, Sumitomo, Yasuda)
 - 1930s: Most space-intensive and labor-intensive production systems in the world

The Modern Age

- Japan
 - Industrialization
 - Urbanization
 - Higher education
 - "Ero, guro and nansensu" (western-inspired lifestyle)



The Modern Age

- Japan
 - Power shared by
 - The oligarchs of the Meiji Restoration
 - The military commanders
 - The zaibatsu (business leaders)

The Modern Age

- Japan
 - A country of powerful earthquakes and storms
 - A theocracy that borrows political and economic elements from China and the West
 - No system of law (system of consensus among the elite)
 - Bushido code rules the army
 - After 1931, military dictatorship under nominal imperial rule (the parliament “is” the opposition)
 - “Kodoha/ “The Imperial Way” (1932): Shinto revived as a military expansionist ideology
 - Booming population (64 million in 1930, growing by one million per year)

The Modern Age

- Japan
 - Western influence:
 - Large industrial groups created within two generations: Mitsubishi, Sumitomo, Yasuda...
 - Evolution of British-style “democracy” (1920s) although largely symbolic vs military power
 - Universal male suffrage (1925)
 - Fascist/communist-style military violence and rationalization of mass murder, peaking with general Sadao Araki (1931-34), fanatically opposed to communism
 - Territorial expansion viewed as essential to modernization (mimicking European powers)

The Modern Age

- Japan
 - 1922 treaty with Britain and USA
 - Elevates Japan's status as a power
 - Guarantees Japan naval superiority in the Pacific

The Modern Age

- Japan
 - Japanese liabilities
 - 35,9% of Japan's trade is with the USA (1929)
 - Manchuria's resources essential to sustain Japan's industry
 - Scarce natural resources and booming population
 - A booming economy that depends on foreign raw materials (notably USA oil)
 - Ambition to create a self-sufficient empire on the model of the Western ones

The Modern Age

- Japan
 - Japanese liabilities
 - Nobody is in charge (unlike Germany, Russia and Italy where one man is in charge, and unlike Britain, France and the USA where the democratically-elected government is in charge)
 - 1931: War with China initiated by low-level officers
 - 1932: Murder of the prime minister by nationalist officers
 - 1934: Puppet state of Manchuria established by the army
 - 1936: Attempted putsch by nationalist officers
 - 1937: War with China initiated by troops
 - 1938: Military law grants power to generals
 - A war economy de facto run by the army

The Modern Age

- **Japan**
 - **Japanese public**
 - **Less nationalistic than the army**
 - **Fascists lose the election of 1937, unlike in Italy 1922 and Germany 1933**

The Modern Age

- Japan
 - Japanese public
 - Views Japanese military actions as legitimate
 - Hypocrisy of Western powers that condemn Japanese actions in China after having conquered most of the planet
 - Need of Japanese economy for resources of Southeast Asia, occupied by European powers (Holland, France, Britain)
 - Japan helped Chinese revolutionaries of 1911, and even trained its army
 - Atrocities in China not well known
 - USA embargo that cripples Japanese ambitions viewed as unfair

The Modern Age

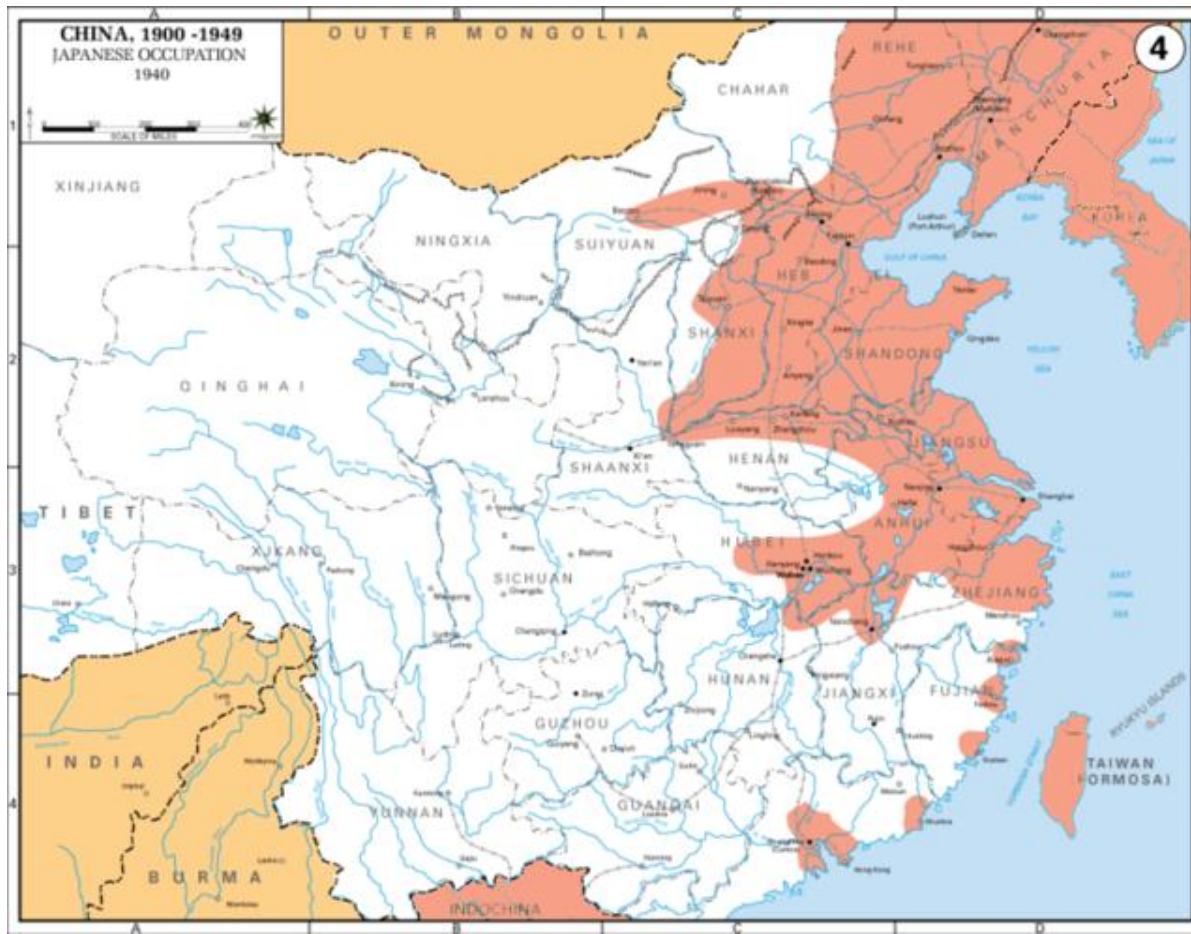
- **Japan**
 - **Japanese public**
 - **Less nationalistic than the army (Fascists lose the election of 1937, unlike in Italy 1922 and Germany 1933)**
 - **Views Japanese military actions as legitimate**
 - **Very little internal dissent to actions of the military**
 - **At the end of World War II, very little sense of individual guilt**

The Modern Age

- Japan
 - 1931: Invasion of Manchuria from Korea
 - 1933: Invasion of Hebei province of China
 - 1934: Establishment of puppet state in Manchuria
 - 1934: Japan repudiates the London Naval Treaty
 - 1937: Full-scale war with China (“Rape of Nanjing”, 350,000 dead)
 - 1938: Japan seizes Canton
 - 1940: Tripartite Pact with Germany and Italy
 - 1941: Japan attacks the USA
 - 1945: Japan surrenders to China and the USA

The Modern Age

- Japan
 - Japanese territories in China (1940)



The Modern Age

- China/ WWI
 - Despite the political fragmentation and the warlords...
 - Economic boom
 - Industrial revolution (mostly funded by foreigners)
 - Railways
 - Mining
 - Textile
 - Tobacco (Nanyang Tobacco Company founded by Jian family, first Western-style capitalists of China)
 - Proliferation of banks

The Modern Age

- China/ WWI
 - The world's industrial power treat China like an infinite market and an infinite source of cheap labor

The Modern Age



- China/ WWI
 - Rise of Chinese nationalism
 - Sun Yatsen
 - Disillusionment with Western moral values
 - Bloodshed of WWI (1914-18)
 - Betrayal of China at Versailles (1919)
 - But mostly a middle-class phenomenon

The Modern Age

- China/ WWI
 - Rise of Chinese nationalism
 - Sun Yatsen
 - West: cult of force (the “rule of Might”)
 - East: cult of “benevolence, justice and morality” (the “rule of Right”)

The Modern Age

- China/ WWI
 - Marxism in China
 - Success of Soviet revolution (1917) and friendly overtures of the Soviet Union (renouncing Manchuria)
 - Marxism does not apply to China because China does not have a capitalist class, an industrial society, a proletariat

The Modern Age

- China/ WWI
 - Li Dazhao's Chinese way to Communism (1918)
 - The Soviet Union represents a third way mediating between West and East
 - China as a whole is an oppressed nation under the yoke of imperialist nations that exploit Chinese labor and own the means of production, just like the proletariat is oppressed by capitalists
 - For the first time, China abandons the belief in its superiority and adopts a foreign (western) model



The Modern Age

- China/ After WWI
 - 1919: Students protest in Tiananmen Sq. against the European powers and Japan ("May 4th movement")
 - 1919: Chinese students travel to France for a work-study program (Zhou Enlai, Deng Xiaoping)



The Modern Age

- China/ After WWI
 - Deng Xiaoping

France in 1920



Soviet Union in 1929



in 1934

The Modern Age

- China/ After WWI
 - Student unions (including high schools) spread to all major cities (Zhou Enlai in Tianjin)
 - Girls are admitted to student unions
 - Spread of sociocultural newspapers (following Chen Duxiu's "New Youth", 1915)
 - Industrial workers use strikes as a political tool (to support students' protests)
 - Lenin dispatches Soviet agents to organize the opposition in China (1920)

The Modern Age

- China/ After WWI
 - Beijing University emerges as the intellectual epicenter
 - Chen Duxiu (dean of Beijing University, 1917)
 - Abandon Confucian collectivism
 - Adopt Western individualism
 - Vernacular language instead of classical language
 - Founds the newspaper “New Youth”, 1915)
 - Founds Communist Party (1921)
 - Writers abandon the literary language for the vernacular (1917)



The Modern Age

- China/ After WWI
 - 1920: Duan ousted
 - Warlords control much of China, including Beijing
 - 1920-21: Famine of Hebei, Shandong, Henan, Shanxi
 - 1922: Washington Conference (Japan returns disputed territories to China)

The Modern Age

- China/ After WWI
 - KMT (Guomingdan/ Kuomintang)
 - National unification
 - Liberation from foreign imperialism
 - Democracy
 - Socialism
 - Assistance from Soviet Union
 - CCP (Chinese Communist Party)
 - Unification and Independence
 - Organization of the urban proletariat
 - Organization of the rural peasants
 - Assistance from Soviet Union
 - 300 members in 1923

The Modern Age

- China/ After WWI
 - 1923: alliance between KMT and CCP under Sun Yatsen in Canton to achieve unification and liberation
 - 1923: Stalin dispatches an agent (Mikhail “Borodin” Gruzenberg) to help the alliance
 - Chiang Kai-shek (studied military organization in Russia) organizes the Whampoa military academy for the KMT, Zhou Enlai is its ideological chief (among early cadets: Lin Biao)
 - Most of China controlled by warlords
 - Zhang Zuolin from Manchuria to Beijing
 - Wu Peifu from central China to Hubei
 - etc etc
 - Chiang Kai-shek in Canton

The Modern Age

- China/ After WWI
 - Northern Expedition of the KMT
 - 1925: Shanghai riots (students, workers), Hong Kong strike (workers), Canton rally (students, workers, soldiers, farmers, Whampoa cadets)
 - 1925: Sun dies and leadership of the KMT passes de facto to Chiang Kaishek/Jiang Jieshi
 - 1926-27: Chiang Kai-shek leads the Whampoa army to conquer Nanjing, Wuhan and Shanghai
 - 1927: Chiang Kai-shek strikes an alliance with the capitalists and foreign powers of Shanghai
 - 1928: the KMT retakes Beijing, establishing a new capital in Nanjing (the “Nanking Decade” 1928-37)

The Modern Age

- China/ After WWI
 - War between the KMT and CCP
 - 1927: Mao Zedong's "Autumn Harvest Uprising" is defeated by the KMT, and the communists retreat to the countryside and adopt guerrilla warfare
 - Chiang Kai-shek's priority is to defeat the communists, not to stop the Japanese expansion
 - German advisors to the Chinese nationalists to fight Japan
 - general Hans von Seeckt (May 1933)
 - general Alexander von Falkenhausen (Apr 1934)
 - 1934-35: the "Long March" (first led by Zhou Enlai, then by Mao) allows the Communists to escape the KMT's siege and regroup in the north
 - During the march Mao obtains control of most Communist forces

The Modern Age

- China/ After WWI
 - War between the KMT and CCP
 - 1937: Stalin encourages the CCP to ally with the KMT against Japan under the leadership of Chiang Kai-shek
 - 1937: Communist agents cause the “Marco Polo Bridge Incident” that starts the war against Japan
 - Beneficiaries of the Sino-Japanese war: Mao (he expands his control while avoiding large-scale confrontations with Japanese forces), Soviet Union (it weakens Japan on the Russian front)

What the Modern Age knew

- China/ Mao



Mao and wife Jiang Qing



What the Modern Age knew

- China/ Mao



The Modern Age

- China/ After WWI
 - Li Dazhao/ Ta-chao (1918)
 - Heir to the utopian tradition
 - All historical events exist forever in the present
 - Salvation comes from action now, not from a distant (in space and time) Utopia

The Modern Age

- China/ After WWI
 - Chen Duxiu (1921)
 - Marxism is the opposite of traditional Chinese thought
 - Priority of science and progress over humanity
 - City over countryside
 - Industry over peasantry
 - Technology over nature
 - Internationalism over nationalism

The Modern Age

- China/ After WWI
 - Mao Zedong
 - Marx and Lenin
 - Women (feminist articles of 1919)
 - Peasants (the Russian revolution started in the cities, and the peasants opposed it; the Chinese revolution started in the countryside with an agrarian revolution)
 - Anti-intellectual
 - 1927: “Autumn Harvest Uprising”
 - 1934-35: “Long March” (Mao slowly replaces Zhou Enlai as the military leader of the communists)

The Modern Age

- China/ After WWI
 - Mao Zedong
 - Difference between Mao and Lenin: mass-based rural (not industrial) revolution; anti-intellectual
 - Difference between Mao and Stalin: internal Chinese consolidation vs worldwide Soviet imperialism; peasants are the pillars, not the enemies

The Modern Age

- China/ After WWI
 - Westernization of China
 - Sun Yatsen is a Christian (who lived in Japan, USA and Europe)
 - Mao Zedong is a Marxist (who studied western philosophy at Changsha's First Normal School)
 - Li Dazhao and Chen Duxiu educated in (Westernized) Japan
 - Chiang Kai-shek is married to a USA-educated woman and converts to Christianity



The Modern Age

- China/ After WWI
 - Mao Zedong: focus on plight of the peasants and women's rights, transforming rural conditions into class warfare
 - Chiang Kaishek (pron Ji-an Jon Tz) focus on urban centers and foreign powers
 - “New Life” movement (1934): foreigners should be taken as model
 - “Blueshirts” (1930s): idealize Benito Mussolini's fascism



Mao Zedong and Chiang Kai Shek
in Chongqing in 1945

The Modern Age

- China/ After WWI
 - Foreign investment in China (1931)
 - Britain \$1.2 billion
 - Japan \$1.15 billion
 - Russia \$275 million
 - USA \$197 million
 - France \$192 million

The Modern Age

- China/ Rural China in the Nanking Decade (1928-37)
 - Accustomed to warfare, floods, droughts, starvation, disease, poor hygiene, exploitation by landowners and bureaucrats
 - Illiterate and superstitious masses
 - Feudal society
 - Short life expectancy
 - No electricity, no motor vehicles

