

WE NEED AN ECOLOGICAL REVOLUTION

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INTRODUCTION¹

The present crisis of civilization is unique

Does history repeat itself? Is it cyclic, or is it unidirectional? Certainly many aspects of history are repetitive - the rise and fall of empires, cycles of war and peace, cycles of construction and destruction. But on the other hand, if we look at the long-term history of human progress, we can see that it is clearly unidirectional. An explosion of knowledge has created the modern world. This is something that never happened before. Never before has the world had a population of more than 7 billion people, to which a billion are added every decade. Never before have we had the power to destroy human civilization and the biosphere with thermonuclear weapons or catastrophic anthropogenic climate change. Our situation today is unique. We cannot rely on old habits, old traditions or old institutions. To save the long-term future for our children and grandchildren, and for all the other creatures with which we share the gift of life, we must overcome the inertia of our institutions and our culture.

The Nobel-Laureate biochemist Albert Szent-Györgyi once wrote: “The story of man consists of two parts, divided by the appearance of modern science at the turn of the century. In the first period, man lived in the world in which his species was born and to which his senses were adapted. In the second, man stepped into a new, cosmic world to which he was a complete stranger.... The forces at man’s disposal were no longer terrestrial forces, of human dimension, but were cosmic forces, the forces which shaped the universe. The few hundred Fahrenheit degrees of our flimsy terrestrial fires were exchanged for the ten million degrees of the atomic reactions which heat the sun.”

“This is but a beginning, with endless possibilities in both directions - a building of a human life of undreamt of wealth and dignity, or a sudden end in utmost misery. Man lives in a new cosmic world for which he was not made. His survival depends on how well and how fast he can adapt himself to it, rebuilding all his ideas, all his social and political institutions.”

¹This book makes use of articles and book chapters that I have previously written on subjects related to the urgent need for fundamental change, but a great deal of new material has been added

Harmony between human society and nature must be restored

Among the many global leaders who have pointed to the need for fundamental change are Pope Francis and former U.S. Vice President Al Gore.

In June, 2015, Pope Francis addressed the climate crisis in an encyclical entitled “*Laudato Si*”, in which he says “Climate change is a global problem with grave implications: environmental, social, economic, political and for the distribution of goods. It represents one of the principal challenges facing humanity in our day.” In his Apostolic Exhortation “*Evangelii Gaudium*”, Pope Francis said: “Just as the commandment ‘Thou shalt not kill’ sets a clear limit in order to safeguard the value of human life, today we also have to say thou shalt not to an economy of exclusion and inequality.”

For very many years Al Gore has struggled to call public attention to the existential dangers of catastrophic climate change. These efforts were recognized with a Nobel Peace Prize, which Al Gore shared with the Intergovernmental Panel on Climate Change (IPCC).

The October 2018 report of the IPCC shocked the world. The report finds that limiting global warming to 1.5°C would require “rapid and far-reaching” transitions in land, energy, industry, buildings, transport, and cities. Global net human-caused emissions of carbon dioxide would need to fall by about 45 percent from 2010 levels by 2030, reaching ‘net zero’ around 2050. Another conclusion of the 2018 report was that humanity has only 12 years to act, if tipping points are to be avoided, beyond which uncontrollable feedback loops would be set in motion.

This situation caused 16-year-old Swedish climate activist Greta Thunberg, addressing the 2019 Davos Economic Forum in Switzerland to say “Our house is on fire. I am here to say that our house is on fire. According to the IPCC, we are less than 12 years away from not being able to undo our mistakes. In that time, unprecedented changes in all aspects of society need to have taken place, including a reduction of our CO₂ emissions by at least 50%.”

Nuclear weapons: an absolute evil!

War was always madness, always immoral, always the cause of unspeakable suffering, economic waste and widespread destruction, and always a source of poverty, hate, barbarism and endless cycles of revenge and counter-revenge.

It has always been a crime for soldiers to kill people, just as it is a crime for murderers in civil society to kill people. No flag has ever been wide enough to cover up atrocities.

But today, the development of all-destroying modern weapons has put war completely beyond the bounds of sanity and elementary humanity. The danger of a catastrophic nuclear war casts a dark shadow over the future of our species. It also casts a very black shadow over the future of the global environment. The environmental consequences of a massive exchange of nuclear weapons have been treated in a number of studies by meteorologists and other experts from both East and West. They predict that a use of nuclear weapons would result in fire storms with very high winds and high temperatures, which would burn a large proportion of the wild land fuels in the affected nations. The resulting smoke and dust would block out sunlight for a period of many months, destroying the ozone layer and the hydrological cycle with a disastrous effect on agriculture. Scientists believe that a nuclear famine could kill a large proportion of the plants, animals and humans on earth.

Fundamental changes are needed

Fundamental changes are needed in order to give our economic system both an ecological conscience and a social conscience. In many countries economics and politics are linked because excessive inequality in wealth has meant that corporate oligarchs control our political systems. To restore true democracy, we must decrease economic inequality. Furthermore, reformed economic systems must prioritize ecological goals, especially the replacement of fossil fuels by renewable energy, reforestation, and the drastic reduction of greenhouse gas emissions.

Since rapid and fundamental changes are urgently needed to save the future, it is perhaps not an exaggeration to speak of the need for an ecological revolution. However, it must be a non-violent revolution.

Strong reasons for avoiding violence in situations of conflict have been given by Mahatma Gandhi. To the insidious argument that “the end justifies the means”, Gandhi answered firmly: “They say that ‘means are after all means’. I would say that ‘means are after all everything’. As the means, so the end. Indeed, the Creator has given us limited power over means, none over end... The means may be likened to a seed, and the end to a tree; and there is the same inviolable connection between the means and the end as

there is between the seed and the tree. Means and end are convertible terms in my philosophy of life.”

Gandhi’s advocacy of non-violence is closely connected to his attitude towards ends and means. He believed that violent methods for achieving a desired social result would inevitably result in an escalation of violence. The end achieved would always be contaminated by the methods used.

Trained as a lawyer, Gandhi fought his battles in the court of public opinion. In this court, violent methods fatally weaken one’s case, besides being futile if one is opposing overwhelming military strength. Today our case for the need to make rapid and fundamental changes must be fought in the court of public opinion. This is made difficult by the fact that the mass media are firmly under the control of powerholding oligarchs. However, the Internet, still relatively uncensored, gives us the opportunity to create our own media.

Lives to inspire us

I have included short sketches of the lives of many famous non-violent revolutionists; and I hope that these “lives of the saints” can give us inspiration. Of course, the choice of whom to include was rather arbitrary, and very many others deserve recognition; but I hope that the few can stand for the many, and I hope that they can inspire us to put our duty to future generations ahead of present profit or pleasure.

One of the chapters discusses the ideals of the Enlightenment. Those ideals are still valid today.

We give our children loving care; but it makes no sense to do so unless we also do all that is within our power to give them a future in which they and their children can survive.

None of us asked to be born at a time of crisis. But we have been born at such a time, and history has given us an enormous responsibility. If we do not work with courage and dedication to save our beautiful world for future generations, all the treasures that past generations have given to us will be lost. You and I, all of us together, can save the future if we work hard enough. Together we can do it!

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Chapter 1

PRINTING CREATES THE MODERN WORLD

1.1 Printing

It was during the T'ang period that the Chinese made an invention of immense importance to the cultural evolution of mankind. This was the invention of printing. Together with writing, printing is one of the key inventions which form the basis of human cultural evolution.

Printing was invented in China in the 8th or 9th century A.D., probably by Buddhist monks who were interested in producing many copies of the sacred texts which they had translated from Sanskrit. The act of reproducing prayers was also considered to be meritorious by the Buddhists.

The Chinese had for a long time followed the custom of brushing engraved official seals with ink and using them to stamp documents. The type of ink which they used was made from lamp-black, water and binder. In fact, it was what we now call "India ink". However, in spite of its name, India ink is a Chinese invention, which later spread to India, and from there to Europe.

We mentioned that paper of the type which we now use was invented in China in the first century A.D.. Thus, the Buddhist monks of China had all the elements which they needed to make printing practical: They had good ink, cheap, smooth paper, and the tradition of stamping documents with ink-covered engraved seals. The first block prints which they produced date from the 8th century A.D.. They were made by carving a block of wood the size of a printed page so that raised characters remained, brushing ink onto the block, and pressing this onto a sheet of paper.

The oldest known printed book, the "Diamond Sutra", is dated 868 A.D., and it consists of only six printed pages. It was discovered in 1907 by an English scholar who obtained permission from Buddhist monks in Chinese Turkestan to open some walled-up monastery rooms, which were said to have been sealed for 900 years. The rooms were found to contain a library of about 15,000 manuscripts, among which was the Diamond Sutra.

Block printing spread quickly throughout China, and also reached Japan, where wood-block printing ultimately reached great heights in the work of such artists as Hiroshige and Hokusai. The Chinese made some early experiments with movable type, but movable type never became popular in China, because the Chinese written language contains 10,000 characters. However, printing with movable type was highly successful in Korea as early as the 15th century A.D..

The unsuitability of the Chinese written language for the use of movable type was the greatest tragedy of the Chinese civilization. Writing had been developed at a very early stage in Chinese history, but the system remained a pictographic system, with a different character for each word. A phonetic system of writing was never developed.

The failure to develop a phonetic system of writing had its roots in the Chinese imperial system of government. The Chinese empire formed a vast area in which many different languages were spoken. It was necessary to have a universal language of some kind in order to govern such an empire. The Chinese written language solved this problem admirably.

Suppose that the emperor sent identical letters to two officials in different districts. Reading the letters aloud, the officials might use entirely different words, although the characters in the letters were the same. Thus the Chinese written language was a sort of "Esperanto" which allowed communication between various language groups, and its usefulness as such prevented its replacement by a phonetic system.

The invention of block printing during the T'ang dynasty had an enormously stimulating effect on literature, and the T'ang period is regarded as the golden age of Chinese lyric poetry. A collection of T'ang poetry, compiled in the 18th century, contains 48,900 poems by more than 2,000 poets.



Figure 1.1: The Diamond Sutra, 868 A.D., is the first known printed book.

1.2 Islamic civilization and printing

Some Islamic contributions to civilization

In the 5th century A.D., there was a split in the Christian church of Byzantium; and the Nestorian church, separated from the official Byzantine church. The Nestorians were bitterly persecuted by the Byzantines, and therefore they migrated, first to Mesopotamia, and later to south-west Persia. (Some Nestorians migrated as far as China.)

During the early part of the middle ages, the Nestorian capital at Gondisapur was a great center of intellectual activity. The works of Plato, Aristotle, Hippocrates, Euclid, Archimedes, Ptolemy, Hero and Galen were translated into Syriac by Nestorian scholars, who had brought these books with them from Byzantium.

Among the most distinguished of the Nestorian translators were the members of a family called Bukht-Yishu (meaning "Jesus hath delivered"), which produced seven generations of outstanding scholars. Members of this family were fluent not only in Greek and Syriac, but also in Arabic and Persian.

In the 7th century A.D., the Islamic religion suddenly emerged as a conquering and proselytizing force. Inspired by the teachings of Mohammad (570 A.D. - 632 A.D.), the Arabs and their converts rapidly conquered western Asia, northern Africa, and Spain. During the initial stages of the conquest, the Islamic religion inspired a fanaticism in its followers which was often hostile to learning. However, this initial fanaticism quickly

changed to an appreciation of the ancient cultures of the conquered territories; and during the middle ages, the Islamic world reached a very high level of culture and civilization.

Thus, while the century from 750 to 850 was primarily a period of translation from Greek to Syriac, the century from 850 to 950 was a period of translation from Syriac to Arabic. It was during this latter century that Yuhanna Ibn Masawiah (a member of the Bukht-Yishu family, and medical advisor to Caliph Harun al-Rashid) produced many important translations into Arabic.

The skill of the physicians of the Bukht-Yishu family convinced the Caliphs of the value of Greek learning; and in this way the family played an extremely important role in the preservation of the western cultural heritage. Caliph al-Mamun, the son of Harun al-Rashid, established at Baghdad a library and a school for translation, and soon Baghdad replaced Gondisapur as a center of learning.

The English word "chemistry" is derived from the Arabic words "*al-chimia*", which mean "the changing". The earliest alchemical writer in Arabic was Jabir (760-815), a friend of Harun al-Rashid. Much of his writing deals with the occult, but mixed with this is a certain amount of real chemical knowledge. For example, in his *Book of Properties*, Jabir gives the following recipe for making what we now call lead hydroxycarbonate (white lead), which is used in painting and pottery glazes: "Take a pound of litharge, powder it well and heat it gently with four pounds of vinegar until the latter is reduced to half its original volume. Then take a pound of soda and heat it with four pounds of fresh water until the volume of the latter is halved. Filter the two solutions until they are quite clear, and then gradually add the solution of soda to that of the litharge. A white substance is formed, which settles to the bottom. Pour off the supernatant water, and leave the residue to dry. It will become a salt as white as snow."

Another important alchemical writer was Rahzes (c. 860 - c. 950). He was born in the ancient city of Ray, near Teheran, and his name means "the man from Ray". Rahzes studied medicine in Baghdad, and he became chief physician at the hospital there. He wrote the first accurate descriptions of smallpox and measles, and his medical writings include methods for setting broken bones with casts made from plaster of Paris. Rahzes was the first person to classify substances into vegetable, animal and mineral. The word "*al-kali*", which appears in his writings, means "the calcined" in Arabic. It is the source of our word "alkali", as well as of the symbol K for potassium.

The greatest physician of the middle ages, Avicenna, (Abu-Ali al Hussein Ibn Abdullah Ibn Sina, 980-1037), was also a Persian, like Rahzes. More than a hundred books are attributed to him. They were translated into Latin in the 12th century, and they were among the most important medical books used in Europe until the time of Harvey. Avicenna also wrote on alchemy, and he is important for having denied the possibility of transmutation of elements.

In mathematics, one of the most outstanding Arabic writers was al-Khwarizmi (c. 780 - c. 850). The title of his book, *Ilm al-jabr wa'd muqabalah*, is the source of the English word "algebra". In Arabic *al-jabr* means "the equating". Al-Khwarizmi's name has also become an English word, "algorism", the old word for arithmetic. Al-Khwarizmi drew from both Greek and Hindu sources, and through his writings the decimal system and the use of zero

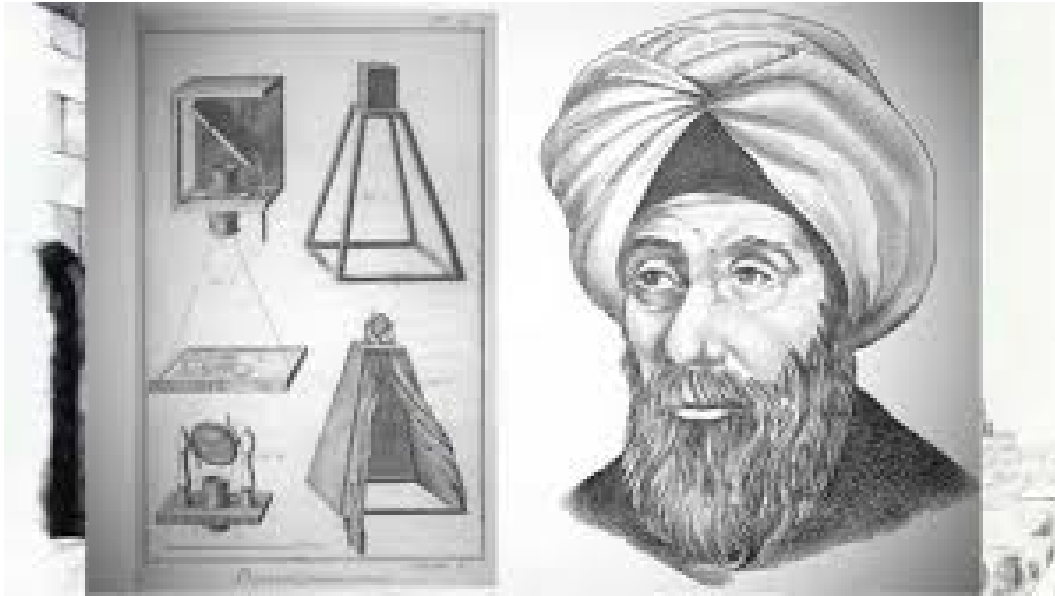


Figure 1.2: **Al-Hazen invented the camera-obscura during the years 1012-1021. It was a forerunner of the modern camera.**

were transmitted to the west.

One of the outstanding Arabic physicists was al-Hazen (965-1038). He made the mistake of claiming to be able to construct a machine which could regulate the flooding of the Nile. This claim won him a position in the service of the Egyptian Caliph, al-Hakim. However, as al-Hazen observed Caliph al-Hakim in action, he began to realize that if he did not construct his machine immediately, he was likely to pay with his life! This led al-Hazen to the rather desperate measure of pretending to be insane, a ruse which he kept up for many years. Meanwhile he did excellent work in optics, and in this field he went far beyond anything done by the Greeks.

