

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

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1919-1945: The Age of the World Wars

1946-1968: The Space Age

1969-1999: The Digital Age

1992-: x Age

"I know not with what weapons World War III will be fought, but World War IV will be fought with sticks and stones."

(Albert Einstein)

"It is easier for a camel to go through a needle's eye, than for a rich man to enter into the kingdom of God"

(Luke 18:25)

Forecasting is very difficult, especially when it involves the future.

(Yogi Berra)

And I thank my parents for the greatest gift of all: poverty

(Roberto Benigni, Oscar ceremony 1999)

A brief history of Biotech

1971: First Biotech startups (e.g. Cetus)

1973: Stanley Cohen and Herbert Boyer invent a practical technique to produce recombinant DNA

1974 Rudolf Jaenisch and Beatrice Mintz inject viral DNA into the DNA of early mouse embryos and produce the first transgenic mammals

1974: Waclaw Szybalski coins the term "synthetic biology"

1975: Paul Berg organizes the Asilomar Conference on Recombinant DNA

1977: Genentech clone a protein using a synthetic recombinant gene

1977: Fred Sanger invents a method for "sequencing" DNA molecules e.

1980: The Supreme Court of the USA rules that life forms can be patente

1982: The first genetically produced medication, insulin

1983: Kary Mullis invents the "polymerase chain reaction“

A brief history of Biotech

- 1989: AquAdvantage salmon by Memorial University in Newfoundland in Canada (approved for consumption in Canada in 2016)
- 1992: Calgene creates the first Genetically Manufactured Food (GMF), the "Flavr Savr" tomato
- 1993: Cynthia Kenyon discovers that a single-gene mutation can double the lifespan of the roundworm
- 1995: Robert Fleischmann sequences the genome of a free-living organism, the bacterium *Haemophilus Influenzae*

A brief history of Biotech

1996: Ian Wilmut clones "Dolly" the sheep

1998: James Thomson and Jeffrey Jones isolate human embryonic stem cells

1999 fluorescent fish GloFish by National University of Singapore

2000 Nexia Biotechnologies creates goats "augmented" with spider genes so that they produce milk equivalent to spider silk

2000: The human genome is decoded

2002: Eckard Wimmer creates the first synthetic virus

2003: The MIT establishes a Registry of Standard Biological Parts

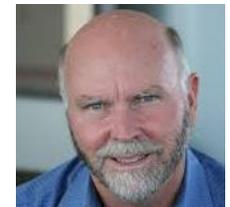
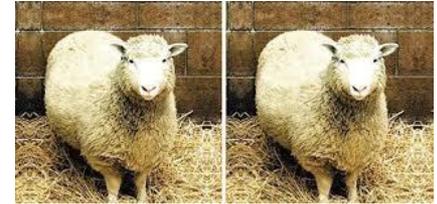
2003: China approves a gene-therapy product, Gendicine

2005: The genomes of the chimpanzee and of rice are published

2006: Personal genomics (23andMe, Syapse, Genophen)

2010: BioCurious is founded for DIY biotech

2010: Craig Venter and Hamilton Smith reprogram a bacterium's DNA



A brief history of Biotech

2010: Cheap printers for living beings (OpenPCR, Cambrian Genomics)

2012: Markus Covert produces the first complete computer model of a free-living organism, the bacterium *Mycoplasma Genitalium*

2012: Jennifer Doudna invents a new technique for gene editing, CRISPR-cas9

2014 Valentino Gantz and Ethan Bier experiment gene drive on fruit flies

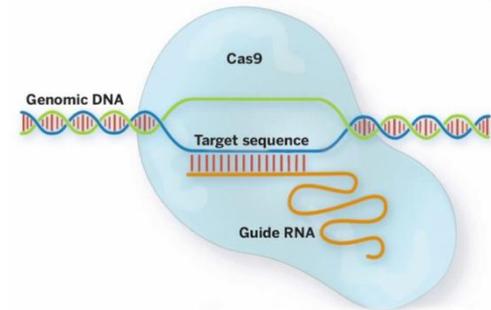
2015 Recombinetics uses TALEN to create two calves whose offspring should never have horns again

2015 Andrea Crisanti experiments gene drive on mosquitoes

2015: Chinese Scientists genetically modify human embryos

2015: The cost of a personal genetic test-kit is \$100, down from \$3 billion in 2003

2018 Kimberly Cooper engineers the first gene drive in a mammal (in mice)



A brief history of Biotech

Cloning

Dolly the Sheep, the first cloned mammal (July 1996 in Britain),

cloning of cattle in Wisconsin (just a few months later in 1997),

cloning cats (the Carbon Copy cat of 2001 in Texas)

cloning of horses (“Prometea” in 2003 in Italy)

cloning of dogs (“Snuppy” in 2005 in South Korea)

What the Modern World knew

- Internet
 - 1991: the World-Wide Web (invented by Tim Berners-Lee) debuts on the Internet
 - 1993: Marc Andreessen develops the first browser for the World Wide Web (Mosaic)
 - 1994: Jerry Yang launches the first search engine, Yahoo
 - 1994: Four million people use the Internet
 - 1994: Pizza Hut begins selling pizzas on the web
 - 1998: The Monica Lewinsky scandal is first reported on the web (Matt Drudge)
 - 1999: Weblogs (Blogs)

What the Modern World knew

- The Revolutions
 - 1825: The Age of the Railway is born with the "Rocket" steam engine for the Liverpool-Manchester railway
 - 1838: The Age of Image is born when Louis Daguerre take a picture of the Boulevard du Temple from a window of the Diorama
 - 1859: The Age of Oil is born when Drake strikes oil in Pennsylvania
 - 1866: The Age of Electricity is born with Werner von Siemens' dynamo
 - 1875: The Age of Steel is born with the opening of the Carnegie Bessemer steel plant in Pittsburgh
 - 1877: the Age of Sound is born with Thomas Edison's phonograph

What the Modern World knew

- The Revolutions
 - 1901: The age of Radio is born when Marconi sends a message from Canada to England across the Atlantic Ocean
 - 1908: The Age of Mass Production begins with the production of the first Ford Model-T in Detroit
 - 1948: The Age of Information begins with the first computer program run on the Manchester Baby
 - 1962: The Age of Telecommunications begins with the launch of the satellite Telstar
 - 1979: The Age of Mobile Telephony begins when Nippon Telegraph and Telephone launches a cellular network in Japan
 - 1995: The Age of Ecommerce is born when Amazon and eBay are launched

What the Modern World knew

- Videogames
 - 1993: Myst (Rand Miller), first “artistic” videogame
 - 1995: Sony Playstation
 - 1996: Nintendo Ultra 64
 - 1996: Tomb Raider (3D) by Core Design
 - 1996: Quake (3D) by id Software
 - 1997: the Cyberathlete Professional League, the world's first videogame sports league
 - 1998: Half Life (Gabe Newell & Marc Laidlaw), novel-level plot and characters
 - 2000: The Sims (Will Wright), imitation of ordinary family life
 - 2003: Katamari Damacy (Keita Takahashi), adventures in a surreal world
 - 2004: The first Major League Gaming for computer gaming is held in New York

What the Modern World knew

- **Videogames**
 - **2006: Nintendo Wii (that transforms the player's physical movements into movements in the game)**
 - **2010: Microsoft Kinect (a motion sensing input device)**

What the Modern Age knew

- **Bibliography**
 - **Piero Scaruffi: Nature of Consciousness (2006)**
 - **Piero Scaruffi: History of Rock and Dance Music (2009)**

The Modern Age

- 1991: The Soviet Union is dismantled**
- 1991: the USA leads an international coalition that attacks Iraq**
- 1992-99: 150,000 people die in the Algerian civil war**
- 1994: Ethnic massacres in Rwanda cause half a million of deaths**
- 1998: Osama bin Laden, wages a holy war against the USA**
- 1998: Pakistan becomes the eight nuclear country**
- 1999: The world's population is 6 billion**
- 2000: Population: China 1.2 billion, India 1 billion, USA 280 million**
- 2000: The most populated U.S. state is California with over 30 million people**
- 2000: 21 million people have died worldwide of the AIDS epidemics**
- 2001: Osama bin Laden's Al Qaeda terrorist organization¹⁴ attacks the USA**

What the Modern World knew

- **Collapse of the Soviet empire (1989-91)**
 - Budget deficit caused by 1985 collapse of oil prices
 - Arms race with USA
 - Pope John Paul II and Solidarnosc
 - War in Afghanistan
 - Chernobyl disaster
 - Ossified functionalism of the nomenklatura
 - Corruption and graft

What the Modern World knew

- **Collapse of the Soviet empire (1989-91)**
 - **Archaic non-competitive economy**
 - **Dysfunctional state companies (steelworks, mines, shipyards)**
 - **Decaying infrastructure (railways, air traffic, telephone grid, power distribution grid)**
 - **Stagnating or declining standards of living**
 - **Degraded quality of life (pollution, housing, hospitals, schools)**

What the Modern World knew

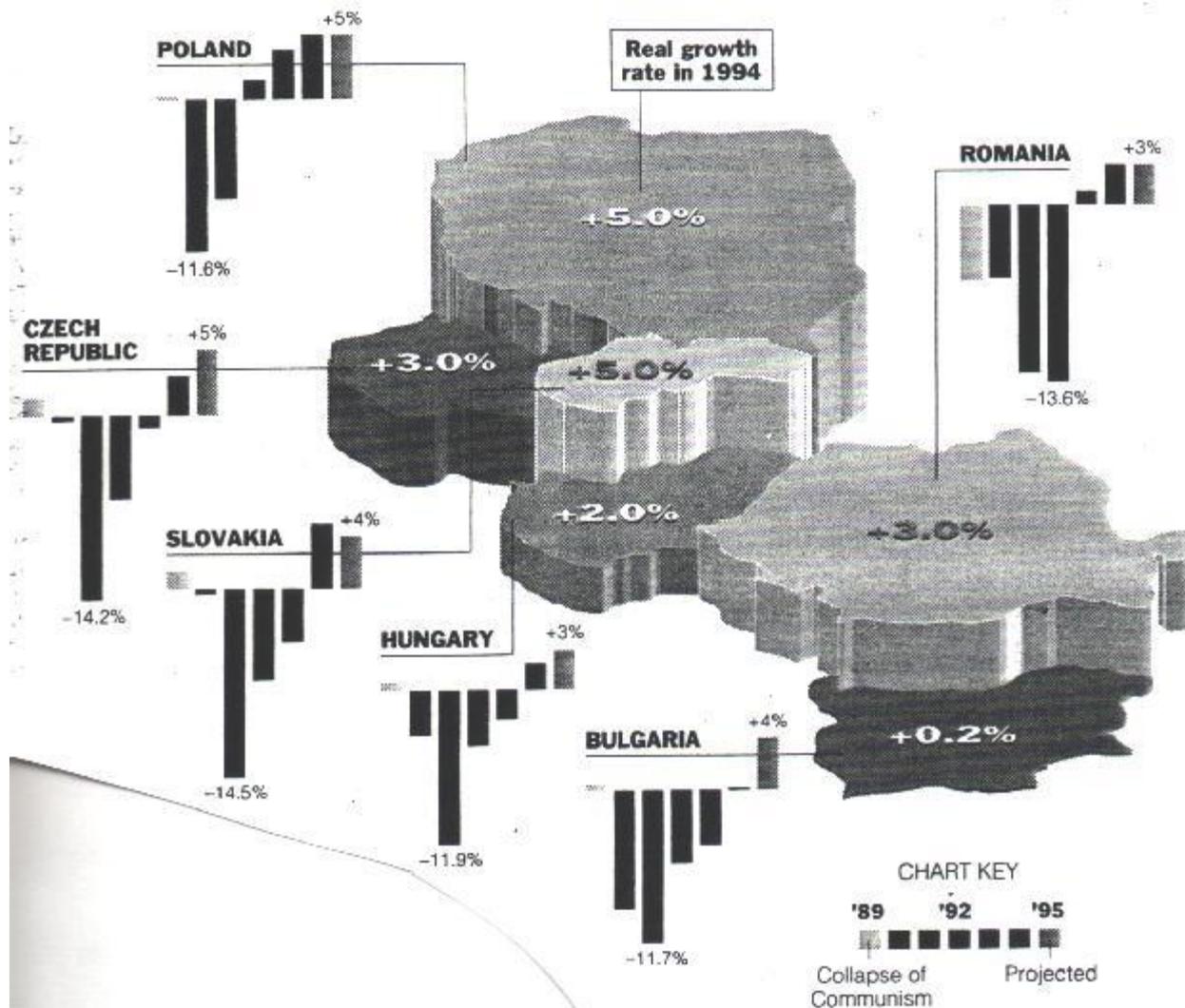
- **Collapse of the Soviet empire (1989-91)**
 - **The most atheist empire of all times was crippled by two religious movements**
 - **Catholic Church (Pope John Paul II) from the west**
 - **Afghan mujaheddins from the south**
 - **The Cold War can be recast as a war between atheism and religion**

What the Modern World knew

- **Collapse of the Soviet empire (1989-91)**
 - **WW1: End of the multi-ethnic empire within Europe (notable exception: Soviet Union)**
 - **WW2: End of the European empires outside Europe**
 - **Cold War: End of the Soviet Union (last multi-ethnic empire run by Europeans)**

GERMANY 1937**GERMANY 1943****GERMANIES TODAY****GERMANY TOMORROW?**

An Economic Dawn in the East



For each country, the worst year and the estimate for 1995 are labeled.

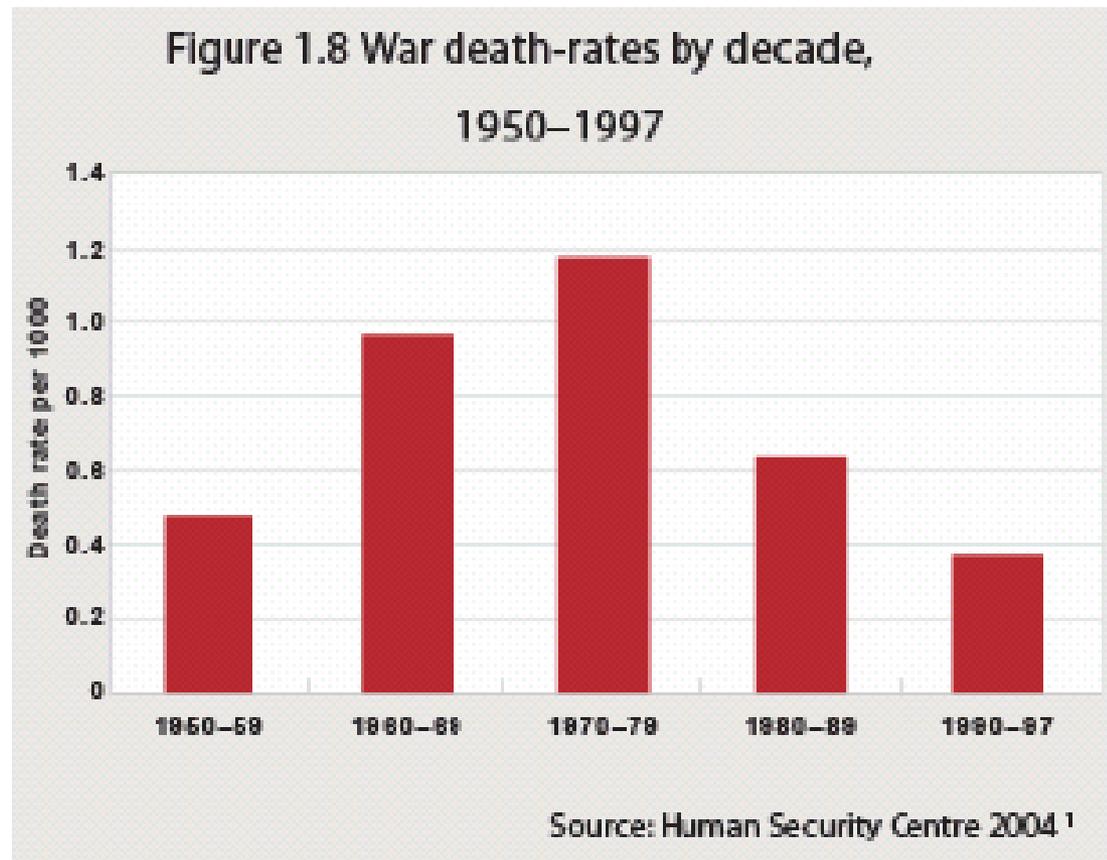
Source: European Bank for Reconstruction and Development

What the Modern World knew

- **The Marxist prophecy**
 - **Marx:**
 - **The proletariat will rule the world**
 - **The economy will be based on manufacturing**
 - **The capitalists will disappear**
 - **2000:**
 - **The proletariat is getting extinct, replaced by machines**
 - **Services are overtaking manufacturing**
 - **The workers have become capitalists (stock market)**

What the Modern World knew

- **Wars' Death Rate**



What the Modern World knew

- War against Terrorism
 - Al Qaeda (worldwide)
 - GIA (Algeria, 1993)
 - Hamas (Israel)
 - Tamil Tigers (Sri Lanka)
 - Chechnen terrorism (Russia)
 - Moro (Philippines)
 - Jemaah Islamiyah (Indonesia)
 - Kashmiri terrorism (India)
 - FARC (Colombia)



Ayman al-Zawahiri,

Osama bin Laden in 1998

What the Modern World knew

- War against Terrorism
 - In the Middle Ages, Christian demand for spices caused the Muslims to get wealthy, and the Islamic world used that wealth to wage war against the Christian world.
 - At the turn of the second millennium, Christian demand for oil caused the Muslims to get wealthy, and the Islamic world used that wealth again to wage war against the Christian world.