The Modern Age

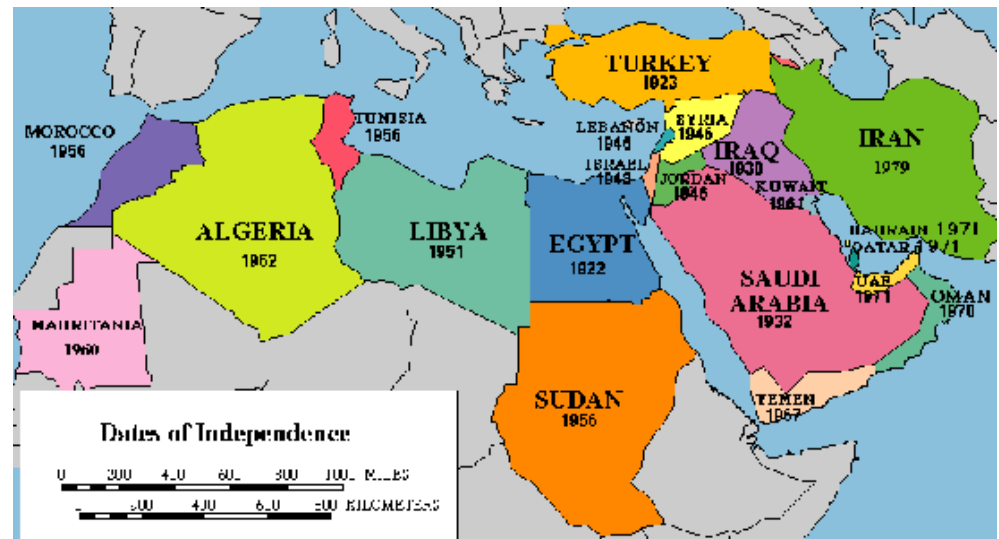
- China/ WWII
 - 1931: the Japanese army invades Manchuria from Korea
 - 1933: the Japanese army invades Hebei
 - 1934: the Japanese appoint the former Manchu emperor Puyi head of the puppet state of Manchukuo with capital in Changchun
 - 1936: Japan invades Suiyuan province
 - 1937: the KMT attacks Japan in Shanghai but is defeated (250,000 killed)
 - 1937: Full-scale war with Japan, that captures the KMT capital Nanjing (“Rape of Nanjing”, 350,000 dead) pushing Chang Kaishek west to Chongqin

The Modern Age

- China/ WWII
 - 1938: Japan seizes Canton
 - Both CCP (Yanan) and KMT (Central China) fight Japan (Korea, Manchuria, East Coast from Beijing to Canton)
 - Japan installs five puppet regimes (Manchukuo, Inner Mongolia, Beijing, Nanjing, Taiwan)
 - 1941: USA pilots (“flying tigers”) help the KMT
 - 1941: Japan attacks the USA that enters the war on the side of the KMT
 - 1943: Cairo Conference between Roosevelt, Churchill and Chiang Kai-shek
 - 1945: the Soviet Union occupies North Korea
 - 1945: Japan surrenders to China

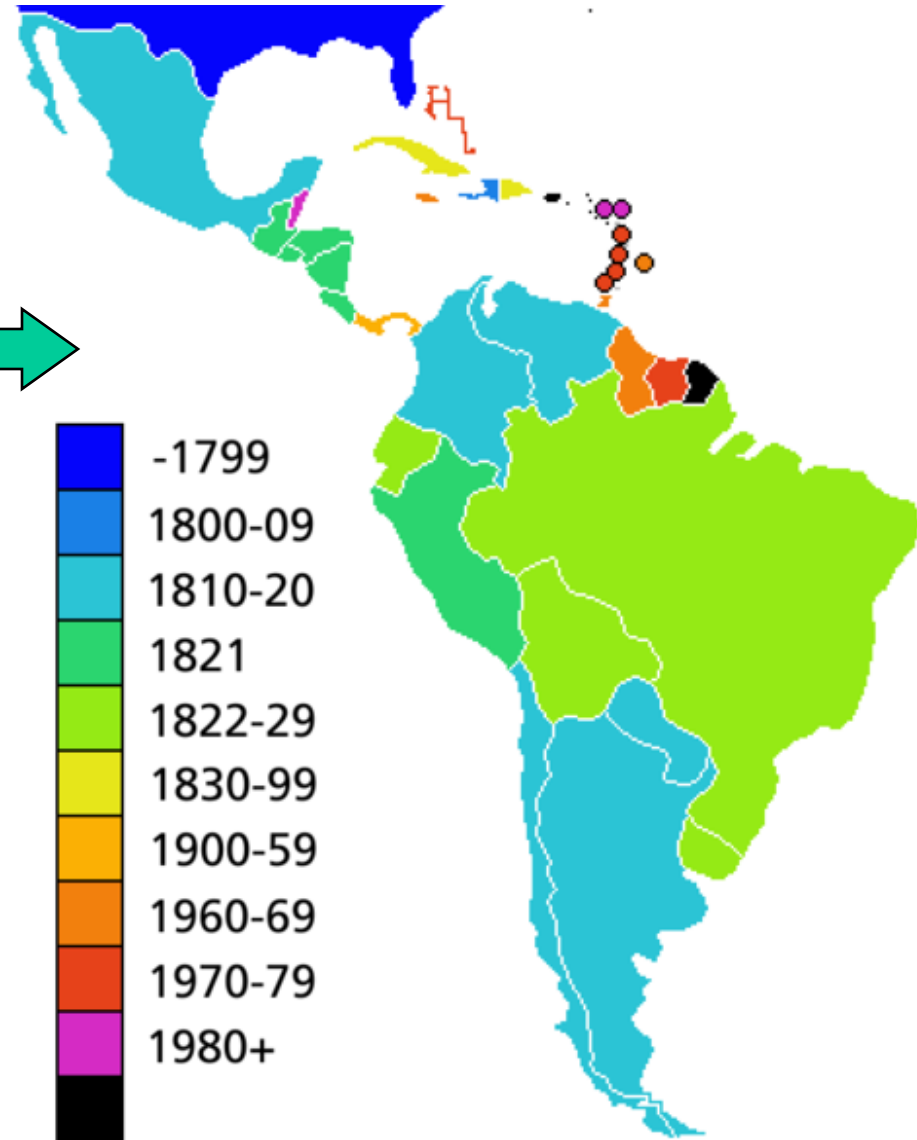
The Modern Age

- Arab independence
 - Sati al-Husri preaches Arab nationalism (1920)
 - Egypt (1922)
 - Saudi Arabia (1926)
 - Iraq (1932)
 - Syria (1943)
 - Lebanon (1943)
 - Transjordan (1946)
 - Libya (1952)
 - Morocco (1956)
 - Tunisia (1956)
 - Kuwait (1961)
 - Algeria (1962)



The Modern Age

- Latin America



The Modern Age

- **Latin America**
 - **The Great Depression causes the collapse of Latin American exports**
 - **Export-driven economies turn to domestic consumption**
 - **Crisis of the old oligarchies and rise of the poor urban masses**
 - **Industrialization has to wait till the 1950s**
 - **The majority of Latin Americans are illiterate till the 1950s**

The Modern Age

- **Latin America**
 - **Populist rulers (champions of peasants and workers) replace the old aristocracy:**
 - **Vargas (Brazil, 1930)**
 - **Cardenas (Mexico, 1934)**
 - **Peron (Argentina, 1946)**
 - **Castro (Cuba, 1959)**

The Modern Age

- Latin America
 - Highest literacy rates: Argentina, Uruguay, Chile, Costa Rica

The Modern Age

- Latin America
 - Mexico
 - Land redistribution
 - Emergence of the indios
 - Education
 - Industrialization
 - One-party system
 - Six-year plan
 - Second oil producer in the world
 - Venezuela
 - Military dictatorship
 - Third oil producer in the world

The Modern Age

- Latin America
 - Chile
 - Most democratic country in Latin America
 - Economic boom
 - Argentina
 - Peronism (1943)
 - Peru
 - Tripartite (Military, APRA, PCP)
 - Brazil
 - Getulio Vargas (1930-54)
 - Industrialization
 - Population boom

The Modern Age

- World War II
 - Britain, USA, Russia win against Germany, Italy and Japan
 - The Holocaust
 - Leagues of Nations (UN, NATO, EU, ...)
 - Yalta

The Modern Age

- Wars and massacres:
 - 1911: Chinese revolution (2.4 million)
 - 1915: the Ottoman empire slaughters Armenians (1.2 million)
 - 1914-18: World War I (8 million)
 - 1917-21: Soviet revolution (5 million)
 - 1931: Japanese Manchurian war (1.1 million)
 - 1934: Mao's Long March (170,000)
 - 1936-37: Stalin's purges (13 million)
 - 1936: Italy's invasion of Ethiopia (200,000)
 - 1936-39: Spanish civil war (600,000)
 - 1939-45: World War II (55 million)

What the Modern Age knew

Physics

1913: Bohr's model of the atom

1919: Rutherford discovers the proton

1920: Arthur Eddington suggests that nuclear fusion fuels the sun

1924: Louis DeBroglie discovers that matter is both particles and waves

1925: Wolfgang Pauli discovers the exclusion principle (fermions can never occupy the same state at the same time)

1927: Werner Heisenberg discovers the uncertainty principle

What the Modern Age knew

Physics

1904: Geroge Hale's Mt Wilson observatory

1912: Henrietta Leavitt discovers a way to measure the distance of stars

1916: Karl Schwarzschild predicts the existence of black holes

1918: Edwin Hubble discovers Andromeda, a galaxy lying outside the Milky Way

1927: Georges Lemaitre calculates that the universe must have begun with a primordial explosion

1929: Edwin Hubble discovers that the universe is expanding

The universe is vast, there are many galaxies, the Earth is just a tiny speck, and all galaxies are moving

What the Modern Age knew

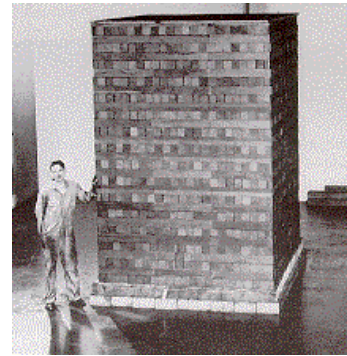
Physics

1933: Fritz Zwicky proposes the existence of “dark matter” to explain anomalies in the motion of galaxies

1936: Fritz Zwicky compiles a catalogue of 10,000 clusters each made of thousands of galaxies

1943: Enrico Fermi's nuclear reactor

1948: George Gamow develops the Big Bang theory



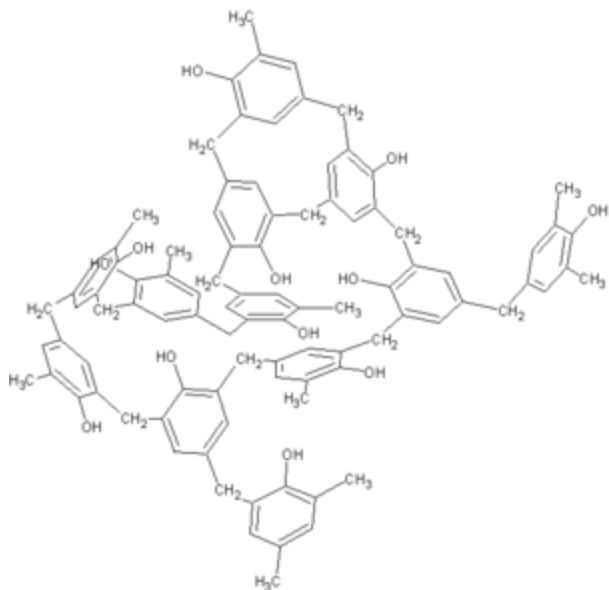
What the Modern Age knew

Physics

Astronomical observations reveal a turbulent universe made of millions of galaxies and punctuated by violent events

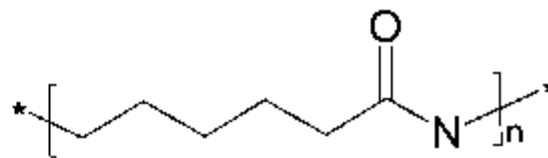
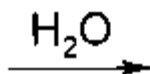
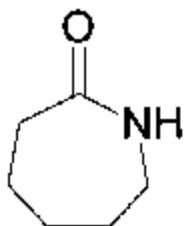
What the Modern Age knew

Synthetic materials



Bakelite

Nylon 6



What the Modern Age knew

Chemistry/ Synthetic materials

1930: I. G. Farben begins manufacturing polystyrene

1933: Eric Fawcett and Reginald Gibson discover polyethylene at ICI

1939: ICI begins producing polyethylene plastic

Plastic needed by the booming electrical and automotive industries

Production of steel flat between 1950 and 1990 (by 1960 plastics overtakes steel)

What the Modern Age knew

Chemistry/ USA

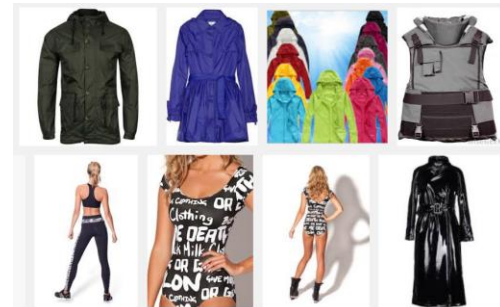
1916: William Walker's School of Chemical Engineering at the MIT

1927: Robert Haslam of the MIT founds Standard Oil's Baton Rouge research lab

1931: Du Pont introduces a synthetic rubber, neoprene

1935: Michael Perrin discovers a practical way to synthesize polyethylene, a very versatile plastic

1935: Wallace Carothers' nylon (1935) at Du Pont, ideal as a synthetic fiber



What the Modern Age knew

Chemistry/ USA

1938: Roy Plunkett invents teflon

1939: Nylon is used to make women's stockings

1941: After the Japanese occupation of rubber plantations, the USA invests in synthetic rubbers (second largest wartime project after the Manhattan Project)

1941: Crash program by the USA to mass produce penicillin for military hospitals

1945: Ed Tupper founds Tupperware for food containers made of polyethylene

What the Modern Age knew

Medicine

1921: Fred Banting and Charles Best
discover insulin, the first hormone therapy

What the Modern Age knew

Medicine

1928: Alexander Fleming's penicillin, but not mass produced until World War II

1941: Norman Heatley and Howard Florey open a lab at the Department of Agriculture's Northern Regional Research Laboratory in Peoria (Illinois) to mass produce penicillin

1942: Mary Hunt (Peoria lab) discover in cantaloupes a better mold for making penicillin

Tuberculosis is almost entirely eliminated.

What the Modern Age knew

Psychology

Sapir, Edward: LANGUAGE (1921)

Kohler, Wolfgang: "The Mentality of Apes" (1925)

Watson, John: "Psychology as Behavior" (1913)

Piaget, Jean: "The Language and Thought of the Child" (1923)

Pavlov, Ivan: "Conditioned Reflexes" (1926)

Lashley, Karl: "Brain Mechanisms And Intelligence" (1930)

Bartlett, Frederic-Charles: REMEMBERING (1932)

Tolman, Edward: PURPOSIVE BEHAVIOR IN ANIMALS AND MEN (1932)

Vygotsky, Lev: "Thought and Language" (1934)

Koffka, Kurt: "Principles of Gestalt Psychology" (1935)

Reich, Wilhelm: "Sexuality in the Culture War" (1936)

Horney, Karen: "The Neurotic Personality of Our Time" (1937)

What the Modern Age knew

Psychology

Skinner, Burrhus: "The Behavior of Organisms" (1938)

Goldstein, Kurt: THE ORGANISM - A HOLISTIC APPROACH
TO BIOLOGY (1939)

Maslow, Abraham: "A Theory of Human Motivation" (1943)

Hull, Clark: "Principles of Behavior" (1943)

What the Modern Age knew

Parapsychology

1927: Joseph Banks Rhine and his wife Louisa establish the parapsychology laboratory at Duke University

1937: Rhine founds the Journal of Parapsychology.