Al-Hazen studied the reflection of light by the atmosphere, an effect which makes the stars appear displaced from their true positions when they are near the horizon; and he calculated the height of the atmospheric layer above the earth to be about ten miles. He also studied the rainbow, the halo, and the reflection of light from spherical and parabolic mirrors. In his book, *On the Burning Sphere*, he shows a deep understanding of the properties of convex lenses. Al-Hazen also used a dark room with a pin-hole opening to study the image of the sun during an eclipses. This is the first mention of the *camera obscura*, and it is perhaps correct to attribute the invention of the *camera obscura* to al-Hazen.

Another Islamic philosopher who had great influence on western thought was Averröes, who lived in Spain from 1126 to 1198. His writings took the form of thoughtful commentaries on the works of Aristotle. He shocked both his Moslem and his Christian readers by maintaining that the world was not created at a definite instant, but that it instead evolved over a long period of time, and is still evolving.

Like Aristotle, Averröes seems to have been groping towards the ideas of evolution which were later developed in geology by Steno, Hutton and Lyell and in biology by Darwin and Wallace. Much of the scholastic philosophy which developed at the University of Paris during the 13th century was aimed at refuting the doctrines of Averröes; but nevertheless, his ideas survived and helped to shape the modern picture of the world.

Muslims in Egypt and probably elsewhere were using printing to mass-produce texts as early as the 10th century. Dozens of examples of their output are preserved in museums and libraries, but have, until recently, been overlooked and neglected by scholars. This phenomenon is yet another example of the 1000-year missing history of science and technology.

It is, however, true that Muslims did not use printing to produce books, nor extended texts in any form, until the 18th century. This challenge was taken up by Europeans from the 15th century onwards, and it would not have been possible there, without the availability of another gift from the Muslims, paper, which had earlier reached Europe from the Muslim world, via Spain and Italy.



Figure 1.3: A handwritten Islamic manuscript: Qazwini, 'Ajaib al-makhlukat, MS probably from Mosul, ca.1305. British Library.

1.3 Gutenberg

Johannes Gensfleisch zur Laden zum Gutenberg (c.1400-1468) was born in the German city of Mainz. He was the youngest son of an upper-class merchant, Friele Gensfleisch zur Laden, whose long-established family traced its roots back to the 13th century.

Johannes Gutenberg was educated as a goldsmith and blacksmith, and may also have attended the University of Erfurt. In 1440, while he was living in Strassburg, he is said to have perfected and unveiled his system of printing with movable type.

By 1448, he was back in Mainz, where he took a loan from his brother-on-law to meet the expenses of setting up a printing press. In 1450, the press was in operation, and Gutenberg took a further loan, 800 guilders, from the moneylender Johann Fust. Peter Schöffer, who became Fust's son-in-law also joined the enterprise, and is believed to have designed the type faces.

Among the many technical innovations introduced by Gutenberg are the invention of a process for mass-producing movable type; the use of oil-based ink for printing books; adjustable molds; mechanical movable type; and the use of a wooden printing press similar to the agricultural screw presses of the period. The alloy which he used was a mixture of lead, tin, and antimony that melted at a relatively low temperature for faster and more economical casting, cast well, and created a durable type. The combination of all these elements made the mass production of books both practical and economically feasible.

Gutenberg's greatest artistic achievement was his printed Bible, but this project also cost so much that it left him with debts of more than 20,000 guilders. A court order gave Fust control of the Bible printing project, and half of the printed Bibles.

Although he had suffered bankruptcy, the aging Gutenberg's greatness was acknowledged in 1465. He was given the title "Hofmann" (Gentleman of the Court) and awarded a yearly stipend, as well as 2,180 liters of grain and 2,000 liters of wine tax-free. He died in 1468, having enjoyed this official recognition for only three years.

Printing quickly affected both religion and science in Europe. By 1517, when Martin Luther posted his Ninety-Five Theses on the door of All Saint's Church in Wittenburg, many cities had printing presses. The theses were quickly reprinted and translated, and they spread throughout Europe. This initiated a pamphlet war, in which both sides used printing to spread their views. The impact of Luther's German translation of the Bible was greatly increased by the fact that inexpensive printed copies were widely available.

Science was similarly revolutionized. Nicolaus Copernicus (1473-1543) had a far greater impact on the history of science than his near contemporary Leonardo da Vinci (1452-1519) because of printing. Leonardo's thousands of pages of notes and his innovations in virtually all the fields of human knowledge have only recently become available in printed form. By contrast, the publication of Copernicus' great book, *De revolutionibus orbium coelestium* (On the Revolutions of the Celestial Spheres) initiated a sequence of discoveries by Tycho Brahe, Galileo, Johannes Kepler and Isaac Newton, discoveries upon which the modern world is built.



Figure 1.4: Gutenberg is credited with introducing printing with movable type into Europe, with many improvements of technique. His inventions were a turning point in European history, and ushered in the modern era, the Reformation, the Age of Reason and the Industrial Revolution.



Figure 1.5: Gutenberg's printing press



Figure 1.6: Gutenberg's bible

Suggestions for further reading

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Chapter 2

IDEALS OF THE ENLIGHTENMENT

2.1 Descartes

Until the night of November 10, 1619, algebra and geometry were separate disciplines. On that autumn evening, the troops of the Elector of Bavaria were celebrating the Feast of Saint Martin at the village of Neuberg in Bohemia. With them was a young Frenchman named René Descartes (1596-1659), who had enlisted in the army of the Elector in order to escape from Parisian society. During that night, Descartes had a series of dreams which, as he said later, filled him with enthusiasm, converted him to a life of philosophy, and put him in possession of a wonderful key with which to unlock the secrets of nature.

The program of natural philosophy on which Descartes embarked as a result of his dreams led him to the discovery of analytic geometry, the combination of algebra and geometry. Essentially, Descartes' method amounted to labeling each point in a plane with two numbers, x and y . These numbers represented the distance between the point and two perpendicular fixed lines, (the coordinate axes). Then every algebraic equation relating x and y generated a curve in the plane.

Descartes realized the power of using algebra to generate and study geometrical figures; and he developed his method in an important book, which was among the books that Newton studied at Cambridge. Descartes' pioneering work in analytic geometry paved the way for the invention of differential and integral calculus by Fermat, Newton and Leibniz. (Besides taking some steps towards the invention of calculus, the great French mathematician, Pierre de Fermat (1601-1665), also discovered analytic geometry independently, but he did not publish this work.)

Analytic geometry made it possible to treat with ease the elliptical orbits which Kepler had introduced into astronomy, as well as the parabolic trajectories which Galileo had calculated for projectiles.

Descartes also worked on a theory which explained planetary motion by means of "vortices"; but this theory was by no means so successful as his analytic geometry, and even-



Figure 2.1: Portrait of René Descartes, after Frans Hals. Public domain, Wikimedia Commons

tually it had to be abandoned.

Descartes did important work in optics, physiology and philosophy. In philosophy, he is the author of the famous phrase “*Cogito, ergo sum*”, “I think; therefore I exist”, which is the starting point for his theory of knowledge. He resolved to doubt everything which it was possible to doubt; and finally he was reduced to knowledge of his own existence as the only real certainty.

René Descartes died tragically through the combination of two evils which he had always tried to avoid: cold weather and early rising. Even as a student, he spent a large portion of his time in bed. He was able to indulge in this taste for a womblike existence because his father had left him some estates in Brittany. Descartes sold these estates and invested the money, from which he obtained an ample income. He never married, and he succeeded in avoiding responsibilities of every kind.

Descartes might have been able to live happily in this way to a ripe old age if only he had been able to resist a flattering invitation sent to him by Queen Christina of Sweden. Christina, the intellectual and strong-willed daughter of King Gustav Adolf, was determined to bring culture to Sweden, much to the disgust of the Swedish noblemen, who considered that money from the royal treasury ought to be spent exclusively on guns and fortifications. Unfortunately for Descartes, he had become so famous that Queen Christina wished to take lessons in philosophy from him; and she sent a warship to fetch him from Holland, where he was staying. Descartes, unable to resist this flattering attention from a royal patron, left his sanctuary in Holland and sailed to the frozen north.

The only time Christina could spare for her lessons was at five o'clock in the morning, three times a week. Poor Descartes was forced to get up in the utter darkness of the bitterly cold Swedish winter nights to give Christina her lessons in a draughty castle library; but his strength was by no means equal to that of the queen, and before the winter was over he had died of pneumonia.

2.2 Newton

On Christmas day in 1642 (the year in which Galileo died), a recently widowed woman named Hannah Newton gave birth to a premature baby at the manor house of Woolsthorpe, a small village in Lincolnshire, England. Her baby was so small that, as she said later, “he could have been put into a quart mug”, and he was not expected to live. He did live, however, and lived to achieve a great scientific synthesis, uniting the work of Copernicus, Brahe, Kepler, Galileo and Descartes.

When Isaac Newton was four years old, his mother married again and went to live with her new husband, leaving the boy to be cared for by his grandmother. This may have caused Newton to become more solemn and introverted than he might otherwise have been. One of his childhood friends remembered him as “a sober, silent, thinking lad, scarce known to play with the other boys at their silly amusements”.

As a boy, Newton was fond of making mechanical models, but at first he showed no special brilliance as a scholar. He showed even less interest in running the family farm,

however; and a relative (who was a fellow of Trinity College) recommended that he be sent to grammar school to prepare for Cambridge University.

When Newton arrived at Cambridge, he found a substitute father in the famous mathematician Isaac Barrow, who was his tutor. Under Barrow's guidance, and while still a student, Newton showed his mathematical genius by inventing the binomial theorem.

In 1665, Cambridge University was closed because of an outbreak of the plague, and Newton returned for two years to the family farm at Woolsthorpe. He was then twenty-three years old. During the two years of isolation, Newton developed his binomial theorem into the beginnings of differential calculus.

Newton's famous experiments in optics also date from these years. The sensational experiments of Galileo were very much discussed at the time, and Newton began to think about ways to improve the telescope. Writing about his experiments in optics, Newton says:

"In the year 1666 (at which time I applied myself to the grinding of optic glasses of other figures than spherical), I procured me a triangular prism, to try therewith the celebrated phenomena of colours. And in order thereto having darkened my chamber, and made a small hole in the window shuts to let in a convenient quantity of the sun's light, I placed my prism at its entrance, that it might thereby be refracted to the opposite wall."

"It was at first a very pleasing divertisement to view the vivid and intense colours produced thereby; but after a while, applying myself to consider them more circumspectly, I became surprised to see them in an oblong form, which, according to the received laws of refraction I expected should have been circular."

Newton then describes his crucial experiment. In this experiment, the beam of sunlight from the hole in the window shutters was refracted by two prisms in succession. The first prism spread the light into a rainbow-like band of colors. From this spectrum, he selected a beam of a single color, and allowed the beam to pass through a second prism; but when light of a single color passed through the second prism, the color did not change, nor was the image spread out into a band. No matter what Newton did to it, red light always remained red, once it had been completely separated from the other colors; yellow light remained yellow, green remained green, and blue remained blue.

Newton then measured the amounts by which the beams of various colors were bent by the second prism; and he discovered that red light was bent the least. Next in sequence came orange, yellow, green, blue and finally violet, which was deflected the most. Newton recombined the separated colors, and he found that together, they once again produced white light.

Concluding the description of his experiments, Newton wrote:

"...and so the true cause of the length of the image (formed by the first prism) was detected to be no other than that light is not similar or homogenous, but consists of *deform rays, some of which are more refrangible than others.*"

"As rays of light differ in their degrees of refrangibility, so they also differ in their disposition to exhibit this or that particular colour... To the same degree of refrangibility ever belongs the same colour, and to the same colour ever belongs the same degree of refrangibility."

“...The species of colour and the degree of refrangibility belonging to any particular sort of rays is not mutable by refraction, nor by reflection from natural bodies, nor by any other cause that I could yet observe. When any one sort of rays hath been well parted from those of other kinds, it hath afterwards obstinately retained its colour, notwithstanding my utmost endeavours to change it.”

During the plague years of 1665 and 1666, Newton also began the work which led to his great laws of motion and universal gravitation. Referring to the year 1666, he wrote:

“I began to think of gravity extending to the orb of the moon; and having found out how to estimate the force with which a globe revolving within a sphere presses the surface of the sphere, from Kepler’s rule of the periodical times of the planets being in a sesquialternate proportion of their distances from the centres of their orbs, I deduced that the forces which keep the planets in their orbs must be reciprocally as the squares of the distances from the centres about which they revolve; and thereby compared the force requisite to keep the moon in her orb with the force of gravity at the surface of the earth, and found them to answer pretty nearly.”

“All this was in the plague years of 1665 and 1666, for in those days I was in the prime of my age for invention, and minded mathematics and philosophy more than at any time since.”

Galileo had studied the motion of projectiles, and Newton was able to build on this work by thinking of the moon as a sort of projectile, dropping towards the earth, but at the same time moving rapidly to the side. The combination of these two motions gives the moon its nearly-circular path.

From Kepler’s third law, Newton had deduced that the force with which the sun attracts a planet must fall off as the square of the distance between the planet and the sun. With great boldness, he guessed that this force is *universal*, and that every object in the universe attracts every other object with a gravitational force which is directly proportional to the product of the two masses, and inversely proportional to the square of the distance between them.

Newton also guessed correctly that in attracting an object outside its surface, the earth acts as though its mass were concentrated at its center. However, he could not construct the proof of this theorem, since it depended on integral calculus, which did not exist in 1666. (Newton himself invented integral calculus later in his life.)

In spite of the missing proof, Newton continued and “...compared the force requisite to keep the moon in her orb with the force of gravity at the earth’s surface, and found them to answer pretty nearly”. He was not satisfied with this incomplete triumph, and he did not show his calculations to anyone. He not only kept his ideas on gravitation to himself, (probably because of the missing proof), but he also refrained for many years from publishing his work on the calculus. By the time Newton published, the calculus had been invented independently by the great German mathematician and philosopher, Gottfried Wilhelm Leibniz (1646-1716); and the result was a bitter quarrel over priority. However, Newton did publish his experiments in optics, and these alone were enough to make him famous.

In 1669, Newton’s teacher, Isaac Barrow, generously resigned his post as Lucasian Pro-

fessor of Mathematics so that Newton could have it. Thus, at the age of 27, Newton became the head of the mathematics department at Cambridge. He was required to give eight lectures a year, but the rest of his time was free for research.

Newton's prism experiments had led him to believe that the only possible way to avoid blurring of colors in the image formed by a telescope was to avoid refraction entirely. Therefore he designed and constructed the first reflecting telescope. In 1672, he presented a reflecting telescope to the newly-formed Royal Society, which then elected him to membership.

Meanwhile, the problems of gravitation and planetary motion were increasingly discussed by the members of the Royal Society. In January, 1684, three members of the Society were gathered in a London coffee house. One of them was Robert Hooke (1635-1703), author of *Micrographia* and Professor of Geometry at Gresham College, a brilliant but irritable man. He had begun his career as Robert Boyle's assistant, and had gone on to do important work in many fields of science. Hooke claimed that he could calculate the motion of the planets by assuming that they were attracted to the sun by a force which diminished as the square of the distance.

Listening to Hooke were Sir Christopher Wren (1632-1723), the designer of St. Paul's Cathedral, and the young astronomer, Edmund Halley (1656-1742). Wren challenged Hooke to produce his calculations; and he offered to present Hooke with a book worth 40 shillings if he could prove his inverse square force law by means of rigorous mathematics. Hooke tried for several months, but he was unable to win Wren's reward.

Meanwhile, in August, 1684, Halley made a journey to Cambridge to talk with Newton, who was rumored to know very much more about the motions of the planets than he had revealed in his published papers. According to an almost-contemporary account, what happened then was the following:

"Without mentioning his own speculations, or those of Hooke and Wren, he (Halley) at once indicated the object of his visit by asking Newton what would be the curve described by the planets on the supposition that gravity diminished as the square of the distance. Newton immediately answered: an Ellipse. Struck with joy and amazement, Halley asked how he knew it? 'Why', replied he, 'I have calculated it'; and being asked for the calculation, he could not find it, but promised to send it to him."

Newton soon reconstructed the calculation and sent it to Halley; and Halley, filled with enthusiasm and admiration, urged Newton to write out in detail all of his work on motion and gravitation. Spurred on by Halley's encouragement and enthusiasm, Newton began to put his research in order. He returned to the problems which had occupied him during the plague years, and now his progress was rapid because he had invented integral calculus. This allowed him to prove rigorously that terrestrial gravitation acts as though all the earth's mass were concentrated at its center. Newton also had available an improved value for the radius of the earth, measured by the French astronomer Jean Picard (1620-1682). This time, when he approached the problem of gravitation, everything fell into place.