What the Modern World knew

- **Middle East**
 - **See logos10 (“the 1990s”)**

The Modern Age

- Latin America
 - 1990s: The age of democracy
 - Mexico:
 - A booming one-party (PRI) semi-democracy
 - 1993: Mexico joins the North American Free Trade Agreement (NAFTA) with the USA and Canada
 - 1994: Guerrilla rebellion by the Zapatista National Liberation Army
 - 2000: Vicente Fox becomes the first opposition candidate (non-PRI) to become president through democratic election

The Modern Age

- Latin America
 - Guatemala
 - 1960-96: Civil war waged by leftist rebels
 - 1995: The army carries out a massacre in Chajul
 - 1996: Alvaro Arzu is elected president of Guatemala and ends the civil war
 - Haiti
 - 1994: The USA invades Haiti to restore democracy

The Modern Age

- Latin America
 - Colombia:
 - 1993: Pablo Escobar, the most famous druglord of Colombia, is killed by the police
 - 1999: Colombia, under siege by the Marxist guerrilla group FARC in the middle of an economic depression, becomes the main recipient of US military aid

The Modern Age

- Latin America
 - Venezuela
 - 1999: The socialist candidate Hugo Chavez wins elections and assumes presidency, seizing control of all institutions
 - Ecuador
 - 1997: president Abdala Bucaram is ousted by Congress for corruption, beginning a period of political instability (six presidents in 8 years)
 - Bolivia
 - 1997: Former dictator Hugo Banzer wins elections and becomes president

The Modern Age

- Latin America
 - Brazil
 - 1992: President impeached and resigns
 - 1995-2002: Fernando Henrique Cardoso of the centrist Partido da Social Democracia Brasileira (PSDB) stabilizes the economy and inflation
 - Uruguay
 - 1985-2000 Julio Marma Sanguinetti dominates
 - Paraguay
 - 1993: First free elections

The Modern Age

- Latin America
 - Peru
 - 1990- 1990: Alberto Fujimori's semi-dictatorship
 - 1992: Abimael Guzman, leader of Sendero Luminoso, is captured
 - 1997: Peru defeats the "Movimiento Revolucionario Tupac Amaru"
 - 2000: Peruvian President Alberto Fujimori is forced to resign for abuse of power

The Modern Age

- Latin America
 - Argentina
 - An incompetent democracy
 - Chile
 - A prosperous democracy

What the Modern World knew

- Average annual rate of growth of the 1990s:
 - East Asia 7.4%
 - India: 5.2%
 - Latin America: 3%
 - Sub-Saharan Africa: 1%
 - Arab world: 0.7% (the “lost decade”)
- Population growth erases even that slim growth in the Arab world:
 - In 1975 real GDP per capita in the Arab world was 21.3% of the average OECD citizen
 - By 1998 the real GDP per capita had fallen to 13.9% of the average OECD citizen.

What the Modern World knew

- **A few generations ago, almost every person on the planet was poor.**

What the Modern World knew

Levels of Population, GDP, and GDP per Capita The West and the Rest 1000-1997								
	1000	1500	1820	1870	1913	1950	1973	1997
Population (million)								
The West	31	66	157	243	391	516	661	767
The Rest	244	367	881	1019	1391	1999	3239	5061
The World	274	433	1037	1262	1782	2515	3900	5829
GDP (billion 1990 international dollars)								
The West	12	48	180	475	1503	3106	8971	16086
The Rest	104	196	514	640	1235	2265	7083	16402
The World	116	244	693	1115	2737	5371	16054	32488
Per Capita GDP (1990 international dollars)								
The West	407	717	1147	1956	3843	6016	13579	20962
The Rest	425	535	583	628	888	1122	2167	3232
The World	423	563	668	884	1536	2135	4117	5573

What the Modern World knew

Share of total trade to GDP (B&M)

	c1870	c1910	c1950	C1995
UK	41	44	30	57
France	33	35	23	43
Germany	37	38	27	46
Sweden	28	40	30	77
Japan	10	30	37	40
Australia	40	39	37	40
US	14	11	9	24

What the Modern World knew

	GDP in billion 1990 international dollars	Per Capita GDP in 1990 international dollars	Population (000s)	Percent of World GDP	Percent of World Population
USA	6629.5	24849	266792	20.5	4.6
China	3657.2	2973	1230075	11.3	21.1
Japan	2613.1	20712	126166	8.1	2.2
India	1609.4	1678	959000	5.0	16.4
Germany	1443.4	17591	82053	4.5	1.4
France	1103.7	18833	58604	3.4	1.0
UK	1055.8	18156	59009	3.3	1.0
Italy	922.4	17253	57520	3.1	1.0
Brazil	892.9	5442	164086	2.7	2.8
Indonesia	742.8	3716	199870	2.3	3.4
Russia	690.4	4691	147200	2.1	2.5
South Korea	604.6	13145	45991	1.9	0.8
Canada	592.9	19576	30287	1.8	0.5
Spain	537.7	13705	39232	1.7	0.7
Mexico	524.0	5559	94275	1.6	1.6
Turkey	503.9	12391	63745	1.6	1.1

What the Modern World knew

- **The Economic Superpowers**
 - **1871: Britain, Germany**
 - **1919: Britain, USA**
 - **1946: USA, Soviet Union**
 - **1991: USA, Japan, Germany**
 - **2001: USA, China, European Union**

What the Modern World knew

- **2001 Military budget (\$100M, % of GDP)**
 - **USA: 3479, 16.55%**
 - **Russia: 91, 18.35%**
 - **Britain: 348, 6.10%**
 - **France: 244, 11.08%**
 - **Germany: 207, 9.80%**
 - **Japan: 405, 5.98%**
 - **China: 204, 7.65%**

What the Modern World knew

- **USA Economy of the 1960s**
 - **Multinational corporations**
 - **Increasing dependency on oil**
 - **Computers ("mainframes")**
- **USA Economy of the 1970s**
 - **Spiraling inflation**
 - **Oil crisis**
- **USA Economy of the 1980s**
 - **Personal computing**
 - **Transition from manufacturing to services**

What the Modern World knew

- **Life expectancy in the USA**

2000	1989-91	1979-81	1969-71	1959-61	1949-51	1939-41	1929-31	1919-21	1909-11	1900-1902
76.9	75.37	73.88	70.75	69.89	68.07	63.62	59.20	56.40	51.49	49.24

What the Modern World knew

- USA Economy of the 1990s
 - Global village (free trade)
 - Computers applied to everything, from factories (ERP and SCM) to warehouses (Wal-Mart) to sales (productivity increases, more efficient communications and larger markets)
 - Booming stock market
 - Dow Jones quadruples in a decade
 - Internet-based services and commerce ("dotcoms")
 - Greatest period of wealth creation in history

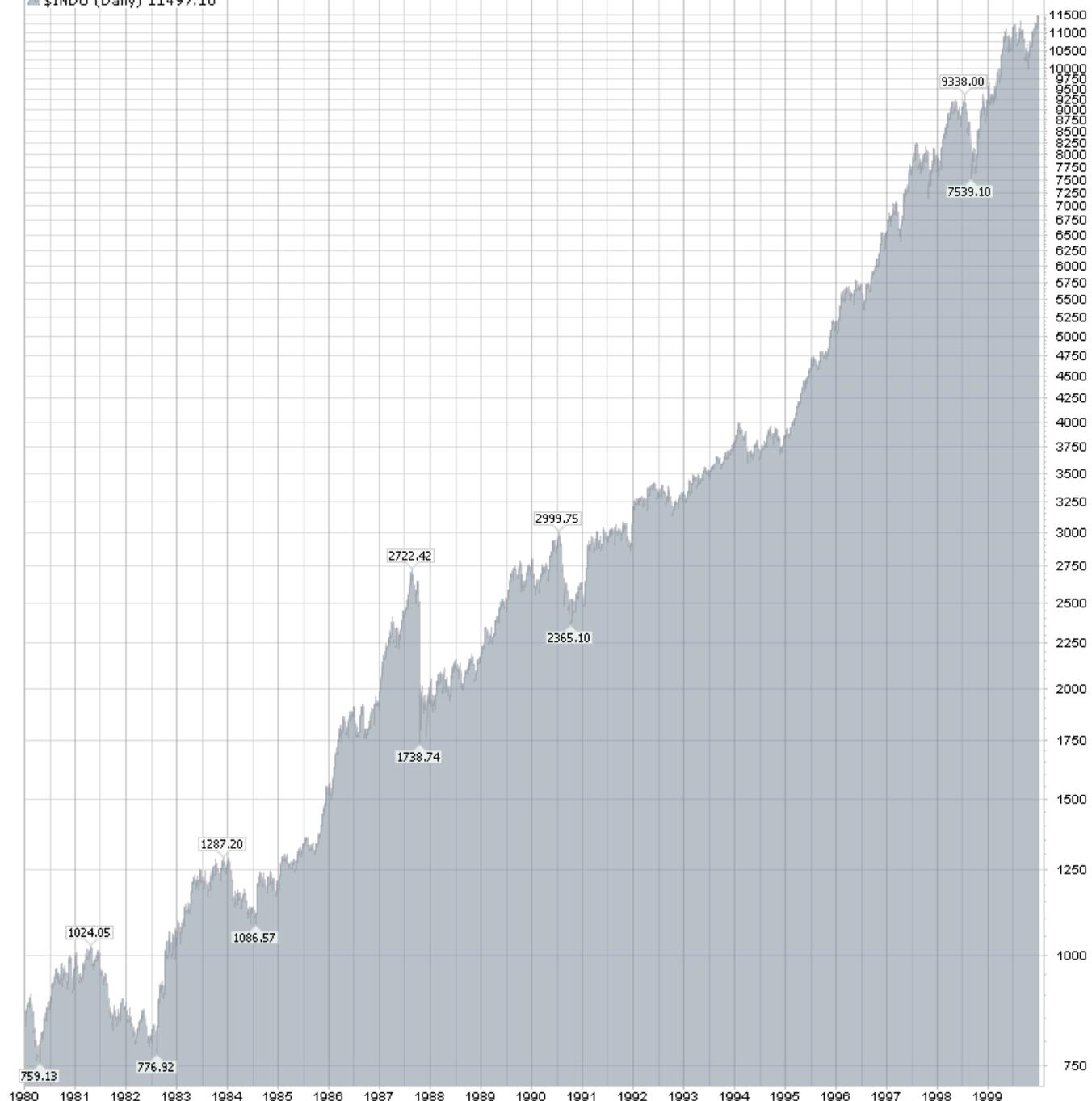
What the Modern World knew

- USA Economy of the 1990s
 - Growing gap with the rivals of the past
 - Japan's economy peaked in 1989
 - Western Europe: slow growth, spiraling deficits and high unemployment
 - China and India still developing
 - Russia still recovering

What the Modern World knew

- **USA Economy of the 1990s**
 - **The age of Alan Greenspan (1987-2006)**
 - **Collapse of the Soviet Union**
 - **Islamic terrorism**
 - **Globalization**
 - **Boom of China**
 - **Net economy**
 - **Biggest stock market bubble of all times (2000-01)**
 - **Oil crisis**
 - **Trade deficit (since the 1970s)**
 - **Capital flow from poor countries to the USA**

\$INDU (Daily) 11497.10



What the Modern World knew

- **A shifting enemy**
 - **The end of World War II (1945) coincided with the beginning of the Cold War (1946)**
 - **The end of the Vietnam War (january 1973) coincided with the first oil crisis (october 1973)**
 - **The end of the Cold War (november 1989) coincided with the first Gulf War (august 1990)**

What the Modern World knew

- **USA vs Fascism:**
 - **Global force for world domination**
 - **Support only within Germany and Japan**
 - **The USA did not depend economically on the enemy**
 - **USA eventually prevailed militarily - Military victory**
 - **USA victory welcomed even by enemies (France, Italy) - Ideological victory**

What the Modern World knew

- **USA vs Soviet Union:**
 - **Global force for world domination**
 - **Support distributed globally but weak at home**
 - **The USA did not depend economically on the enemy**
 - **USA eventually prevailed economically - Economic victory**
 - **USA victory welcomed even by enemies (Easter Europe, Central Asia) - Ideological victory**

What the Modern World knew

- **USA vs Islamic fundamentalism:**
 - **Global force for world domination**
 - **Support distributed globally and especially at home**
 - **The USA depends economically on the enemy**
 - **USA trying to win militarily, economically and ideologically**
 - **but this is not a country, unlike Germany, Japan, Soviet Union**

What the Modern World knew

- **Anglosaxon countries (USA, Britain, Australia, Canada)**
 - **1946-2004 Stable economic growth and employment rate**
 - **Early industrialization**
 - **Early adopters of knowledge-intensive service economy**
 - **Dynamics economies**
 - **Deregulation**
 - **Little or no government subsidies**
 - **Productivity increase**
 - **Low rates of household savings**
 - **Poor social network**
 - **Trade deficits**

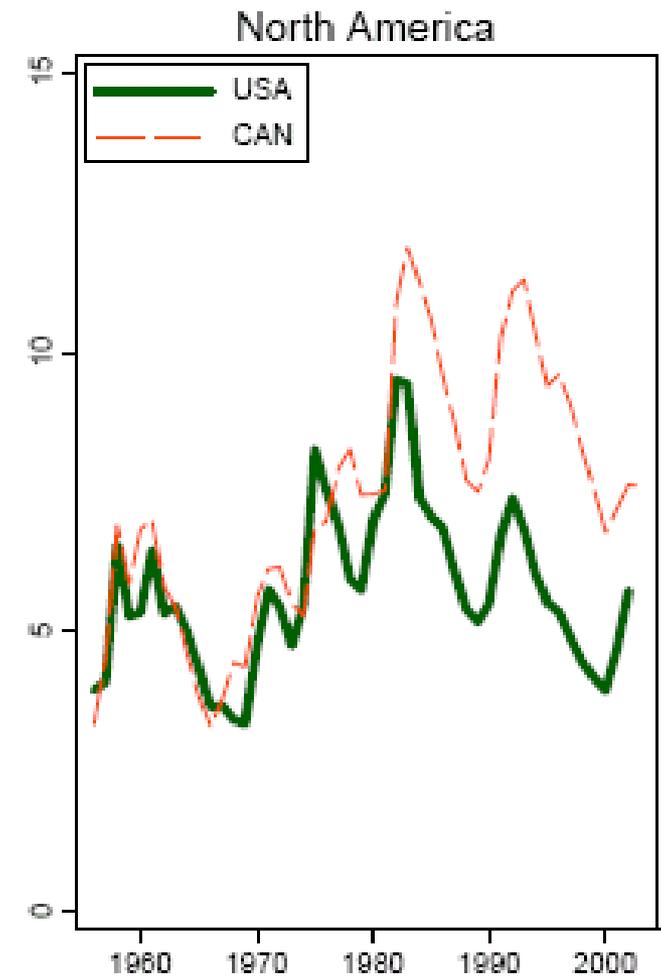
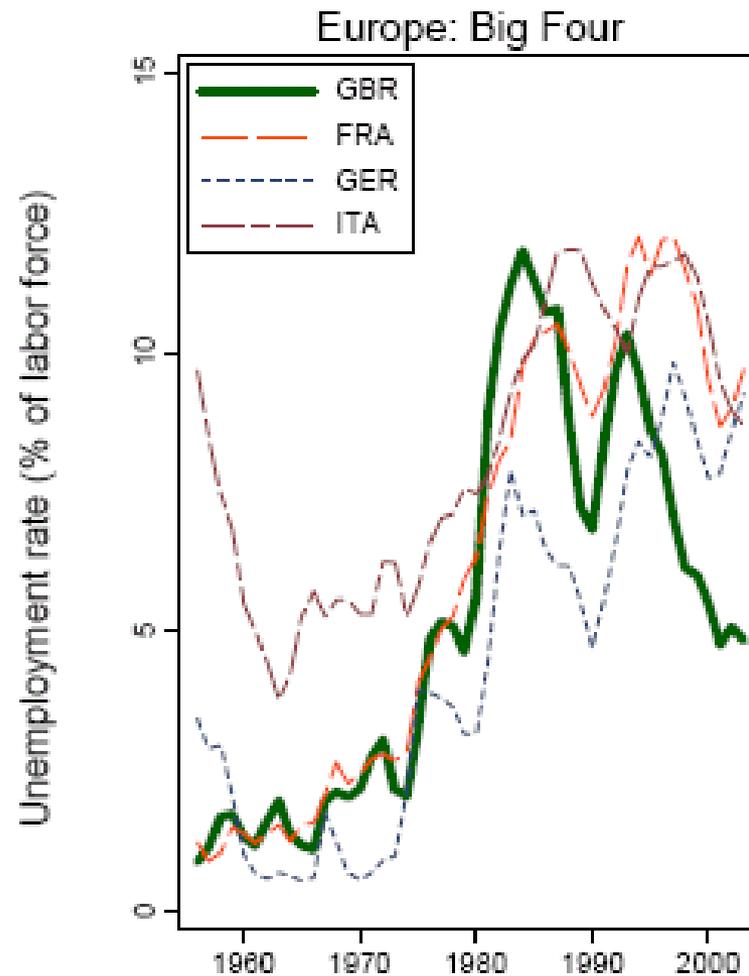
What the Modern World knew