What the Modern Age knew

Beauty

1923: The swivel-up tube for lipstick is invented by James Mason in the middle of a lipstick craze

- 1923: Coco Chanel makes suntanning fashionable
- 1926: Greta Garbo launches the fad of the eyebrow pencil
- 1926: Maidenform introduces a push-up bra
- 1932: Revlon introduces a nail polish, a variation on the nitrocellulose-based substance invented by Carleton Ellis
- 1935: Warners introduces four cup sizes called A, B, C and D
- 1936: L'Oreal invents sunscreen
- 1939: DuPont launches nylon stockings

What the Modern Age knew

Appliances

1929: 18 million homes in the USA have electricity (out of 27 million)

1946: Percy Spencer invents the microwave oven

1957: 27% of US population owns a fridge compared with 5% in Britain

What the Modern Age knew

Time

1927 Warren Marrison at Bell Labs invents the quartz-crystal clock

What the Modern Age knew

Media

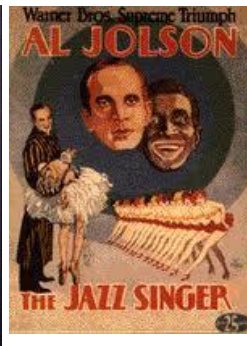
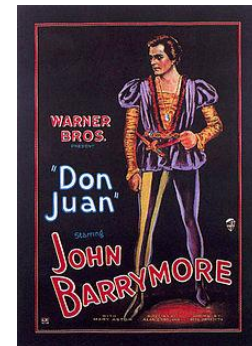
1887: Hertz discovers radio waves

1901: Marconi conducts the first radio transmission

1914: composer Jerome Kern invents the "musical"

1925: Leica compact camera that doesn't require heavy equipment

1926: films with synchronized voice and music are introduced (talking movies)



What the Modern Age knew

Media

1927: the juke-box is introduced by Automatic Music Instrument

1927: Philo Farnsworth invents the television in San Francisco

1931: Clarence Hickman at Bell Labs invents the telephone answering machine

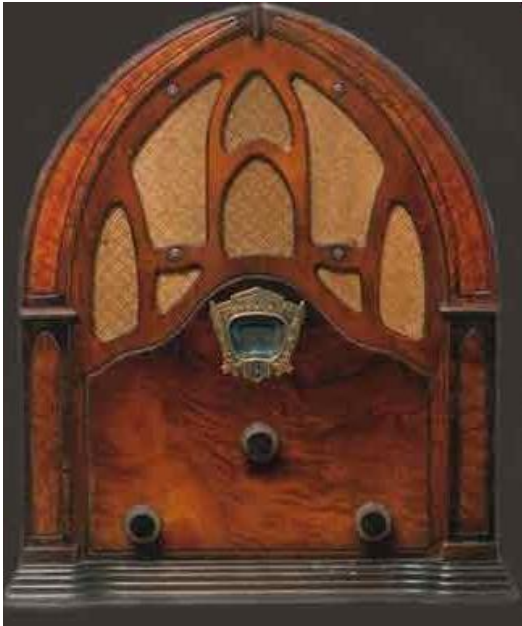
1935: Eduard Schüller at AEG builds a magnetic tape recorder

1940: Peter Goldmark invents color television



What the Modern Age knew

Media



Cathedral radio (1932)

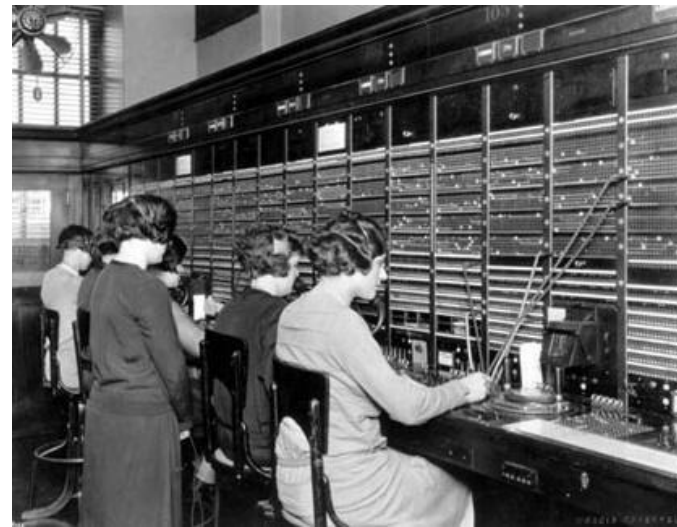


Telephone (1929)



Leica (1925)

AT&T Switchboard (1930)



Tv Set Model 817 (1938)
(Museum of Science, London)

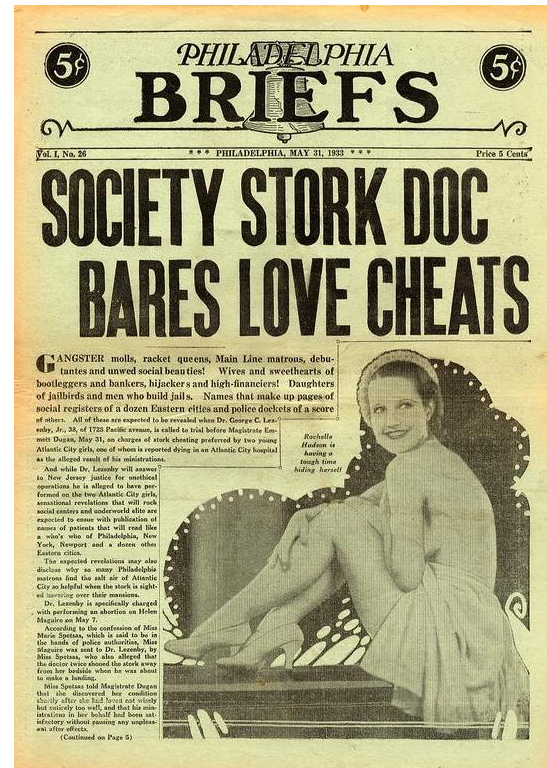
What the Modern Age knew

Video



What the Modern Age knew

Media



What the Modern Age knew

Media/ The Birth of the Information Economy

- "The entire Earth will be converted into a huge brain" (Nikolas Tesla, talking about the radio in 1904)
- The scientific methods of the steel factory and of the car assembly plant are applied to the production of telecommunication and information creating the equivalent of "mass production" for information and information monopolies (Western Union, AT&T, CBS, NBC, Hollywood studios)
- The mass production of information is used for political propaganda (Lenin, Mussolini, Hitler)

What the Modern Age knew

Office

- 1938: Chester Carlson's xerography
- Dictation machine
- Fax machine
- Telephone
- Typewriter
- Answering machine
- Mechanical calculator



What the Modern Age knew

Home



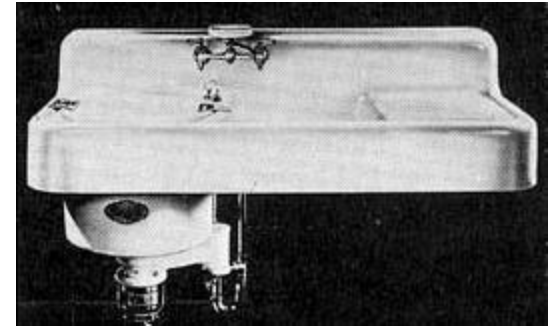
1935 refrigerator



1933 washing machine



1932 sewing machine



1927 in-sink dishwasher



1934 kitchen

What the Modern Age knew

- The automobile in the 1920s
 - 1923: DuPont and General Motors develop Duco, a quick-drying, durable, inexpensive, and colorful automotive lacquer



What the Modern Age knew

- The automobile in the 1930s



What the Modern Age knew

- The automobile in the 1930s



Alfa Romeo 1933
(Blackhawk Museum)

What the Modern Age knew

- The automobile in the 1940s



What the Modern Age knew

- The North Atlantic transatlantic liners
 - 1929-38: Golden age
 - Germany's "Bremen" and "Europa", Italy's "Rex", France's "Normandie" (1934), Britain's "Queen Mary" (1936)
 - Britain-New York: 4 days



Queen Mary



What the Modern Age knew

- The Airplane
 - 1918: United States Post Office establishes airmail service (between New York and Philadelphia)
 - 1919: Walter Hinton pilots a plane from the USA to Lisbon, the first transatlantic flight (with many stops)
 - 1919: British pilots fly from Newfoundland to Ireland, the first nonstop transatlantic flight (in 16 hours)
 - 1920: Aircraft Travel and Transport inaugurates London–Paris passenger service
 - 1923: John Macready and Oakley Kelly fly a plane nonstop from New York to San Diego, the first transcontinental flight
 - 1924: Four Seattle planes fly around the world (in 175 days)
 - 1936: Heinrich Focke flies the first helicopter

What the Modern Age knew

The Airplane

1927: Charles Lindbergh makes the first solo, nonstop transatlantic flight between two capitals (from New York to Paris in 33 hours)

1930: Ellen Church, a nurse, becomes the first airplane stewardess (for Boeing)

1935: Pan American inaugurates air service in the Pacific, flying China Clipper planes built by Martin and Boeing (seven days from California to the Philippines)



What the Modern Age knew

The Airplane

- 1939: Pan American inaugurates the world's first transatlantic passenger service, flying a Boeing B-314 Clipper between New York and Marseilles
- 1939: Boeing introduces a large airplane, the 314s, that can carry 74 passengers (the Douglas DC-2 carries 14 passengers)



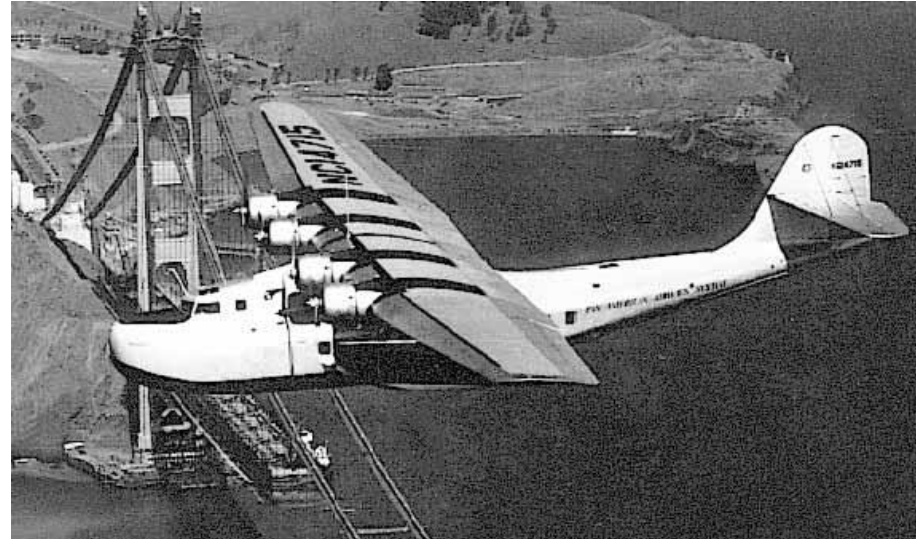
What the Modern Age knew

- The Airplane

Spirit of St Louis



Pan Am clipper of 1936



What the Modern Age knew

- The Airplane
 - Boeing 314s



HAVANA :: HAITI :: SANTO DOMINGO :: PORTO RICO :: NASSAU

Fastest Through Service
To HAVANA · NASSAU · LATIN AMERICA
 New all-luxury service from your home city to the Indies, Central and South America

EXTEND your southern trip this year. Board **PAN** one of the nation's most luxurious planes at the nearest railway center. Continue on a Pan American Air liner from Miami or Brownsville, Texas. In no greater time than you usually spend for your winter trip, visit Havana, Nassau, the West Indies, Mexico or Central America.

Watch the miles of tropical islands, beaches and jungles unfold in passing panorama. No matter how well you think you know the tropics, delightful surprises await you.

Daily service from Miami to Nassau. Seven sailings daily to Havana. These increased schedules have been made to satisfy a growing demand for trips to two of the most popular winter resorts in the western world.

Pan American Airways now carries passengers over routes covering 12,000 miles—the most extensive air transport service in the Western Hemisphere. For the first time in history, North, Central, and South America are linked by quick and luxurious service, comparable with that offered by America's finest trains.

Every Pan American airplane is unexcelled. Carries two pilots, radio operator, a steward, communicators by radio with two airports at alternate intervals. Has wide aisles, metal seats, clear-view windows, modern toilet facilities. For through tickets and information, apply to your Railroad agent or to the principal travel bureau or to Pan American Airways. For travel suggestions, make reservations call or address:

YAKA TRIPS FAVORITE TRIPS Havana, Mexico, Cuba, to other countries in West Indies. From NEW YORK— To Miami, St. Thomas and Puerto Rico (via St. John, P.R.)—\$10.00 To Havana—\$12.00 To Nassau—\$15.00 From MIAMI— To Havana—\$8.00 To Nassau—\$10.00	From CHICAGO— To Miami, St. Thomas and Puerto Rico (via St. John, P.R.)—\$15.00 To Havana—\$18.00 To Nassau—\$20.00 From ST. LOUIS— To Miami, St. Thomas and Puerto Rico (via St. John, P.R.)—\$12.00 To Havana—\$15.00 To Nassau—\$18.00 TRANSFER ON TRIP P.A.N. AIRLINES at MIAMI From St. Louis to Miami, Nassau or Havana. From Miami to Havana, Nassau or St. Louis.	From NEW YORK— To Miami, St. Thomas and Puerto Rico (via St. John, P.R.)—\$10.00 To Havana—\$12.00 To Nassau—\$15.00 From MIAMI— To Havana—\$8.00 To Nassau—\$10.00 From CHICAGO— To Miami, St. Thomas and Puerto Rico (via St. John, P.R.)—\$15.00 To Havana—\$18.00 To Nassau—\$20.00 From ST. LOUIS— To Miami, St. Thomas and Puerto Rico (via St. John, P.R.)—\$12.00 To Havana—\$15.00 To Nassau—\$18.00
---	---	---

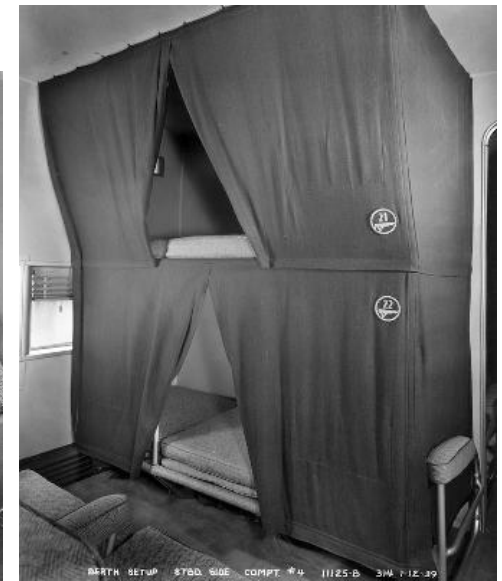
PAN AMERICAN AIRWAYS, INC.
 122 EAST 42ND STREET, NEW YORK CITY

MEXICO :: GUATEMALA :: HONDURAS :: NICARAGUA :: COSTA RICA
 PANAMA :: CANAL ZONE :: SOUTH AMERICA

Check-in...



On board...