By the autumn of 1684, Newton was ready to give a series of lectures on dynamics, and he sent the notes for these lectures to Halley in the form of a small booklet entitled *On the Motion of Bodies*. Halley persuaded Newton to develop these notes into a larger

book, and with great tact and patience he struggled to keep a controversy from developing between Newton, who was neurotically sensitive, and Hooke, who was claiming his share of recognition in very loud tones, hinting that Newton was guilty of plagiarism.

Although Newton was undoubtedly the greatest physicist of all time, he had his shortcomings as a human being; and he reacted by striking out from his book every single reference to Robert Hooke. The Royal Society at first offered to pay for the publication costs of Newton's book, but because a fight between Newton and Hooke seemed possible, the Society discretely backed out. Halley then generously offered to pay the publication costs himself, and in 1686 Newton's great book was printed. It is entitled *Philosophiae Naturalis Principia Mathematica*, (The Mathematical Principles of Natural Philosophy), and it is divided into three sections.

The first book sets down the general principles of mechanics. In it, Newton states his three laws of motion, and he also discusses differential and integral calculus (both invented by himself).

In the second book, Newton applies these methods to systems of particles and to hydrodynamics. For example, he calculates the velocity of sound in air from the compressibility and density of air; and he treats a great variety of other problems, such as the problem of calculating how a body moves when its motion is slowed by a resisting medium, such as air or water.

The third book is entitled *The System of the World*. In this book, Newton sets out to derive the entire behavior of the solar system from his three laws of motion and from his law of universal gravitation. From these, he not only derives all three of Kepler's laws, but he also calculates the periods of the planets and the periods of their moons; and he explains such details as the flattened, non-spherical shape of the earth, and the slow precession of its axis about a fixed axis in space. Newton also calculated the irregular motion of the moon resulting from the combined attractions of the earth and the sun; and he determined the mass of the moon from the behavior of the tides.

Newton's *Principia* is generally considered to be the greatest scientific work of all time. To present a unified theory explaining such a wide variety of phenomena with so few assumptions was a magnificent and unprecedented achievement; and Newton's contemporaries immediately recognized the importance of what he had done.

The great Dutch physicist, Christian Huygens (1629-1695), inventor of the pendulum clock and the wave theory of light, travelled to England with the express purpose of meeting Newton. Voltaire, who for reasons of personal safety was forced to spend three years in England, used the time to study Newton's *Principia*; and when he returned to France, he persuaded his mistress, Madame du Chatelet, to translate the *Principia* into French; and Alexander Pope, expressing the general opinion of his contemporaries, wrote a famous couplet, which he hoped would be carved on Newton's tombstone:

"Nature and Nature's law lay hid in night.

God said: 'Let Newton be!', and all was light!"

The Newtonian synthesis was the first great achievement of a new epoch in human thought, an epoch which came to be known as the "Age of Reason" or the "Enlightenment". We might ask just what it was in Newton's work that so much impressed the intellectuals

of the 18th century. The answer is that in the Newtonian system of the world, the entire evolution of the solar system is determined by the laws of motion and by the positions and velocities of the planets and their moons at a given instant of time. Knowing these, it is possible to predict all of the future and to deduce all of the past.

The Newtonian system of the world is like an enormous clock which has to run on in a predictable way once it is started. In this picture of the world, comets and eclipses are no longer objects of fear and superstition. They too are part of the majestic clockwork of the universe. The Newtonian laws are simple and mathematical in form; they have complete generality; and they are unalterable. In this picture, although there are no miracles or exceptions to natural law, nature itself, in its beautiful works, can be regarded as miraculous.

Newton's contemporaries knew that there were other laws of nature to be discovered besides those of motion and gravitation; but they had no doubt that, given time, all of the laws of nature would be discovered. The climate of intellectual optimism was such that many people thought that these discoveries would be made in a few generations, or at most in a few centuries.

In 1704, Newton published a book entitled *Opticks*, expanded editions of which appeared in 1717 and 1721. Among the many phenomena discussed in this book are the colors produced by thin films. For example, Newton discovered that when he pressed two convex lenses together, the thin film of air trapped between the lenses gave rise to rings of colors ("Newton's rings"). The same phenomenon can be seen in the colors of soap bubbles or in films of oil on water.

In order to explain these rings, Newton postulated that "...every ray of light in its passage through any refracting surface is put into a transient constitution or state, which in the progress of the ray returns at equal intervals, and disposes the ray at every return to be easily transmitted through the next refracting surface and between the returns to be easily reflected from it."

Newton's rings were later understood on the basis of the wave theory of light advocated by Huygens and Hooke. Each color has a characteristic wavelength, and is easily reflected when the ratio of the wavelength to the film thickness is such that the wave reflected from the bottom surface of the film interferes constructively with the wave reflected from the top surface. However, although he ascribed periodic "fits of easy reflection" and "fits of easy transmission" to light, and although he suggested that a particular wavelength is associated with each color, Newton rejected the wave theory of light, and believed instead that light consists of corpuscles emitted from luminous bodies.

Newton believed in his corpuscular theory of light because he could not understand on the basis of Huygens' wave theory how light casts sharp shadows. This is strange, because in his *Opticks* he includes the following passage:

"Grimaldo has inform'd us that if a beam of the sun's light be let into a dark room through a very small hole, the shadows of things in this light will be larger than they ought to be if the rays went on by the bodies in straight lines, and that these shadows have three parallel fringes, bands or ranks of colour'd light adjacent to them. But if the hole be enlarg'd, the fringes grow broad and run into one another, so that they cannot be

distinguish'd”

After this mention of the discovery of diffraction by the Italian physicist, Francesco Maria Grimaldi (1618-1663), Newton discusses his own studies of diffraction. Thus, Newton must have been aware of the fact that light from a very small source does not cast completely sharp shadows!

Newton felt that his work on optics was incomplete, and at the end of his book he included a list of “Queries”, which he would have liked to have investigated. He hoped that this list would help the research of others. In general, although his contemporaries were extravagant in praising him, Newton’s own evaluation of his work was modest. “I do not know how I may appear to the world”, he wrote, “but to myself I seem to have been only like a boy playing on the seashore and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.”

2.3 Huygens and Leibniz

Meanwhile, on the continent, mathematics and physics had been developing rapidly, stimulated by the writings of René Descartes. One of the most distinguished followers of Descartes was the Dutch physicist, Christian Huygens (1629-1695).

Huygens was the son of an important official in the Dutch government. After studying mathematics at the University of Leiden, he published the first formal book ever written about probability. However, he soon was diverted from pure mathematics by a growing interest in physics.

In 1655, while working on improvements to the telescope together with his brother and the Dutch philosopher Benedict Spinoza, Huygens invented an improved method for grinding lenses. He used his new method to construct a twenty-three foot telescope, and with this instrument he made a number of astronomical discoveries, including a satellite of Saturn, the rings of Saturn, the markings on the surface of Mars and the Orion Nebula.

Huygens was the first person to estimate numerically the distance to a star. By assuming the star Sirius to be exactly as luminous as the sun, he calculated the distance to Sirius, and found it to be 2.5 trillion miles. In fact, Sirius is more luminous than the sun, and its true distance is twenty times Huygens’ estimate.

Another of Huygens’ important inventions is the pendulum clock. Improving on Galileo’s studies, he showed that for a pendulum swinging in a circular arc, the period is not precisely independent of the amplitude of the swing. Huygens then invented a pendulum with a modified arc, not quite circular, for which the swing was exactly isochronous. He used this improved pendulum to regulate the turning of cog wheels, driven by a falling weight; and thus he invented the pendulum clock, almost exactly as we know it today.

In discussing Newton’s contributions to optics, we mentioned that Huygens opposed Newton’s corpuscular theory of light, and instead advocated a wave theory. Huygens believed that the rapid motion of particles in a hot body, such as a candle flame, produces a wave-like disturbance in the surrounding medium; and he believed that this wavelike



Figure 2.2: Christian Huygens. Public domain, Wikimedia Commons

disturbance of the “ether” produces the sensation of vision by acting on the nerves at the back of our eyes.

In 1678, while he was working in France under the patronage of Louis XIV, Huygens composed a book entitled *Traité de la Lumière*, (Treatise on Light), in which he says:

“...It is inconceivable to doubt that light consists of the motion of some sort of matter. For if one considers its production, one sees that here upon the earth it is chiefly engendered by fire and flame, which undoubtedly contain bodies in rapid motion, since they dissolve and melt many other bodies, even the most solid; or if one considers its effects, one sees that when light is collected, as by concave mirrors, it has the property of burning as fire does, that is to say, it disunites the particles of bodies. This is assuredly the mark of motion, at least in the true philosophy in which one conceives the causes of all natural effects in terms of mechanical motions...”

“Further, when one considers the extreme speed with which light spreads on every side, and how, when it comes from different regions, even from those directly opposite, the rays traverse one another without hindrance, one may well understand that when we see a luminous object, it cannot be by any transport of matter coming to us from the object, in the way in which a shot or an arrow traverses the air; for assuredly that would too greatly impugn these two properties of light, especially the second of them. It is in some other way that light spreads; and that which can lead us to comprehend it is the knowledge which we have of the spreading of sound in the air.”

Huygens knew the velocity of light rather accurately from the work of the Danish astronomer, Ole Rømer (1644-1710), who observed the moons of Jupiter from the near and far sides of the earth’s orbit. By comparing the calculated and observed times for the moons to reach a certain configuration, Rømer was able to calculate the time needed for light to propagate across the diameter of the earth’s orbit. In this way, Rømer calculated the velocity of light to be 227,000 kilometers per second. Considering the early date of this first successful measurement of the velocity of light, it is remarkably close to the accepted modern value of 299,792 kilometers per second. Thus Huygens knew that although the speed of light is enormous, it is not infinite.

Huygens considered the propagation of a light wave to be analogous to the spreading of sound, or the widening of the ripple produced when a pebble is thrown into still water. He developed a mathematical principle for calculating the position of a light wave after a short interval of time if the initial surface describing the wave front is known. Huygens considered each point on the initial wave front to be the source of spherical wavelets, moving outward with the speed of light in the medium. The surface marking the boundary between the region outside all of the wavelets and the region inside some of them forms the new wave front.

If one uses Huygens’ Principle to calculate the wave fronts and rays for light from a point source propagating past a knife edge, one finds that a part of the wave enters the shadow region. This is, in fact, precisely the effect which was observed by both Grimaldi and Newton, and which was given the name “diffraction” by Grimaldi. In the hands of Thomas Young (1773-1829) and Augustin Jean Fresnel (1788-1827), diffraction effects later became a strong argument in favor of Huygens’ wave theory of light.

(You can observe diffraction effects yourself by looking at a point source of light, such as a distant street lamp, through a piece of cloth, or through a small slit or hole. Another type of diffraction can be seen by looking at light reflected at a grazing angle from a phonograph record. The light will appear to be colored. This effect is caused by the fact that each groove is a source of wavelets, in accordance with Huygens' Principle. At certain angles, the wavelets will interfere constructively, the angles for constructive interference being different for each color.)

Interestingly, modern quantum theory (sometimes called wave mechanics) has shown that *both* Huygens' wave theory of light and Newton's corpuscular theory contain aspects of the truth! Light has both wave-like and particle-like properties. Furthermore, quantum theory has shown that small particles of matter, such as electrons, also have wave-like properties! For example, electrons can be diffracted by the atoms of a crystal in a manner exactly analogous to the diffraction of light by the grooves of a phonograph record. Thus the difference of opinion between Huygens and Newton concerning the nature of light is especially interesting, since it foreshadows the wave-particle duality of modern physics.

Among the friends of Christian Huygens was the German philosopher and mathematician Gottfried Wilhelm Leibniz (1646-1716). Leibniz was a man of universal and spectacular ability. In addition to being a mathematician and philosopher, he was also a lawyer, historian and diplomat. He invented the doctrine of balance of power, attempted to unify the Catholic and Protestant churches, founded academies of science in Berlin and St. Petersburg, invented combinatorial analysis, introduced determinants into mathematics, independently invented the calculus, invented a calculating machine which could multiply and divide as well as adding and subtracting, acted as advisor to Peter the Great and originated the theory that "this is the best of all possible worlds" (later mercilessly satirized by Voltaire in *Candide*).

Leibniz learned mathematics from Christian Huygens, whom he met while travelling as an emissary of the Elector of Mainz. Since Huygens too was a man of very wide interests, he found the versatile Leibniz congenial, and gladly agreed to give him lessons. Leibniz continued to correspond with Huygens and to receive encouragement from him until the end of the older man's life.

In 1673, Leibniz visited England, where he was elected to membership by the Royal Society. During the same year, he began his work on calculus, which he completed and published in 1684. Newton's invention of differential and integral calculus had been made much earlier than the independent work of Leibniz, but Newton did not publish his discoveries until 1687. This set the stage for a bitter quarrel over priority between the admirers of Newton and those of Leibniz. The quarrel was unfortunate for everyone concerned, especially for Leibniz himself. He had taken a position in the service of the Elector of Hanover, which he held for forty years. However, in 1714, the Elector was called to the throne of England as George I. Leibniz wanted to accompany the Elector to England, but was left behind, mainly because of the quarrel with the followers of Newton. Leibniz died two years later, neglected and forgotten, with only his secretary attending the funeral.



Figure 2.3: Portrait of Gottfried Wilhelm Leibniz by J.F. Wentzel. Public domain, Wikimedia Commons

2.4 The Bernoullis and Euler

Among the followers of Leibniz was an extraordinary family of mathematicians called Bernoulli. They were descended from a wealthy merchant family in Basel, Switzerland. The head of the family, Nicolas Bernoulli the Elder, tried to force his three sons, James (1654-1705), Nicolas II (1662-1716) and John (1667-1748) to follow him in carrying on the family business. However, the eldest son, James, had taught himself the Leibnizian form of calculus, and instead became Professor of Mathematics at the University of Basel. His motto was "*Invicto patre sidera verso*" ("Against my father's will, I study the stars").

Nicolas II and John soon caught their brother's enthusiasm, and they learned calculus from him. John became Professor of Mathematics in Gröningen and Nicolas II joined the faculty of the newly-formed Academy of St. Petersburg. John Bernoulli had three sons, Nicolas III (1695-1726), Daniel (1700-1782) and John II (1710-1790), all of whom made notable contributions to mathematics and physics. In fact, the family of Nicolas Bernoulli the Elder produced a total of nine famous mathematicians in three generations!

Daniel Bernoulli's brilliance made him stand out even among the other members of his gifted family. He became professor of mathematics at the Academy of Sciences in St. Petersburg when he was twenty-five. After eight Russian winters however, he returned to his native Basel. Since the chair in mathematics was already occupied by his father, he was given a vacant chair, first in anatomy, then in botany, and finally in physics. In spite of the variety of his titles, however, Daniel's main work was in applied mathematics, and he has been called the father of mathematical physics.

One of the good friends of Daniel Bernoulli and his brothers was a young man named Leonhard Euler (1707-1783). He came to their house once a week to take private lessons from their father, John Bernoulli. Euler was destined to become the most prolific mathematician in history, and the Bernoullis were quick to recognize his great ability. They persuaded Euler's father not to force him into a theological career, but instead to allow him to go with Nicolas III and Daniel to work at the Academy in St. Petersburg.

Euler married the daughter of a Swiss painter and settled down to a life of quiet work, producing a large family and an unparalleled output of papers. A recent edition of Euler's works contains 70 quarto volumes of published research and 14 volumes of manuscripts and letters. His books and papers are mainly devoted to algebra, the theory of numbers, analysis, mechanics, optics, the calculus of variations (invented by Euler), geometry, trigonometry and astronomy; but they also include contributions to shipbuilding science, architecture, philosophy and musical theory!

Euler achieved this enormous output by means of a calm and happy disposition, an extraordinary memory and remarkable powers of concentration, which allowed him to work even in the midst of the noise of his large family. His friend Thiébauld described Euler as sitting "...with a cat on his shoulder and a child on his knee - that was how he wrote his immortal works".

In 1771, Euler became totally blind. Nevertheless, aided by his sons and his devoted scientific assistants, he continued to produce work of fundamental importance. It was his habit to make calculations with chalk on a board for the benefit of his assistants, although

he himself could not see what he was writing. Appropriately, Euler was making such computations on the day of his death. On September 18, 1783, Euler gave a mathematics lesson to one of his grandchildren, and made some calculations on the motions of balloons. He then spent the afternoon discussing the newly-discovered planet Uranus with two of his assistants. At five o'clock, he suffered a cerebral hemorrhage, lost consciousness, and died soon afterwards. As one of his biographers put it, "The chalk fell from his hand; Euler ceased to calculate, and to live".

In the eighteenth century it was customary for the French Academy of Sciences to propose a mathematical topic each year, and to award a prize for the best paper dealing with the problem. Léonard Euler and Daniel Bernoulli each won the Paris prize more than ten times, and they share the distinction of being the only men ever to do so. John Bernoulli is said to have thrown his son out of the house for winning the Paris prize in a year when he himself had competed for it.

Euler and the Bernoullis did more than anyone else to develop the Leibnizian form of calculus into a workable tool and to spread it throughout Europe. They applied it to a great variety of problems, from the shape of ships' sails to the kinetic theory of gasses. An example of the sort of problem which they considered is the vibrating string.