- **Non-Anglosaxon western world**
 - **1946-1990 Economies of reconstruction: Rapid economic expansion, Low unemployment**
 - **1991-2004 Stagnation, High unemployment**
 - **Late industrialization**
 - **Still relying on heavy industry**
 - **Heavily regulated**
 - **Large government subsidies**
 - **High savings rate**
 - **Large welfare systems**
 - **Trade surplus**

What the Modern World knew

- **Continental Europe: Economies of Unemployment**
 - **1945-68: Conversion from agriculture to industry**
 - **People leave self-employment in fields (dependent on weather) to become employees in factories (dependent on market)**
 - **1968-69: Workers demand rights. Entrepreneurs stop hiring and offsource.**
 - **Welfare state, but unemployment.**
 - **Strikes to claim workers rights were actually resistance to change, attempts to recreate the millenarian stability of rural societies.**

Unemployment rates



What the Modern World knew

– Globalization

- **Ever-growing markets**
- **Ever-higher productivity (technology)**
- **Borderless managers**
- **Agricultural products and raw materials lose their value**
- **Knowledge-intensive goods becoming dominant**
- **World capital flows increasingly detached from trade patterns**
- **A global nation without a global government**

What the Modern World knew

- **Globalization**
 - **Political/economic control**
 - **United Nations**
 - **IMF**
 - **World Bank**
 - **World Trade Organization**
 - **Tribunal of the Hague**
 - **African Organization**
 - **League of Arab States**

What the Modern World knew

- **Globalization**
 - **Free-trade zones**
 - **European Union**
 - **ASEAN**
 - **Mercosur**
 - **NAFTA**

What the Modern World knew

– Globalization

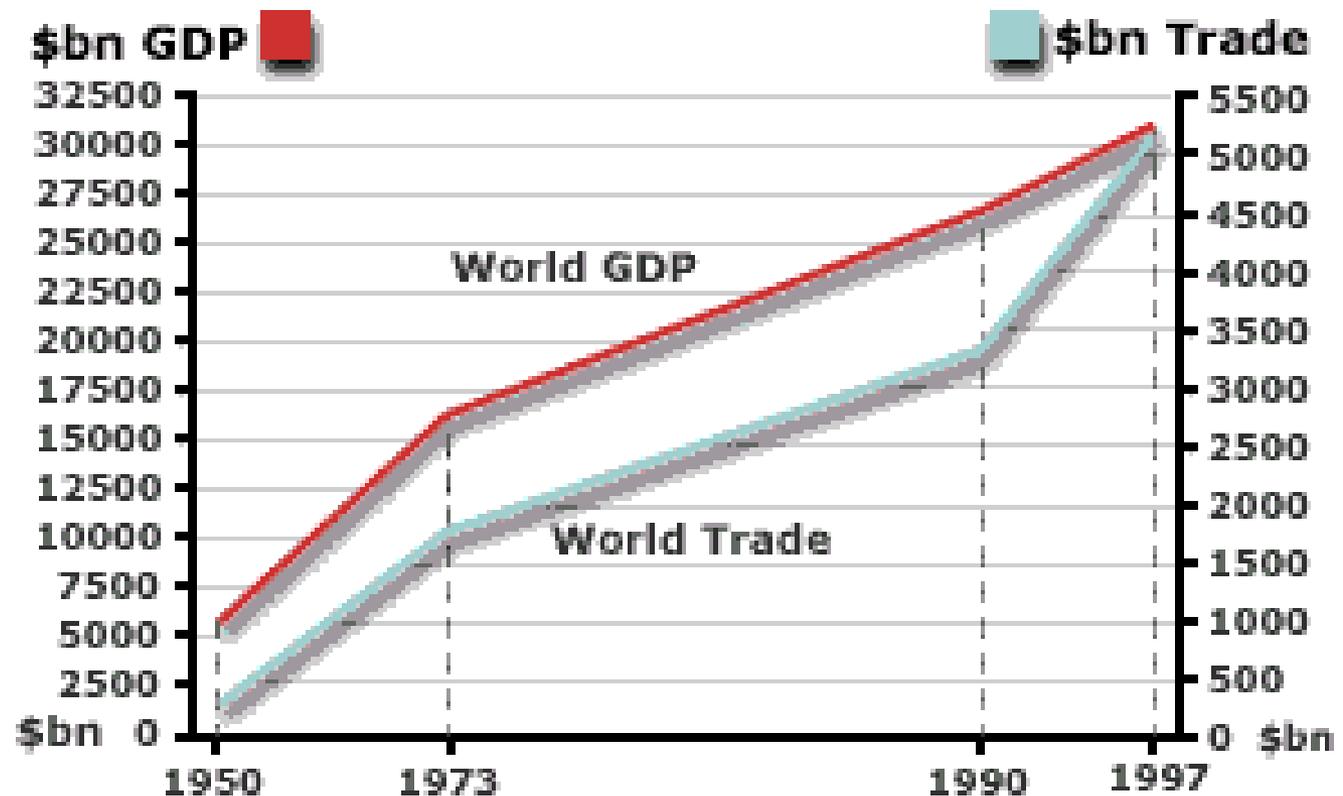
• World's Biggest Exporters (2000)

- USA: \$683bn
- Germany: \$540bn
- Japan: \$388bn
- France: \$307bn
- Britain: \$273bn
- Italy: \$241bn
- Canada: \$214bn
- Netherlands: \$198bn
- China: \$183bn
- Hong Kong: \$174bn

What the Modern World knew

– Globalization

- World trade fuels world's economic growth
- Trade flows increase much faster than world population



SOURCE: WTO

What the Modern World knew

- **Oil**

- **1950s: The Seven Sisters (BP, Esso, Gulf Oil, Mobil, Royal Dutch Shell, SoCal and Texaco) control 85% of oil reserves**
- **1950s: The age of Detroit's "gas guzzlers"**
- **1970s: Pressure in oil-producing countries to nationalize oil resources (Saudi Aramco, Brazil's Petrobras, Malaysia's Petronas, Russia's Gazprom, China's Sinopec, Venezuela's PDVSA)**
- **1980s: Major oil companies outsource drilling and production to specialists (Halliburton, Schlumberger)**
- **1990s: Price of oil dips leading to industry consolidation**
- **1998: "Fracking" makes natural gas cheaper than oil**

What the Modern World knew

- **Oil**

- **2000s: Global demand for oil increases and prices skyrocket**
- **2000s: New technologies allow oil firms to exploit new resources**
- **2000s: Oil demand falling in the West and later in developing countries because of more fuel-efficient vehicles and conservation programs**
- **2010s: National oil companies control over 90% of oil reserves, while the oil multinationals mainly discover, produce, refine and market the product**
- **2013: Exxon Mobil is the second company in the world for market capitalization (after Apple), Chevron employs 62 thousand people, Dutch Shell, Total, British Petroleum**

What the Modern World knew

- **Exporting the American dream/ Part 2**
 - **Second generation of "Asian tigers" (1990s): China, India, Thailand, Malaysia, Indonesia**
 - **Different philosophies: Confucian, Hindu, Buddhist, Muslim**
 - **Role of the state: liberal reforms reduce the power of the state (China, India)**
 - **Government: mostly technocrats and educated**
 - **China: needs money and technology (needs the Western capitalists)**
 - **India: poor transportation and electricity infrastructure, restrictive labor laws discourage labor-intensive sectors**

What the Modern World knew

- **Exporting the American dream / Part 2**
 - **Taiwan, Singapore, South Korea, etc, China capitalized on cheap labor to capture offshored jobs from the USA**
 - **India capitalized on English-speaking, college-educated and cheap engineers to capture offshored jobs from the USA**
 - **The USA lost blue-collar (low-paying low-skills) jobs to China**
 - **The USA loses white-collar (high-paying high-skills) jobs to India**

What the Modern World knew

- **Exporting the American dream / Part 2**
 - **China: Chinese conglomerates succeed because of the government**
 - **India: Indian conglomerates succeed despite the government**
 - **Indian conglomerates aim for self-sufficiency**
 - **Jindal produces steel and power through backward integration from its own captive coal and iron-ore mines**
 - **Gautam Adani buys port and coal mines, builds power plant and railway**
 - **India: unlike China's labor-intensive exports, exporting capital-intensive items that require skilled workers**

What the Modern World knew

- Exporting the American dream / Part 2
 - 1991: Manmohan Singh is appointed finance minister in India and proceeds to liberalize India's socialist economy

What the Modern World knew

- Exporting the American dream / Part 2
 - 1991: The Indian government sets up the Software Technology Parks of India (STPI) to promote software exports and opens the first park in the Electronics City of Bangalore
 - 1991: Om Prakash Jindal splits between his children the steel and power conglomerate that he built in India
 - 1991: Wipro wins a software contract from a US customer that interacts via the Internet
 - 1992: South Korea's Samsung becomes the largest producer of memory chips in the world
 - 1993: American outsources the management of its credit-card business to its Indian office led by Roman Roy, the first major project of business-process outsourcing to India

What the Modern World knew

- **Exporting the American dream / Part 2**
 - **1995: The Essar Group run by Nand Kishore Ruia's sons Shashi and Ravi Ruia is an Indian conglomerate that extends from shipping to steel, oil, power and telecommunications**
 - **1995: Lakshmi Mittal, the son of Mohan Mittal, founds his own steel business, LNM Group (later Mittal Steel)**
 - **1995: South Korean conglomerate LG acquires Zenith**
 - **1996: South Korean conglomerate Samsung builds a factory in Texas, one of the largest foreign investments in the history of the USA**
 - **1996: Malaysia's Proton purchases British sport car manufacturer Lotus**
 - **1996: Malaysia embarks in the construction of the Multimedia Supercorridor**
 - **1996: The Petrona Towers of Malaysia become the tallest buildings in the world**

What the Modern World knew

- **Exporting the American dream / Part 2**
 - **1997: Asian financial crisis**
 - **1997: Lenovo passes IBM to become China's main vendor of personal computers**
 - **1998: Former Shanghai mayor Zhu Rongji is appointed prime minister of Communist China and proceeds to overhaul state-owned companies**
 - **1998: Tata introduces India's first passenger car**
 - **1998: Gautam Adani buys India's port of Mundra and creates a "special economic zone" of 100 sqkm for his diversified financial empire**
 - **1998: South Korea's Samsung introduces the world's first digital television set**
 - **1999: Daewoo, the second largest conglomerate in South Korea with interests in about 100 countries, goes bankrupt**
 - **1999: Azim Premji is the richest person in India and Wipro has the highest market capitalization in India**

What the Modern World knew

- Exporting the American dream / Part 2
 - East Asian economic boom:
 - China: 10% yearly in 1979-2011
 - India: 8.7% in 2003-08
 - Japan: Lost decade of the 1990s

What the Modern World knew

- Exporting the American dream / Part 2
 - East Asian countries that did not experience the boom:
 - Philippines (Catholic, USA ally)
 - Pakistan (Muslim, USA ally)
 - Bangladesh (Muslim, neutral)
 - Vietnam (Buddhist, USA enemy)
 - Laos (Buddhist, USA enemy)
 - Cambodia (Buddhist, USA enemy)
 - North Korea (Buddhist, USA enemy)
 - Mongolia (Buddhist, USA enemy)

Capitalism and Free Trade

- Exporting the American dream / Part 2
 - 1960s: Western Europe + USA + Japan are the capitalist world and have free trade
 - 1970s: The Asian Tigers join the capitalist world and free trade
 - 1980s: China and India
 - 1990s: The Soviet block, Latin America and Africa joined the capitalist free trade world
 - The world economy grows by 4% in 1970-2003
 - World trade grows 6%
 - I.T. alone grows 10% yearly in 1980-2005

What the Modern World knew

- Worries of the western world
 - 1960s: Pollution, Nuclear holocaust
 - 1980s: Heart diseases, Drugs, Crime,
 - 2000s: AIDS, Cancer, Islamic terrorism

What the Modern World knew

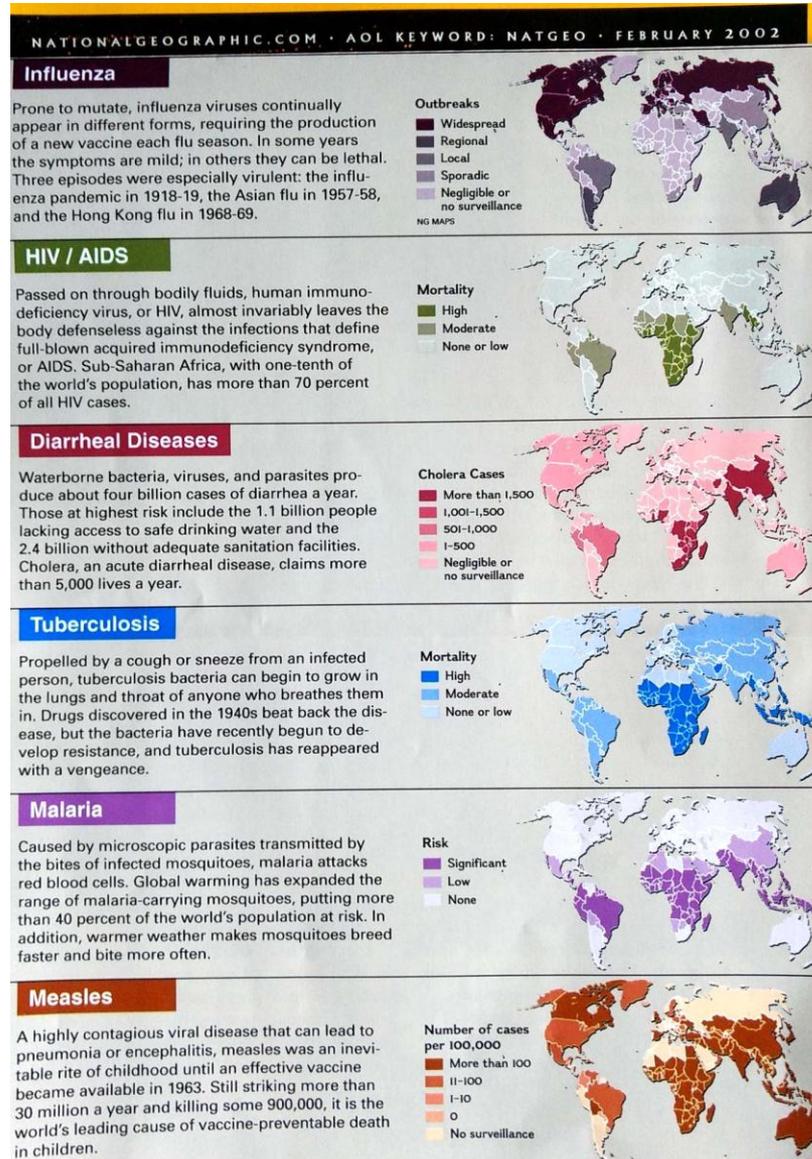
- Causes of death (year 2000)
 - Heart (17 million, 31% of total)
 - Tobacco (4.9 million)
 - Pneumonia (4.4 million)
 - Cancer (3.2 million)
 - Lung cancer (1.1 million), Stomach cancer (765,000), Colon and rectum cancer (525,000), Liver cancer (505,000)
 - AIDS (3.2 million)
 - Tuberculosis (3 million)
 - Malaria (2.1 million)
 - Alcohol (1.8 million)
 - Car accidents (1.2 million)
 - Hepatitis B (1.1 million)

What the Modern World knew

- Causes of death
 - Measles (1 million)
 - Suicide (830,000)
 - Typhoid (600,000)
 - Shigella (600,000)
 - Rotavirus (600,000)
 - Homicide (520,000)
 - Drowning (500,000)
 - Neonatal tetanus (400,000)
 - Breast cancer (385,000)
 - Wars (312,000)
 - Influenza (250,000)
 - Illicit drugs (223,000)
 - Cholera (120,000)
- Total: 55 million (year 2000), of which 17 million due to infectious diseases, of which 9 million in children

What the Modern World knew

- Diseases



What the Modern World knew

- The human population in 2000
 - 750 million people chronically under-nourished
 - 1 billion malnourished
 - 1 billion illiterate
 - 1.2 billion with average annual income lower than \$1,100 (USA: \$38,000 per capita)
 - The USA (4.65% of world population) produces 32.9% of the world's gross product
 - The USA, Japan and Germany (8% of the world's population) produce 50% of the world's gross product
 - The USA, Japan and the European Union (12% of the world's population) produce 75% of the world's gross product

What the Modern World knew

- The human population in 2000
 - During the Black Death of 1348 the supply of people dropped, and thus the price of people rose (both urban and agricultural wages increased in the following centuries, basically until the slave trade, helping increase the living standards in Europe)
 - During the 20th century, the supply of people increased dramatically...