What the Modern Age knew

- Leisure time
 - Radio
 - Cinema
 - Automobile
 - Newspaper (cartoons, sports, news)

What the Modern Age knew

- The world shrinks
 - Telegraph, radio and telephone: real-time communication
 - Trains and cars: long-distance travel reduced to days, not months
 - Airplane: international travel
 - Telescope

What the Modern Age knew

- Ideas
 - Philosophy of Science
 - Behaviorism
 - Cognitivism
 - Quantum Mechanics
 - Formal Systems
 - Linguistics and Semiotics
 - Holism, Existentialism

What the Modern Age knew

- The Atom
 - Niels Bohr (1913)
 - Electrons are arranged in concentric shells outside the nucleus of the atom
 - The number of electrons equals the atomic number of the atom
 - The outermost shell of electrons determine the chemical behavior of the atom
 - Paul Rutherford (1919)
 - The nucleus of the atom contains positively charged particles (protons)
 - The number of protons is equal to the number of electrons

What the Modern Age knew

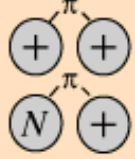
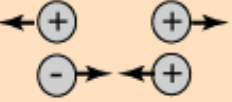
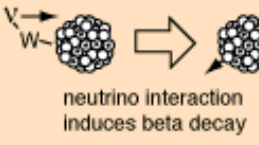
- The Atom
 - James Chadwick (1932)
 - The nucleus of the atom contains charge-less particles (neutrons)
 - Isotopes are atoms of the same element (containing the same number of electrons/protons) but with different numbers of neutrons
 - Elementary forces:
 - Electromagnetic force
 - Gravitational force
 - Nuclear force

What the Modern Age knew

- The Atom
 - Enrico Fermi (1933)
 - Fourth kind of interaction: “weak force” (among subnuclear particles)
 - Trans-uranic elements (elements heavier than uranium)

What the Modern Age knew

- Elementary forces:
 - Electromagnetic force
 - Gravitational force
 - Nuclear force
 - Weak force

Fundamental Forces				
<i>Strong</i>		Strength 1	Range (m) 10^{-15} (diameter of a medium sized nucleus)	Particle gluons, π (nucleons)
<i>Electro-magnetic</i>		Strength $\frac{1}{137}$	Range (m) Infinite	Particle photon mass = 0 spin = 1
<i>Weak</i>		Strength 10^{-6}	Range (m) 10^{-18} (0.1% of the diameter of a proton)	Particle Intermediate vector bosons W^+ , W^- , Z_0 , mass > 80 GeV spin = 1
<i>Gravity</i>		Strength 6×10^{-39}	Range (m) Infinite	Particle graviton ? mass = 0 spin = 2

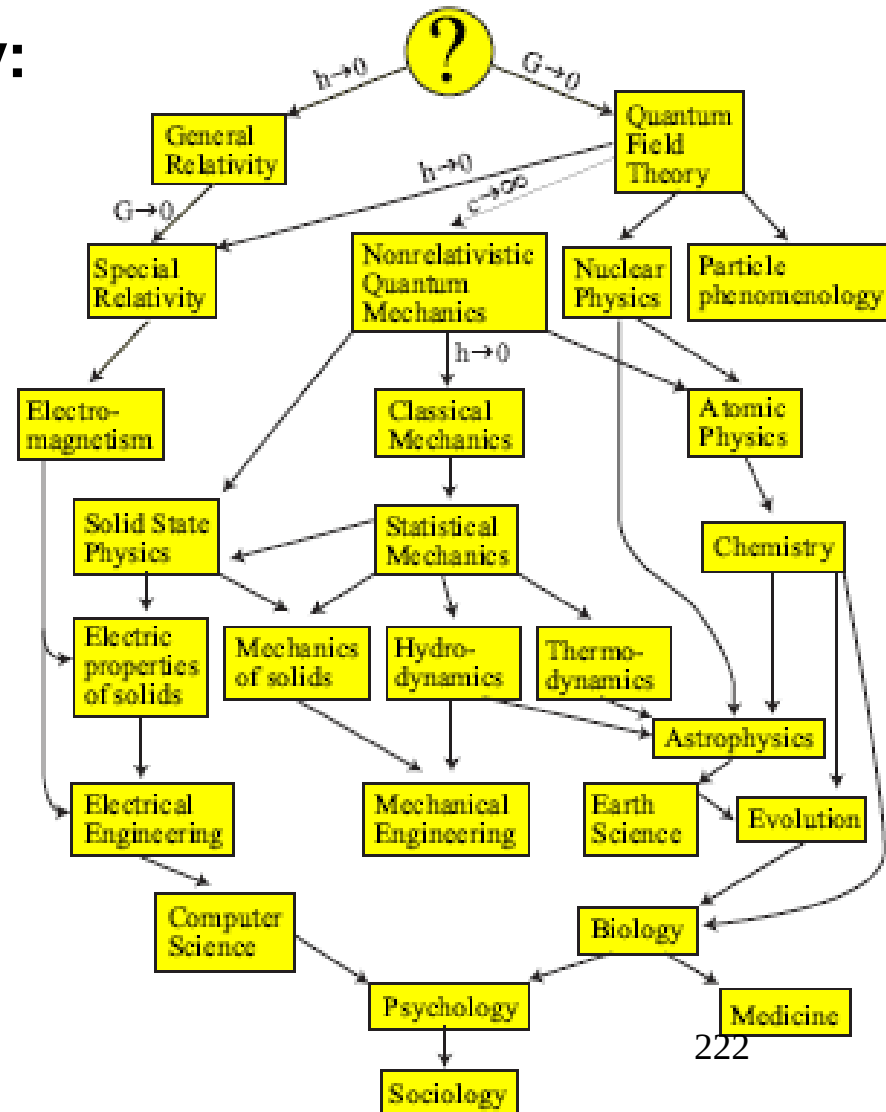
What the Victorian Age knew

Vaccines

- Germ theory of disease: vaccines
 - 1921 French biologists Leon Calmette and Jean-Marie Guerin develop a tuberculosis vaccine
 - 1927: The yellow-fever virus itself is isolated
 - 1931: Ernst Ruska and Max Knoll invent the electron microscope (scientists can finally see viruses)
 - 1933: Wilson Smith, Christopher Andrewes and Patrick Laidlaw discover the human influenza virus
 - 1936: Norman Pirie and Fred Bawden discover that the tobacco mosaic virus contains RNA, contrary to Wendell Stanley's hypothesis that viruses consist entirely of protein
 - 1937: Max Theiler develops the yellow-fever vaccine

What the Modern Age knew

- Science in the 20th century:



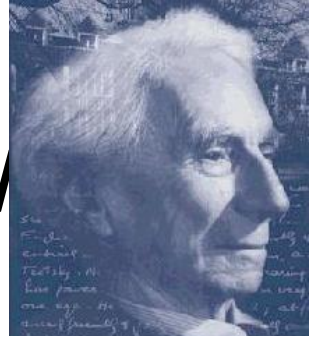
What the Modern Age knew

- Moritz Schlick (1918)
 - The problems of philosophy are due to linguistic misunderstandings
 - The structure of experience can be described/communicated, but its content is beyond our ability to describe/communicate

What the Modern Age knew

- Samuel Alexander (1920)
 - Synthesis of Kant, Hegel, Darwin, Wundt, Bergson, Einstein
 - Emergent evolution: existence is hierarchically arranged and emerges via an ongoing evolutionary process
 - Matter emerges from space-time
 - Life emerges from matter
 - Mind emerges from life
 - God emerges from mind

What the Modern Age knew



- Bertrand Russell (1921)
 - No substance (“neutral monism”): everything in the universe is made of space-time events, and events are neither mental nor physical (both matter and mind are meaningless over-simplifications of reality)
 - Matter is less material than Newton thought, and the spirit is less spiritual than Berkley thought
 - They are different ways of organizing space-time
 - What truly exists is "events"
 - The difference between matter and mind is simply the "causal" relationships that are brought to bear

What the Modern Age knew

- Bertrand Russell (1921)
 - Sensations are both material and mental
 - A sensation is part of the object that can be constructed out of it
 - A sensation is also part of the mind in whose biography the perception occurred
 - An object is defined by all the appearances that emanate from the place where it is towards minds
 - A mind is defined by all the appearances that start from objects and reach it

What the Modern Age knew

- Bertrand Russell (1921)
 - Consciousness allows us to perceive some of the processes that occur in our brain
 - What a neurophysiologist really sees while examining someone else's brain is a part of her own brain
 - The irreducibility of the mental to the physical is an illusion: the mental and the physical are different ways of knowing the same thing, the former by consciousness and the latter by the senses
 - Consciousness gives us immediate, direct knowledge of what is in the brain, whereas the senses can observe what is in the brain
 - The mental is a transparent grasp of the intrinsic character of the brain.
 - Consciousness is just another sense

What the Modern Age knew

- Bertrand Russell (1913)
 - The proposition (a logical artifact) vs the sentence (its description in natural language)
 - “Elephants do not fly” and “Unicorns do not exist” have the same structure, but one says that Elephants do not have a certain property, whereas the other one says that nothing in the world is a unicorn
 - A name “signifies” a concept, a concept “denotes” an object
 - Calculus of classes (a class is the set of objects by which a function is satisfied)
 - Logical reconstruction of Mathematics
 - The second theorem of the 110th chapter of the second volume of “Principia Mathematica” proves that $1+1=2$

What the Modern Age knew

- Bertrand Russell (1913)
 - Paradox in Frege's system of Logic:
 - The class of all the classes that are not members of themselves is both a member and not a member of itself (the barber who shaves all barbers who do not shave themselves)
 - A predicate cannot be predicated of itself
 - Theory of types (logical contradictions can be resolved at a higher level)
 - Description Theory (1905)
 - It is false both that the present king of France is bald and that he is not bald

What the Modern Age knew

- Jan Lukasiewicz (1920): three-valued logic (true, false, neither true nor false)
- Brouwer (1920): intuitionist logic

What the Modern Age knew



- Ludwig Wittgenstein (1921)
 - Philosophical problems are false problems: they are due to linguistic misunderstandings
 - The structure of language reflects the structure of the world
 - The world is made of complex facts that can be broken down into simpler facts
 - Language is made of complex propositions that can be broken down into simpler propositions
 - Language is like a map of the world: the connections between the elements of language reflects the connections between the elements of the world

What the Modern Age knew

- Ludwig Wittgenstein (1921)
 - The structure of language reflects the structure of the world
 - The totality of true propositions (the totality of science) provide a representation of the world that is adequate and complete
 - Understanding a proposition is knowing “what is the case if it is true” (to which reality it corresponds)
 - Language means the world because names mean objects and sentences mean facts
 - The meaning of the world cannot be understood from inside the world

What the Modern Age knew

- Ludwig Wittgenstein (1921)
 - Ethics is impossible because we are inside the world that ethics struggles to understand
 - Metaphysics is a fictitious discipline due to a wrong use of language: it is neither true nor false, it cannot be justified (just like religion and magic)
 - Mathematical entities are pure constructions of the mind: the mathematician is an inventor
 - Mathematics cannot be grounded in the world: it is a game played by mathematicians

What the Modern Age knew

- Ludwig Wittgenstein (1921)
 - *1 The world is all that is the case.*
 - *4.01 A proposition is a picture of reality.*
 - *4.121 ...Propositions show the logical form of reality. They display it.*
 - *4.1212 What can be shown, cannot be said.*
 - *5.43 ...all the propositions of logic say the same thing, to wit nothing.*
 - *5.4711 To give the essence of a proposition means to give the essence of all description, and thus the essence of the world.*
 - *5.6 The limits of my language mean the limits of my world.*

What the Modern Age knew

- Ludwig Wittgenstein (1953)
 - Language has a function
 - Words are tools
 - Assertions, commands, questions, etc
 - Language is a game between people
 - The meaning of a proposition can only be understood in its context
 - Truth is a multi-faceted concept: different statements can be all true without being true in the same way (“alethic pluralism”)
 - The meaning of a word is due to the consensus of a society

What the Modern Age knew

- Ludwig Wittgenstein (1953)
 - To understand a word is to understand a language
 - To understand a language is to master the linguistic skills

What the Modern Age knew

- Wittgenstein (1953)
 - Definitions are ambiguous or implausible
 - Categories are based on “family resemblance”, not on features
 - There is no ghost in the machine, no mind that understands, just “understanding”

What the Modern Age knew

- Wittgenstein
 - The human species is 'a ceremonial animal'

What the Modern Age knew

- Edward Sapir (1921)
 - Language and thought influence each other
 - Language also shapes thought
 - The structure of the language has an influence on the way its speakers understand the environment
 - Language contains a hidden metaphysics
 - Language contains an implicit classification of experience
 - Grammatical and categorial patterns of language embody cultural models
 - Language is a culturally-determined system of patterns that creates the categories by which individuals not only communicate but also think

What the Modern Age knew

- Franz Rosenzweig (1921)
 - Proto-existentialist
 - Any attempt to reduce the three elements of reality (God, the world, and humanity) to logic is contrary to experience (critique of Hegel)
 - They form a Whole
 - The Whole can be appreciated only through transcendent experience
 - “All knowledge of the Whole originates in the fear of death”

What the Modern Age knew

- Oswald Spengler (1922)
 - History is cyclical, not linear (not unlimited evolution/progress)
 - High Cultures: Indian, Babylonian, Egyptian, Chinese, Mayan-Aztec, Arabian (Hebraic and Islamic), Classical (Greece and Rome), Western (European), each lasting about 1000 years
 - Histories of various cultures follow a similar pattern
 - All aspects of a culture (art, politics, science) share underlying principles which differ from culture to culture

What the Modern Age knew

- Oswald Spengler (1922)
 - Each High Culture has as a distinguishing feature a "prime symbol" or soul, generally derived from its religion, which permeates its art, science, and politics:
 - Egyptian: the "Path" (preoccupation with the sequential passages of the soul)
 - Classical: the "point-present" (preoccupation with the neighborhood, the domestic, the space of immediate visibility: Euclidean geometry, two-dimensional painting and relief-sculpture, lack of facial expression of Grecian statues)
 - Western: the "Faustian" soul (upward reaching for the absolute/infinite, as in the vertical style of Gothic cathedrals and classical music)

What the Modern Age knew

- Oswald Spengler (1922)
 - Culture is "organic", follows a life pattern:
 - Spring: the time of the origin of its basic principles, i.e. birth of its religion
 - Summer: its "best shape", when all facets are working according to the culture's principles, the age of its greatest achievements
 - Autumn: principles break down, mega-cities are born, money drives politics, citizens question traditions, art is non-intuitive, atheism spreads, and eventually a benign despot takes over to restore order
 - Winter: despots battle each other for control of the planet, masses are indifferent, cities depopulate, masses gradually return to traditional values

What the Modern Age knew

- Oswald Spengler (1922)
 - Western civilization:
 - A culture of directedness and will ("Faustian")
 - Western religion requires us to convert others
 - Western art has a perspective, a direction
 - Western music is directed toward a tonal center
 - Western science is about changing the world
 - Western mathematics is not only geometry (which is static) but also calculus (dynamic)
 - Western civilization ended its summer in the second half of the 18th century, began its autumn with Napoleon, and entered its winter in the 19th century

What the Modern Age knew

- Oswald Spengler (1922)
 - A culture moves in the direction of its destiny, regardless of individual choices: one can choose to contribute or to be irrelevant
 - Supreme duty of the individual: striving for the destruction of capitalism and democracy

What the Modern Age knew

- HG Wells (1928)
 - The Open Conspiracy (1928): how to start a world revolution to establish a technocratic world state

What the Modern Age knew

- The chorus girls of “Runnin’ Wild” (1923) introduce the “charleston”



What the Modern Age knew

- John Carson records the first example of “country music” (1923)



What the Modern Age knew

- Behaviorism deals with mental terms only to the extent that they are related to behavior
 - Conway Lloyd Morgan (1894)
 - “In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty if it can be interpreted as the outcome of one which stands lower on the psychological scale”
 - John Watson (1913):
 - Mental states are unscientific
 - Stimulus-response patterns explain animal behavior



What the Modern Age knew

- Behaviorism deals with mental terms only to the extent that they are related to behavior
 - Ivan Pavlov (1926)
 - Conditioned reflexes
 - Burrhus Skinner (1938)
 - Gilbert Ryle (1949):
 - The mind is not another substance but simply a domain of discourse (“ghost in the machine”)

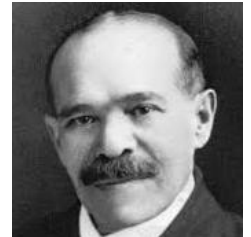


What the Modern Age knew

- Gestalt Philosophy
 - Mach's principle (1886): inertia results from the connection of that object with all the rest of the matter in the universe
 - Christian Ehrenfels: "Über Gestaltqualitäten" (1890)

What the Modern Age knew

- Gestalt Psychology
 - An individual stimulus does not cause an individual response
 - Form is the elementary unit of perception: we do not construct a perception by analyzing a myriad data, we perceive the form as a whole
 - Max Wertheimer (1912)
 - Perception is more than the sum of the things perceived
 - Form is the elementary unit of perception
 - Wolfgang Kohler (1925)
 - Problem-solving as sudden insight
 - Restructuring of the field of perception



What the Modern Age knew

- Gestalt Psychology
 - Karl Lashley (1930)
 - Functions are not localized but distributed around the brain
 - Every brain region partakes (to some extent) in all brain processes
 - The brain as a whole is “fault tolerant”
 - Memory as an electromagnetic field and a specific memory as a wave within that field



What the Modern Age knew

- Otto Selz (1920s)
 - To solve a problem entails to recognize the situation and to fill in the gaps
 - Information in excess contains the solution
 - Infer = anticipate
 - To solve a problem = to comprehend it
 - Comprehending = reducing the current situation to a past situation