In 1727, John Bernoulli in Basel, corresponding with his son Daniel in St. Petersburg, developed an approximate set of equations for the motion of a vibrating string by considering it to be a row of point masses, joined together by weightless springs. Then Daniel boldly passed over to the continuum limit, where the masses became infinitely numerous and small.

The result was Daniel Bernoulli's famous wave equation, which is what we would now call a partial differential equation. He showed that the wave equation has sinusoidal solutions, and that the sum of any two solutions is also a solution. This last result, his superposition principle, is a mathematical proof of a property of wave motion noticed by Huygens. The fact that many waves can propagate simultaneously through the same medium without interacting was one of the reasons for Huygens' belief that light is wavelike, since he knew that many rays of light from various directions can cross a given space simultaneously without interacting. Because of their work with partial differential equations, Daniel Bernoulli and Léonard Euler are considered to be the founders of modern theoretical physics.

2.5 The Age of Reason

Political philosophy of the Enlightenment

The 16th, 17th and 18th centuries have been called the "Age of Discovery", and the "Age of Reason", but they might equally well be called the "Age of Observation". On every side, new worlds were opening up to the human mind. The great voyages of discovery had revealed new continents, whose peoples demonstrated alternative ways of life. The telescopic exploration of the heavens revealed enormous depths of space, containing myriads of previously unknown stars; and explorations with the microscope revealed a new and

marvelously intricate world of the infinitesimally small.

In the science of this period, the emphasis was on careful observation. This same emphasis on observation can be seen in the Dutch and English painters of the period. The great Dutch masters, such as Jan Vermeer (1632-1675), Frans Hals (1580-1666), Pieter de Hooch (1629-1678) and Rembrandt van Rijn (1606-1669), achieved a careful realism in their paintings and drawings which was the artistic counterpart of the observations of the pioneers of microscopy, Anton van Leeuwenhoek and Robert Hooke. These artists were supported by the patronage of the middle class, which had become prominent and powerful both in England and in the Netherlands because of the extensive world trade in which these two nations were engaged.

Members of the commercial middle class needed a clear and realistic view of the world in order to succeed with their enterprises. (An aristocrat of the period, on the other hand, might have been more comfortable with a somewhat romanticized and out-of-focus vision, which would allow him to overlook the suffering and injustice upon which his privileges were based.) The rise of the commercial middle class, with its virtues of industriousness, common sense and realism, went hand in hand with the rise of experimental science, which required the same virtues for its success.

In England, the House of Commons (which reflected the interests of the middle class), had achieved political power, and had demonstrated (in the Puritan Rebellion of 1640 and the Glorious Revolution of 1688) that Parliament could execute or depose any monarch who tried to rule without its consent. In France, however, the situation was very different.

After passing through a period of disorder and civil war, the French tried to achieve order and stability by making their monarchy more absolute. The movement towards absolute monarchy in France culminated in the long reign of Louis XIV, who became king in 1643 and who ruled until he died in 1715.

The historical scene which we have just sketched was the background against which the news of Newton's scientific triumph was received. The news was received by a Europe which was tired of religious wars; and in France, it was received by a middle class which was searching for an ideology in its struggle against the *ancien régime*.

To the intellectuals of the 18th century, the orderly Newtonian cosmos, with its planets circling the sun in obedience to natural law, became an imaginative symbol representing rationality. In their search for a society more in accordance with human nature, 18th century Europeans were greatly encouraged by the triumphs of science. Reason had shown itself to be an adequate guide in natural philosophy. Could not reason and natural law also be made the basis of moral and political philosophy? In attempting to carry out this program, the philosophers of the Enlightenment laid the foundations of psychology, anthropology, social science, political science and economics.

One of the earliest and most influential of these philosophers was John Locke (1632-1705), a contemporary and friend of Newton. In his *Second Treatise on Government*, published in 1690, John Locke's aim was to refute the doctrine that kings rule by divine right, and to replace that doctrine by an alternative theory of government, derived by reason from the laws of nature. According to Locke's theory, men originally lived together

without formal government:

“Men living together according to reason,” he wrote, “without a common superior on earth with authority to judge between them, is properly the state of nature... A state also of equality, wherein all the power and jurisdiction is reciprocal, no one having more than another; there being nothing more evident than that creatures of the same species, promiscuously born to all the same advantages of nature and the use of the same facilities, should also be equal amongst one another without subordination or subjection...”

“But though this be a state of liberty, yet it is not a state of licence... The state of nature has a law to govern it, which obliges every one; and reason, which is that law, teaches all mankind who will but consult it, that being equal and independent, no one ought to harm another in his life, health, liberty or possessions.”

In Locke’s view, a government is set up by means of a social contract. The government is given its powers by the consent of the citizens in return for the services which it renders to them, such as the protection of their lives and property. If a government fails to render these services, or if it becomes tyrannical, then the contract has been broken, and the citizens must set up a new government.

Locke’s influence on 18th century thought was very great. His influence can be seen, for example, in the wording of the American Declaration of Independence. In England, Locke’s political philosophy was accepted by almost everyone. In fact, he was only codifying ideas which were already in wide circulation and justifying a revolution which had already occurred. In France, on the other hand, Locke’s writings had a revolutionary impact.

Credit for bringing the ideas of both Newton and Locke to France, and making them fashionable, belongs to Francois Marie Arouet (1694-1778), better known as “Voltaire”. Besides persuading his mistress, Madame de Chatelet, to translate Newton’s *Principia* into French, Voltaire wrote an extremely readable commentary on the book; and as a result, Newton’s ideas became highly fashionable among French intellectuals. Voltaire lived with Madame du Chatelet until she died, producing the books which established him as the leading writer of Europe, a prophet of the Age of Reason, and an enemy of injustice, feudalism and superstition.

The Enlightenment in France is considered to have begun with Voltaire’s return from England in 1729; and it reached its high point with the publication of the *Encyclopedia* between 1751 and 1780. Many authors contributed to the *Encyclopedia*, which was an enormous work, designed to sum up the state of human knowledge.

Turgot and Montesquieu wrote on politics and history; Rousseau wrote on music, and Buffon on natural history; Quesnay contributed articles on agriculture, while the Baron d’Holbach discussed chemistry. Other articles were contributed by Condorcet, Voltaire and d’Alembert. The whole enterprise was directed and inspired by the passionate faith of Denis Diderot (1713-1784). The men who took part in this movement called themselves “*philosophes*”. Their creed was a faith in reason, and an optimistic belief in the perfectibility of human nature and society by means of education, political reforms, and the scientific method.

The *philosophes* of the Enlightenment visualized history as a long progression towards the discovery of the scientific method. Once discovered, this method could never be lost;

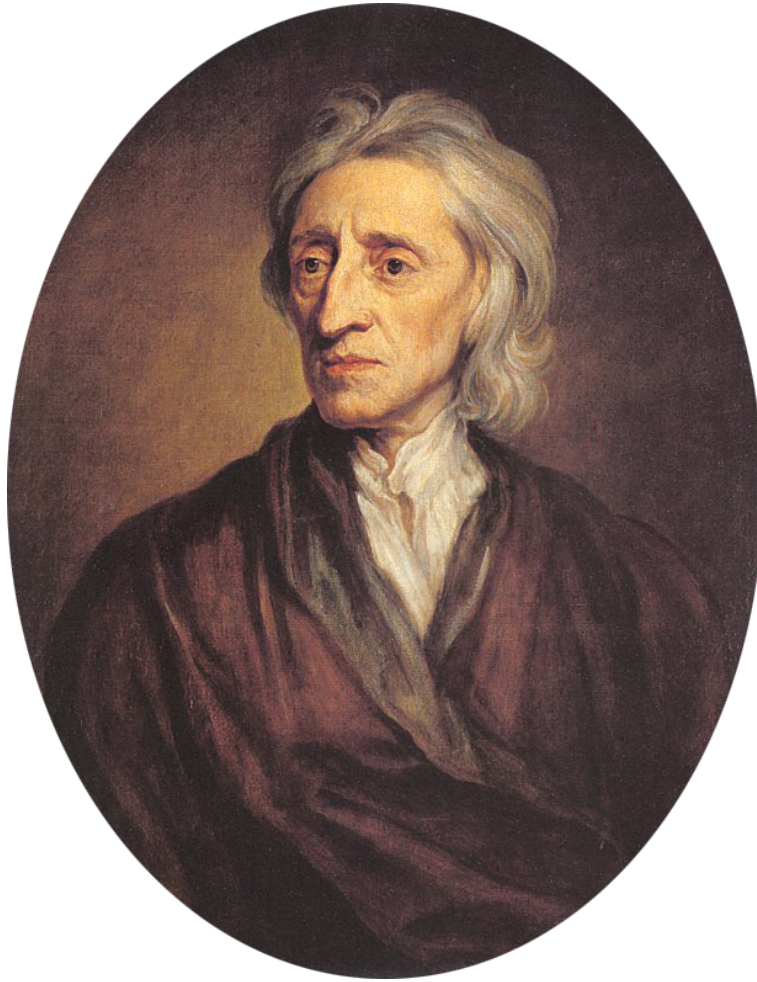


Figure 2.4: John Locke (1632-1705): “Men living together according to reason, without a common superior on earth with authority to judge between them, is properly the state of nature... A state also of equality, wherein all the power and jurisdiction is reciprocal, no one having more than another; there being nothing more evident than that creatures of the same species, promiscuously born to all the same advantages of nature and the use of the same facilities, should also be equal amongst one another without subordination or subjugation...”

and it would lead inevitably (they believed) to both the material and moral improvement of society. The *philosophes* believed that science, reason, and education, together with the principles of political liberty and equality, would inevitably lead humanity forward to a new era of happiness. These ideas were the faith of the Enlightenment; they influenced the French and American revolutions; and they are still the basis of liberal political belief.

2.6 Voltaire and Rousseau

Voltaire (1694-1778)

Francois-Marie Arouet, who later changed his name to Voltaire, was born in Paris. His father was a lawyer and a minor treasury official, while his mother's family was on the lowest rank of the French nobility. He was educated by Jesuits at Collège Louis-le-Grande, where he learned Latin theology and rhetoric. He later became fluent in Italian, Spanish and English.

Despite his father's efforts to make him study law, the young Voltaire was determined to become a writer. He eventually became the author of more than 2,000 books and pamphlets and more than 20,000 letters. His works include many forms of writing, including plays, poems, novels, essays and historical and scientific works. His writings advocated civil liberties, and he used his satirical and witty style of writing to criticize intolerance, religious dogma and absolute monarchy. Because of the intolerance and censorship of his day, he was frequently in trouble and sometimes imprisoned. Nevertheless, his works were very popular, and he eventually became extremely rich, partly through clever investment of money gained through part ownership of a lottery.

During a period of forced exile in England, Voltaire mixed with the English aristocracy, meeting Alexander Pope, John Gay, Jonathan Swift, Lady Mary Wortley Montague, Sarah, Duchess of Marlborough, and many other members of the nobility and royalty. He admired the English system of constitutional monarchy, which he considered to be far superior to the absolutism then prevailing in France. In 1733, he published a book entitled *Letters concerning the English Nation*, in London. When French translation was published in 1734, Voltaire was again in deep trouble. In order to avoid arrest, he stayed in the country château belonging to Émilie du Châtelet and her husband, the Marquis du Châtelet.

As a result, Madame du Châtelet became his mistress and the relationship lasted for 16 years. Her tolerant husband, the Marquis, who shared their intellectual and scientific interests, often lived together with them. Voltaire paid for improvements to the château, and together, the Marquis and Voltaire collected more than 21,000 books, and enormous number for that time. Madame du Châtelet translated Isaac Newton's great book, *Principia Mathematica*, into French, and her translation was destined to be the standard one until modern times. Meanwhile, Voltaire wrote a French explanation of the ideas of the *Principia*, which made these ideas accessible to a wide public in France. Together, the Marquis, his wife and Voltaire also performed many scientific experiments, for example experiments designed to study the nature of fire.

Voltaire's vast literary output is available today in approximately 200 volumes, published by the University of Oxford, where the Voltaire Foundation is now established as a research department.

Rousseau (1712-1778)

In 1754 Rousseau wrote: "The first man who, having fenced in a piece of land, said 'This is mine', and found people naïve enough to believe him, that man was the true founder of civil society. From how many crimes, wars, and murders, from how many horrors and misfortunes might not any one have saved mankind, by pulling up the stakes, or filling up the ditch, and crying to his fellows: Beware of listening to this impostor; you are undone if you once forget that the fruits of the earth belong to us all, and the earth itself to nobody."

Later, he began his influential book *The Social Contract*, published in 1752, with the dramatic words: "Man is born free, and everywhere he is in chains. Those who think themselves the masters of others are indeed greater slaves than they." Rousseau concludes Chapter 3 of this book with the words: "Let us then admit that force does not create right, and that we are obliged to obey only legitimate powers". In other words, the ability to coerce is not a legitimate power, and there is no rightful duty to submit to it. A state has no right to enslave a conquered people.

These ideas, and those of John Locke, were reaffirmed in 1776 by the American Declaration of Independence: "We hold these truths to be self-evident: That all men are created equal. That they are endowed by their Creator with certain inalienable rights, and that among these are the rights to life, liberty and the pursuit of happiness; and that to pursue these rights, governments are instituted among men, deriving their just powers from the consent of the governed."

Today, in an era of government tyranny and subversion of democracy, we need to remember that the just powers of any government are not derived from the government's ability to use of force, but exclusively from the consent of the governed.



Figure 2.5: Voltaire used his satirical and witty style of writing to criticize intolerance, religious dogma and absolute monarchy. He wrote more than 2,000 books and pamphlets and more than 20,000 letters. His writings made a significant contribution to the Enlightenment, and paved the way for revolutions both in France and America.



Figure 2.6: The frontpiece of Voltaire's book popularizing Newton's ideas for French readers. Madame du Châtelet appears as a muse, reflecting Newton's thoughts down to Voltaire.

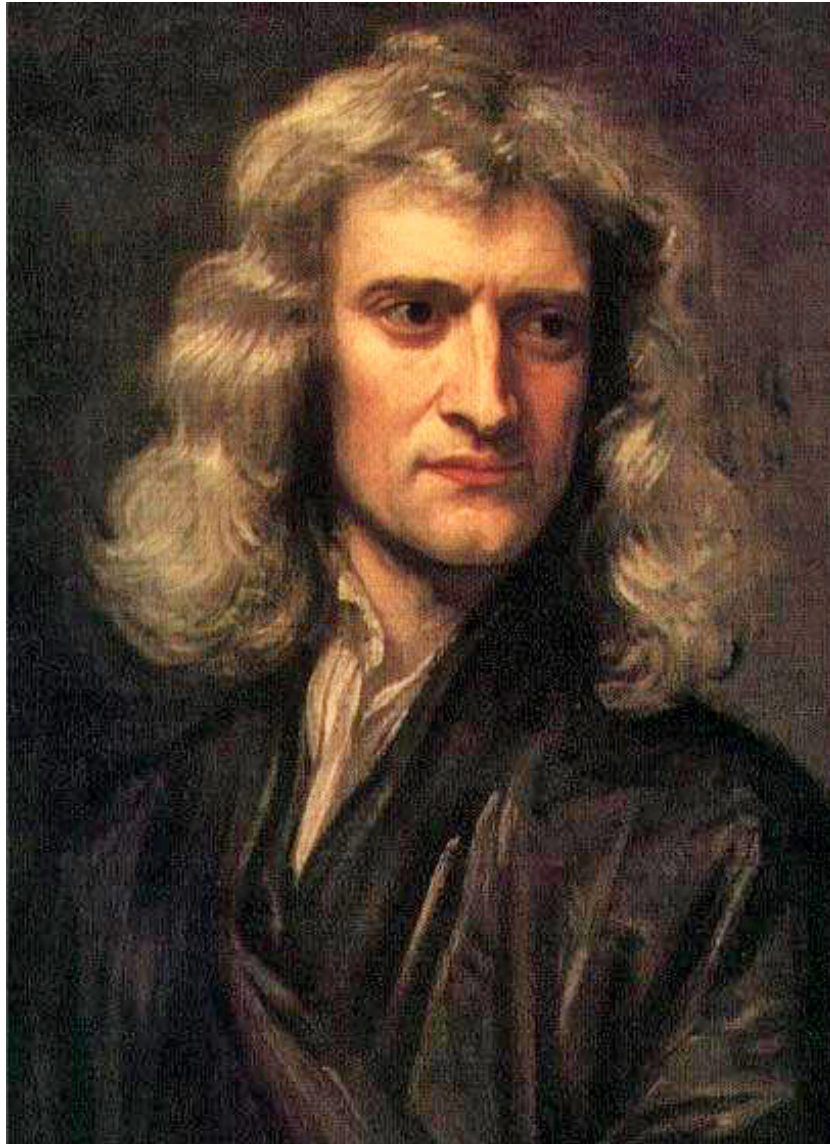


Figure 2.7: The work of Sir Isaac Newton (1642-1726) illustrates a key aspect of human cultural evolution: Because of the introduction of printing in Europe, Newton was able to build on the work of his predecessors, Copernicus, Brahe, Galileo and Kepler. He could never have achieved his great synthesis alone. During the Enlightenment, Newton became a symbol of rationality and reason. Alexander Pope wrote: “Nature, and nature’s laws, lay hid in night. God said ‘Let Newton be’, and all was light!”