What the Modern World knew

- The human population in 2000
 - The fall of Communism created a huge reservoir of cheap, skilled labor in Eastern Europe, China and India
 - Consequences
 - Cheap goods...
 - Outsourcing...

What the Modern World knew

- **Estimated population in 2050**
 - **1 India** **1,601,004,572**
 - **2 China** **1,417,630,630**
 - **3 United States** **420,080,587**
 - **4 Indonesia** **336,247,428**
 - **5 Nigeria** **307,420,055**
 - **6 Bangladesh** **279,955,405**
 - **7 Pakistan** **267,813,495**
 - **8 Brazil** **228,426,737**
 - **9 Congo (Kinshasa)** **181,260,098**
 - **10 Mexico** **147,907,650**

What the Modern World knew

- **Estimated population in 2050**
 - **14 Russia** **118,233,243**
 - **24 Germany** **73,607,121**
 - **29 Britain** **63,977,435**
 - **30 France** **61,017,122**
 - **35 Italy** **50,389,841**
 - **47 Spain** **35,564,293**
 - **Europe's population in 2004 was 726 million (of which 455 in the European Union)**
 - **Europe's population in 2050 may shrink to 565 million people**

What the Modern World knew

- Total Population of the World

1950 2,556,000,053

1960 3,039,451,023

1970 3,706,618,163

1980 4,453,831,714

1990 5,278,639,789

2000 6,082,966,429

2010 6,848,932,929

2020 7,584,821,144

2030 8,246,619,341

2040 8,850,045,889

2050 9,346,399,468

What the Modern World knew

- Environment: tiger population



What the Modern World knew

- **Women's condition**
 - **Women own only 1% of the world's wealth, and earn 10% of the world's income, despite making up 51% of the population**
 - **When childcare and housework are taken into consideration, women work longer than men in both the industrialized and developing world (by 20% in the industrialized world, and 30% in the developing world).**
 - **Sweden has the highest number of women in national legislature at 42%. The USA has just 11%. The world average is just 9% (2000)**

What the Modern World knew

- **Women's condition**
 - **1991: Donna Haraway's "Simians, Cyborgs, and Women"**
 - **1992: Camille Paglia's "Sex, Art and American Culture"**
 - **1992: Susan Faludi's "Backlash: The Undeclared War Against American Women"**
 - **2001: Kathy Rudy's "Radical Feminism, Lesbian Separatism and Queer Theory"**

What the Modern World knew

- **Decadence of Western society**
 - **Drugs**
 - **AIDS**
 - **Homeless (USA only)**
 - **Divorce (or no marriage)**

What the Modern World knew

- **Breakdown of the family**
 - **1995: out-of-wedlock birth rate rises from 4% in 1965 to 23.6% in the USA**
 - **1997: the divorce rate in the USA reaches 50%**

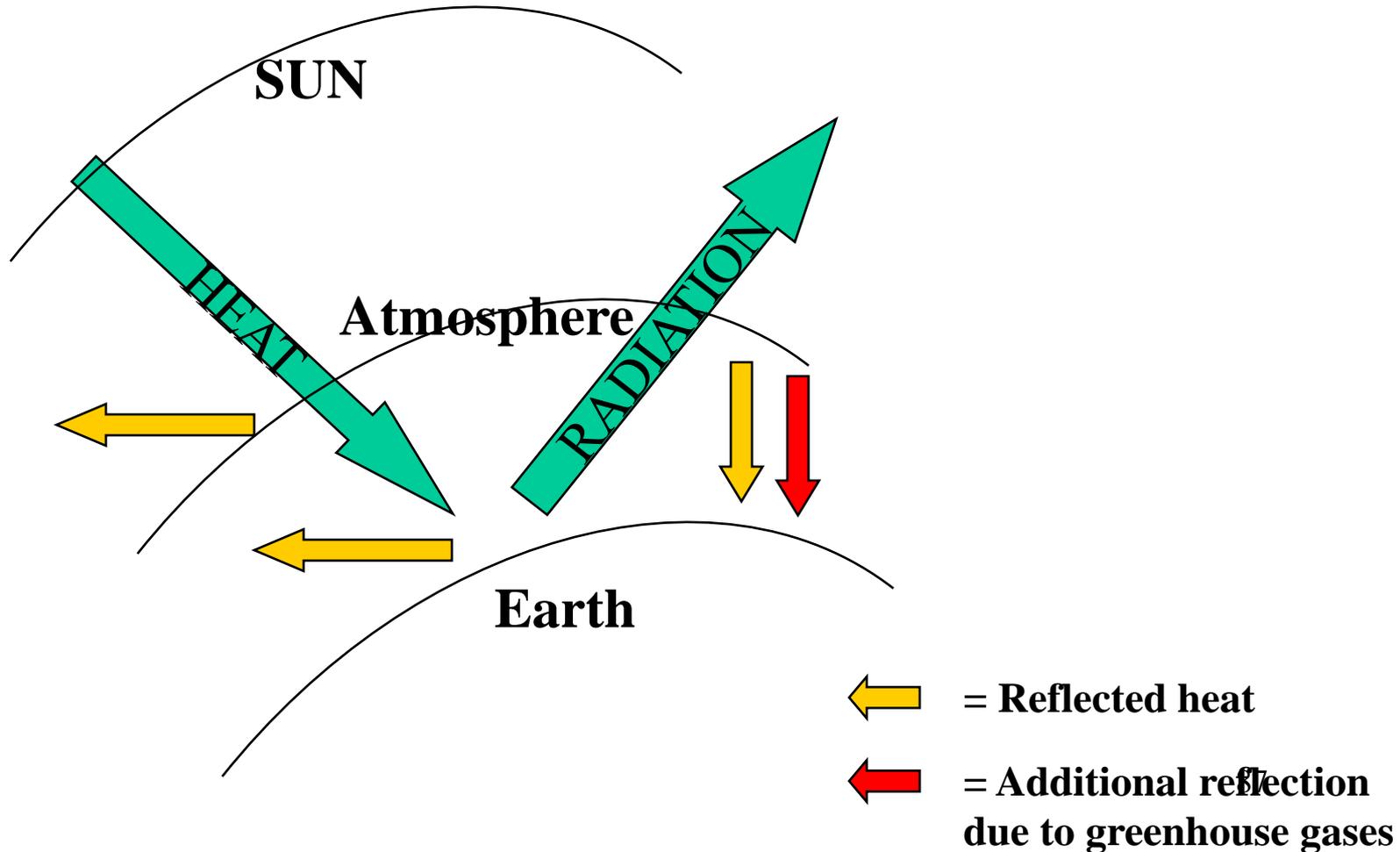
What the Modern World knew

- **Divorce Rate 1996**

Belarus	68%
Russian Federation	65
Sweden	64
Latvia	63
Ukraine	63
Czech Republic	61
Belgium	56
Finland	56
Lithuania	55
United Kingdom	53
Moldova	52
United States	49
Hungary	46
Canada	45
Norway	43
France	43
Germany	41
Netherlands	41
Switzerland	40
Iceland	39
Kazakhstan	39

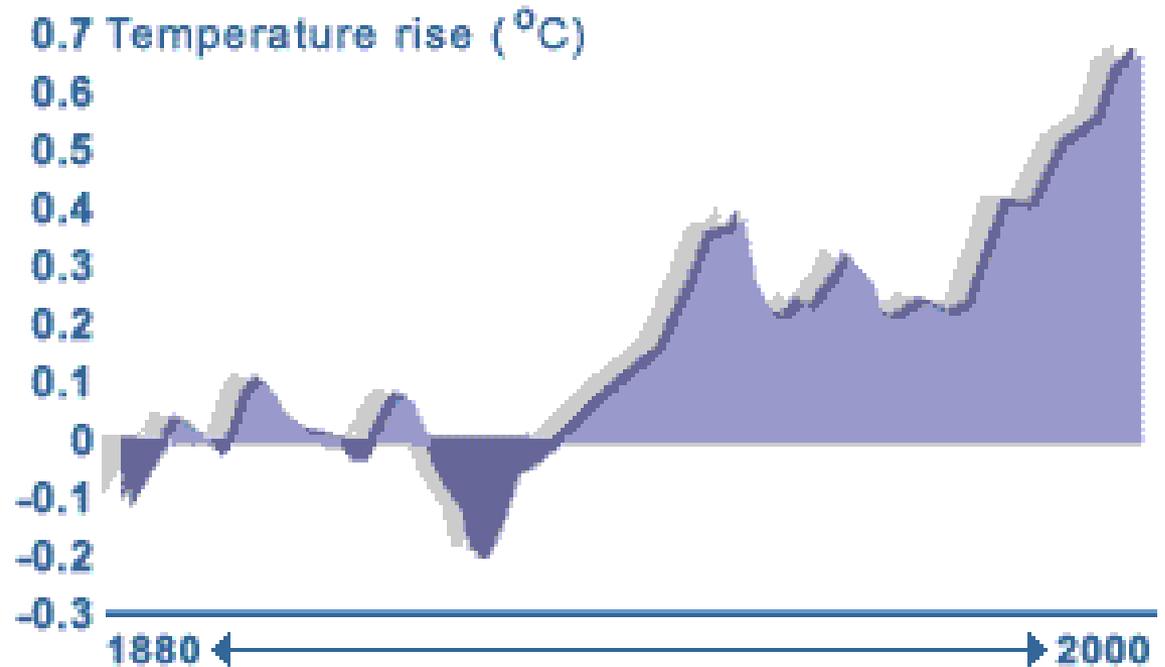
What the Modern World knew

- 1950-1990: Nuclear holocaust
- 1990- : Global warming



What the Modern World knew

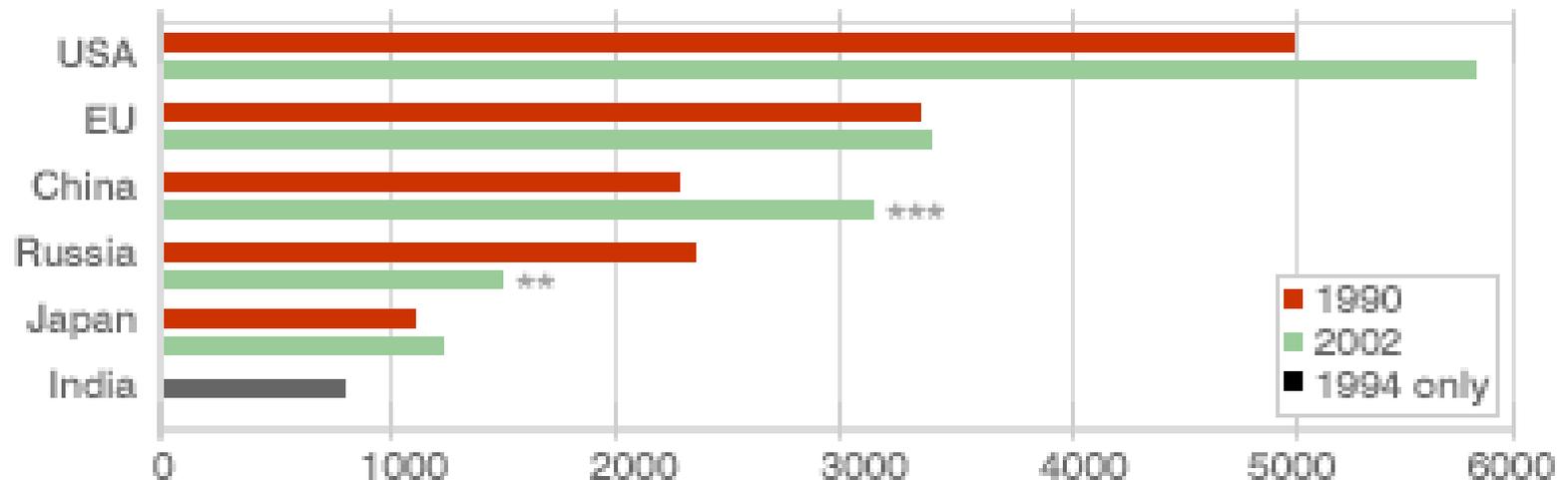
- **Global warming**
 - **Greenhouse-gas levels highest for 650,000 years**



What the Modern World knew

- Top greenhouse-gas emitters

CO2 EMISSIONS (1,000 MILLION TONNES)



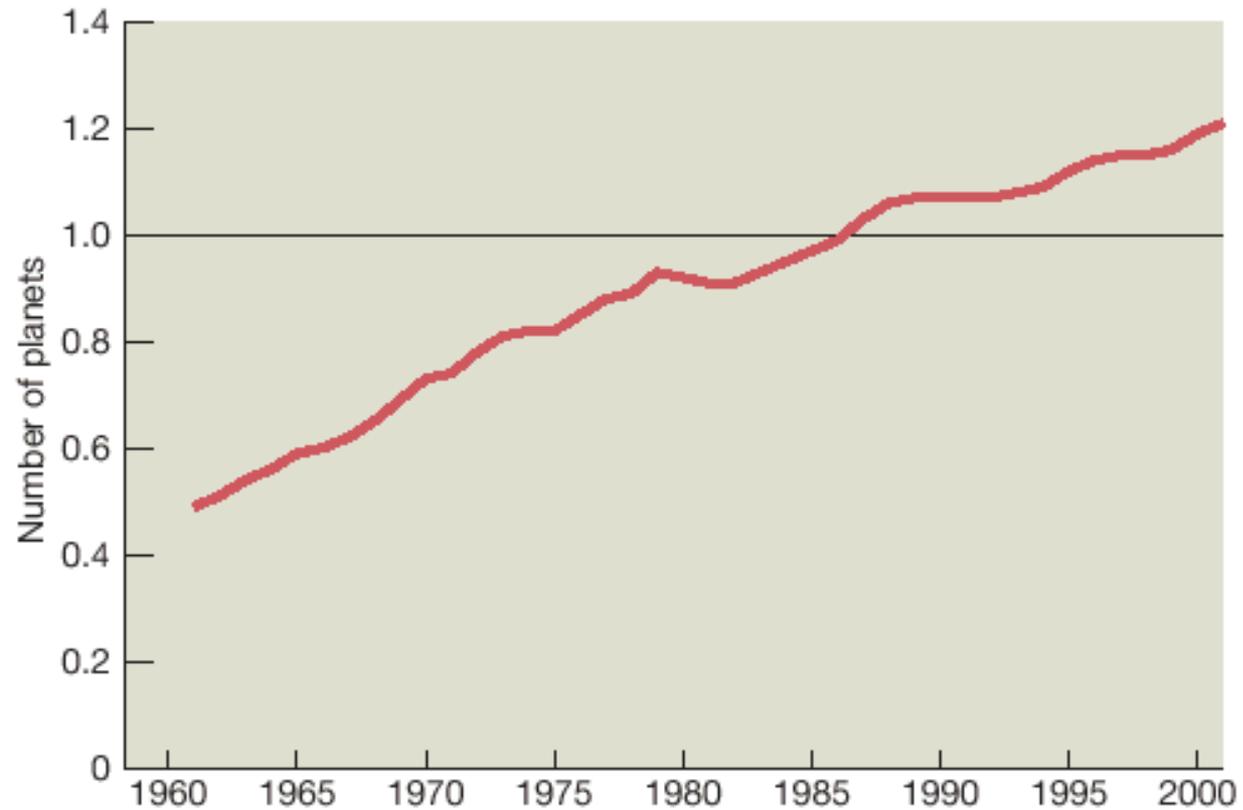
1999, *2001 (both China figures include Hong Kong)