What the Modern Age knew

- Kurt Goldstein's theory of disease (1939)
 - The organism cannot be divided into "organs": it is the whole that reacts to the environment
 - "Disease" is a manifestation of a change of state between the organism and its environment
 - Healing does not come through "repair" but through adaptation of the whole system
 - The organism cannot simply return to the state preceding the event that changed it, but has to adapt to the conditions that caused the new state



What the Modern Age knew

- Kurt Goldstein's theory of disease (1939)
 - A local symptom is not meaningful to understand a "disease", and the organism's behavior during a disease cannot be explained as a response to that specific symptom
 - A sick person's body undergoes mass-scale adjustments

What the Modern Age knew



- **Jean Piaget (1923)**
 - The mind grows, just like the body grows
 - Living beings are in constant interaction with their environment
 - Survival depends on maintaining a state of equilibrium between the organism and the environment
 - Regulation of behavior in order to continuously adapt to the information flow from the environment
 - Cognition, therefore, is but self-regulation

What the Modern Age knew

- **Jean Piaget**
 - **Cognitive process = a loop of assimilation and accommodation that proceeds in stages**
 - **Progress from simple mental arrangements to complex ones (from literal to abstract)**
 - **Not by gradual evolution but by sudden rearrangements of mental operations**
 - **Cognitive growth = transition from a stage in which the dominant factor is perception, which is irreversible, to a stage in which the dominant is abstract thought, which is reversible**

What the Modern Age knew

- **Jean Piaget**
 - **Semantics (relations between signs and objects)**
 - **Pragmatics (relations between signs, objects and users)**

What the Modern Age knew

- **Martin Buber (1923)**
 - **Human existence is defined by the way in which we engage in dialogue with each other, with the world, and with God**

What the Modern Age knew

- **Martin Buber (1923)**
 - **Two types of relationships:**
 - **I-It (subject to object) relationship**
 - Viewing both objects and people by their functions, as means to an end
 - The I is detached from the It
 - The being of the I belongs to I, but not to It
 - **I-You (subject to subject) relationship**
 - Experiencing both objects and people
 - A new level of awareness (dynamic, creative)
 - The I is unified with the You
 - The being of the I belongs both to I and to You

What the Modern Age knew

- **Martin Buber (1923)**
 - **I-You is the natural state.**
 - **I-You antedates the I**
 - **I-It postulates the I**
 - **God is the Eternal You**
 - **We can't define God. It can only be experienced.**
 - **Proving God's existence or defining God reduces God to an I-It relationship**

What the Modern Age knew

- **Alfred Lotka (1925)**
 - **Biological systems are networks of chemical agents that undergo cycles (autocatalysis)**
 - **The cycles help the network exist, assume an identity and grow**

What the Modern Age knew

- **Adolf Hitler (1925)**
 - **"What good fortune for governments that the people do not think"**
 - **"The size of the lie is a definite factor in causing it to be believed"**
 - **"Those who want to live, let them fight, and those who do not want to fight in this world of eternal struggle do not deserve to live"**
 - **"Mankind has grown strong in eternal struggles and it will only perish though eternal peace"**
 - **"Propaganda must not serve the truth, especially insofar as it might bring out something favorable for the opponent"**

What the Modern Age knew

- **Adolf Hitler (1925)**
 - **"Any alliance whose purpose is not the intention to wage war is senseless and useless"**
 - **"National Socialist Germany wants peace because of its fundamental convictions.. no war would be likely alter the distress in Europe... The principal effect of every war is to destroy the flower of the nation... Germany needs peace and desires peace!"**
 - **"It is always more difficult to fight against faith than against knowledge"**

What the Modern Age knew

- **Liu Jen-Hang (1926)**
 - **Classification of utopias**
 - **Fantasy: Buddhist and Christian paradises, Tolstoj, Saint-Simon**
 - **Mysticism: Hindu mystics, Zeno, Lao-tze, ...**
 - **Natural life: Chinese hermits and philosophers**
 - **Social: Confucius, Mencius**
 - **Equality of sexes: Socrates, Plato, More, Francis Bacon, Campanella**
 - **Modern: Fourier, Saint-Simon, ...**
 - **Contemporary: Bellamy, Wells, ...**

What the Modern Age knew

- **Liu Jen-Hang (1926)**
 - **Phase to Utopia**
 - **Conquest of nature**
 - **Eugenetics to create a better race**
 - **Matriarchal society eliminates murder**
 - **Pervasive pursue of the arts**
 - **Discovery of intergalactic worlds**
 - **Immortality (Buddhahood and Taoist immortality)**

What the Modern Age knew

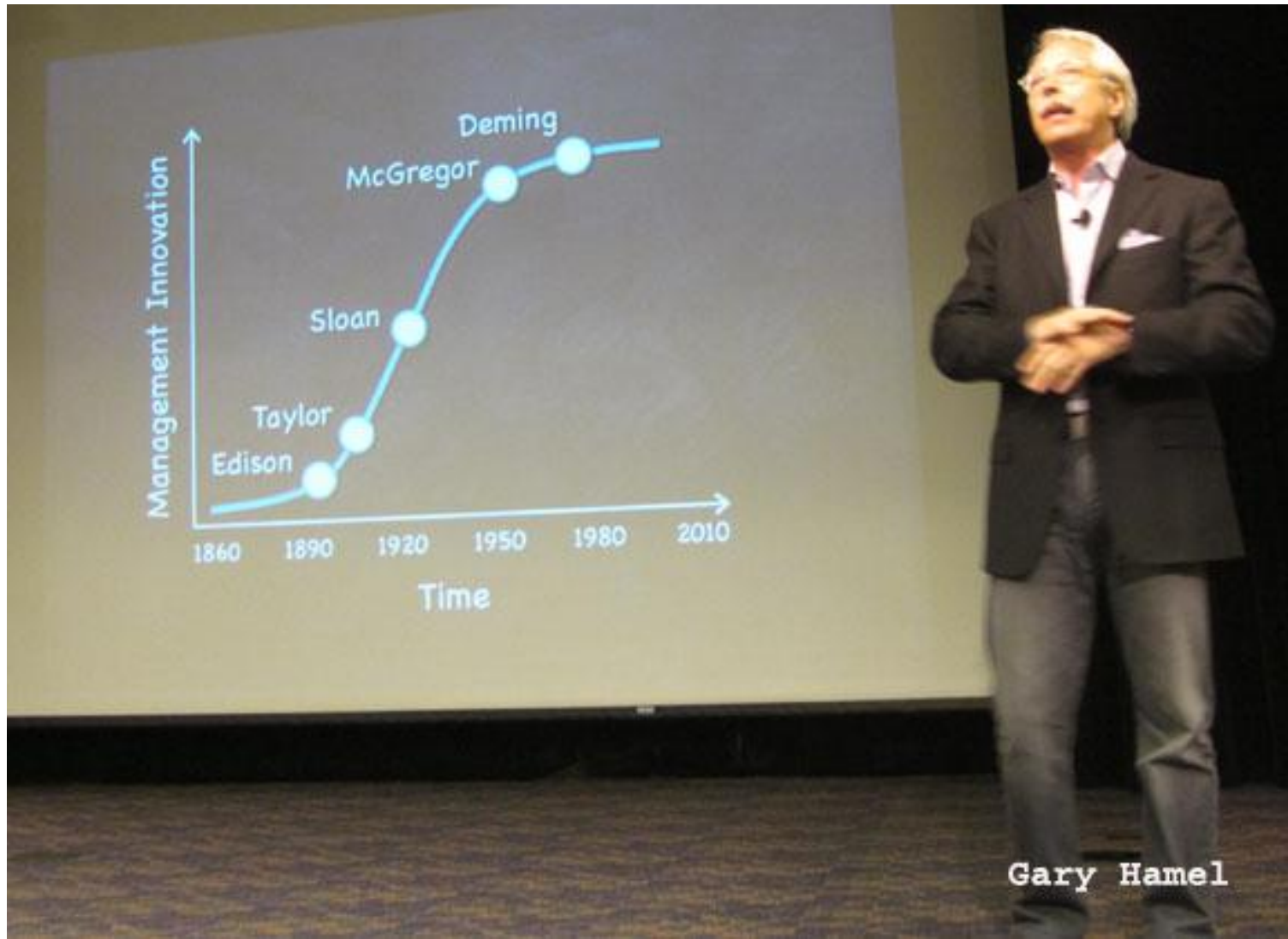
- **Liu Jen-Hang (1926)**
 - **Comparison of China and the West**
 - The “middle” vs the extremes
 - Longing for education vs longing for power
 - Manpower vs machines
 - Family-based vs individual-based morality
 - Unity vs differentiation in history
 - Old vs new
 - Monk vs knight mentality
 - Tyranny vs democracy
 - Overland trade vs overseas trade
 - Opium vs alcohol
 - Feminine (yin) vs masculine (yang)

What the Modern Age knew

- **Jan Smuts (1926)**
 - **Holism: "the tendency in nature to form wholes that are greater than the sum of the parts through creative evolution"**

What the Modern Age knew

- The Science of Management



What the Modern Age knew

- **The Science of Management**
 - A new way of managing scientific discovery
 - Turning scientific innovation into social value
 - The cause of success has mostly been management, not technology

What the Modern Age knew

- **Quantum Mechanics**
 - **First major theory of a dimension that humans cannot perceive (the infinitely small)**
 - **Humans were not built by evolution to understand the quantum world**
 - **Quantum Mechanics reaches conclusions that are at odds with the world that humans were designed to cope with (indeterminacy, the observer collapses the wave, the vacuum is not empty, antimatter, etc)**

What the Modern Age knew

- **Quantum Mechanics**
 - **Only “interpretations” of what it means are possible: we cannot verify its meaning because its meaning lies beyond our cognitive closure**
 - **The role of science is not to explain nature but simply to predict the result of experiments**

What the Modern Age knew

- Quantum Mechanics
 - A consequence of the electric revolution: the study of electricity led to the study of the atom
 - A German phenomenon: Germany was at the vanguard of the electric revolution

What the Modern Age knew

- Quantum Mechanics
 - Energy quanta (1900): atoms can emit energy only in discrete amounts (Max Planck)
 - Energy-frequency equivalence (1905): the energy of a photon is proportional to the frequency of the radiation, i.e. light itself exists only in discrete units, and it is both particle and wave $h\nu=E=mc^2$ (Albert Einstein)
 - Structure of the atom (1913): electrons are permitted to occupy only some orbits (Niels Bohr)
 - Dualism (1923): waves and particles are dual aspects (Louis de Broglie)



What the Modern Age knew

- Classical physics:
 - Bodies move continuously and exchange energy continuously
 - Particles and waves are different things
 - Causality
 - Continuity of motion
 - Continuity of energy



What the Modern Age knew

- Quantum Mechanics
 - Planck: black body radiation is discrete
 - Einstein: photoelectric effect is discrete $E=h\nu$
 - Light waves have a particle-like character
 - Bohr: the electron can only be in some discrete orbits of the atom, only some energy levels are possible for electrons
 - All forms of energy is discontinuous, there is an “atom” of energy
 - DeBroglie: Light waves have a particle-like character AND particles have a wave-like character



What the Modern Age knew

- Quantum Mechanics
 - No causality
 - Discontinuity of motion
 - Discontinuity of energy

What the Modern Age knew

- Quantum Mechanics
 - Max Born's and Werner Heisenberg's matrix formulation of quantum mechanics (1925)
 - Erwin Schrodinger's equation (1926) describes the behavior of the electron's wave in time and it is continuous
 - Wave function (1926): wave of probabilities (Max Born)
 - Werner Heisenberg's "uncertainty principle" (1927): there is a limit to the precision with which we can measure quantities
 - Niels Bohr's principle of complementarity (1928): we are limited in our understanding of nature by pairs of inherently indeterminate quantities



What the Modern Age knew

- Quantum Mechanics
 - Spin (1925): George Uhlenbeck and Samuel Goudsmit discover that each electron “spins” with an angular momentum of $1/2$ Planck constant
 - A particle is defined by mass, charge and spin
 - Anti-matter (1928): positively charged electron (Paul Dirac)
 - Paul Dirac’s unification of Quantum Mechanics and Special Relativity (1930)
 - Quantum Electrodynamics (1940s): quantum field theory of the electromagnetic force (Richard Feynman’s diagrams)



What the Modern Age knew



- Quantum Mechanics
 - The state of a particle is described by a “wave function” which summarizes (“superposes”) all the alternatives and their probabilities
 - Erwin Schrodinger's equation (1926) describes how this wave function evolves in time (a linear equation)
 - The wave function describes a set of possibilities
 - A measurement causes a “collapse of the wave function” (a non-linear process): only one eigenvalue is possible after the measurement, the one that is measured
 - A measurement introduces irreversibility: the collapse cannot be undone

What the Modern Age knew

- Quantum Mechanics
 - An observable quantity can assume a range of values (its “eigenvalues”), each one with a given probability
 - An observer can measure at the same time only observables which are compatible
 - Werner Heisenberg’s “uncertainty principle” (1927): there is a limit to the precision with which we can measure quantities



What the Modern Age knew



- Quantum Mechanics
 - Indeterminacy principle
 - An electron is connected to a wave
 - Experiments show that all other subatomic particles also exhibit wave-like properties
 - $E=h\nu$ + relativity $\rightarrow p=h/L$ momentum and wavelength
 - An accurate definition of the position requires light of short wavelengths,
 - i.e. large momentum; and an accurate measurement of momentum requires light of very low momentum, i.e. long wavelength

What the Modern Age knew

- **Quantum Mechanics**
 - **Forces are due to exchanges of discrete amounts of energy (“quanta”)**
 - **Equivalent descriptions: wave and particle, energy and mass, frequency and wavelength**
 - **Space-time is discrete**
 - **The vacuum is not empty**
 - **There is a limit to how small a physical system can be**
 - **Randomness**
 - **Schroedinger's cat**
 - **Non-locality**

What the Modern Age knew

- **The impossibility of the vacuum**
 - **Newton's vacuum: remove all gases**
 - **Thermal radiation remains even after all gases have been removed**
 - **Thermodynamic vacuum: cool down the vacuum to absolute-zero temperature**
 - **A non-thermal radiation remains after the temperature is lowered to absolute zero: the "zero point" radiation (helium at absolute zero does not freeze, it still remains a liquid zero-point energy being its source of energy)**

What the Modern Age knew

- **Interpretations of Quantum Mechanics**
 - **Niels Bohr: only phenomena are real**
 - **Werner Heisenberg: the world "is" made of possibility waves (particles are merely "potentialities")**
 - **Albert Einstein: an incomplete description of the universe ("hidden variables")**
 - **John Von Neumann: consciousness**
 - **Paul Dirac: our knowledge of a system**
 - **David Bohm: a quantum potential acts beyond the 4-dimensional geometry of spacetime**
 - **Hugh Everett: a multiverse**

Table 2. Various interpretations of quantum mechanics **Kuzemsky, 2008**

Name	Authors	Year
Electrodynamical [394]	Schrödinger	1926
Probabilistic [361, 362]	Born	1926
Copenhagen [391, 392, 365, 360]	Bohr, Heisenberg	1927–1930
Statistical [391, 392]	Einstein, Schrödinger	1935–1953
Quantum ensembles	Nikol'skii [291]	1936~1947
Quantum ensembles	Blokhintsev [375–378]	1940–1977
Statistical	de Broglie, Popper [395]	1950–1980
Statistical	Bopp, Ballentine [396, 397]	1970
Generalized probabilistic	Fukuda, Maki [398, 399]	1988
Quantum ensembles	Youm, Whittakker [393]	1992
Fock [363] (theory of predictions)	Fock	1936–1965
Integrals along trajectories [384]	Feynman	1949
Many-world [400, 401, 354, 366]	Everett	1957
Bohm [402–404]	Bohm, Goldstein [405–407]	1951–2002
Dialogue [408, 409]	Mittelstaedt	1983
Operationalistic [410]	Lamb	1969
Spontaneous localization [411]	Ghirardi et al.	1980–1996
Transactional [412]	Cramer	1986
Interactive [413, 414]	Healey	1989
Modal [415]	Kochen	1985
Modal [416]	van Fraassen	1981–1991
Modal [356, 417, 418]	Vermaas, Dicks	1990–1996
Protective measurement [419]	Aharonov, Anandan, Vaidman	1993
Information [420]	Kadomtsev	1994
Consistent [421–423]	Griffith	1996–2003
Immaterial [424]	Onyszkiewicz	1996–1999

What the Modern Age knew



- **John Von Neumann (1932)**
 - The flow of time is mysteriously altered by measurements
 - The classical world emerges from the quantum world thanks to measurement
 - A continuous process of the probabilistic kind gives rise to a discontinuous process of the deterministic kind
 - Measurement of a system consists in a chain of interactions between the instrument and the system, whereby the states of the instrument become dependent on the states of the system

What the Modern Age knew

- **John Von Neumann (1932)**
 - **Eventually, states of the observer's consciousness are made dependent on states of the system, and the observer "knows" what the value of the observable is**
 - **Somewhere between the system and the observer's consciousness the "collapse" occurs**

What the Modern Age knew

- **John Von Neumann (1932)**
 - **Game theory**
 - **Zero-sum games (one player's win is the other player's loss) and Non-zero sum games (both stand to gain or lose)**
 - **Prisoner's dilemma (non-zero sum)**
 - **Any n -person non-zero-sum game can be reduced to an $n + 1$ zero-sum game, and such $n + 1$ person games can be generalized from the special case of the two-person zero-sum game**

What the Modern Age knew

- Entanglement
- Albert Einstein (1935)
 - Paradox: once entangled, the states of two particles would be entangled forever, no matter how far from each other (EPR paper: 5 citations in 20 years, more than 300 in 2014)
- Schroedinger (1935)
 - Entanglement is the most fundamental feature of Quantum Mechanics
- John Bell (1964)
 - Yep, that's the way it is!