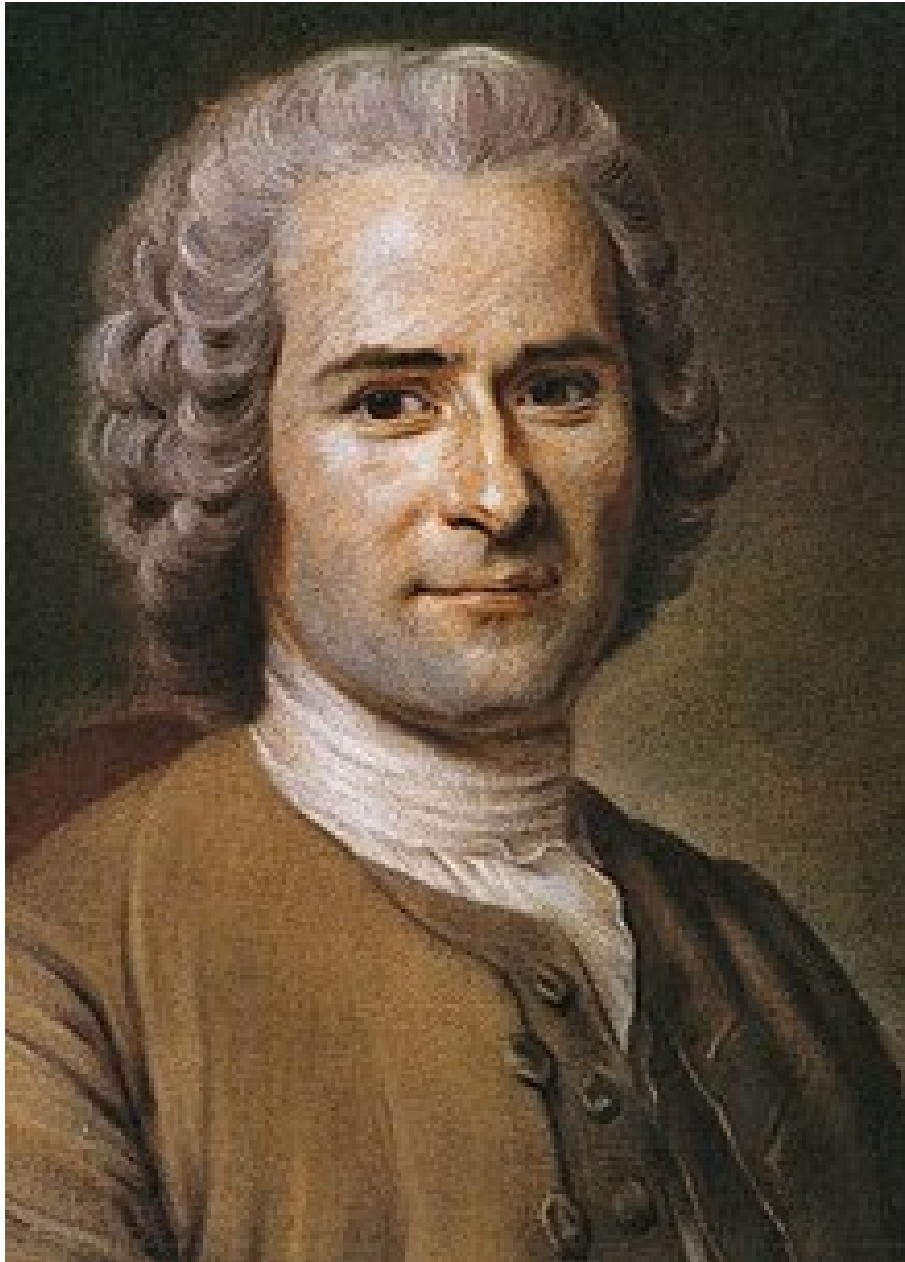


Figure 2.8: Unlike Voltaire, Rousseau was not an advocate of science, but instead believed in the importance of emotions. He believed that civilization has corrupted humans rather than making them better. Rousseau was a pioneer of the romantic movement. His book, *The Social Contract*, remains influential today.

2.7 The printer and publisher Joseph Johnson

As an example of the influence of printing on the liberation of ideas, we can consider the circle of important authors that formed around the English printer and publisher Joseph Johnson (1738-1809). His weekly dinners for authors were famous. Among the many great thinkers, artists, scientists, writers and religious dissenters who attended these dinners, or whose works he published, were William Cowper, Erasmus Darwin, William Blake, Henry Fuseli, Mary Wollstonecraft, William Godwin, Thomas Robert Malthus, Thomas Paine, Priscilla Wakefield, Gilbert Wakefield. Benjamin Franklin, Richard Price and Joseph Priestly.

Throughout her career, the pioneering feminist writer Mary Wollstonecraft was aided by Johnson. As she wrote to her sister, she had decided to become the first of a new genus: a professional female writer. Having learned French and German, she translated Necker's *Of the Importance of Religious Opinions* and Saltzman's *Elements of Morality for the Use of Children*. Mary was helped in her new career by the liberal publisher, Joseph Johnson, who was also the publisher of Thomas Paine and William Godwin. Mary met these already famous authors at Johnson's dinner parties, and conversations with them helped to expand her knowledge and ambitions. Joseph Johnson was a very brave man. By publishing the works of radical authors, he was risking arrest by England's repressive government. In her letters, Mary described Johnson as "a father and brother".

At Johnson's parties Mary met, for the second time, the famous novelist and philosopher William Godwin. This time, they both formed a higher opinion of each other than at their first meeting. A passionate love affair developed between them, and when Mary became pregnant, they were married. Tragically, Mary Wollstonecraft died in childbirth. Her daughter Mary would later become the wife of Godwin's admirer, the poet Percy Bysshe Shelley, and Mary Shelly created the enduring masterpiece *Frankenstein*.



Figure 2.9: The printer and publisher Joseph Johnson (1738-1809). Johnson was the publisher of William Godwin, Mary Wollstonecraft and Thomas Paine. His dinner parties included many famous dissenting thinkers of the time.



Figure 2.10: Mary Wollstonecraft in a painting by John Opie. She called Joseph Johnson “my father and brother”.



Figure 2.11: The famous scientist and dissenter, Joseph Priestly, in a portrait by Henry Fuseli, commissioned by Joseph Johnson. Priestly and Fuseli were among Johnson's closest friends.

2.8 Mary Wollstonecraft's *Vindication of the Rights of Woman*

Mary Wollstonecraft, whom we mentioned above in connection with the publisher Joseph Johnson, published a book in 1792 entitled *Vindication of the Rights of Woman*. In it she said:

"My main argument is built on this simple principle, that if [woman] be not prepared by education to become the companion of man, she will stop the progress of knowledge and virtue; for truth must be common to all".

Wollstonecraft contends that society will degenerate without educated women, particularly because mothers are the primary educators of young children. She attributes the problem of uneducated women to men and to "...a false system of education, gathered from the books written on this subject by men who [consider] females rather as women than human creatures"

"Taught from their infancy that beauty is woman's scepter, the mind shapes itself to the body, and, roaming round its gilt cage, only seeks to adorn its prison.

"I then would fain convince reasonable men of the importance of some of my remarks; and prevail on them to weigh dispassionately the whole tenor of my observations. I appeal to their understandings; and, as a fellow-creature, claim, in the name of my sex, some interest in their hearts. I entreat them to assist to emancipate their companion, to make her a help meet for them! Would men but generously snap our chains, and be content with rational fellowship instead of slavish obedience, they would find us more observant daughters, more affectionate sisters, more faithful wives, more reasonable mothers: in a word, better citizens.

2.9 William Blake

Education as an engraver and printmaker

William Blake was born in 1757 in the Soho district of London. He was the third of seven children, two of whom died in infancy. His parents, who were English Dissenters, seem to have been reasonable wealthy during his childhood, since his father was able to purchase many books for him. Among these were books of engravings and drawings through which Blake became familiar with the works of Michelangelo, Raphael and Albrecht Dürer.

Recognizing their son's extremely independent temperament and his gifts as an artist, his parents sent him to an ordinary school only long enough to learn reading and writing, after which he was tutored at home by his mother, and later apprenticed to an engraver and printmaker. After he had finished his apprenticeship, the young Blake became a student at the Royal Academy. Finally, he opened his own engraving and printmaking shop.

Blake continued to read avidly on topics of all kinds, but was most influenced by his studies of the Bible.



Figure 2.12: Newton depicted in a print by William Blake (public domain).

Marriage

In 1782, while recovering from the pain of a rejected marriage proposal, Blake met Catherine Boucher, who was five years his junior. He told Catherine about the pain he had experienced and asked “Do you pity me?” When she answered that she did, Blake replied “Then I love you”.

Blake’s marriage to Catherine was an extremely happy one. She was illiterate, but he taught her to read and write. Later he also trained her as an engraver. She was an invaluable help to him, and she lifted his spirits whenever he was burdened by misfortunes. She said of her husband, “He is always in Heaven”.

Political activity

William Blake’s first collection of poems, *Poetical Sketches*, was printed around 1783. After his father’s death, Blake and former fellow apprentice James Parker opened a print shop in 1784, and began working with radical publisher Joseph Johnson. Johnson’s house was

a meeting-place for some leading English intellectual dissidents of the time: theologian and scientist Joseph Priestley, philosopher Richard Price, artist John Henry Fuseli, early feminist Mary Wollstonecraft and English-American revolutionary Thomas Paine. Along with William Wordsworth and William Godwin, Blake had great hopes for the French and American revolutions, but despaired with the rise of Robespierre and the Reign of Terror in France.

Blake illustrated *Original Stories from Real Life* (2nd edition, 1791) by Mary Wollstonecraft. They seem to have shared some views on sexual equality and the institution of marriage. In 1793 Blake published *Visions of the Daughters of Albion*, in which he condemned the cruel absurdity of enforced marriage without love and defended the right of women to complete self-fulfilment.

Some verses from Blake's *Auguries of Innocence*

To see a World in a Grain of Sand
And a Heaven in a Wild Flower
Hold Infinity in the palm of your hand
And Eternity in an hour

A Robin Red breast in a Cage
Puts all Heaven in a Rage

A Dove house filled with Doves & Pigeons
Shudders Hell thr' all its regions

A dog starvd at his Masters Gate
Predicts the ruin of the State

A Horse misusd upon the Road
Calls to Heaven for Human blood

Each outcry of the hunted Hare
A fibre from the Brain does tear

A Skylark wounded in the wing
A Cherubim does cease to sing

The Game Cock clipd & armd for fight
Does the Rising Sun affright

Every Wolfs & Lions howl
Raises from Hell a Human Soul

The wild deer, wandring here & there
Keeps the Human Soul from Care

The Lamb misusd breeds Public Strife
And yet forgives the Butchers knife

The Bat that flits at close of Eve
Has left the Brain that wont Believe

The Owl that calls upon the Night
Speaks the Unbelievers fright

He who shall hurt the little Wren
Shall never be belovd by Men

He who the Ox to wrath has moved
Shall never be by Woman loved

The wanton Boy that kills the Fly
Shall feel the Spiders enmity

He who torments the Chafers Sprite
Weaves a Bower in endless Night

The Catterpillar on the Leaf
Repeats to thee thy Mothers grief

Kill not the Moth nor Butterfly
For the Last Judgment draweth nigh

He who shall train the Horse to War
Shall never pass the Polar Bar

The Beggars Dog & Widows Cat
Feed them & thou wilt grow fat

The Gnat that sings his Summers Song
Poison gets from Slanders tongue

The poison of the Snake & Newt
Is the sweat of Envys Foot

The poison of the Honey Bee
Is the Artists Jealousy

The Princes Robes & Beggars Rags
Are Toadstools on the Misers Bags

A Truth thats told with bad intent
Beats all the Lies you can invent

The Whore & Gambler by the State
Licenced build that Nations Fate

The Harlots cry from Street to Street
Shall weave Old Englands winding Sheet

The Winners Shout the Losers Curse
Dance before dead Englands Hearse

Every Night & every Morn
Some to Misery are Born
Every Morn and every Night
Some are Born to sweet delight
Some are Born to sweet delight
Some are Born to Endless Night.

Jerusalem

And did those feet in ancient time
Walk upon England's mountains green?
And was the holy Lamb of God
On England's pleasant pastures seen?

And did the Countenance Divine
Shine forth upon our clouded hills?
And was Jerusalem builded here
Among these dark Satanic Mills?

Bring me my bow of burning gold!
Bring me my arrows of desire!
Bring me my spear! O clouds, unfold!
Bring me my chariot of fire!

I will not cease from mental fight,
Nor shall my sword sleep in my hand,
Till we have built Jerusalem
In England's green and pleasant land.

London

I wandered through each chartered street
Near which the chartered Thames doth flow.
A mark in every face I meet,
Marks of weakness, marks of woe.

In every cry of every man,
In every infant's cry of fear,
In every voice, in every ban,
The mind-forged manacles I hear.

How the chimney-sweeper's cry
Every blackening church appalls,
And how the hapless soldier's sigh
Runs in blood down palace-walls.

But most, through midnight streets I hear
How the youthful harlot's curse
Blasts the new-born infant's tear,
And blights with plagues the marriage-hearse.

2.10 William Godwin

Political Justice

In 1793 the English novelist and philosopher William Godwin published an enormously optimistic book, *Political Justice*. As the eighteenth century neared its end, this book became the focus of hopes for political reform and the center of the debate on human progress. Godwin was lifted briefly to enormous heights of fame and adulation, from which he plunged, a few years later, into relative obscurity.

In *Political Justice*, Godwin predicted a future society where scientific progress would liberate humans from material want. Godwin predicted that in the future, with the institution of war abolished, with a more equal distribution of property, and with the help of scientific improvements in agriculture and industry, much less labour would be needed

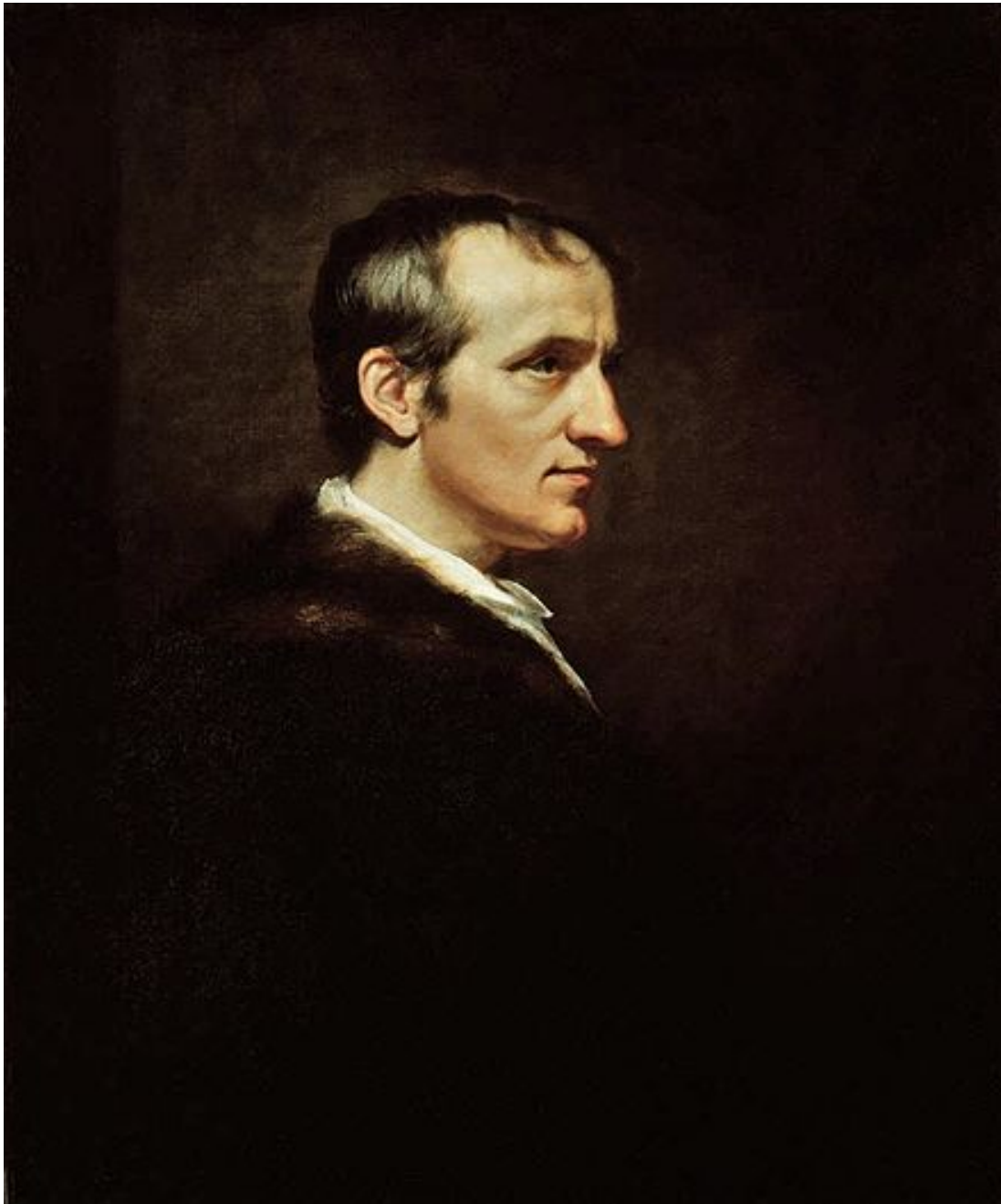


Figure 2.13: William Godwin in a painting by James Northcote (Wikipedia).

to support life. Luxuries are at present used to maintain artificial distinctions between the classes of society, Godwin wrote, but in the future values will change; humans will live more simply, and their efforts will be devoted to self-fulfillment and to intellectual and moral improvement, rather than to material possessions. With the help of automated agriculture, the citizens of a future society will need only a few hours a day to earn their bread.