SOURCES: UNFCCC (China figures from IEA)

What the Modern World knew

- **Ecological Debt (ecological footprint = use of renewable natural resources)**

Fig. 2: **HUMANITY'S ECOLOGICAL FOOTPRINT, 1961-2001**



What the Modern World knew

- **Supranational entities**
 - **Commonwealth (1931): 1,800 million**
 - **Britain, Cyprus, Malta**
 - **Canada, Jamaica, Guyana, Dominica, Grenada, Trinidad and Tobago, Antigua and Barbuda, Bahamas, Barbados, Belize, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines**
 - **Australia, New Zealand, Nauru, Papua New Guinea, Solomon, Tonga, Tuvalu, Kiribati, Vanuatu, Western Samoa**
 - **Kenya, Tanzania, Botswana, Nigeria, Swaziland, Gambia, Ghana, Zambia, Zimbabwe, Mauritius, Seychelles, Sierra Leone, Uganda, Lesotho Malawi, South Africa, Mozambique**
 - **India, Pakistan, Bangladesh, Sri Lanka, Maldives, Brunei, Singapore, Malaysia**

What the Modern World knew

- **Supranational entities**
 - **Arab League (1945): 280 million**
 - Egypt, Libya, Sudan, Morocco, Tunisia, Algeria, Mauritania, Somalia, Djibouti, Comoros
 - Iraq, Kuwait, Jordan, Lebanon, Saudi Arabia, Syria, Yemen, United Arab Emirates, Bahrain, Qatar, Oman, Palestine
 - **European Union (1957): 457 million**
 - Austria, Belgium, Britain, Greek Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Holland, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden

What the Modern World knew

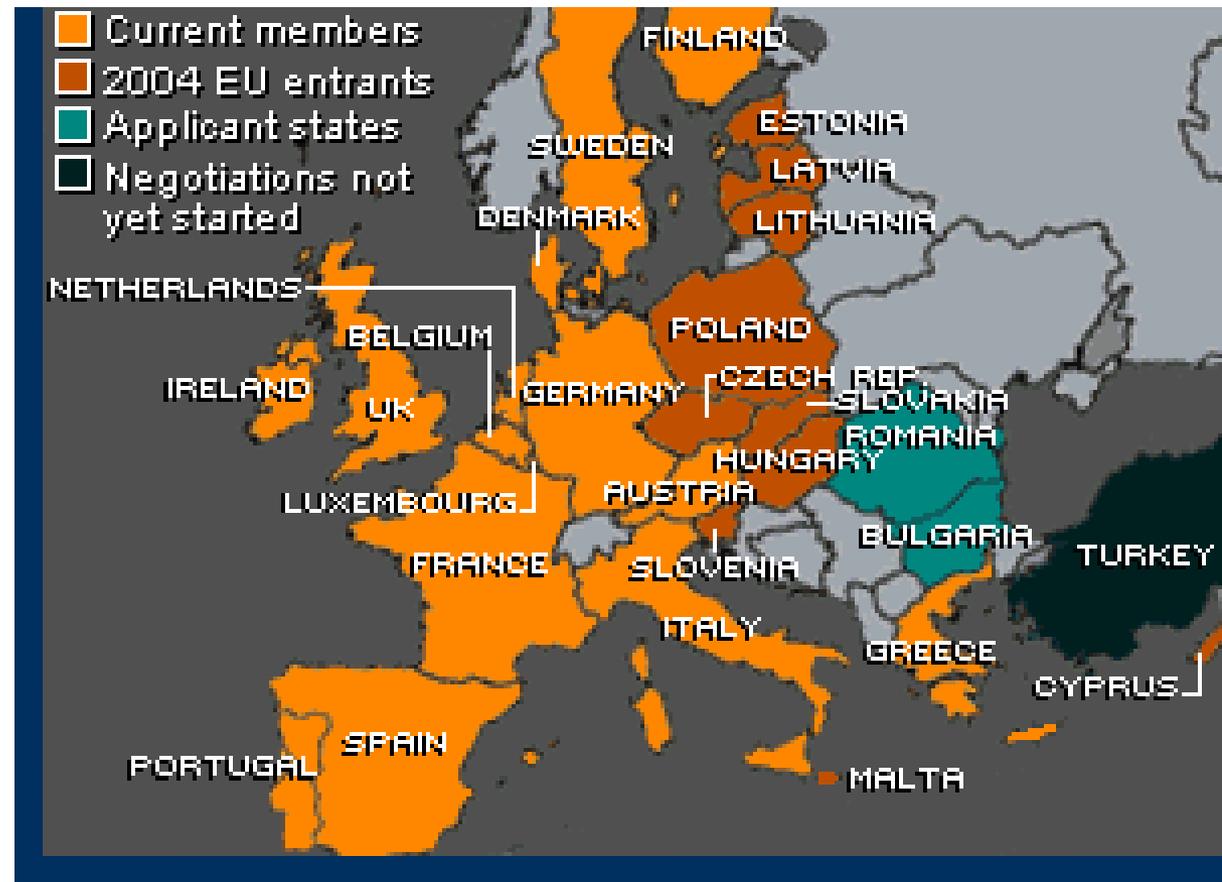
- **Supranational entities**
 - **Organisation of African Unity (1963): 850 million people**
 - **All African countries except Morocco and including the Sahrawi Republic**
 - **Asean (1967): 522 million**
 - **Brunei, Burma, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam**

What the Modern World knew

- **A United Europe**
 - **Roman Empire: 31 BC - 476 AD**
 - **Charlemagne: 800 AD - 814 AD**
 - **Napoleon: 1799 - 1814**
 - **Hitler: 1939 - 1945**
 - **European Union: 1957 - ...**

What the Modern World knew

- **A United Europe (2004)**
 - 25 states
 - 455 million people
 - 738,573 sq kms
 - GDP of 9.613 trillion euros (more than \$10 trillion)



What the Modern World knew

- **European Union**

Table 1.1. *Growth, Unemployment, and Employment in the European Union, the United States, and Japan, 1961–1999*

	<u>Average Annual Percentage Change, GDP in Constant Prices</u>			
	<u>1961-70</u>	<u>1971-80</u>	<u>1981-90</u>	<u>1991-99</u>
European Union	4.8	3.0	2.4	1.9
United States	4.2	3.2	2.9	2.5
Japan	10.5	4.5	4.0	1.1

	<u>Average Annual Percentage of Civilian Labor Force Unemployed</u>			
	<u>1961-70</u>	<u>1971-80</u>	<u>1981-90</u>	<u>1991-99</u>
European Union	2.2	4.0	9.0	10.1
United States	4.7	6.4	7.1	5.8
Japan	1.2	1.8	2.5	3.1

What the Modern World knew

- **European Union**

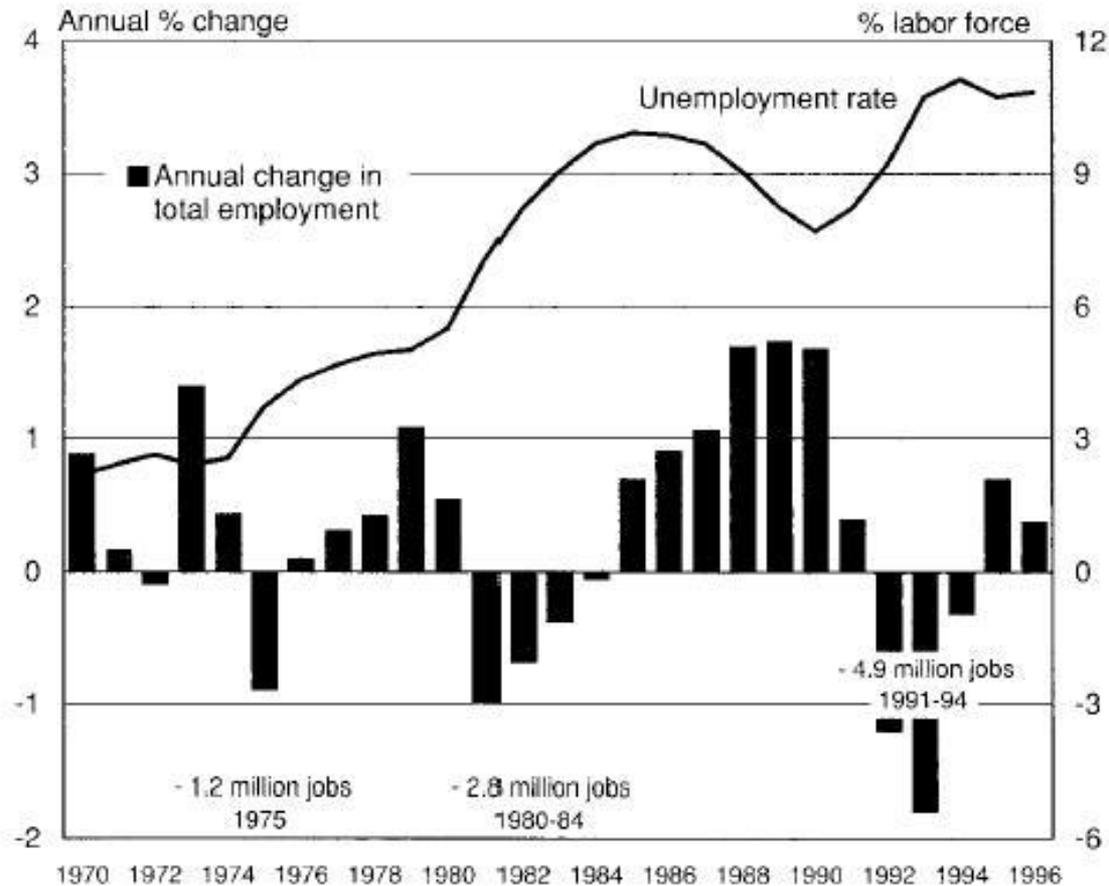


Figure 1.2 The Annual Change in Total Employment and the Rate of Unemployment in the European Union, 1970–1996. *Source:* European Commission

What the Modern World knew

- **European Union**

US DOLLAR WEAKNESS

One Euro buys:

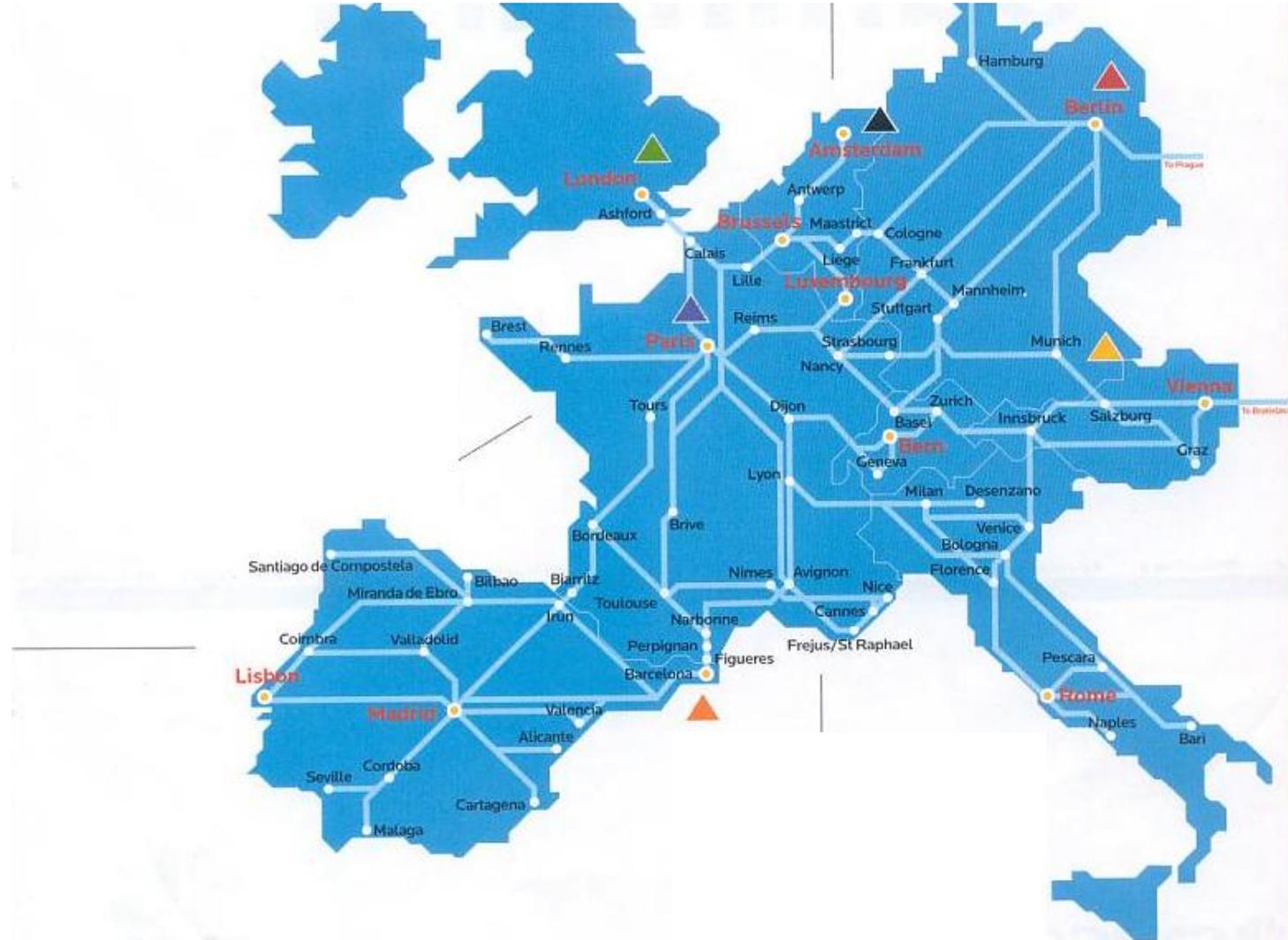
\$



SOURCE: Bloomberg

What the Modern World knew

- European High-speed railway network



What the Modern World knew

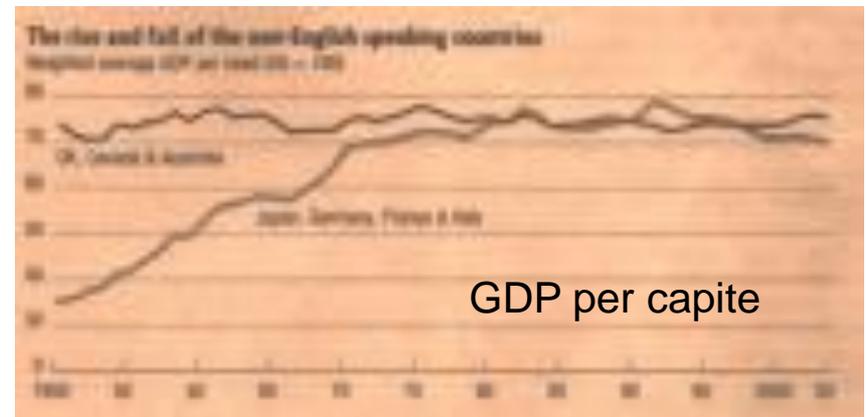
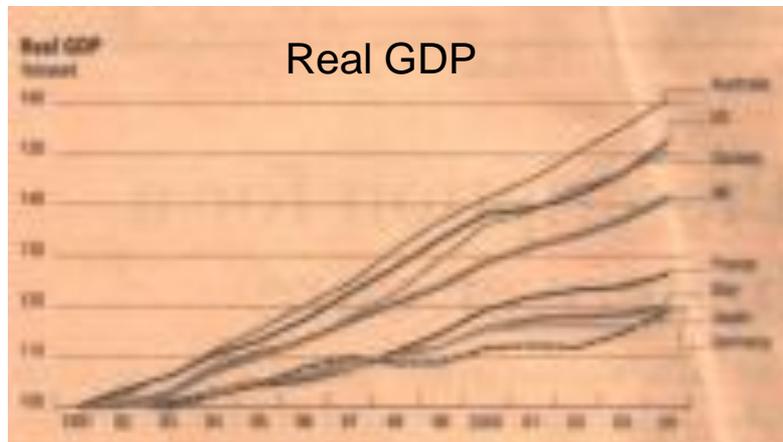
- **The Euro (1999)**
 - **Reunification of Germany makes Germany too powerful**
 - **France lessens German superpower by removing the symbol of its might: the mark**
 - **Goals of the euro:**
 - **Unification of political cultures**
 - **Economic convergence**
 - **Discipline**
 - **Stability**
 - **Cement pro-European sentiment**
 - **Unprecedented prosperity for future generations**
 - **Higher integration**