What the Modern Age knew

- A brief history of teleportation
 - Impossible according to Heisenberg's uncertainty principle (the very act of measuring its state destroys it so it is impossible to make an exact replica)
 - William Wootters: Entanglement offers a way around it (1993)
 - ("Teleporting an unknown quantum state via dual classical and Einstein-Podolsky-Rosen channels", 1993). In 1998 the team led by US physicist Jeff Kimble teleports a photon for about one meter (1993)
 - Nicolas Gisin teleports a photon to 2 kms (2003)
 - Anton Zeilinger teleports a photon to 143 kms (2012)

What the Modern Age knew

- **Charlie-Dunbar Broad (1925)**
 - **Emergent materialism explains the relation between mind and body**

What the Modern Age knew

- **Vladimir Vernadsky (1926)**
 - **Biosphere**

What the Modern Age knew



- Martin Heidegger (1927)
 - Man is unique in that it can question the nature/essence of being: the fundamental question is the question of being
 - Man is not a “what” but a “who”
 - Man is part of the world but is also the observer of the world
 - Man is not Dasein (existence) but Dase-in (“existing in” the world)
 - The world is not a world of particles or formulas: it is a world of meaning, that the mind can understand

What the Modern Age knew

- Martin Heidegger (1927)
 - We exist as part of the world
 - The world and the mind cannot be separated
 - We cannot detach ourselves from reality because we are part of it
 - We just "act", we are "thrown" in an action
 - Subject and object do not exist independently and cannot be separated
 - Unity of the "dasein" (being)
 - The distinction between mind and world is illusory: there is only a "being in the world" that is not divided into mind and world

What the Modern Age knew

- Martin Heidegger (1927)
 - Knowledge of an object depends on Dasein's self-awareness
 - Dasein's self-awareness (Erschlossenheit, disclosedness)
 - Understanding: existence is possibility
 - Attunement: emotional involvement (emotions tune us to the world)
 - Habituation: losing sight of the context, being lost in everyday assumptions

What the Modern Age knew

- Martin Heidegger (1927)
 - Truth is where subject and object come together
 - Truth is ultimately Dasein's self-awareness
 - Truth is the precondition for truth (for true judgements)
 - But that is also the precondition for untrue judgements
 - Therefore "The essence of truth is untruth"

What the Modern Age knew

- Martin Heidegger (1927)
 - Technology alienates humans because it recasts the natural environment as a “Bestand” to be utilized for the purpose of humans
 - “The Earth reveals itself as a mining district... the Rhine itself appears to be something at our command...e.g, a supply of power... no longer the river running through the native country”
 - People lose their identity because the natural environment that provided them with an identity is now simply a store of resources to be exploited

What the Modern Age knew

- Martin Heidegger
 - "Agriculture is now a mechanized food industry, in essence the same as the manufacture of corpses in the gas chambers and death camps, the same thing as the blockades and reduction of countries to famine, the same thing as the manufacture of hydrogen bombs."

What the Modern Age knew

- Martin Heidegger
 - Death is the possibility of impossibility
 - Only humans die; plants and animals simply cease to exist

What the Modern Age knew

- Clarence Irving Lewis (1929)
 - All knowledge is conceptual
 - Knowledge of an experience is not a mental copy of the object, but a relation between concepts
 - The mind performs a “diagnosis of appearance”: it interprets experience based on its significance for future experience and action, and this interpretation is based on past success in classifying similar experiences
 - The mind creates a world order that serves its purpose

What the Modern Age knew

- **Clarence Irving Lewis (1929)**
 - **Modal logic: modal operator “impossible”**

What the Modern Age knew

- **Ronald Fisher (1930)**
 - **Darwinism is a stochastic theory**
 - **Sexual selection is a positive feedback**
 - **Natural selection requires Mendelian inheritance in order to work the way it works**
 - **What changes in evolution is the relative frequency of discrete hereditary units, each of which may or may not appear (more or less randomly) in successive generations**

What the Modern Age knew

- **Krishna Chandra Bhattacharyya (1930)**
 - **Absolute of knowing = Truth**
 - **Absolute of willing = Freedom**
 - **Absolute of feeling = Value**

What the Modern Age knew

- **Logical (neo-) Positivism**
 - Creating a universal language a` la Leibniz to elucidate and answer all the philosophical questions
 - Wedding science and Frege's symbolic logic
 - Philosophy's goal is only to clarify the "syntax", not the semantics
 - The meaning of a proposition is its method of verification
 - Truth is coherence within a set of beliefs

What the Modern Age knew

- Rudolf Carnap (1928)
 - Program to derive scientific knowledge (knowledge of the physical world) by logical construction starting from our sensory experience
 - The fundamental elements of knowledge are the qualia (“red”), which are global and immediate experiences: subjectivity
 - From subjectivity one derives physical objects (logical constructions from the sense data)
 - From physical objects one can derive the intersubjective level, and then the sociocultural level
 - Metaphysics, instead, is only a form of art

What the Modern Age knew

- **Rudolf Carnap (1928)**
 - Experience comes as wholes, not as items
 - Construction of the world arises from the experienced events of a lifetime
 - A language is defined by
 - a set of formation rules that specify if a sequence of symbols is a valid sentence in that language
 - and a set of transformation rules that allow to transform one valid sentence into another valid sentence
 - Syntactic rules could account for meaning

What the Modern Age knew

- **Edwin Hubble (1929)**
 - **The universe is big (the lights in the sky are galaxies as big as the Milky Way)**
 - **The universe is expanding**
 - **The energy of the universe is not conserved: it is increasing**

What the Modern Age knew



- Alfred Whitehead (1929)
 - The world is unitary, not fragmented into “things”
 - The history of the world is a continuous process, not fragmented into “events”
 - Things and events are temporary clusters of world features
 - The fundamental sense is touch
 - All senses are (like touch) a physical interaction between the observer’s body and the environment

What the Modern Age knew

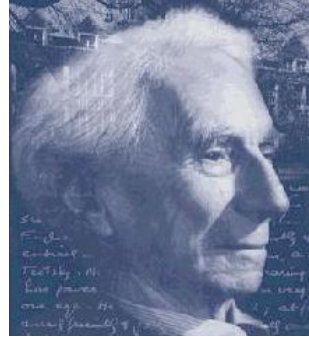
- **Alfred Whitehead (1929)**
 - **Perceptions are the foundation of mind, therefore mind is part of the bodily interaction with the world**
 - **Nature is permeated by mind**
 - **Every particle is an event having both an “objective” aspect of matter and a “subjective” aspect of experience**
 - **Some material compounds, such as the brain, create the unity of experience that we call “mind”**

What the Modern Age knew

- **Alfred Whitehead (1929)**
 - **Process theology: God and the universe are evolving together**

What the Modern Age knew

- **Logic**
 - The laws of thought are the laws of logic
 - Paradoxes
 - "I am lying"
 - The class of classes that do not belong to themselves ("the barber who shaves all barbers who do not shave themselves")
 - The omnipotent god
 - Russell & Whitehead (1913):
Axiomatization of Mathematics
 - Wittgenstein (1921): Axiomatization of Language



What the Modern Age knew

- **Logic**
 - **Paradoxes**
 - **"I am lying"**
 - **The class of classes that do not belong to themselves ("the barber who shaves all barbers who do not shave themselves")**
 - **The omnipotent god**

What the Modern Age knew

- Logic
 - David Hilbert's formal systems (1900)
 - Kurt Goedel's theorem of incompleteness (1931)
 - Alan Turing: definition of algorithm via the Turing machine (1936)
 - Alonzo Church (1936): definition of algorithm via Lambda calculus
 - Turing's and Church's conclusion: Hilbert's Entscheidungsproblem is impossible (there is no universal algorithm for deciding whether or not a Turing machine will stop)



Hilbert



Goedel



What the Modern Age knew

- **Alfred Tarski (1935)**
 - Truth is defined in a meta-language
 - Tarski replaced the universal and intuitive notion of "truth" with an infinite series of rules which define truth in a language relative to truth in another language.
 - Correspondence theory of truth: the definition of truth is in the world (truth as correspondence with the facts)
 - “Model-theoretic” semantics: models of the world yield interpretations of sentences in that world
 - The meaning of a proposition is the set of situations in which it is true

What the Modern Age knew

- Ernst Cassirer (1929)
 - The human mind is a symbolic system
 - Understanding the world is turning it into symbols
 - Animals live in the world
 - Humans live in a symbolic representation of the world
 - All cultural artifacts are symbolic forms that mediate between the individual's consciousness and the world/nature
 - Cultural artifacts are not products but functions
 - Morality is as necessary as mathematical logic

What the Modern Age knew

- **Ernst Cassirer (1929)**
 - The human mind is a symbolic system
 - Understanding the world is turning it into symbols
 - Animals live in the world
 - Humans live in a symbolic representation of the world
 - Symbolic activity has progressively distanced the human mind from the real world to the point that it feels like a man is "constantly conversing with himself"

What the Modern Age knew

- **Ernst Cassirer (1929)**
 - All cultural artifacts are symbolic forms that mediate between the individual's consciousness and the world/nature
 - Cultural artifacts are not products but functions
 - Morality is as necessary as mathematical logic

What the Modern Age knew

- **Ernst Cassirer (1929)**
 - Evolution from mythos to logos:
 - Language and myth were originally one
 - They split and myth led to art while language led to logic
 - Symbols (human knowledge) are built on Kant-like innate categories
 - Kant's categories
 - Common-sense categories
 - Historical categories
 - mythical categories

What the Modern Age knew

- **John Maynard Keynes (1930)**
 - No self-correcting mechanism to lift an economy out of a depression exists
 - Unused savings prolong economic stagnation
 - Government spending
 - Utopia: state in which citizens no longer need to worry about survival, but can focus on their hobbies
 - "For the first time since his creation man will be faced with his real, permanent problem: how to use his freedom"

What the Modern Age knew

- **Groucho Marx**

- A black cat crossing your path signifies that the animal is going somewhere.
- A child of five would understand this. Send someone to fetch a child of five.
- Anyone who says he can see through women is missing a lot.
- Before I speak, I have something important to say.
- Behind every successful man is a woman, behind her is his wife.
- Either he's dead or my watch has stopped.
- From the moment I picked your book up until I laid it down, I was convulsed with laughter. Someday I intend reading it.
- Humor is reason gone mad.
- I didn't like the play, but then I saw it under adverse conditions - the curtain was up.
- I intend to live forever, or die trying.
- I must confess, I was born at a very early age.
- I never forget a face, but in your case I'll be glad to make an exception.
- I remember the first time I had sex - I kept the receipt.
- I was married by a judge. I should have asked for a jury.
- I've got the brain of a four year old. I'll bet he was glad to be rid of it.

Marriage is a wonderful institution, but who wants to live in an institution?

What the Modern Age knew

- **Swing**



What the Modern Age knew

- **Sarvepalli Radhakrishnan (1932)**
 - Intuitive absolute idealism
 - “The successive emergence of the material, the animal, the organic, the animal, the human and the spiritual” (as told by Evolution theories) highlight a “cosmic evolution to reveal the Spirit”
 - Evolution does not end with the emergence of human consciousness, but continues with the emergence of a super-consciousness capable of realizing the union with a reality that science cannot grasp

What the Modern Age knew

- **Sarvepalli Radhakrishnan (1932)**
 - The empirical world exists (not an illusion/maya) and it is “the Absolute in action... as creator” (Ishvara, of whom Vishnu, Shiva, etc are different aspects)
 - There are three forms of pramana (knowledge): perception, logic and intuition.
 - Intuition is the fundamental form of cognition, when the mind works as a whole to grasp the essence of reality (knowledge by being)

What the Modern Age knew

- **Muhammad Iqbal (1932)**
 - Humans are imperfect egos
 - God is the absolute ego
 - God is the supreme ideal for all the other egos (cfr Nietzsche's Uebermensch)
 - The process that leads to perfection is a process not of passive acceptance of God's will but a process of active social life

What the Modern Age knew

- **German Reaction to Rational Society**
 - The trauma of modern technological warfare (WWI)
 - German obsession with unreason
 - Reaction against urban rationalist civilization
 - Frankfurt School: Adorno, Horkheimer, Marcuse
 - Novels of the Alienation: late Mann, Kafka, Musil
 - Atonal and serial music: Schoenberg, Berg, Webern
 - Heidegger

What the Modern Age knew

- **Karl Jaspers (1932)**
 - **Existence (Dasein) is existence in the world (“situated” existence)**
 - **Existence is orientation in the world**
 - **It is impossible to transcend the human experience**
 - **Freedom of the individual (to choose another existence and the risks that come with it)**
 - **Real freedom of choice is impossible because we are what we are (historically, socially, etc)**
 - **Freedom is only acceptance of one’s destiny**

What the Modern Age knew

- Karl Jaspers (1932)
 - Communication is the way an existence realizes itself, but even communication is a mirage: an existence cannot truly join with other existences
 - An existence is a contradiction in terms
 - Each existence can only glimpse the essence of its own existence (it cannot change it)

What the Modern Age knew

- **Karl Jaspers (1932)**
 - **The axial age of 600-300 BC: Confucius, Lao-Tze, Buddha, Zoroaster, Socrates, Aristotle, Plato, etc.**

What the Modern Age knew

- **Karl Jaspers (1932)**
 - **Nazism was the last avatar of German nationalism that, starting with the Reformation, assumed increasingly aggressive forms as a reaction to the difficulty in achieving political unity**

What the Modern Age knew

- **Walter Cannon**
 - **Homeostasis: living organisms are capable of self-maintenance**

What the Modern Age knew

- Alford Korzybski (1933)
 - Animals: hunters and gatherers = bind to territory, i.e. "space-binders"
 - Humans: agriculture = bind to a memory of the past and prediction of the future, i.e. "time-binders"
 - Time-binding is enabled by a nervous system that is capable of constructing and manipulating symbols
 - Time-binding allows to transmit knowledge to succeeding generations

What the Modern Age knew

- Alford Korzybski (1933)
 - The rate of growth of human knowledge is exponential
 - Language allows time-binders to categorize/generalize experiences and communicate them to others

What the Modern Age knew

- **Alford Korzybski (1933)**
 - Human knowledge is limited by
 - the structure of the nervous systems
 - the structure of language
 - Human beings cannot experience the world directly, but only through "abstractions" that are due to the nervous system and language
 - What humans know is not necessarily what truly happens

What the Modern Age knew

- **Alford Korzybski (1933)**
 - **General Semantics to remedy the limits of language:**
 - **We have fewer words and concepts than experiences: we "confuse" similar situations**
 - **We must evaluate a situation less by intension (its category) and more by extension (its unique features)**
 - **We must avoid categorization/generalization and spot the unique characteristics of a situation**