Godwin went on to say, "The spirit of oppression, the spirit of servility and the spirit of fraud - these are the immediate growth of the established administration of property. They are alike hostile to intellectual improvement. The other vices of envy, malice, and revenge are their inseparable companions. In a state of society where men lived in the midst of plenty, and where all shared alike the bounties of nature, these sentiments would inevitably expire. The narrow principle of selfishness would vanish. No man being obliged to guard his little store, or provide with anxiety and pain for his restless wants, each would lose his own individual existence in the thought of the general good. No man would be the enemy of his neighbor, for they would have nothing to contend; and of consequence philanthropy would resume the empire which reason assigns her. Mind would be delivered from her perpetual anxiety about corporal support, and free to expatiate in the field of thought which is congenial to her. Each man would assist the inquiries of all."

Godwin insisted that there is an indissoluble link between politics, ethics and knowledge. *Political Justice* is an enthusiastic vision of what humans could be like at some future period when the trend towards moral and intellectual improvement has lifted men and women above their present state of ignorance and vice. Much of the savage structure of the penal system would then be unnecessary, Godwin believed. (At the time when he was writing, there were more than a hundred capital offenses in England, and this number had soon increased to almost two hundred. The theft of any object of greater value than ten shillings was punishable by hanging.)

In its present state, Godwin wrote, society decrees that the majority of its citizens "should be kept in abject penury, rendered stupid with ignorance and disgustful with vice, perpetuated in nakedness and hunger, goaded to the commission of crimes, and made victims to the merciless laws which the rich have instituted to oppress them". But human behavior is produced by environment and education, Godwin pointed out. If the conditions of upbringing were improved, behavior would also improve. In fact, Godwin believed that men and women are subject to natural laws no less than the planets of Newton's solar system. "In the life of every human", Godwin wrote, "there is a chain of causes, generated in that eternity which preceded his birth, and going on in regular procession through the whole period of his existence, in consequence of which it was impossible for him to act in any instance otherwise than he has acted."

The chain of causality in human affairs implies that vice and crime should be regarded with the same attitude with which we regard disease. The causes of poverty, ignorance, vice and crime should be removed. Human failings should be cured rather than punished. With this in mind, Godwin wrote, "our disapprobation of vice will be of the same nature as our disapprobation of an infectious distemper."

With improved environment and education, humans will reach a higher moral level. But

what is morality? Here Godwin draws heavily on his Christian background, especially on the moral principles of the Dissenting community. The Parable of the Good Samaritan illustrates the central principle of Christian ethics: We must love our neighbor as much as we love ourselves; but our neighbor is not necessarily a member of our immediate circle. He or she may be distant from us, in culture, in ethnic background or in geographical distance. Nevertheless, that person is still our neighbor, a member of the human family, and our duty to him or her is no less than our duty to those who are closest to us. It follows that narrow loyalties must be replaced or supplemented by loyalty to the interests of humanity as a whole.

Judging the benevolence of our actions is the responsibility of each individual conscience, Godwin says, not the responsibility of the State, and the individual must follow his or her conscience even if it conflicts with the dictates of the State. Each individual case should be judged by itself. If our institutions and laws meet the criteria of benevolence, justice and truth, we should give them our enthusiastic support; if not, we should struggle to change them. In giving personal judgement such a dominant role, Godwin anticipates the ideas of Thoreau, Tolstoy and Gandhi.

The exercise of individual judgement requires great honesty and objectivity. In order for the power of truth and reason to overcome prejudice and error, Godwin says, it is necessary for each person always to speak and act with complete sincerity. Even the degree of insincerity necessary for elegant manners is wrong in Godwin's opinion.

Starting with these ethical principles, Godwin proceeds with almost mathematical logic to deduce the consequences, intoxicated by his enthusiasm and not stopping even when the conclusions to which he is driven conflict with conventional wisdom and intuition. For example, he denies that humans have rights and maintains that they only have duties.

Regarding the right to dispose of private property as one chooses, Godwin says: "To whom does any article, suppose a loaf of bread, justly belong? I have an hundred loaves in my possession, and in the next street there is a poor man expiring with hunger, to whom one of these loaves would be a means of preserving his life. If I withhold this loaf from him, am I not unjust? If I impart it, am I not complying with what justice demands?"

In other words, according to Godwin, our duty to act for the benefit of humanity implies a sacrifice of our private rights as individuals. Private property is not really our own, to be used as we wish; it is held in trust, to be used where it will do the greatest amount of good for humanity as a whole.

Godwin also denies that several commonly admired virtues really are virtues. Keeping promises, he says, is not a virtue because at any given moment we have a duty to do the greatest possible good through our actions. If an act is good, we should do it because we believe it to be good, not because we have promised to do it; and a promise should not force us to perform an act which we believe to be bad. A virtuous person therefore does not make promises. Similarly, Godwin maintains that gratitude is a vice since it distorts our judgement of the benevolence of our actions. When he heard of Godwin's doctrine on gratitude, Edmund Burke remarked "I would save him from that vice by not doing him any service!"

Godwin saw the system of promises, loyalty, and gratitude as a means by which indi-

vidual judgement can be suspended and tyranny maintained. People can be forced to act against their consciences because of promises which they have made or services which they have received. An example of this is the suspension of private ethical judgement which follows a soldier's induction into an army. We should perform an act, Godwin maintains, not because of fear of punishment or hope of reward or in return for favors that we have received, but rather because we believe the act to be of the highest benefit to humanity as a whole.

Many of our political institutions may be needed now, Godwin said, because of mankind's present faults; but in the future, when humanity has reached a higher level of perfection, they will be needed less and less. The system of nation states might then be replaced by a loose federation of small communities, within each of which problems could be resolved by face-to-face discussion. Regarding this future ideal system, Godwin writes: "It is earnestly to be desired that each man was wise enough to govern himself without the interference of any compulsory restraint; and since government in its best state is an evil, the object principally to be aimed at is, that we should have as little of it as the general peace of human society will permit."

Political Justice is a vision or prophesy of what human life might be like, not in the world as it is but in an ideal world of the future. As Godwin's disciple, Percy Bysshe Shelley, later expressed it in his verse-drama *Prometheus Unbound*,

*The loathsome mask has fallen, the man remains
Sceptreless, free, uncircumscribed, but man
Equal, unclassed, tribeless, and nationless,
Exempt from awe, worship, degree, the king
Over himself; just, gentle, wise...*

Enormous instant fame; The New Philosophy

The quarto edition of *Political Justice* was a best seller and the book was soon republished in a less expensive octavo edition which sold equally well. It was pirated in Ireland, Scotland, and America and hundreds of groups of workers who could not afford to buy the book individually bought joint copies, which then circulated among the subscribers or were read aloud to groups. The doctrines advocated in *Political Justice* were soon being called the "New Philosophy".

Godwin became famous overnight: "I was nowhere a stranger", he wrote later, "...I was everywhere received with curiosity and kindness. If temporary fame ever was an object worthy to be coveted by the human mind, I certainly obtained it in a degree that has seldom been exceeded."

Godwin's friend, the essayist William Hazlitt, described this sudden burst of fame in the following words: "... he blazed as a sun in the firmament of reputation; no-one was more talked of, more looked up to, more sought after, and wherever liberty, truth, justice was the theme, his name was not far off".

William Wordsworth read *Political Justice* in 1794 and was greatly influenced by it. Between February and August 1795, Wordsworth met Godwin seven times for long private discussions. Much of Wordsworth's writing from the Great Decade shows the mark of Godwin's ideas, as can be seen, for example in the following lines from *The Prelude*:

*How glorious! in self-knowledge and self-rule,
To look through all the frailties of the world,
And, with a resolute mastery shaking off
Infirmities of nature, time and place,
Build social upon personal Liberty,
Which, to the blind restraints of general laws
Superior, magisterially adopts
One guide, the light of circumstances, flashed
Upon an independent intellect*

Things as they are

On 26 May 1794, Godwin added to his already great reputation by publishing a powerful and original psychological novel, *Things as They Are*, later renamed *Caleb Williams*. Godwin's purpose in writing this novel was to illustrate some of the themes of *Political Justice* and to bring his ideas to readers who might not be directly interested in philosophy.

In *Caleb Williams*, Godwin makes several literary innovations which were to influence such writers as Edgar Allan Poe, Charles Dickens, Balzac, and Victor Hugo. *Caleb Williams* is, in fact, the ancestor of the modern thriller and detective story.

A few hangings needed to cast a chill over discussion

Godwin had written a Preface to *Caleb Williams* in which he said: "The question now afloat in the world respecting THINGS AS THEY ARE, is the most interesting which can be presented to the human mind. While one party pleads for reformation and change, the other extols in the warmest terms the existing constitution of society... It is now known to philosophers that the spirit and character of a government intrudes itself into every rank of society. But this is a truth highly worthy to be communicated to persons whom books of philosophy and science are never likely to reach. Accordingly it was proposed in the invention of the following work, to comprehend, as far as the progressive nature of a single story would allow, a general review of the modes of domestic and unrecorded tyranny." .

This Preface was never printed, because Godwin's publisher, Crosby, was afraid of prosecution. In fact, the publication of *Caleb Williams* coincided with a decision by Pitt's government that a few hangings were needed in order to cast a chill on public discussion of political reform. On the day of publication, orders went out for the arrest of Godwin's friends in the reform movement, Hardy, Thelwall, and Horne Tooke. Although the radical leaders were arrested in May, *habeas corpus* was suspended, and it was not until 2 October

1794 that a charge was brought against them. A few days later, on a trip to Warwickshire, Godwin heard that his closest friend, Thomas Holcroft, also had been arrested.

Godwin hurried back to London and locked himself in his home, studying the charges that had been brought by Lord Chief Justice Eyre against Holcroft and the others. The charge was high treason and the law under which Eyre brought this charge had been passed in the fourteenth century, during the reign of Edward III. It defined high treason as any act which could “compass or imagine the Death of a King”. The penalty for this offense was to be hanged by the neck, to be cut down while still living, to be disembowelled, to have one’s bowels burnt before one’s eyes, and then to be beheaded and quartered. It was rumored that as soon as the 12 prisoners were convicted, 800 further arrest warrants were ready to go out and Godwin’s own name might well have been among them.

Godwin soon saw that Eyre’s argument involved an unprecedented broadening of the definition of high treason. Essentially Eyre was arguing that the actions of the accused might cause events in England to follow the same course as in France, where Louis XVI had recently been executed. On 21 October Godwin published an anonymous article in the Morning Chronicle entitled *Cursory Strictures on the Charge Delivered by Lord Chief Justice Eyre*. It was a carefully written legal argument, completely different in style from anything that Godwin had written previously. In this article, he argued that in broadening the interpretation of high treason without precedent, Eyre was in effect creating a new law and judging the prisoners *ex post facto*. It was especially necessary for high treason to have a narrow definition, Godwin pointed out, since a broad definition could lead to the abridgement of all English civil liberties.

After the publication of *Cursory Strictures* it became clear to everyone that Eyre’s charge lay outside the boundary of the law and that it would probably not be upheld. Nevertheless, the atmosphere in the courtroom was tense as the jury returned its verdicts. As soon as Holcroft was acquitted, he left the dock and went to sit beside Godwin. The artist, Sir Thomas Lawrence, made a sketch of the two friends sitting side-by-side and waiting for the verdict on the other prisoners, Godwin’s bending and contemplative figure contrasting with Holcroft’s upright and defiant stance. In the end, all charges were dropped.

William and Mary

Soon after these dramatic events, William Godwin met Mary Wollstonecraft for a second time. On 8 January 1796, Mary Hayes, a friend and admirer of Mary Wollstonecraft, invited her to tea together with William Godwin and Thomas Holcroft. The tea was a success, and Godwin found Mary Wollstonecraft very much changed from the carelessly dressed and irritating woman who had dominated the conversation at Johnson’s dinner when he had wanted to hear Thomas Paine. Now, several years later, she had become much more attractive. Mary’s beauty and her charming, intelligent conversation won Godwin’s heart. He also greatly admired her recently published book, *Letters Written during a Short Residence in Sweden, Norway and Denmark*.

On 13 February, Godwin called on Mary Wollstonecraft, but she was not at home. On 14 April, she broke the social rules of the time and returned his call. During the next

few months they often appeared together at literary and artistic dinners in London. They had many friends in common and both of them had many admirers of the opposite sex. Godwin was not a tall man and his nose was rather large. On the other hand, he had fine eyes and a high, impressive brow; his manners had become more gallant and fame is a powerful aphrodisiac. A number of attractive intellectual women fluttered around him. Mary's admirers included the poet Robert Southey, the distinguished artist John Opie, and Godwin's closest friend, Thomas Holcroft.

Gradually, during the spring and summer of 1796, the friendship between Mary Wollstonecraft and William Godwin deepened into love. Outwardly, nothing was changed. Both partners were hard at work, Godwin preparing a new edition of *Political Justice* and Mary writing a novel, *The Wrongs of Woman*. Like *Caleb Williams*, Mary's novel was designed to illustrate the themes of the New Philosophy. They kept their relationship a secret, continued to live separately, and continued to meet their friends as before, but they had become lovers. For Godwin, this was the first real love affair of his life and he was at first very awkward, afraid of the strong emotions he was experiencing. Mary tenderly and good-humouredly guided him through his difficulties.

As winter approached, a crisis occurred: Johnson, Mary's publisher insisted that she should settle her debts and refused to give her more credit. At the same time, Mary realized that she was pregnant. She had experienced some of the harsh penalties with which English society of that time punished unwed mothers. Many of her former friends had dropped away. Her remaining friends called her Mrs Imlay, maintaining the fiction that she had been legally married; but with the new baby no such cover would be possible. Johnson offered a solution: He knew of a rich but somewhat elderly admirer who was willing to solve all of Mary's problems, both financial and social, by marrying her. Mary felt insulted and would not hear of this solution. In her books she had often denounced marriage for the sake of property as "legalized prostitution". Instead, she asked Godwin to marry her. He did this in spite of his own disapproval of the institution of marriage as practised at that time in Europe, an institution which he had called "the most odious of all monopolies".

Godwin and Mary were in fact extremely happy together. They were not at all alike: He relied on reason, while she placed more trust in her emotions. These differences meant that each revealed a new world for the other. For Godwin, Mary opened a world of strong feelings; and he acquired from her a taste for the writings of Rousseau, whom she called "the Prometheus of Sentiment". Godwin was never the same again. All his later novels and books of philosophy were to stress the importance of domestic affections and sensitivity to the force of emotion.

Mary's tragic death in childbirth

Mary's baby was due at the end of August 1797. She insisted that no doctor was needed, only a midwife. After a long labour, she gave birth to a baby girl at 11 p.m. and Godwin was overjoyed that all had gone well. However, at 2 a.m. the midwife warned Godwin that his wife was still in danger, since the afterbirth had not yet appeared. A doctor was

sent for; and following the accepted medical practice of the time, he removed the afterbirth surgically. Mary at first seemed to be recovering well; but in a few days it became clear that she was fatally ill with an infection, very likely the result of the operation to remove the afterbirth. On 10 September she died, brave and affectionate to the end. In her last words, she spoke of Godwin as “the kindest, best man in the world”.

Godwin was left heartbroken by Mary’s death. In a letter to Holcroft he wrote: “My wife is now dead. I firmly believe that there does not exist her equal in the world. I know from experience that we were formed to make each other happy. I have not the least expectation that I can now ever know happiness again”. In his sorrow, he sat rereading Mary’s books and letters, seeming to hear her voice again through the words that she had written.