What the Modern World knew

- **The Euro (1999)**
 - **Effects:**
 - **Clash of cultures (North saves, South spends)**
 - **Economic divergence (North thrives, South collapses)**
 - **Extravagance (excessive spending and borrowing)**
 - **Real estate bubbles**
 - **Anti-European sentiment**
 - **Highly educated youth with no jobs and huge national debts**
 - **However, the final outcome might indeed be**
 - **Higher Integration**

What the Modern World knew

- **Anglosaxon model vs European/Japanese model**



What the Modern World knew

- **World product/ PPP (2003)**
 - **Europe** **\$10.84 trillion (379 million people)**
 - **USA** **\$10.40 trillion (290 milion)**
 - **China** **\$5.70 trillion (1,287 million)**
 - **Japan** **\$3.55 trillion (127 million)**
 - **India** **\$2.66 trillion (1,049 million)**
 - **Russia** **\$1.35 trillion (144 million)**
 - **Brazil** **\$1.34 trillion (182 million)**

What the Modern World knew

- **The Asian Miracle**

- **See**

- [**http://www.scaruffi.com/politics/asianmir.html**](http://www.scaruffi.com/politics/asianmir.html)

What the Modern World knew

- **India**
 - **Liberalization of 1991 by Congress and in 1998 by BJP generates economic boom (India becomes an "Asian tiger")**
 - **Most of the growth rate takes place in Gujarat, Maharashtra, Tamil Nadu**
 - **Less than 50% of agricultural India has irrigation**
 - **30-40% of the population under the poverty line, especially in Bihar and Uttar Pradesh**

What the Modern World knew

- **India**
 - **End of the Cold War and dissolution of the Soviet Union (1991)**
 - **Both the USA and China distance themselves from Pakistan**
 - **Rapid increase of trade with the USA (offshoring, software)**
De facto alliance with the USA against Islamic terrorism
 - **Separatist movements turn to kidnapping and extortion**

What the Modern World knew

- **China's economic miracle**
 - **1993: Jiang Zemin is appointed president of**
 - **1994: China's GDP grows at an average annual rate of about 10% between 1994 and 2000**
 - **1997: Britain cedes Hong Kong to China**
 - **2002: Jiang Zemin resigns and Hu Jintao succeeds him**
 - **2003: "Three Gorges Dam", world's largest dam**
 - **2003: China sends a man in space, the third country to do so after the USSR and the USA**

What the Modern World knew

- **China's economic miracle**
 - **2005: More than 300 skyscrapers in Shanghai**
 - **2005: China's trade surplus triples in one year to a record \$102 billion, and China becomes the world's third-largest foreign trader after the United States and Germany with trade of \$1.4 trillion, as well as second only to Japan for foreign currency reserves (\$794 billion)**
 - **2005: China becomes the fourth world economy after the USA, Japan and Germany**
 - **2006: a railway connection between China and Tibet is inaugurated**
 - **2006: North Korea announces its first nuclear test, angering the USA, South Korea and Japan**

What the Modern World knew

- **China's economic miracle**
 - **One-party market economy**
 - **China's GDP growth peaks at 14.2% in 1992**
 - **China's energy consumption growth peaks at 15.3 percent in 1993**
 - **Huge trade surplus, as China's government feels that China does not need anything from the West**
 - **What is the opium of the 21st century? The lifestyle of the USA (music, cinema, fashion, etc)**

What the Modern World knew

- **China's GDP Growth Rate**

1961	-37.2	1971	5.4	1981	5.4	1991	8.4
1962	-6.5	1972	2.6	1982	8.7	1992	12.5
1963	9.4	1973	7.4	1983	9.8	1993	11.9
1964	13.7	1974	2.6	1984	13.2	1994	11.4
1965	14.1	1975	6.5	1985	11.2	1995	9.5
1966	7.7	1976	-1.6	1986	7.9	1996	8.7
1967	-2.4	1977	5.3	1987	10	1997	8.1
1968	-2.8	1978	9.3	1988	9.6	1998	7.2
1969	9.2	1979	6.8	1989	4	1999	6.6
1970	12.4	1980	5.6	1990	3.8	2000	7.4



Olympics

Athens 1896

1. USA	11	7	2
2. Greece (GRE)	10	18	17
3. Germany (GER)	6	5	2
4. France (FRA)	5	4	2
5. Great Britain (GBR)	2	3	2

Berlin 1936

1. Germany (GER)	33	26	30
2. USA	24	20	12
3. Hungary (HUN)	10	1	5
4. Italy (ITA)	8	9	5
5. Finland (FIN)	7	6	6

Rome 1960

1. USSR (URS)	43	29	31
2. USA	34	21	16
3. Italy (ITA)	13	10	13
4. Germany (EUA)	12	19	11
5. Australia (AUS)	8	8	6

Montreal 1976

1. USSR (URS)	49	41	35
2. East Germany	40	25	25
3. USA	34	35	25
4. West Germany	10	12	17
5. Japan (JPN)	9	6	10

Barcelona 1992

1. Former USSR	45	38	29
2. USA	37	34	37
3. Germany (GER)	33	21	28
4. China	16	22	16
5. Cuba (CUB)	14	6	11

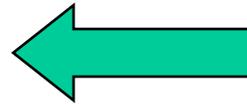
Sidney 2000

1. USA	40	24	33
2. Russia	32	28	28
3. China	28	16	15
4. Australia (AUS)	16	25	11 ² 17
5. Germany (GER)	13	17	26

Olympics

Athens 2004

1. USA	35	39	29
2. Russia	27	27	38
3. China	32	17	14
4. Australia	17	16	16
5. Japan	16	9	12

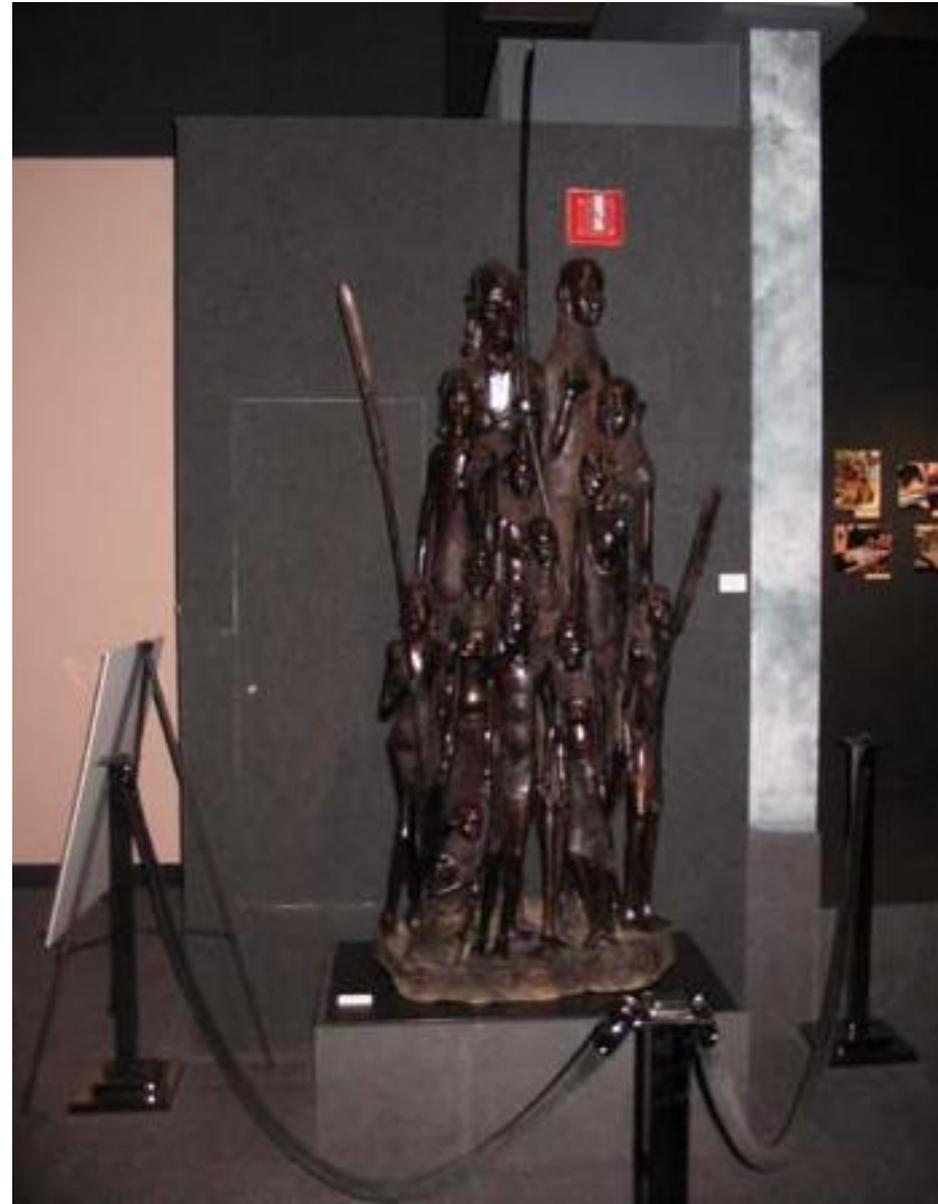


First time that
no western European
country is in the
top five.

What the Modern Age knew

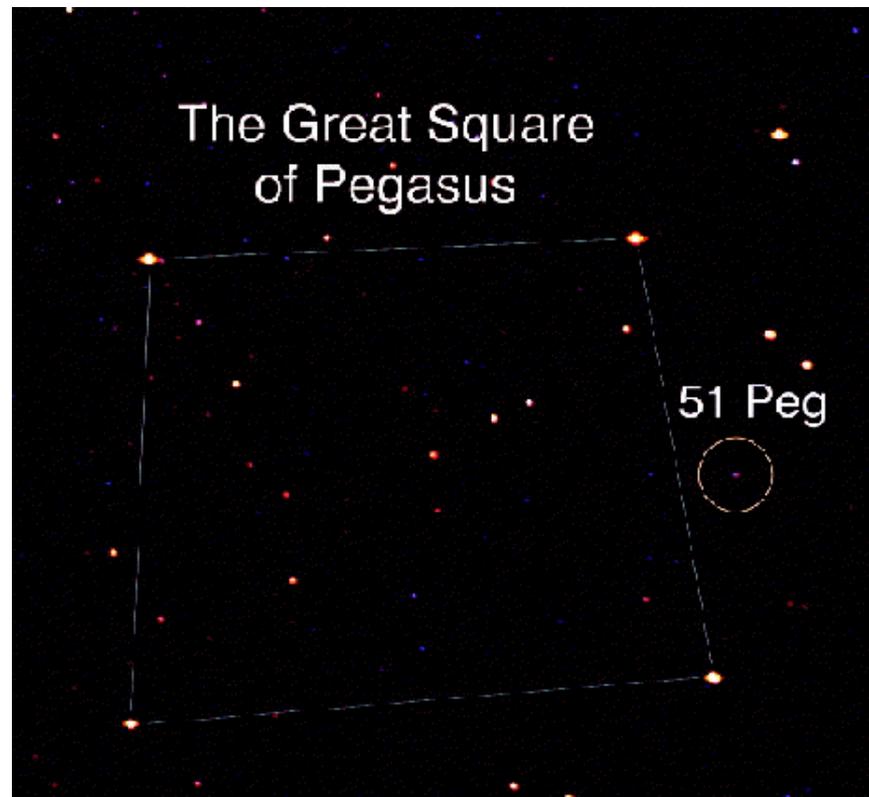
- Africa

Masai family, Kenya



What the Modern Age knew

- Astronomy
 - 1995: the first extrasolar planet is detected (orbiting 51 Pegasi, a star in the Pegasus constellation, 40 light years from the Sun)



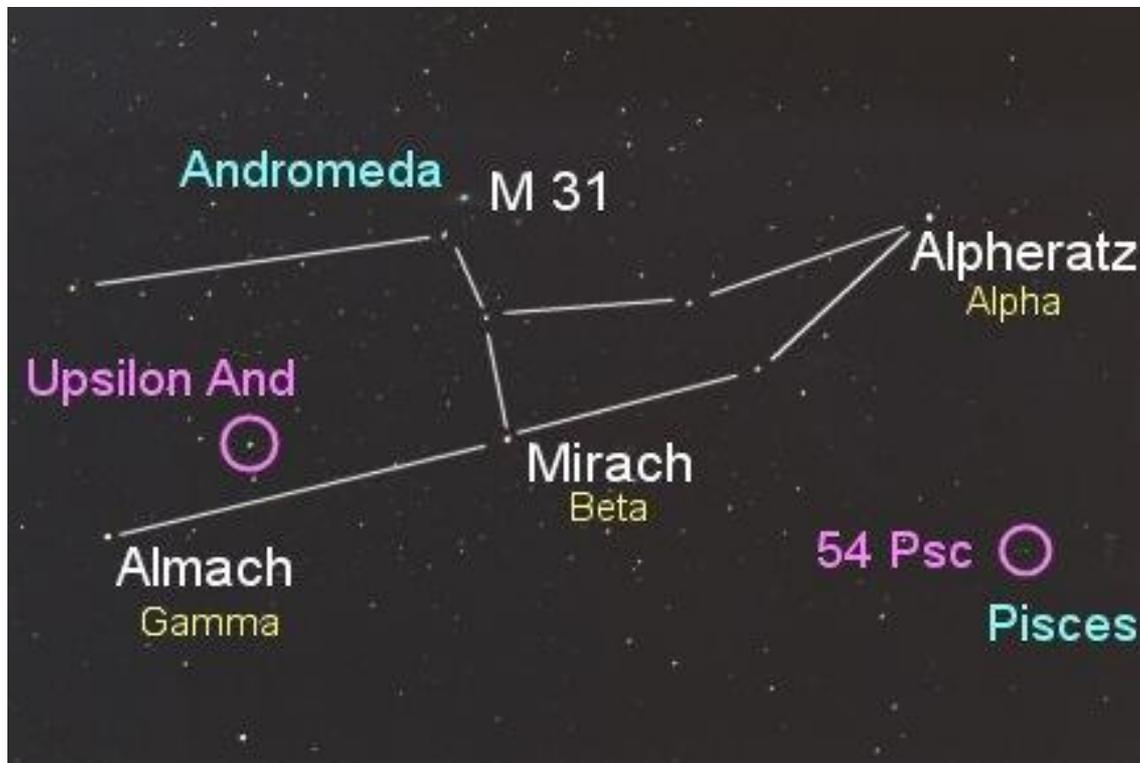
What the Modern Age knew

- Astronomy
 - 1997: Mars Pathfinder lands on Mars with a rover robot and broadcasts live images



What the Modern Age knew

- Astronomy
 - 1999: the first planetary system outside the Solar System is detected (Upsilon Andromedae, 44 light years from the solar system)



What the Modern Age knew

- International scientific cooperation
 - 1954: European countries found CERN (Centre Europeen pour la Recherche Nucleaire) to halt the exodus of nuclear physicists to the USA
 - 1974: European countries found ESA (European Space Agency)
 - 1993: the USA, Canada, Japan, Russia, the European Space Agency and Brazil launch a project to build the International Space Station, the largest international scientific project in history
 - 2005: The European Union, the USA, Russia, Japan, South Korea and China partner in the Iter (International Thermonuclear Experimental Reactor) to develop a nuclear fusion reactor

What the Modern Age knew

- Colin McGinn (1991):
 - Consciousness does not belong to the "cognitive closure" of our organism
 - Understanding our consciousness is beyond our cognitive capacities
 - "Mind may just not be big enough to understand mind"
 - Objection: "Cognitive closure" changes during the course of a lifetime
 - Objection: "Cognitive closure" has evolved over the centuries

What the Modern Age knew

- **Daniel Dennett (1991):**
 - **The mind is occupied by several parallel "drafts"**
 - **A "draft" is a narrative that occurs in the mind, triggered by some interaction with the world**
 - **At every point in time, there are many drafts**
 - **One of the drafts is dominant in the brain, and that is what we are conscious of**
 - **"Consciousness" simply refers to the feeling of the overall brain activity**