1931



1902



1939



1941



1915



BUILDING
AMERICA



What the Modern Age knew

- Biology
 - 1859: Charles Darwin (Evolution=variation+selection)
 - 1865: Gregor Mendel (Units of transmission of traits)
 - 1906: William Bateson ("Genetics")
 - 1920s: Thomas Hunt Morgan ("chromosomes")
 - 1920s: Population Genetics (Probabilities)
 - 1930s: Ethology
 - 1940s: Modern Synthesis (variation=mutation)

What the Modern Age knew

- Biology
 - Ronald Fisher (1918): using statistical techniques to study the effects of selection and mutation (the distribution of genes in population), concludes that natural selection is by far the most effective factor to change gene frequency
 - John-Burdon-Sanderson Haldane (1924): a mathematical theory of natural selection
 - Mutation adds genes into the gene pool of the population, selection only acts on individual genes, and evolution consists in adding or subtracting genes from the gene pool of the population
 - No role for interaction among genes
 - Continuous unbranching evolution

What the Modern Age knew

- **Biology**
 - **William Castle (1919):** genes modify the effects of other genes, and the interaction among genes shapes the phenotype
 - **Sewall Wright (1931):** interaction between genes is a source of additional variation within smaller populations
 - **Field naturalists:** geographic isolation is crucial for speciation

What the Modern Age knew

- **Biology**
 - **Conclusions of statistical study of biology**
 - **Natural selection is the driving force of evolution (unlike Bateson and DeVries)**
 - **Evolution occurs gradually through the selective accumulation of small genetic differences**

What the Modern Age knew

- **Biology**
 - **Formation of species**
 - **Francis Sumner (1930): natural selection AND geographic isolation are the main drivers of new species formation**
 - **Theodosius Dobzhansky (1937): genetic foundation of species formation (evolution is "a change in the frequency of an allele within a gene pool")**
 - **Bridging the gap between field naturalists and mathematical biologists**
 - **Selection also helps stabilize a species by providing enough variation to adapt to changing conditions**

What the Modern Age knew

- Biology
 - Formation of species
 - Ernst Mayr (1942): a species is a population of individuals that can reproduce with one another and that are reproductively isolated from other population (a species is not just a group of morphologically similar individuals)

What the Modern Age knew

- **Biology**
 - **Origin of life**
 - **Alexander Oparin (1929)**
 - **Gradual increase in the level of organization in chemical compounds until properties of life emerge**
 - **Continuity between inorganic and organic matter**
 - **Dialectical materialism applied to biology: entirely new laws of nature emerge as higher levels of organization are achieved**
 - **Theory of the “primordial soup” from which life arose**

What the Modern Age knew

- **Biology**
 - **Hominids**
 - **1931: white Kenyan archaeologist Louis Leakey discovers human stone tool fossils in the Olduvai Gorge of Kenya**

What the Modern Age knew

- Biology
 - Jakob von Uexkull
 - Kant: “phenomenal world” (that we can sense and know) and “noumenal world” (the unknowable beyond)
 - Umgebung = animal’s physical surroundings
 - Umwelt = the world that the animal senses and acts on
 - There isn't a single world common to all animals
 - Each animal perceives its own perspective of reality

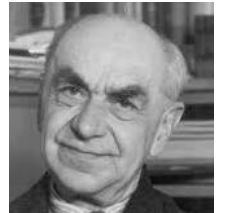
—

What the Modern Age knew

- Biology
 - Ethology
 - 1935: Konrad Lorenz discovers “imprinting”
 - Evolutionary explanations for the instinctive behavior of animals
 - Instinct has been shaped by blind variation and natural selection: it is "knowledge" acquired over millennia that is now encoded in the genome of a species

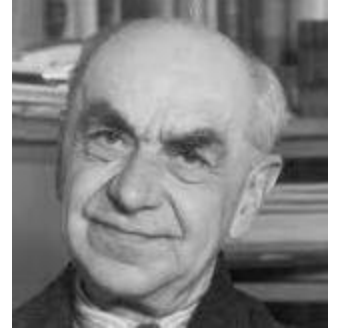
What the Modern Age knew

- **Cognitive Psychology**
 - **Richard Semon (1904): the “engram”**
 - **Otto Selz (1920s): schema**
 - **Fredrick Bartlett (1932): Reconstructive memory**
 - **Edward Tolman (1932): “cognitive map”**
 - **Donald Broadbent (1957): "short-term memory" and "long-term memory"**



What the Modern Age knew

- Fredrick Bartlett (1932)
 - Encoding
 - Schemas
 - Optimized storage
 - Reconstructing = finding meaning (explaining)



What the Modern Age knew



- Edward Tolman (1932)
 - A rat knows how to navigate a maze because it maintains a cognitive map that covers much more than the rat has ever experienced directly.
 - A cognitive map is a mental representation of the world in which we live.
 - They both represent and participate in the creation of our experience of the world.
 - A cognitive map is created and continuously improved through the individual's experience
 - The cognitive map “is” the world, insofar as the individual is concerned.

What the Modern Age knew

- **Arnold Toynbee (1934)**
 - **Civilization is due to the “response to a challenge”**
 - **Civilizations occur not in environments where human life is easy (e.g., Nyasaland) but in environments where human life is difficult**

What the Modern Age knew

- **Emil Cioran (1934)**
 - Humans are doomed to unhappiness
 - Philosophers ignore the suffering of the body, the most obvious of realities
 - Mystical revelation gives answers to questions that philosophers can't even ask
 - History is a procession of false absolutes

What the Modern Age knew

- Gaston Bachelard (1934)
 - Science is a discontinuous process (eg, Relativity, Quantum Mechanics)
 - Objective stance for Science
 - Subjective stance for Art
 - Scientists communicate via abstract mathematics
 - Artists communicate through Jung's collective unconscious

What the Modern Age knew

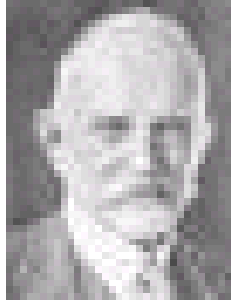
- Karl Popper (1934)
 - Science is not inductive
 - Science is hypothetico-deductive
 - Truth is relative to a theory
 - A scientific theory provides the means to falsify it
 - No definition of absolute truth is possible



What the Modern Age knew

- **Karl Popper (1934)**
 - **Democracy is the form of government that embodies the scientific trial-and-error method**
 - **Democracy is the form of government that allows for change in the form of government**

What the Modern Age knew



- **George Herbert Mead (1934)**
 - **Consciousness is not a separate substance, but the world in its relationship with the organism**
 - **Consciousness is in the world, outside the organism**
 - **Objects of the environment are colored, beautiful, etc: that "is" consciousness**
 - **Objects do not exist per se, they are just the way an organism perceives the environment**
 - **It is our acting in the environment that determines what we perceive as objects**
 - **Different organisms may perceive different objects**

What the Modern Age knew

- **George Herbert Mead (1934)**
 - **The environment results from the actions of the organism**
 - **We are actors as well as observers (of the consequences of our actions)**

What the Modern Age knew

- **George Herbert Mead (1934)**
 - Any change in the organism results in a change of the environment.
 - Those objects have qualities and values that constitute what we call "consciousness"
 - Consciousness is not a brain process: the switch that turns consciousness on or off is a brain process
 - Consciousness is pervasive but only social species can report on their conscious experiences
 - A self always belongs to a society of selves
 - Consciousness is a product of socialization among biological organisms

What the Modern Age knew

- **George Herbert Mead (1934)**
 - **The mind is socially constructed: society constitutes an individual as much as the individual constitutes society**

What the Modern Age knew

- **Lev Vygotsky (1934)**
 - **Language provides a semiotic mediation of knowledge and therefore guides the child's cognitive growth**
 - **Cognitive faculties are internalized versions of social processes**



What the Modern Age knew

- **Lev Vygotsky (1934)**
 - The individual is the result of a dialectical cooperation between nature and history, between the biological sphere and the social sphere
 - An individual is a product of culture as well as a product of nature
 - Children develop under the influence of both biology and society
 - "Zone of proximal development" = difference between the unguided (independent) problem solving skills and the guided (coached) problem solving skills

What the Modern Age knew

- **Lev Vygotsky (1934)**
 - **Language is a way to organize (internally) the world**
 - **Language is also a way to transmit mind to less mentally-able individuals and across generations: the by-products of this process of "coaching" are the arts and sciences**
 - **The acquisition of language itself is such a process of transmission of mind: teaching a child to speak is a way of coaching the mind of the child**
 - **Humans solve problems by speaking as well as by using their body and tools**
 - **The process of "learning" from a coach is mostly unconscious (just like the child is not conscious that s/he is learning to speak)**

What the Modern Age knew

- **Lev Vygotsky (1934)**
 - **We become conscious of a function only after we have mastered it by practicing it unconsciously**

What the Modern Age knew

- **Paul Otlet (1934)**
 - **A network of “electric telescopes” that would allow people to search and browse through millions of interlinked documents, and to send messages to each other**
 - **A paperless future**

What the Modern Age knew

- **Karen Horney (1937)**
 - **Neurosis is an ongoing process, not a sudden malfunction of the mind**
 - **The contradictions of capitalist society lead to neurosis (e.g., competition required in the workplace vs cooperation desired with neighbors)**
 - **There is as much “womb envy” by men towards women as “penis envy” by women towards men**

What the Modern Age knew

- John Dewey (1938)
 - Pragmatist: the truth is that which works
 - What the world is depends upon what we do with it
 - Knowledge is an instrument by which humans can adapt to the world and transform it
 - Knowledge is a way to generate certainty from doubt (habits from chaos)
 - When faced with an indeterminate situation, we reach a scientific or common-sense explanation of the situation that provisionally reduces the original indeterminacy
 - Knowledge is always tentative and dynamic

What the Modern Age knew

- John Dewey (1938)
 - Stimuli influence responses (behavior)
 - But responses (behavior) also influence stimuli
 - Behavior is purposeful and changes the environment that operates on behavior
 - Most prominent public intellectual in the USA

What the Modern Age knew

- **John Dewey (1938)**
 - **Knowledge is the individual's struggle to create habits**
 - **Ethics is society's struggle to create habits**

What the Modern Age knew

- **Charles Morris (1938)**
 - **Theory of signs**
 - **Syntax studies the relation between signs and signs**
 - **Semantics studies the relation between signs and objects**
 - **Pragmatics studies the relation between signs, objects and users**

What the Modern Age knew

- **Alfred-Jules Ayer (1936)**
 - **Meaningful statements are either logical or empirical**
 - **A statement is considered empirical only if some sensory observation is relevant to determining its truth or falseness**
 - **Metaphysics and Ethics are nonsensical because are founded on statements that are neither logical nor empirical**
 - **Moral judgements are meant to evoke emotions by speakers into listeners: they are “emotive”, not “cognitive”**

What the Modern Age knew

- Pierre Teilhard de Chardin (1938)
 - Evolution is a general law of nature
 - Matter has always obeyed to a law of "complexification" (the universe's matter-energy is progressing towards ever increased complexity)
 - Humanity marks the stage when evolution leaves the "biosphere" and enters the "noosphere" (human consciousness and knowledge)
 - Humanity is the stage when "evolution becomes conscious of itself"



What the Modern Age knew

- Pierre Teilhard de Chardin (1938)
 - The evolution of the noosphere will end in the convergence of matter and spirit into the "omega point"
 - Reconciling science and religion



What the Modern Age knew

- **Burrhus Skinner (1938)**
 - **Behaviorism**
 - **All forms of learning can be reduced to conditioning phenomena**
 - **All learned behavior is the result of selective reinforcement of random responses**
 - **Mental states (what goes on in our minds) have no effect on our actions**
 - **Similarity between reinforcement and natural selection: random mutations are "selected" by the environment, random behavior is also selected by the environment**

What the Modern Age knew

- **Burrhus Skinner (1938)**
 - **Therapy is not about releasing repressed impulses but about conditioning brains in order to correct disordered behavior**

What the Modern Age knew

- **Fung Yu-Lan (1938)**
 - **Rational Confucianism**
 - **Li (principle/form) and Ch'i/Qi (material/matter) are the fundamental categories of metaphysics**
 - **Existence is the continuous process of Qi realizing Li**
 - **The whole of these processes of “existence” is the Tao (as constant renewal of the universe)**

What the Modern Age knew

- **Johan Huizinga (1938)**
 - **Play as the fundamental component of culture**

What the Modern Age knew

- **Walter Benjamin (1940)**
 - **Fusing Marxism and Judaism**
 - **The Proletariat is at once the vehicle for the salvation of mankind from itself**
 - **“Only the messiah himself can close all historical events”**

What the Modern Age knew

- **Walter Benjamin (1940)**
 - **A text contains not only its surface meaning but also an underlying structure and message**

What the Modern Age knew

- **Walter Benjamin (1940)**
 - **Politics is not merely a struggle to control the future but also a struggle to control the past**
 - **The winner manipulates history to perpetuate its own ideology**

What the Modern Age knew

- **Walter Benjamin (1940)**
 - **The work of art in the age of mechanical reproduction**
 - **“..the unique value of the authentic work of art has its basis in ritual, the location of its original use value”**
 - **“... the work of art reproduced becomes the work of art designed for reproducibility”**
 - **“...but the instant the criterion of authenticity ceases to be applicable to artistic production, the total function of art is reversed. Instead of being based on ritual, it begins to be based on another practice: politics”**

What the Modern Age knew

- **Konrad Lorenz (“Kant’s Lehre vom Apriorischen im Lichte gegenwärtiger Biologie”, 1941)**
 - **A-priori knowledge (space, time, causation) is the product of the biological evolution of the human brain**
 - **Our senses gives us true information about the environment because they have been selected over the millennia based on their usefulness**
 - **The world is not an illusion and we know it by adapting to it**
 - **Human knowledge is a consequence of biological evolution (evolutionary epistemology)**

What the Modern Age knew

- **Joseph Schumpeter (1942)**
 - Profit only comes from innovation
 - Each innovation destabilizes the market
 - The market then reaches a new equilibrium that a new innovation will destabilize
 - Profits occur only at time of non-equilibrium when the innovation is cutting costs and increasing productivity
 - Capitalism goes through cycles of boom and bust

What the Modern Age knew

- **Susanne Langer (1942)**
 - **The mind creates symbols all the time: it transforms all experience into symbols**
 - **Speech is a natural manifestation of the mind's symbolic activity: children babble spontaneously all the time (other primates don't)**
 - **A child does not learn to speak; she learns to speak a specific language**
 - **Language was not born to communicate; once it existed, it turned out to be an effective way to communicate**

What the Modern Age knew

- **Susanne Langer (1942)**
 - **All forms of symbolization originate from the same principle: the mind creates symbols all the time, and then some of its symbolic activity turns out to be important for some practical activity**
 - **We should not confuse the importance and the origin of a phenomenon.**
 - **We think that speech is for communicating because language is important for communicating, when in reality communication was just a by-product of speech.**

What the Modern Age knew

- **Susanne Langer (1942)**
 - **Singing predates speech: the speech of primitive cultures have a singsong quality, the speech of children fluctuates violently in tone**
 - **Monotone speech is imposed by social etiquette**
 - **Dance and song are natural manifestations of the mind's symbolic activity**
 - **Music (the combination of dance and song) was born for non-artistic reasons, but then music became important as an "art" to express feelings that couldn't be expressed by speech alone.**

What the Modern Age knew

- Existentialism
 - Reacting against Hegel's metaphysical speculations
 - Focus on the human experience
 - Philosophy of the crisis of values
 - The object and the subject of existentialism are the same: the I
 - Kierkegaard

What the Modern Age knew



- Albert Camus (1942)
 - Philosophy of the absurd:
 - The search for meaning is futile
 - The world is unintelligible
 - There is no God
 - “There only one serious philosophical problem and that is suicide”

What the Modern Age knew

- Joseph Schumpeter (1942)
 - Capitalism is inherently unstable (not equilibrium but continuous drift away from equilibrium)
 - Capitalism does not administer structures, it continuously destroys and creates them
 - Emphasis on innovation
 - Innovation tends to cluster around certain points in time (“neighborhoods of equilibrium”)
 - Capitalism will inevitably lead to socialism