Soon Godwin found consolation for his grief by editing the unpublished works of his dead wife and by writing her biography. Believing strongly in the principle of absolute honesty, he tried to describe her life and work as simply and as accurately as he could, not hiding her human weaknesses, but at the same time doing full justice to her stature as a great pioneer of woman’s rights. He included her letters to Imlay, and a description of an affair between Mary and the Swiss artist Fuseli, which had taken place before her departure for France.

On 29 January 1798, Johnson published Godwin’s *Memoirs of the Author of the Vindication of the Rights of Woman*, together with four small volumes of Mary’s posthumous works, including her unfinished novel, *The Wrongs of Woman*.

The wave of hope crashes down

Godwin’s moving and honest portrait of his wife is one of his most enduring and readable books but its honesty shocked his contemporaries more than anything else that he had written. The European Magazine, for example, said that it would be read “with disgust by every female who has any pretensions to delicacy; with detestation by everyone attached to the interests of religion and morality; and with indignation by any one who might feel any regard for the unhappy woman, whose frailties should have been buried in oblivion”.

This reaction against the *Memoirs* was part of a much more general reaction against all liberal ideas. In 1798, Napoleon’s armies were victorious on the continent, and the French were massing their forces for an invasion of England. Napoleon believed that the ordinary people of England would welcome him as a liberator and, in fact, the English government was facing a mutiny in its own navy, massive riots, and rebellion in Ireland. The Establishment was fighting for its life and was not in the mood to make fine distinctions about whether the blows that it struck were above or below the belt. Pitt and Grenville had already introduced the “Gagging Acts”, which effectively put an end to freedom of speech and assembly. The government now sponsored, by means of a secret subsidy, the *Anti-Jacobin Review*, a periodical which savagely attacked all of the leading liberals in turn, including both William and Mary.

Godwin had been carried to great heights by the wave of hope which accompanied the French Revolution; and as the wave crashed he was carried down with it. Despite the

abuse and ridicule which were increasingly heaped upon him, he maintained a philosophical attitude, confident that he had already made a permanent contribution to the idea of human progress. His ideas, and those of his pioneering wife Mary Wollstonecraft, can speak to our present dangerous situation.

2.11 The Marquis de Condorcet

A vision of human progress

In France the Marquis de Condorcet had written an equally optimistic book, *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain*. Condorcet's optimism was unaffected even by the fact that at the time when he was writing he was in hiding, under sentence of death by Robespierre's government. Like Godwin's *Political Justice*, this book offers an optimistic vision of how human society can be improved. Together, the two books provoked Malthus to write his book on population.

Condorcet becomes a mathematician

Marie-Jean-Antoine-Nicolas Caritat, Marquis de Condorcet, was born in 1743 in the town of Ribemont in southern France. He was born into an ancient and noble family of the principality of Orange but there was nothing in his background to suggest that he might one day become a famous scientist and social philosopher. In fact, for several generations before, most of the men in the family had followed military or ecclesiastical careers and none were scholars.

After an initial education received at home from his mother, Condorcet was sent to his uncle, the Bishop of Lisieux, who provided a Jesuit tutor for the boy. In 1758 Condorcet continued his studies with the Jesuits at the College of Navarre. After he graduated from the College, Condorcet's powerful and independent intelligence suddenly asserted itself. He announced that he intended to study mathematics. His family was unanimously and violently opposed to this idea. The privileges of the nobility were based on hereditary power and on a static society. Science, with its emphasis on individual talent and on progress, undermined both these principles. The opposition of Condorcet's family is therefore understandable but he persisted until they gave in.

From 1765 to 1774, Condorcet focused on science. In 1765, he published his first work on mathematics entitled *Essai sur le calcul intégral*, which was well received, launching his career as a mathematician. He would go on to publish many more papers, and in 1769, at the age of 26, he was elected to the Academie royale des Sciences (French Royal Academy of Sciences)

Condorcet worked with Leonhard Euler and Benjamin Franklin. He soon became an honorary member of many foreign academies and philosophic societies including the Royal

Swedish Academy of Sciences (1785), Foreign Honorary Member of the American Academy of Arts and Sciences (1792), and also in Prussia and Russia.

Human rights and scientific sociology

In 1774, at the age of 31, Condorcet was appointed Inspector-General of the Paris Mint by his friend, the economist Turgot. From this point on, Condorcet shifted his focus from the purely mathematical to philosophy and political matters. In the following years, he took up the defense of human rights in general, and of women's and blacks' rights in particular (an abolitionist, he became active in the Society of the Friends of the Blacks in the 1780s). He supported the ideals embodied by the newly formed United States, and proposed projects of political, administrative and economic reforms intended to transform France.

The year 1785 saw the publication of Condorcet's highly original mathematical work, *Essai sur l'application de l'analyse à la probabilité des décisions rendues à la pluralité des voix*, in which he pioneered the application of the theory of probability in the social sciences. A later, much enlarged, edition of this book extended the applications to games of chance. Through these highly original works, Condorcet became a pioneer of scientific sociology.

In 1786, Condorcet married one of the most beautiful women of the time, Sophie de Grouchy (1764-1822). Condorcet's position as Inspector-General of the Mint meant that they lived at the Hotel des Monnaies. Mme Condorcet's salon there was famous.

The French Revolution

Ever since the age of 17, Condorcet had thought about questions of justice and virtue and especially about how it is in our own interest to be both just and virtuous. Very early in his life he had been occupied with the idea of human perfectibility. He was convinced that the primary duty of every person is to contribute as much as possible to the development of mankind, and that by making such a contribution, one can also achieve the greatest possible personal happiness. When the French Revolution broke out in 1789 he saw it as an unprecedented opportunity to do his part in the cause of progress and he entered the arena wholeheartedly.

Condorcet was first elected as a member of the Municipality of Paris; and then, in 1791, he became one of the six Commissioners of the Treasury. Soon afterwards he was elected to the Legislative Assembly, of which he became first the Secretary and finally the President. In 1792, Condorcet proposed to the Assembly that all patents of nobility should be burned. The motion was carried unanimously; and on 19 June his own documents were thrown on a fire with the others at the foot of a statue of Louis XIV.

Condorcet was one of the chief authors of the proclamation which declared France to be a republic and which summoned a National Convention. As he remained above the personal political quarrels that were raging at the time, Condorcet was elected to the National Convention by five different constituencies. When the Convention brought Louis XVI to trial, Condorcet maintained that, according to the constitution, the monarch was



Figure 2.14: The Marquis de Condorcet (public domain).

inviolable and that the Convention therefore had no legal right to try the King. When the King was tried despite these protests, Condorcet voted in favor of an appeal to the people.

Drafting a new constitution for France

In October 1792, when the Convention set up a Committee of Nine to draft a new constitution for France, Condorcet sat on this committee as did the Englishman, Thomas Paine. Under sentence of death in England for publishing his pamphlet *The Rights of Man*, Paine had fled to France and had become a French citizen. He and Condorcet were the chief authors of a moderate (Gerondist) draft of the constitution. However, the Jacobin leader, Robespierre, bitterly resented being excluded from the Committee of Nine and, when the Convention then gave the responsibility for drafting the new constitution to the Committee for Public Safety, which was enlarged for this purpose by five additional members. The result was a hastily produced document with many glaring defects. When it was presented to the Convention, however, it was accepted almost without discussion. This was too much for Condorcet to stomach and he published anonymously a letter entitled *Advice to the French on the New Constitution*, in which he exposed the defects of the Jacobin constitution and urged all Frenchmen to reject it.

Hiding from Robespierre's Terror

Condorcet's authorship of this letter was discovered and treated as an act of treason. On 8 July 1793, Condorcet was denounced in the Convention; and an order was sent out for his arrest. The officers tried to find him, first at his town house and then at his house in the country but, warned by a friend, Condorcet had gone into hiding.

The house where Condorcet took refuge was at Rue Servandoni, a small street in Paris leading down to the Luxembourg Gardens, and it was owned by Madame Vernet, the widow of a sculptor. Madame Vernet, who sometimes kept lodgings for students, had been asked by Condorcet's friends whether she would be willing to shelter a proscribed man. 'Is he a good man?', she had asked; and when assured that this was the case, she had said, 'Then let him come at once. You can tell me his name later. Don't waste even a moment. While we are speaking, he may be arrested.' She did not hesitate, although she knew that she risked death, the penalty imposed by the Convention for sheltering a proscribed man.

Condorcet writes the *Esquisse*

Although Robespierre's agents had been unable to arrest him, Condorcet was sentenced to the guillotine *in absentia*. He knew that in all probability he had only a few weeks or months to live and he began to write his last thoughts, racing against time. Hidden in the house at Rue Servandoni, and cared for by Madame Vernet, Condorcet returned to a project which he had begun in 1772, a history of the progress of human thought, stretching from the remote past to the distant future. Guessing that he would not have

time to complete the full-scale work he had once planned, he began a sketch or outline: *Esquisse d'un Tableau Historique des progrès de l'Esprit Humain*.

Condorcet's *Esquisse*, is an enthusiastic endorsement of the idea of infinite human perfectibility which was current among the philosophers of the 18th century, and in this book, Condorcet anticipated many of the evolutionary ideas of Charles Darwin. He compared humans with animals, and found many common traits. Condorcet believed that animals are able to think, and even to think rationally, although their thoughts are extremely simple compared with those of humans. He also asserted that humans historically began their existence on the same level as animals and gradually developed to their present state.

Since this evolution took place historically, he reasoned, it is probable, or even inevitable, that a similar evolution in the future will bring mankind to a level of physical, mental and moral development which will be as superior to our own present state as we are now superior to animals.

In his *Esquisse*, Condorcet called attention to the unusually long period of dependency which characterize the growth and education of human offspring. This prolonged childhood is unique among living beings. It is needed for the high level of mental development of the human species; but it requires a stable family structure to protect the young during their long upbringing. Thus, according to Condorcet, biological evolution brought into existence a moral precept, the sanctity of the family.

Similarly, Condorcet maintained, larger associations of humans would have been impossible without some degree of altruism and sensitivity to the suffering of others incorporated into human behavior, either as instincts or as moral precepts or both; and thus the evolution of organized society entailed the development of sensibility and morality.

Condorcet believed that ignorance and error are responsible for vice; and he listed what he regarded as the main mistakes of civilization: hereditary transmission of power, inequality between men and women, religious bigotry, disease, war, slavery, economic inequality, and the division of humanity into mutually exclusive linguistic groups.

Condorcet believed the hereditary transmission of power to be the source of much of the tyranny under which humans suffer; and he looked forward to an era when republican governments would be established throughout the world. Turning to the inequality between men and women, Condorcet wrote that he could see no moral, physical or intellectual basis for it. He called for complete social, legal, and educational equality between the sexes.

Condorcet predicted that the progress of medical science would free humans from the worst ravages of disease. Furthermore, he maintained that since perfectibility (i.e. evolution) operates throughout the biological world, there is no reason why mankind's physical structure might not gradually improve, with the result that human life in the remote future could be greatly prolonged. Condorcet believed that the intellectual and moral facilities of man are capable of continuous and steady improvement; and he thought that one of the most important results of this improvement will be the abolition of war.

At the end of his *Esquisse*, Condorcet said that any person who has contributed to the progress of mankind to the best of his ability becomes immune to personal disaster and suffering. He knows that human progress is inevitable and can take comfort and courage from his inner picture of the epic march of mankind, through history, towards a better

future.

Shortly after Condorcet completed the *Esquisse*, he received a mysterious warning that soldiers of the Convention were on their way to inspect Madame Vernet's house. Wishing to spare his generous hostess from danger, he disguised himself as well as he could and slipped past the portress. However, Condorcet had only gone a few steps outside the house when he was recognized by Madame Verdet's cousin, who risked his life to guide Condorcet past the sentinels at the gates of Paris, and into the open country beyond.

Condorcet wandered for several days without food or shelter, hiding himself in quarries and thickets. Finally, on 27 March 1794, hunger forced him to enter a tavern at the village of Clamart, where he ordered an omelette. When asked how many eggs it should contain, the exhausted and starving philosopher replied without thinking, 'twelve'. This reply, together with his appearance, excited suspicion. He was asked for his papers and, when it was found that he had none, soldiers were sent for and he was arrested. He was taken to a prison at Bourg-la-Reine, but he was so weak that he was unable to walk there, and had to be carried in a cart. The next morning, Condorcet was found dead on the floor of his cell. The cause of his death is not known with certainty. It was listed in official documents as congestion sanguine, congestion of the blood but the real cause may have been cold, hunger, exhaustion or poison. Many historians believe that Condorcet was murdered by Robespierre's agents, since he was so popular that a public execution would have been impossible.

After Condorcet's death the currents of revolutionary politics shifted direction. Robespierre, the leader of the Terror, was himself soon arrested. The execution of Robespierre took place on 25 July 1794, only a few months after the death of Condorcet.

Condorcet's *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain* was published posthumously in 1795. In the post-Thermidor reconstruction, the Convention voted funds to have it printed in a large edition and distributed throughout France, thus adopting the *Esquisse* as its official manifesto. Condorcet's name will always be linked with this small prophetic book. It was destined to establish the form in which the eighteenth-century idea of progress was incorporated into Western thought, and (as we shall see) it provoked Robert Malthus to write *An Essay on the Principle of Population*.

2.12 Thomas Robert Malthus

A debate between father and son

T.R. Malthus' *Essay on The Principle of Population*, the first edition of which was published in 1798, was one of the the first systematic studies of the problem of population in relation to resources. Earlier discussions of the problem had been published by Botterro in Italy, Robert Wallace in England, and Benjamin Franklin in America. However Malthus' *Essay* was the first to stress the fact that, in general, powerful checks operate continuously to keep human populations from increasing beyond their available food supply. In a later



Figure 2.15: Thomas Robert Malthus.

edition, published in 1803, he buttressed this assertion with carefully collected demographic and sociological data from many societies at various periods of their histories.

The publication of Malthus' *Essay* coincided with a wave of disillusionment which followed the optimism of the Enlightenment. The utopian societies predicted by the philosophers of the Enlightenment were compared with reign of terror in Robespierre's France and with the miseries of industrial workers in England; and the discrepancy required an explanation.

The optimism which preceded the French Revolution, and the disappointment which followed a few years later, closely paralleled the optimistic expectations of our own century, in the period after the Second World War, when it was thought that the transfer of technology to the less developed parts of the world would eliminate poverty, and the subsequent disappointment when poverty persisted.

Science and technology developed rapidly in the second half of the twentieth century, but the benefits which they conferred were just as rapidly consumed by a global population which today is increasing at the rate of one billion people every fourteen years. Because of the close parallel between the optimism and disappointments of Malthus' time and those of our own, much light can be thrown on our present situation by rereading the debate between Malthus and his contemporaries.

Thomas Robert Malthus (1766-1834) came from an intellectual family: His father, Daniel Malthus, was a moderately well-to-do English country gentleman, an enthusiastic believer in the optimistic ideas of the Enlightenment, and a friend of the philosophers Henry Rousseau, David Hume and William Godwin. The famous book on population by the younger Malthus grew out of conversations with his father.

In 1793, Robert Malthus was elected a fellow of Jesus College, and he also took orders in the Anglican Church. He was assigned as Curate to Okewood Chapel in Surrey. This small chapel stood in a woodland region, and Malthus' illiterate parishioners were so poor that the women and children went without shoes. They lived in low thatched huts made of woven branches plastered with mud. The floors of these huts were of dirt, and the only light came from tiny window openings. Malthus' parishioners diet consisted almost entirely of bread. The children of these cottagers developed late, and were stunted in growth. Nevertheless, in spite of the harsh conditions of his parishioners' lives, Malthus noticed that the number of births which he recorded in the parish register greatly exceeded the number of deaths. It was probably this fact which first turned his attention to the problem of population.

Robert Malthus lived with his parents at Albury, about nine miles from Oakwood, and it was here that the famous debates between father and son took place. As Daniel Malthus talked warmly about Godwin, Condorcet, and the idea of human progress, the mind of his son, Robert, turned to the unbalance between births and deaths which he had noticed among his parishioners at Okewood Chapel. He pointed out to his father that no matter what benefits science might be able to confer, they would soon be eaten up by population growth.

Regardless of technical progress, the condition of the lowest social class would remain exactly the same: The poor would continue to live, as they always had, on the exact

borderline between survival and famine, clinging desperately to the lower edge of existence. For them, change for the worse was impossible since it would loosen their precarious hold on life; their children would die and their numbers would diminish until they balanced the supply of food. But any change for the better was equally impossible, because if more nourishment should become available, more of the children of the poor would survive, and the share of food for each of them would again be reduced to the precise minimum required for life.

Observation of his parishioners at Okewood had convinced Robert Malthus that this sombre picture was a realistic description of the condition of the poor in England at the end of the 18th century. Techniques of agriculture and industry were indeed improving rapidly; but among the very poor, population was increasing equally fast, and the misery of society's lowest class remained unaltered.