What the Modern Age knew

- Daniel Dennett (1991):
 - There is no place in the brain where consciousness resides
 - Consciousness does not flow at all, there is no single stream of consciousness
 - The continuity of consciousness is an illusion
 - It doesn't even exist all the time: "probing precipitates narratives"
 - The goal of the parallel drafts is to manage "memes"

What the Modern Age knew

- **William Calvin (1991)**
 - **A Darwinian process in the brain finds the best thought from the many that are continuously produced**
 - **Cerebral code (the equivalent of genetic) allows for reproduction and selection of thoughts**
 - **A neural pattern copies itself repeatedly around a region of the brain**
 - **“Thoughts” compete and evolve subconsciously**
 - **Dreaming occurs all the time but we can't see them when we are awake**
 - **Our actual thought is simply the dominant pattern in the copying competition**
 - **Circuits in the cerebral cortex act as copying machines**
 - **Variants compete for cortex space**

What the Modern Age knew

- Merlin Donald (1991)
 - The human mind developed in four stages:
 - Episodic mind: remembers repeating episodes, learns stimulus-response associations, cannot retrieve memories without environmental cues, lives entirely in the present.
 - Mimetic mind: maintains motor-based representations, retrieves memories independent of environmental cues, redescribes experience based on knowledge, understands the world, communicates intentions and desires, makes tools
 - Mythic (narrative) mind: constructs narratives, builds myths
 - Theoretical (symbolic) mind: manipulates symbols ¹²³

What the Modern Age knew

- Robert Rosen (1991)
- Definition of complexity that is based on relations and, by extension, principles of organization
- All systems have a quality called "organization", in particular living ones
- The main attribute of living organisms is their organization (the one attribute that reductionist science ignores)
- It is impossible to define "life" from a scientific reductionistic viewpoint
- Living organisms as "anticipatory systems"
- Definition of life: metabolism and repair
- Definition of life based on function, not on material substance

What the Modern Age knew

- **Robert Rosen (1991)**
 - **"The human body completely changes the matter it is made of roughly every 8 weeks, through metabolism and repair. Yet, you're still you-- with all your memories, your personality... If science insists on chasing the particles, they will follow them right through an organism and miss the organism entirely"**

What the Modern Age knew

- **Tsui Hark: Wong Fei-hung (1991)**
- **Takeshi Kitano: Sonatine (1993)**
- **Krzysztof Kieslowski: Rouge (1994)**
- **Bela Tarr: Satantango/ Satan's Tango (1994)**
- **Quentin Tarantino: Pulp Fiction (1994)**

What the Modern World knew

- **John Ralston Saul (1992)**
 - **Grand economic theories rarely last more than a few decades**
 - **Open-market theory -1929**
 - **Communism 1917-1991**
 - **Keynesianism 1933-1979**
 - **Globalisation 1976-**
 - **Globalization**
 - **Ever-growing markets**
 - **Ever-higher productivity (technology)**
 - **Borderless managers**

What the Modern World knew

- **John Ralston Saul (1992)**
 - **Critique of Globalization**
 - **Caused by geopolitical vacuum**
 - **Nation states replaced with transnational corporations**
 - **But natural resources and consumers live in real places**
 - **Modern democratic society is only superficially based on the individual and democracy**

What the Modern World knew

- **John Ralston Saul (1992)**
 - **Critique of Globalization**
 - **Knowledge has not made people more conscious: people live in inscrutable worlds where languages are highly technical**
 - **Money markets are pure inflation, cause instability, and produce no real growth**
 - **Global market forces do not serve the public good**

What the Modern Age knew

- **Stuart Kauffman (1993)**
 - **Self-organizing systems: the fundamental force that counteracts the universal drift towards disorder**
 - **Structure arises from the interaction of many independent units**
 - **Complexity can be formally defined as nonlinearity**
 - **Spontaneous emergence of order, or self-organization of complex systems, is ubiquitous**
 - **Organisms change their interactions in such a way to reach the boundary between order and chaos**

What the Modern Age knew

- **Stuart Kauffman (1993)**
 - **Systems at the boundary between order and chaos have the flexibility to adapt rapidly and successfully**
 - **Living organisms are a particular type of complex adaptive systems**
 - **Life was not only possible and probable, but almost inevitable**
 - **A universal law of emergent collective behavior of complex chemical networks**
 - **Nature herself does the job that God was supposed to do: creation of order**

What the Modern Age knew

- **Lee Smolin (1994)**
 - **Loop Quantum Gravity**
 - **Merging Quantum Mechanics and General Relativity**
 - **Space and time are made of discrete units just like matter is made of atoms and energy comes in quanta**
 - **Quantum states of space are related to “spin networks”**
 - **Spin networks describe the geometry of space**
 - **Quantum states of spacetime are related to “spin foams”**
 - **The big bang is a bounce**

What the Modern Age knew

- John Brockman (1995)
 - The third culture: scientists are taking the place of the traditional intellectual in the discussion of the meaning of our lives, redefining who and what we are

What the Modern Age knew

- Antonio Damasio (1995)
 - Locations where the brain binds features together: convergent zones
 - A convergence zone is not a "store" of information but an agent capable of decoding a signal (of reconstructing information)
 - Convergence zones behave like indexes that draw information from other areas of the brain.
 - A convergence zone is the instructions to recognize and combine features (bring back the memory of something)
 - Convergence zones enable the brain to work in reverse at any time

What the Modern Age knew

- **Antonio Damasio (1995)**
 - **The assembly (“binding”) of consciousness requires more than a working memory: a system of “convergence zones”**
 - **“Movie in the mind” consciousness (how a number of sensory inputs are transformed into the continuous flow of sensations of the mind):**
 - **Constructed from sensory mappings**
 - **First order narrative of sensory mappings**
 - **Unchanged throughout a lifetime**
 - **Shared by other species**
 - **Purely non-verbal process**

What the Modern Age knew

- **Antonio Damasio (1995)**
 - **"Self" consciousness**
 - **Topography of the body**
 - **Topography of the environment**
 - **Self vs nonself**
 - **Second-order narrative in which the self is interacting with the non-self**
 - **An "owner" and "observer" of the movie is created**
 - **Verbal process**
 - **Body's homeostasis (continuity of the same organism)**
 - **The self is continuously reconstructed**

What the Modern Age knew

- **Antonio Damasio (1995)**
 - **"Self" consciousness**
 - **The "I" is not telling the story: the "I" is created by stories told in the mind**
 - **"You are the music while the music lasts" (Eliot)**

What the Modern Age knew

- **Graham Cairns-Smith (1995)**
 - **A rudimentary system of feelings was born by accident**
 - **Evolutionary usefulness evolved more complex feelings**
 - **The organism was flooded with emotions and a "stream of consciousness" appeared**
 - **Verbal language allowed to express it in a more sophisticated way than the primitive facial language**
 - **Thought was born.**
 - **With language, thought and deep emotions, the conscious "I" was born**
 - **Consciousness originated from the evolution of emotions**

What the Modern Age knew

- **Gary Cziko (1995)**
 - **Universal selection: Darwinian explanation for the emergence of complex systems (human language, the brain, science itself)**
 - **The emergence of complexity in all kinds of systems is due to a “blind” process of cumulative variation and selection that is ubiquitous in nature**
 - **We merely machines and we are blind ones too**

What the Modern Age knew

- **Cinema**

- **Lars von Trier: Riget/ Kingdom (1995)**
- **Emil Kusturica: Underground (1995)**
- **Jan Svankmajer: Conspirators of Pleasure (1996)**
- **Manuel de Oliveira: Viagem ao Principio do Mundo (1997)**
- **Abbas Kiarostami: Ta'ame-gilas (1997)**
- **David Lynch: Lost Highway (1997)**
- **John Woo: Face/Off (1998)**
- **Hirokazu Kore-eda: Afterlife (1998)**

What the Modern Age knew

- **Paul Churchland (1995)**
 - **The mental (beliefs, desires, sensations, emotions, thoughts, etc) is the subject of "folk psychology", not science**
 - **We explain people's behavior by using a vocabulary which ascribes mental states to people**
 - **Only brain processes exist.**
 - **Folk physics was replaced by the more precise language of Newton's Physics**
 - **There is nothing in the brain that resembles what folk psychology talks about**

What the Modern Age knew

- **Gary Cziko (1995)**
 - A universal process of Darwinian evolution is responsible for knowledge at all levels
 - Knowledge is the product of the interaction with the environment
 - All knowledge is created through a Darwinian process of blind variation coupled with environmental selection
 - Phylogenetic selection creates knowledge shared by the whole species (learning from the environment as a species)
 - Ontogenetic selection creates knowledge for the individual: immune system, virus (learning from the individual as an individual)

What the Modern Age knew

- **Gary Cziko (1995)**
 - **Animal behavior is purposeful and changes the environment that operates on the animal's behavior.**
 - **William Powers' "perceptual control theory": behavior controls perception as much as perception determines behavior.**
 - **A control system is as blind as the immune system that creates an army of antibodies. Nonetheless, a control system exhibits a behavior that appears to be "purposeful".**
 - **An organism is ultimately a hierarchy of control systems, each of which senses something in the environment and tries to control it.**

What the Modern Age knew

- **Gary Cziko (1995)**
 - **In a sense, there is no learning: there is just the blind functioning of a network of control systems.**
 - **Darwinian selection not of behaviors but of control systems**

What the Modern Age knew

- **Gary Cziko (1995)**
 - Solving a problem consists in visualizing it correctly.
 - The brain produces many different visualizations of the problem until one "fits".
 - At all levels the brain does not really "know" what to do: it just takes guesses, and the correct guesses are rewarded.

What the Modern Age knew

- Gary Cziko (1995)
 - Skinner: Language is learned via reinforcement
 - Chomsky: Language is learned thanks to a universal grammar
 - Cziko: Language is learned via a Darwinian process

What the Modern Age knew

- Paul Virilio (1995)
 - Techno-skepticism
 - “The build-up of information superhighways we are facing a new phenomenon: loss of orientation”
 - "What lies ahead is a disturbance in the perception of what reality is".
 - “The very word globalization is a fake. There is no such thing as globalization, there is only virtualization.”

What the Modern Age knew

- **Rodolfo Llinas (1996)**
 - **Neurons are active all the time**
 - **The activity of neurons generates patterns of behavior all the time**
 - **Neurons are always active, even when there are no inputs**
 - **Neurons operate at their own pace, regardless of the pace of information**
 - **A rhythmic system controls their activity**
 - **The neurons are telling the body to move even when the body is not moving**
 - **The environment selects which movement the body will actually perform**
 - **Movement is not reactive: it is active and automatic**
 - **An organism has only limited control of its brain**

What the Modern Age knew

- **Rodolfo Llinas (1996)**
 - **A scanning system that sweeps across all regions of the brain 40 times a second**
 - **A wave of nerve pulses sent out from the thalamus and triggering all the synchronized cells in the cerebral cortex that are recording sensory information**
 - **The cells then fire a coherent wave of messages back to the thalamus**
 - **Only cortex cells that are active at that moment respond to the request from the thalamus.**
 - **Consciousness originates from the constant interaction between the thalamus and the cortex**

What the Modern Age knew

- **Steven Mithen (1996)**
 - **Four kinds of intelligence (four “modules” in the brain) evolved independently:**
 - **Social intelligence: the ability to deal with other humans**
 - **Natural-history intelligence: the ability to deal with the environment**
 - **Tool-using intelligence**
 - **Linguistic intelligence (language, metaphor and analogy)**
 - **The hunters-gatherers of pre-history were experts in all these domains, but those different kinds of expertise did not mix**

What the Modern Age knew

- **Steven Mithen (1996)**
 - **"Cognitive fluidity" caused the cultural explosion of art, technology, farming, religion, ...**
 - **What caused cognitive fluidity?**
 - **Self-awareness may have integrated intelligences that for thousands of years had been kept separate.**
 - **Mithen's evolutionary theory mirrors Annette Karmiloff-Smith's theory of child development**

What the Modern World knew

- **Samuel Huntington (1996)**
 - **Western Civil War**
 - **1648:**
 - **The modern international system is born with the Peace of Westphalia**
 - **Conflicts of the Western world are among monarchs attempting to expand the territory they ruled**
 - **Monarchs create nation states**
 - **1793:**
 - **Nationalism is born with the French Revolution**
 - **Conflicts are among nations**
 - **Nation states create cultural dogmas**

What the Modern World knew

- **Samuel Huntington (1996)**
 - **Western Civil War**
 - **1919:**
 - **Ideologies are born with the Russian Revolution**
 - **Conflicts are among ideologies (nazism, communism, democracy)**
 - **Cultural dogmas create western civilization**

What the Modern World knew

- **Samuel Huntington (1996)**
 - **Clash of Civilizations**
 - **1991:**
 - **The fall of Communism and the triumph of Capitalism ends the Western Civil War**
 - **Globalization weakens the nation state as a source of identity**
 - **Conflicts are among civilizations (Western, Islamic, Confucian, Japanese, Islamic, Hindu, Slavic-Orthodox, Latin American, African)**
 - **Capitalism creates regional economic blocs (European Union, Asean, etc)**

What the Modern World knew

- **Samuel Huntington (1996)**
 - **Conflicts have been driven over the centuries by different factors.**
 - **When the monarchic state was born, the wars were mainly for territorial disputes among monarchs**
 - **At some point the monarchic states became well-established and the fight started between monarchy and republican aspirations (from the USA/French revolutions on). The republican spirit won and the monarchy died.**

What the Modern World knew

- **Samuel Huntington (1996)**
 - **Once the national state was born, the fulcrum of war became the fight between different nations. This eventually led to WWI and WWII and to the independence wars by the colonies. The biggest winners were the USA and the Soviet Union.**
 - **In the 20th century the fight increasingly moved towards ideology: fascism, communism, democracy. Democracy first defeated fascism and then communism.**
 - **Now that states are independent and peoples have more freedom, the fight is shifting towards ethnic and religious factors that were suppressed under the monarchs, national states, colonial empires, ideological empires.**

What the Modern Age knew

- **Jared Diamond (1997)**
 - **The achievements of different races over millennia depend on geography and ecology, not on intellectual superiority**

What the Modern Age knew

- **Peter Galison (1997)**
 - **Scientific revolutions are due to new tools (rather than new ideas)**
 - **The progress of science is driven by tools**

What the Modern Age knew

- End of the British Empire (1997)
 - 1497 John Cabot set foot in Newfoundland in the name of Henry VII
 - 1997 Hong Kong is returned to China

What the Modern Age knew

- Katherine Hayles (1999)
 - "information technologies... fundamentally alter the relation of signified to signifier"
 - "a signifier on one level becomes a signified on the next-higher level."