What the Modern Age knew



- **JeanPaul Sartre (1943)**
 - Human nature is not predetermined
 - There is no "human nature" because there is no God to conceive it.
 - We are free to act as we will
 - It is our actions that determine our nature
 - Existence (the free I) precedes essence (the I's nature)
 - At first, the individual is nothing. Then she defines herself by her actions.
 - Each individual is fully responsible for what she becomes
 - "Man is condemned to be free"

What the Modern Age knew

- **JeanPaul Sartre (1943)**
 - Indirectly, each individual's choice on what to be has an effect on all humans
 - "In choosing myself, I choose Man" (humankind)
 - Each individual has "total and deep responsibility"
 - This causes anxiety
 - Existentialism abolishes God, but recognizes that this act increases (not decreases) the individual responsibility for his actions
 - It complicates, not simplifies, his moral life
 - "We are alone, with no excuses"

What the Modern Age knew

- **JeanPaul Sartre (1943)**
 - **Consciousness is “intentional”: its only function is to refer to objects**
 - **The objects of knowing exist outside consciousness: the subject and the object are separated**
 - **Consciousness depends on objects, not objects on consciousness**
 - **If consciousness is conscious of something, that something is not part of consciousness, it must exist outside consciousness, because consciousness can only refer to it (i.e. the self is an object of consciousness, not the subject)**
 - **There is nothing inside consciousness**
 - **Consciousness per se is nothingness**

What the Modern Age knew

- **Sartre (1943)**
 - **Freedom is the condition of nothingness, when consciousness is not invaded by objects and can reflect**
 - **This freedom causes angst because it causes the revelation of one's own nothingness**
 - **Human existence is characterized by "nothingness", the will to negate, and is therefore doomed to failure**
 - **Absolute freedom of choice is the main moral value, which entails one's responsibility for her own decisions**
 - **Industrial-age society causes "serialization", a loss of the self**

What the Modern Age knew

- **Sartre (1943)**
 - **“Each word is a path of transcendence; it shapes our feelings, names them, and attributes them to an imaginary personage who takes it upon himself to live them”**

What the Modern Age knew

- **Nicolai Hartmann (1943)**
 - **Knowledge of the world should be as immediate as knowledge of the self**

What the Modern Age knew

- **Friedrich von Hayek (1944)**
 - **Spontaneous social order**
 - **Law has evolved to account for the wishes of people**

What the Modern Age knew

- **Erwin Schrodinger (1944)**
 - **Biological organization is created and maintained at the expense of thermodynamic order**
 - **Life displays two fundamental processes: creating order from order (the progeny has the same order as the parent) and creating order from disorder (as every living system does at every metabolic step, eating and growing)**
 - **Living systems seem to defy the second law of Thermodynamics.**

What the Modern Age knew

- **Erwin Schrodinger (1944)**
 - They live in a world of energy flux (not a closed world)
 - An organism stays alive in its highly organized state by absorbing energy from the environment and processing it to produce a lower entropy state within itself.
 - "Living organisms feed upon negative entropy... Life is "negentropic".
 - The existence of a living organism depends on increasing the entropy of the rest of the universe.

What the Modern Age knew

- Maurice Merleau-Ponty (1945)
 - Human freedom is never total: it is limited by our embodiment
 - The individual is, first and foremost, a “situated” being, a body that lives in an environment
 - The body is not just an object surrounded by objects: it is the very subject of experience, that interacts with the environment
 - The body shapes the environment, but, in turn, the environment shapes the body, whose freedom is therefore limited by the way the environment shapes it

What the Modern Age knew

- Maurice Merleau-Ponty (1945)
 - The distinction between subject and object is blurred like when clasping one's own hands: it isn't clear which hand is being touched and which is touching

What the Modern Age knew

- Maurice Merleau-Ponty (1945)
 - The same conditioning exists in society: the body is a linguistic actor but its linguistic action is constrained by the language it uses (the meaning of a linguistic action is constructed on the basis of a meaning acquired from the language)
 - Ditto at the level of society: we are political agents, but our political actions are shaped by the historical background
 - At all levels there are a “visible” and an “invisible” dimensions of being that continuously affect each other

What the Modern Age knew

- Maurice Merleau-Ponty (1945)
 - Philosophy consists in relearning to see the world

What the Modern Age knew

- Kenneth Craik (1943)
 - Mind may be a particular type of machine which is capable of building internal models of the world and process them to produce action
 - Internal representation
 - Symbolic processing of such representation
 - Intelligence = inferential processing of knowledge

What the Modern Age knew

- Western Pacifism
 - 30: Jesus' "Sermon on the Mount"
 - 1661: Quakers
 - 1713: Abbe' de Saint-Pierre's "Perpetual Peace"
 - 1816: Society for the Promotion of Permanent and Universal Peace founded in London
 - 1864: Geneva Convention
 - 1901: Nobel Peace Prize
 - 1916: Conscientious objection is recognised in Britain
 - 1921: Herbert Runham-Brown founds War Resisters' International
 - 1929: Erich Maria Remarque's "All Quiet on the Western Front"
 - 1930: Mahatma Gandhi's passive resistance
 - 1962: Bob Dylan's "Blowing In The Wind"
 - 1963: Nuclear Test Ban treaty
 - 1968: Non-Proliferation of Nuclear Weapons
 - 1971: Greenpeace

What the Modern Age knew

- **Poetry 1918-1945**
 - **Aleksandr Blok (1880, Russia): “The Twelve” (1918)**
 - **Rainer Maria Rilke (1875, Germany): "Duineser Elegien" (1923)**
 - **William Yeats (1865, Ireland): "The Tower" (1928)**

What the Modern Age knew

- **Poetry 1918-1945**
 - **Czeslaw Milosz (1911, Poland): "Poem of the Stony Time" (1933)**
 - **Fernando Pessoa (1888, Portugal): "Mensagem" (1933)**
 - **Federico Garcia Lorca (1898, Spain): "Llanto por la muerte de Ignacio Sanchez Mejias" (1935)**
 - **Eugenio Montale (1896, Italy): "La Bufera" (1941)**
 - **Nazim Hikmet (1902, Turkey): "In This Year" (1941)**
 - **Wallace Stevens (1879, USA): "Notes Toward A Supreme Fiction" (1942)**
 - **Thomas Eliot (1888, USA): "Four Quartets" (1942)**
 - **Juan-Ramon Jimenez (1881, Spain): "La Estacion Total" (1946)**

What the Modern Age knew

- **Fiction 1918-45**
 - **James Joyce (1882, Ireland): "Ulysses" (1922)**
 - One ordinary day in the ordinary life of an ordinary man in an ordinary town is a microcosm of all human history
 - Le monologue interieur
 - “History if a nightmare from which I am trying to awake”
 - **James Joyce (1882, Ireland): “Finnegas Wake” (1922)**
 - Not an ordinary day, but an ordinary night (which represents the whole history of humankind)
 - A whole new language (the private language of sleep)
 - Vico’s philosophy of historical cycles

What the Modern Age knew

- **Fiction 1918-45**
 - **Marcel Proust (1871, France): "A la Recherche du Temp Perdu" (1922)**
 - **Italo Svevo (1861, Italy): "La Coscienza di Zeno" (1923)**
 - **Forster (1879, Britain): "Passage to India" (1924)**
 - **FrancisScott Fitzgerald (1896, USA): "Great Gatsby" (1925)**
 - **Andre' Gide (1869, France): "Les Faux-Monnayeurs" (1925)**
 - **Virginia Woolf (1882, Britain): "To The Lighthouse" (1927)**
 - **Julien Green (1900): "Adrienne Mesurat" (1927)**

What the Modern Age knew

- **Fiction 1918-45**
 - **Celine (1894): "Voyage a Bout de la Nuit" (1932)**
 - **Stanislaw Witkiewicz (1885, Poland): "Insatiability" (1930)**
 - **Louis-Ferdinand Celine (1894, France): "Voyage a Bout de la Nuit" (1932)**
 - **William Faulkner (1897, USA): "Light in August" (1932)**
 - **Robert Musil (1880, Austria): "Man Without Qualities" (1933): what is means to be human in a inhuman (scientific) society ("we no longer have any inner voices")**
 - **Elias Canetti (1905): "Die Blendung/ Auto Da Fe" (1935)**
 - **Jean-Paul Sartre (1905): "La Nausee" (1938)**
 - **Joseph Roth (1894): "Die Legende vom heiligen Trinker" (1939)**

What the Modern Age knew

- Robert Musil (1880, Austria): "Der Mann Ohne Eigenschaften/ Man Without Qualities" (1933)
 - "The story of this novel boils down to this: that the story which should have been told is not told"

What the Modern Age knew

- **Fiction 1918-45**
 - **Mikhail Bulgakov (1891, RUssia): "The Master and Margarita" (1940)**
 - **Bulgakov (1891, Russia): "The Master and Margarita" (1940)**
 - **Albert Camus (1913, France): "The Stranger" (1942)**
 - **Jorge-Luis Borges (1899, Argentina): "Ficciones" (1944)**
 - **Julien Gracq (1910): "Un Beaux Tenebreux" (1945)**
 - **Hermann Broch (1886): "Der Tod des Vergil" (1945)**

What the Modern Age knew

- **Theatre 1918-45**
 - **Luigi Pirandello (1867, Italy): "Enrico IV" (1922)**
 - **Ernst Toller (1893): "Masse-Mensch" (1921)**
 - **Jean Cocteau (1889, France): "Orphee" (1926)**
 - **Paul Claudel (1868): "Le Soulier de Satin" (1928)**

What the Modern Age knew

- **Theatre 1918-45**
 - **Jean Giraudoux (1882): "Electre" (1937)**
 - **Bertold Brecht (1898, Germany): "Leben Des Galilei" (1939)**

What the Modern Age knew

- Music 1918-45
 - Szymanowski: Stabat Mater (1926)
 - Janacek: Slavonic Mass (1926)
 - Puccini: "Turandot" (1926)
 - Webern: Symphony (1928)
 - Ravel: Concerto in D (1931)
 - Bartok: Music for Strings, Perc and Celesta (1936)
 - Varese: Ionisation (1933)
 - Berg: Violin Concerto (1935)
 - Hindemith: Mathis del Maler (1938)
 - Messiaen: Quatuor pour la Fin du Temps (1941)
 - Petrassi: Coro di Morti (1941)

What the Modern Age knew

- Ballet/ Russia
 - Russian ballet splits
 - George Balanchine (Georgi Balanchivadze) resurrects Russian ballet in France with the baroque and neoclassical production of Stravinsky's "Apollon Musagete" (1928)
 - In the Soviet Union ballet is hailed as a national glory but has to serve the ideology of “socialist realism” (Kirov Ballet in St Petersburg/Leningrad and Bolshoi Ballet in Moscow)

What the Modern Age knew

- Ballet/ Soviet Union
 - Aleksandr Gorsky transposes Konstantin Stanislavsky's theatrical ideas to the ballet but social realism rules. Exceptions:
 - Leonid Lavrovsky (choreographer) + Prokofiev (composer) + Galina Ulanova (dancer): "Romeo and Juliet" (1940)
 - Leonid Yakobson (choreographer) + Aram Khachaturian (composer): the sexy and grandiose "Spartacus" (1956) in a Duncan-like free-form style
 - Russian ballet weakened by defections of the star dancers: Rudolf Nureyev (1961), Ulanova (1970), Mikhail Baryshnikov (1974)

What the Modern Age knew

- Ballet/ Europe
 - Ninette de Valois (Edris Stannus) founds the Vic-Wells Ballet (1931) to import Diaghilev's style to Britain
 - Frederick Ashton (choreographer) + Margot Fonteyn (dancer): the abstract ballet "Symphonic Variations" (1946)
 - Kurt Jooss: "The Green Table" (1932)
 - Leonid Massine: "Les Presages" (1933)
 - Uday Shankar: "Labour and Machinery"

What the Modern Age knew

- Ballet/ Futurism
 - Fortunato Depero's Balli Plastici (1918) with robots
 - Fedele Azari's manifesto "Il Teatro Aereo Futurista" (1919), which equates theater and dance
 - Franco Casavola: "Macchina del 3000" (1924), designed by Depero
 - Nikolai Foregger (Soviet Union, 1939): "Mechanical Dance" (1923)
 - Oskar Schlemmer (Germany): "The Triadic Ballet" (1922) with robotic puppets
 - Oskar Schlemmer: "Metal Dance" (1929)

What the Modern Age knew

- Ballet/ USA
 - John Martin becomes the first dance critic in New York (1927), explaining that modern dance is about expression and not spectacle (as opposed to Diaghilev's extravagant productions)
 - Martha Graham's "Heretic" debuts (1929) and launches a "percussive" style based on the rhythm of breathing
 - Antony Tudor + Arnold Schoenberg: the Freudian but Noverre-style narrative "Pillar of Fire" (1942)

What the Modern Age knew

- Ballet/ USA
 - George Balanchine founds in New York the School of American Ballet (1934), promoting free-form dance styles borrowed from gymnastics
 - Balanchine + Tchaikovsky: “Serenade” (1935)
 - Lucia Chase’s and Richard Pleasant’s American Ballet Theater (1939)
 - Ballet becomes the art of movement
 - Competition from Broadway musicals and Hollywood musicals (Balanchine works for both)

What the Modern Age knew

- Multimedia theater/ Russia
 - FEKS (Factory of the Eccentric Actor): “electrified” production of Gogol’s “The Wedding” (1922)
 - Eisenstein’s “A Wise Man” (1922) includes his film “Glumov’s Diary” (1922), circus acts and songs

What the Modern Age knew

- Multimedia theater/ Germany
 - Frederick Kiesler's production of Capek's "RUR" (1922)
 - Erwin Piscator's production of Ernst Toller's "Hoppla" (1927)
- Multimedia theater/ Germany
 - Paul Claudel's "Book of Christopher Columbus" (1927)
- Multimedia theater/ Czechoslovakia
 - Emil Burian's production of Wedekind's "Spring's Awakening" (1936)

What the Modern Age knew

- Comics
 - Little Nemo (1905)
 - Popeye (1929)
 - Buck Rogers (1929)
 - Tintin (1929)
 - Mickey Mouse (1930)
 - Dick Tracy (1931)
 - Alley Oop (1933)
 - Brick Bradford (1933)
 - Flash Gordon (1934)
 - Li'l Abner (1934)
 - Terry Lee (1934)
- Comics
 - Secret Agent X-9 (1934)
 - Phantom (1936)
 - Superman (1938)
 - Batman (1939)
 - Spirit (1940)
 - Pogo (1943)
 - Lucky Luke (1946)
 - Charlie Brown (1950)
 - Asterix (1959)
 - Spiderman (1962)

What the Modern Age knew

- Pulp fiction
 - Frank Mumsey's *Argosy* (1894)
 - Jacob Henneberger's *Weird Tales* (1923)
 - Bernarr Macfadden's *Ghost Stories* (1926)
 - Hugo Gernsback's *Amazing Stories* (1926), devoted to science fiction

What the Modern Age knew

- Horror/ literature
 - Haiti's voodoo and zombies
 - William Seabrook's book "The Magic Island" (1929)
 - Seabury Quinn's story "The Corpse Master" (1929)
 - Garnett Weston's story "Salt is not for Slaves" (1931)
 - Theodore Roscoe's story "The Voodoo Express" (1931)
 - Zora Neale Hurston's book "Tell My Horse" (1938)

What the Modern Age knew

- Horror/cinema
 - James Whale's film Frankenstein (1931)
 - Tod Browning's film "Dracula" (1931)
 - Karl Freund's film The Mummy (1932)
 - Faustin Wirkus' film "Voodoo" (1933)
 - Victor Halperin's film "White Zombie" (1932)
 - Jacques Tourneur's I Walked With A Zombie (1943)

What the Modern Age knew

- African-American music
 - 1912: Blues
 - 1917: Jazz
 - 1932: Gospel music
 - 1942: Rhythm'n'blues
 - 1951: Rock'n'roll
 - 1955: Soul music
 - 1960: Reggae (Jamaica)
 - 1965: Funk music
 - 1970: Dub
 - 1976: Hip-hop
 - 1981: Techno
 - 1984: House

What the Modern Age knew

- Jazz
 - 1932: Swing
 - 1945: Bebop
 - 1950: Cool jazz
 - 1960: Free jazz
 - 1969: Fusion jazz

What the Modern Age knew

Piero Scaruffi

Copyright 2018

<http://www.scaruffi.com/know>