What the Modern Age knew

- Cinema
 - Kevin Smith: Dogma (1999)
 - Pedro Almodovar: Todo Sobre Mi Madre (1999)
 - Majid Majidi: Color Of Paradise (2000)
 - Christopher Nolan: Memento (2001)
 - Alejandro Gonzales Inarritu: 21 Grams (2003)
 - Michel Gondry: Eternal Sunshine of the Spotless Mind (2004)

What the Modern Age knew

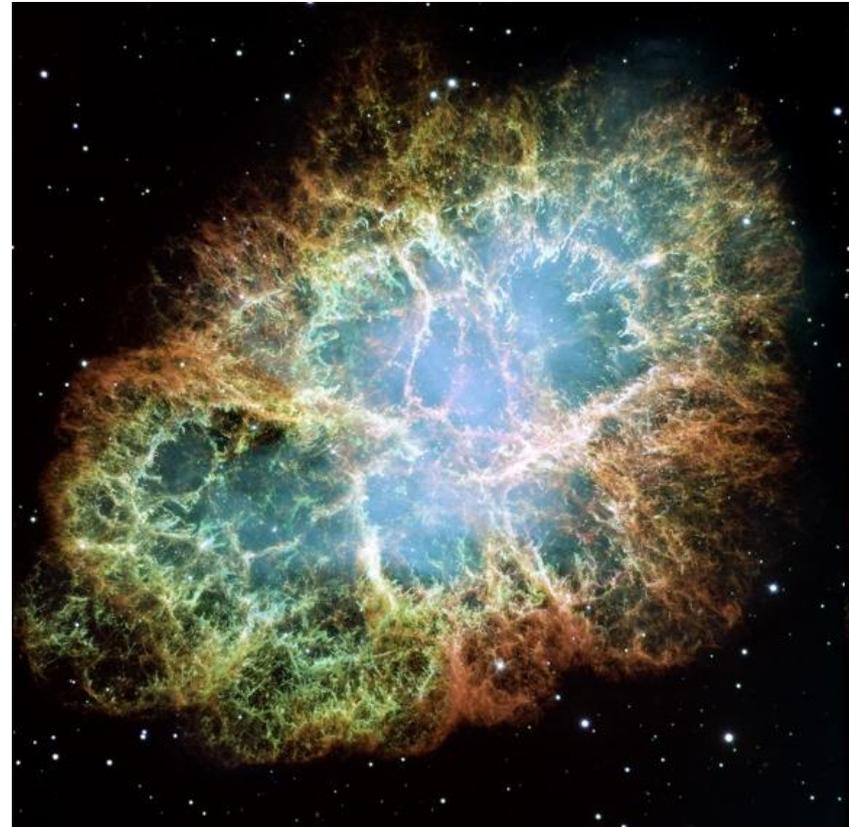
- Multimedia Theater
 - Robert Lepage (1957, Canada): “Needles and Opium” (1991)
 - George Coates (1952, USA): “20/20 Blake” (1996)
 - Mika Tuomola (1971, Finland): “Daisy's Amazing Discoveries” (1996)
 - ieVR (USA): “Machinal” (1999)
 - Uninvited Guest (Britain): “Film” (2000)
 - Builders Association (Marianne Weems): “Alladeen” (2003)
 - Blast Theory (Britain): “10 Backwards” (1999)
 - Chameleons Group (Steve Dixon, Britain): “The Doors of Serenity” (2002)

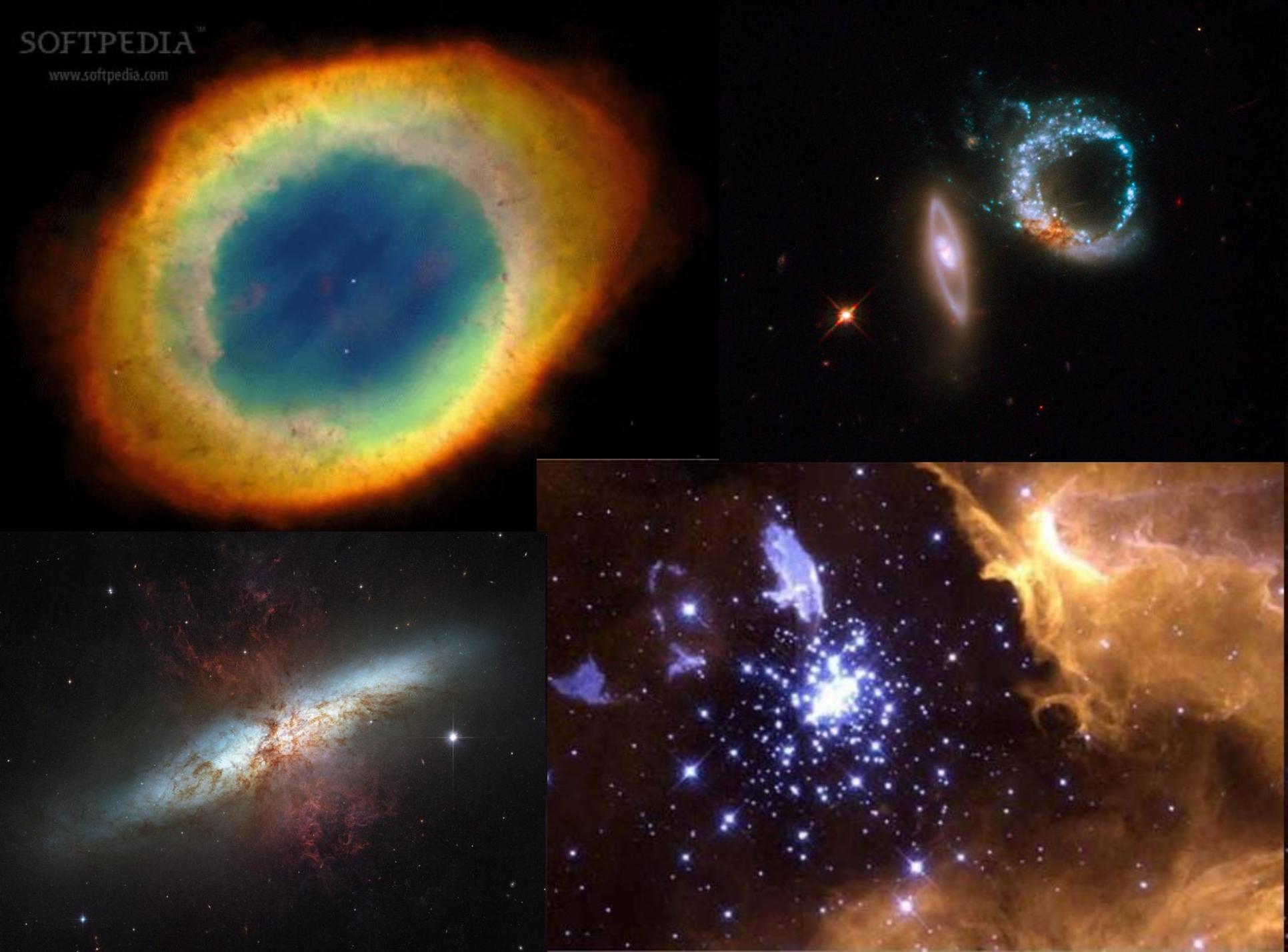
What the Modern Age knew

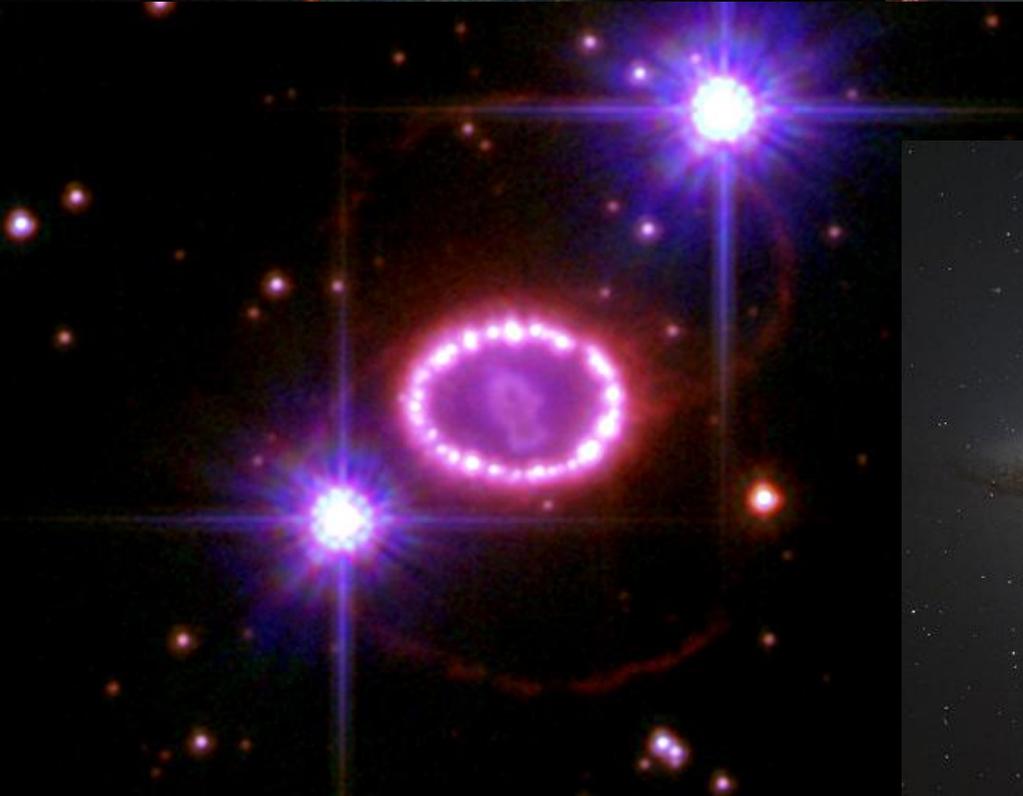
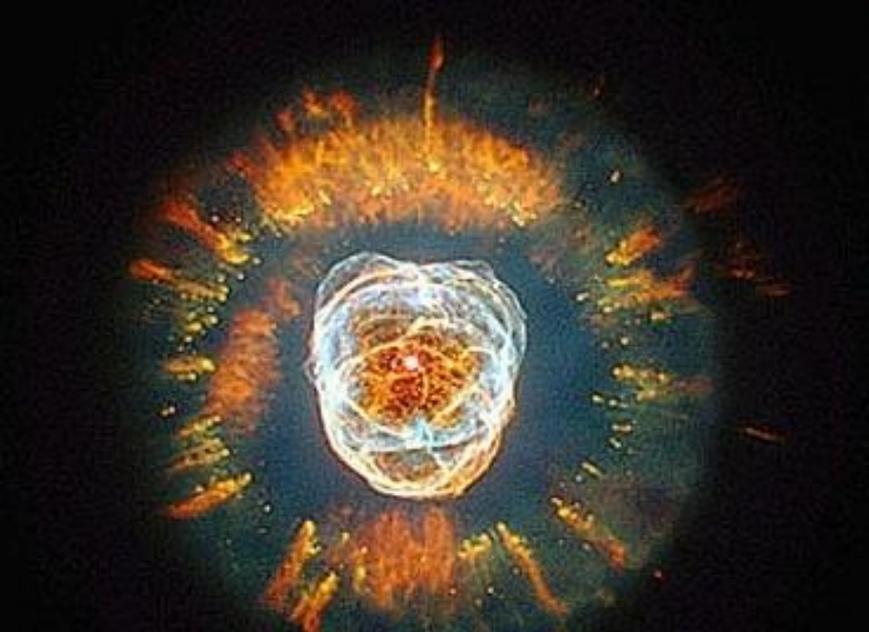
- Ballet
 - Paul Taylor (1930, USA): “Company B” (1991)
 - Dumb Type (Japan): “Lovers” (1994)
 - Deborah Colker “Volcano” (1994)
 - Diane Gromala, Yacov Sharir, and Marcos Novak: “Dancing with the Virtual Dervish” (1994) – virtual reality
 - Merce Cunningham uses software to capture and project the movements of dancers during “Biped” (1999)
 - Kunstwerk-blend (Sophia Lycouris): “Trans/forms” (1999)
 - Alexei Ratmansky (1968, Russia): “Dreams” (1997)

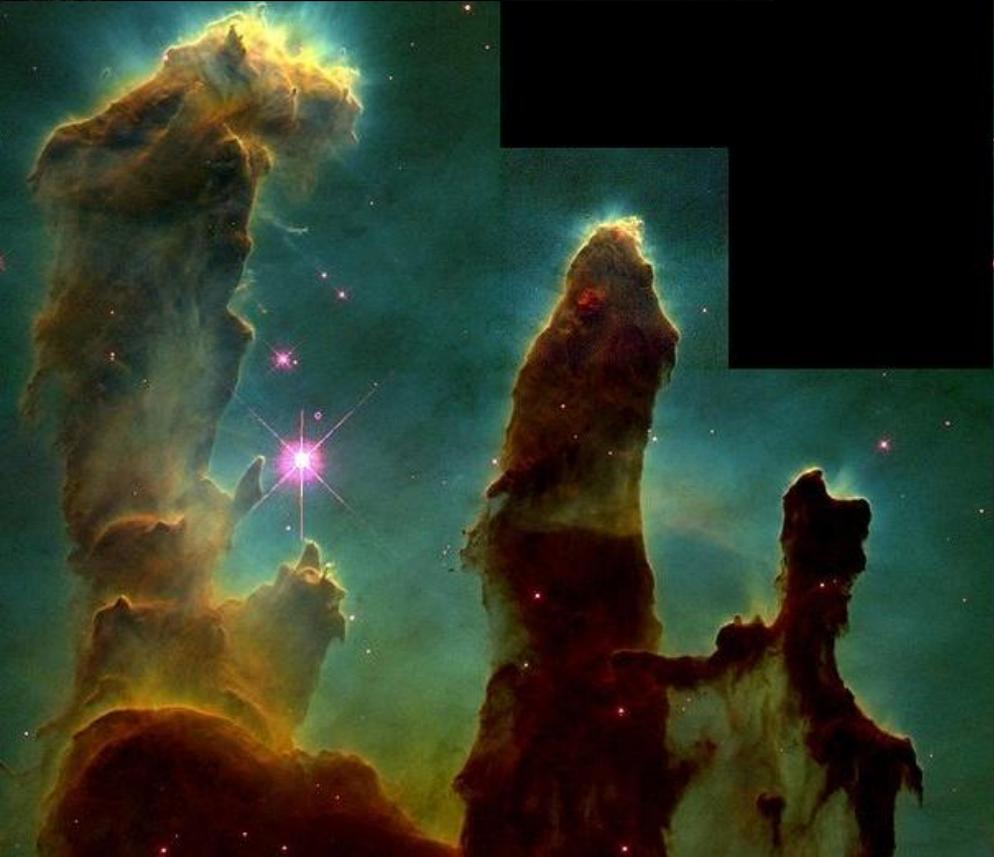
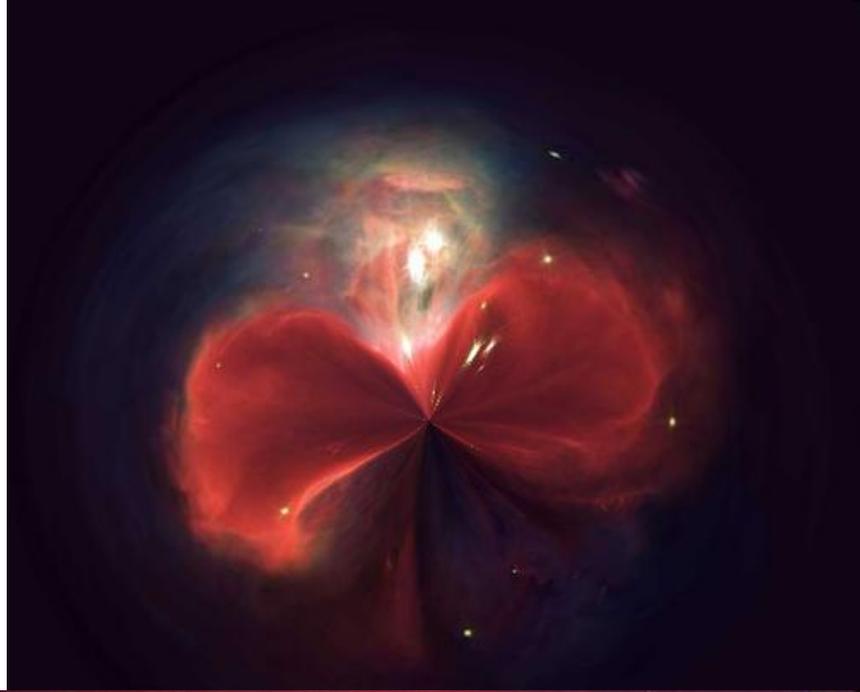
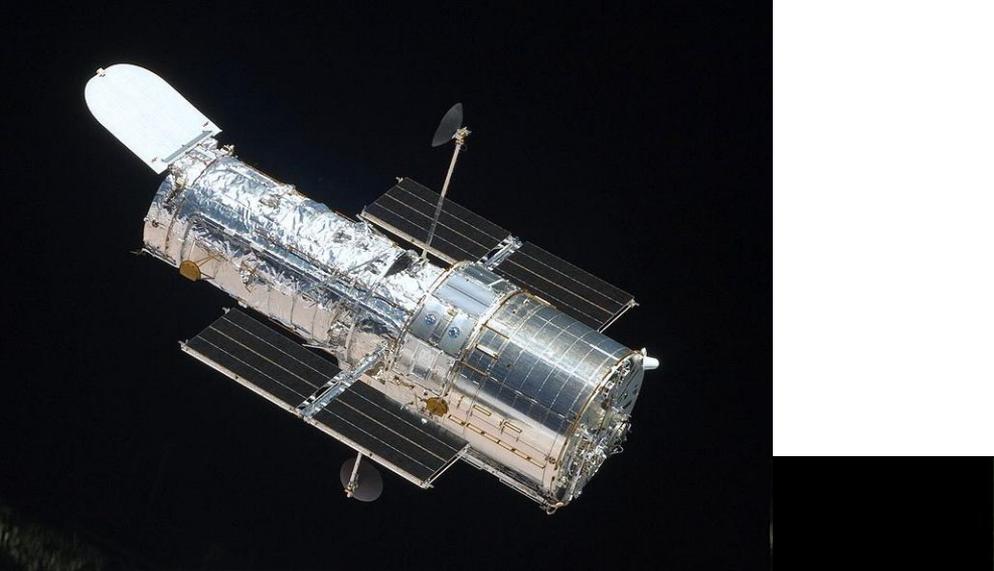
What the Modern Age knew

- Hubble Telescope (1990)
 - The age of the universe is 13.7 billion years











Piero Scaruffi

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