Publication of the first essay in 1798

Daniel Malthus was so impressed with his son's arguments that he urged him to develop them into a small book. Robert Malthus' first essay on population, written in response to his father's urging, was only 50,000 words in length. It was published anonymously in 1798, and its full title was *An Essay on the Principle of Population, as it affects the future improvement of society, with remarks on the speculations of Mr. Godwin, M. Condorcet, and other writers*. Robert Malthus' *Essay* explored the consequences of his basic thesis: that "the power of population is indefinitely greater than the power in the earth to produce subsistence for man".

"That population cannot increase without the means of subsistence", Robert Malthus wrote, "is a proposition so evident that it needs no illustration. That population does invariably increase, where there are means of subsistence, the history of every people who have ever existed will abundantly prove. And that the superior power cannot be checked without producing misery and vice, the ample portion of these two bitter ingredients in the cup of human life, and the continuance of the physical causes that seem to have produced them, bear too convincing a testimony."

In order to illustrate the power of human populations to grow quickly to enormous numbers if left completely unchecked, Malthus turned to statistics from the United States, where the population had doubled every 25 years for a century and a half. Malthus called this type of growth "geometrical" (today we would call it "exponential"); and, drawing on his mathematical education, he illustrated it by the progression 1,2,4,8,16,32,64,128,256,...etc. In order to show that, in the long run, no improvement in agriculture could possibly keep pace with unchecked population growth, Malthus allowed that, in England, agricultural output might with great effort be doubled during the next quarter century; but during a subsequent 25-year period it could not again be doubled. The growth of agricultural output could at the very most follow an arithmetic (linear) progression, 1,2,3,4,5,6,...etc.

Because of the overpoweringly greater numbers which can potentially be generated by exponential population growth, as contrasted to the slow linear progression of sustenance, Malthus was convinced that at almost all stages of human history, population has not

expanded freely, but has instead pressed painfully against the limits of its food supply. He maintained that human numbers are normally held in check either by “vice or misery”. (Malthus classified both war and birth control as forms of vice.) Occasionally the food supply increases through some improvement in agriculture, or through the opening of new lands; but population then grows very rapidly, and soon a new equilibrium is established, with misery and vice once more holding the population in check.

Like Godwin’s *Political Justice*, Malthus’ *Essay on the Principle of Population* was published at exactly the right moment to capture the prevailing mood of England. In 1793, the mood had been optimistic; but by 1798, hopes for reform had been replaced by reaction and pessimism. Public opinion had been changed by Robespierre’s Reign of Terror and by the threat of a French invasion. Malthus’ clear and powerfully written essay caught the attention of readers not only because it appeared at the right moment, but also because his two contrasting mathematical laws of growth were so striking.

One of Malthus’ readers was William Godwin, who recognized the essay as the strongest challenge to his utopian ideas that had yet been published. Godwin several times invited Malthus to breakfast at his home to discuss social and economic problems. (After some years, however, the friendship between Godwin and Malthus cooled, the debate between them having become more acrimonious.)

In 1801, Godwin published a reply to his critics, among them his former friends James Mackintosh and Samuel Parr, by whom he recently had been attacked. His *Reply to Parr* also contained a reply to Malthus: Godwin granted that the problem of overpopulation raised by Malthus was an extremely serious one. However, Godwin wrote, all that is needed to solve the problem is a change of the attitudes of society. For example we need to abandon the belief “that it is the first duty of princes to watch for (i.e. encourage) the multiplication of their subjects, and that a man or woman who passes the term of life in a condition of celibacy is to be considered as having failed to discharge the principal obligations owed to the community”.

“On the contrary”, Godwin continued, “it now appears to be rather the man who rears a numerous family that has to some degree transgressed the consideration he owes to the public welfare”. Godwin suggested that each marriage should be allowed only two or three children or whatever number might be needed to balance the current rates of mortality and celibacy. This duty to society, Godwin wrote, would surely not be too great a hardship to be endured, once the reasons for it were thoroughly understood.

The second essay, published in 1803

Malthus’ small essay had captured public attention in England, and he was anxious to expand it with empirical data which would show his principle of population to be valid not only in England in his own day, but in all societies and all periods. He therefore traveled widely, collecting data. He also made use of the books of explorers, such as Cook and Vancouver.

Malthus’ second edition, more than three times the length of his original essay on population, was ready in 1803. Book I and Book II of the 1803 edition of Malthus’ *Essay* are

devoted to a study of the checks to population growth which have operated throughout history in all the countries of the world for which he possessed facts.

In his first chapter, Malthus stressed the potentially enormous power of population growth contrasted the slow growth of the food supply. He concluded that strong checks to the increase of population must almost always be operating to keep human numbers within the bounds of sustenance. He classified the checks as either preventive or positive, the preventive checks being those which reduce fertility, while the positive checks are those which increase mortality. Among the positive checks, Malthus listed “unwholesome occupations, severe labour and exposure to the seasons, extreme poverty, bad nursing of children, great towns, excesses of all kinds, the whole train of common diseases and epidemics, wars, plague, and famine”.

In the following chapters of Books I, Malthus showed in detail the mechanisms by which population is held at the level of sustenance in various cultures. He first discussed primitive hunter-gatherer societies, such as the inhabitants of Tierra del Fuego, Van Diemens Land and New Holland, and those tribes of North American Indians living predominantly by hunting. In hunting societies, he pointed out, the population is inevitably very sparse: “The great extent of territory required for the support of the hunter has been repeatedly stated and acknowledged”, Malthus wrote, “...The tribes of hunters, like beasts of prey, whom they resemble in their mode of subsistence, will consequently be thinly scattered over the surface of the earth. Like beasts of prey, they must either drive away or fly from every rival, and be engaged in perpetual contests with each other...The neighboring nations live in a perpetual state of hostility with each other. The very act of increasing in one tribe must be an act of aggression against its neighbors, as a larger range of territory will be necessary to support its increased numbers. The contest will in this case continue, either till the equilibrium is restored by mutual losses, or till the weaker party is exterminated or driven from its country... Their object in battle is not conquest but destruction. The life of the victor depends on the death of the enemy”. Malthus concluded that among the American Indians of his time, war was the predominant check to population growth, although famine, disease and infanticide each played a part.

In Book II, Malthus turned to the nations of Europe, as they appeared at the end of the 18th century, and here he presents us with a different picture. Although in these societies poverty, unsanitary housing, child labour, malnutrition and disease all took a heavy toll, war produced far less mortality than in hunting and pastoral societies, and the preventive checks, which lower fertility, played a much larger roll.

Malthus painted a very dark panorama of population pressure and its consequences in human societies throughout the world and throughout history: At the lowest stage of cultural development are the hunter-gatherer societies, where the density of population is extremely low. Nevertheless, the area required to support the hunters is so enormous that even their sparse and thinly scattered numbers press hard against the limits of sustenance. The resulting competition for territory produces merciless intertribal wars.

The domestication of animals makes higher population densities possible; and wherever this new mode of food production is adopted, human numbers rapidly increase; but very soon a new equilibrium is established, with the population of pastoral societies once more

pressing painfully against the limits of the food supply, growing a little in good years, and being cut back in bad years by famine, disease and war.

Finally, agricultural societies can maintain extremely high densities of population; but the time required to achieve a new equilibrium is very short. After a brief period of unrestricted growth, human numbers are once more crushed against the barrier of limited resources; and if excess lives are produced by overbreeding, they are soon extinguished by deaths among the children of the poor.

Malthus was conscious that he had drawn an extremely dark picture of the human condition. He excused himself by saying that he has not done it gratuitously, but because he was convinced that the dark shades really are there, and that they form an important part of the picture. He did allow one ray of light, however: By 1803, his own studies of Norway, together with personal conversations with Godwin and the arguments in Godwin's *Reply to Parr*, had convinced Malthus that "moral restraint" should be included among the possible checks to population growth. Thus he concluded Book II of his 1803 edition by saying that the checks which keep population down to the level of the means of subsistence can all be classified under the headings of "moral restraint, vice and misery". (In his first edition he had maintained that vice and misery are the only possibilities).

Replies to Malthus

The second edition of Malthus' *Essay* was published in 1803. It provoked a storm of controversy, and a flood of rebuttals. In 1803 England's political situation was sensitive. Revolutions had recently occurred both in America and in France; and in England there was much agitation for radical change, against which Malthus provided counter-arguments. Pitt and his government had taken Malthus' first edition seriously, and had abandoned their plans for extending the Poor Laws. Also, as a consequence of Malthus' ideas, England's first census was taken in 1801. This census, and subsequent ones, taken in 1811, 1821 and 1831, showed that England's population was indeed increasing rapidly, just as Malthus had feared. (The population of England and Wales more than doubled in 80 years, from an estimated 6.6 million in 1750 to almost 14 million in 1831.) In 1803, the issues of poverty and population were at the center of the political arena, and articles refuting Malthus began to stream from the pens of England's authors.

William Coleridge planned to write an article against Malthus, and he made extensive notes in the margins of his copy of the *Essay*. In one place he wrote: "Are Lust and Hunger both alike Passions of physical Necessity, and the one equally with the other independent of the Reason and the Will? Shame upon our race that there lives an individual who dares to ask the Question." In another place Coleridge wrote: "Vice and Virtue subsist in the agreement of the habits of a man with his Reason and Conscience, and these can have but one moral guide, Utility, or the virtue and Happiness of Rational Beings". Although Coleridge never wrote his planned article, his close friend Robert Southey did so, using Coleridge's notes almost verbatim. Some years later Coleridge remarked: "Is it not lamentable - is it not even marvelous - that the monstrous practical sophism of Malthus should now have gained complete possession of the leading men of the kingdom! Such an

essential lie in morals - such a practical lie in fact it is too! I solemnly declare that I do not believe that all the heresies and sects and factions which ignorance and the weakness and wickedness of man have ever given birth to, were altogether so disgraceful to man as a Christian, a philosopher, a statesman or citizen, as this abominable tenet."

In 1812, Percy Bysshe Shelley, who was later to become William Godwin's son-in-law, wrote: "Many well-meaning persons... would tell me not to make people happy for fear of over-stocking the world... War, vice and misery are undoubtedly bad; they embrace all that we can conceive of temporal and eternal evil. Are we to be told that these are remedyless, because the earth would in case of their remedy, be overstocked?" A year later, Shelley called Malthus a "priest, eunuch, and tyrant", and accused him, in a pamphlet, of proposing that ".. after the poor have been stript naked by the tax-gatherer and reduced to bread and tea and fourteen hours of hard labour by their masters.. the last tie by which Nature holds them to benignant earth (whose plenty is garnered up in the strongholds of their tyrants) is to be divided... They are required to abstain from marrying under penalty of starvation... whilst the rich are permitted to add as many mouths to consume the products of the poor as they please"

Godwin himself wrote a long book (which was published in 1820) entitled *Of Population, An Enquiry Concerning the Power and Increase in the Number of Mankind, being an answer to Mr. Malthus*. One can also view many of the books of Charles Dickens as protests against Malthus' point of view. For example, *Oliver Twist* gives us a picture of a workhouse "administered in such a way that the position of least well-off independent workers should not be worse than the position of those supported by parish assistance."

Among the 19th century authors defending Malthus was Harriet Martineau, who wrote: "The desire of his heart and the aim of his work were that domestic virtue and happiness should be placed within the reach of all... He found that a portion of the people were underfed, and that one consequence of this was a fearful mortality among infants; and another consequence the growth of a recklessness among the destitute which caused infanticide, corruption of morals, and at best, marriage between pauper boys and girls; while multitudes of respectable men and women, who paid rates instead of consuming them, were unmarried at forty or never married at all. Prudence as to time of marriage and for making due provision for it was, one would think, a harmless recommendation enough, under the circumstances."

The Irish Potato Famine of 1845

Meanwhile, in Ireland, a dramatic series of events had occurred, confirming the ideas of Malthus. Anti-Catholic laws prevented the Irish cottagers from improving their social position; and instead they produced large families, fed almost exclusively on a diet of milk and potatoes. The potato and milk diet allowed a higher density of population to be supported in Ireland than would have been the case if the Irish diet had consisted primarily of wheat. As a result, the population of Ireland grew rapidly: In 1695 it had been approximately one million, but by 1821 it had reached 6,801,827. By 1845, the population of Ireland was more than eight million; and in that year the potato harvest

failed because of blight. All who were able to do so fled from the country, many emigrating to the United States; but two million people died of starvation. As the result of this shock, Irish marriage habits changed, and late marriage became the norm, just as Malthus would have wished. After the Potato Famine of 1845, Ireland maintained a stable population of roughly four million.

Malthus continued a life of quiet scholarship, unperturbed by the heated public debate which he had caused. At the age of 38, he married a second cousin. The marriage produced only three children, which at that time was considered to be a very small number. Thus he practiced the pattern of late marriage which he advocated. Although he was appointed rector of a church in Lincolnshire, he never preached there, hiring a curate to do this in his place. Instead of preaching, Malthus accepted an appointment as Professor of History and Political Economy at the East India Company's College at Haileybury. This appointment made him the first professor of economics in England, and probably also the first in the world. Among the important books which he wrote while he held this post was *Principles of Political Economy, Considered with a View to their Practical Application*. Malthus also published numerous revised and expanded editions of his *Essay on the Principle of Population*. The third edition was published in 1806, the fourth in 1807, the fifth in 1817, and the sixth in 1826.

In the societies that Malthus describes, we can see a clear link not only between population pressure and poverty, but also between population pressure and war. Undoubtedly this is why the suffering produced by poverty and war saturates so much of human history. Stabilization of population through birth control offers a key to eliminating this suffering.

Population stabilization and sustainability

Does the contrast between the regions of our contemporary world mean that Malthus has been "proved wrong" in some regions and "proved right" in others? To answer this question, let us re-examine the basic assertion which Malthus puts forward in Books I and II of the 1803 version of his *Essay*. His basic thesis is that the maximum natural fertility of human populations is greatly in excess of replacement fertility. This being so, Malthus points out, human populations would always increase exponentially if they were not prevented from doing so by powerful and obvious checks.

In general, Malthus tells us, populations cannot increase exponentially because the food supply increases slowly, or is constant. Therefore, he concludes, in most societies and almost all periods of history, checks to population growth are operating. These checks may be positive, or they may be preventive, the positive checks being those which raise the death rate, while the preventive checks lower the birth rate. There are, however, Malthus says, exceptional periods of history when the populations of certain societies do actually increase exponentially because of the opening of new lands or because of the introduction of new methods of food production. As an example, he cites the growth of the population of the United States, which doubled every 25 years over a period of 150 years.

We can see, from this review of Malthus' basic thesis, that his demographic model is flexible enough to describe all of the regions of our contemporary world: If Malthus were

living today, he would say that in countries with low birth and death rates and stable populations, the checks to population growth are primarily preventive, while in countries with high death rates, the positive checks are important. Finally, Malthus would describe our rapidly-growing global population as the natural result of the introduction of improved methods of food production in the developing countries. We should notice, however, that the flexibility of Malthus' demographic model first appears in the 1803 version of his *Essay*. In the 1798 version, he maintained "...that population does invariably increase, where there are means of subsistence.." and "that the superior power (of population) cannot be checked without producing misery and vice.." This narrower model of population did not agree with Malthus' own observations in Norway in 1799, and therefore in his 1803 *Essay* he allowed more scope for preventive checks, which included late marriage and moral restraint as well as birth control (which he classified under the heading of "vice").

Today we are able to estimate the population of the world at various periods in history, and we can also make estimates of global population in prehistoric times. Looking at the data, we can see that the global population of humans has not followed an exponential curve as a function of time, but has instead followed a hyperbolic trajectory. At the time of Christ, the population of the world is believed to have been approximately 220 million. By 1500, the earth contained 450 million people, and by 1750, the global population exceeded 700 million. As the industrial and scientific revolution has accelerated, global population has responded by increasing at a break-neck speed: In 1930, the population of the world reached two billion; in 1958 three billion; in 1974 four billion; in 1988 five billion, and in 1999, six billion.

Today, roughly a billion people are being added to the world's population every decade. But our food supply cannot keep increasing at this rate. On the contrary, the amount of food available to us is threatened by water shortages, climate change and the end of petroleum-supported high-yield agriculture. Thus, facing the threat of an extremely large-scale global famine, we need to listen to the warning voice of Malthus.

2.13 Charles Darwin's life and work

Linnaeus, Lamarck and E. Darwin

During the 17th and 18th centuries, naturalists had been gathering information on thousands of species of plants and animals. This huge, undigested heap of information was put into some order by the great Swedish naturalist, Carl von Linné (1707-1778), who is usually called by his Latin name, Carolus Linnaeus.

Linnaeus reclassified all living things, and he introduced a binomial nomenclature, so that each plant or animal became known by two names - the name of its genus, and the name of its species. In the classification of Linnaeus, the species within a given genus resemble each other very closely. Linnaeus also grouped related genera into classes, and related classes into orders. Later, the French anatomist, Cuvier (1769-1832), grouped related orders into phyla.

In France, the Chevalier J.B. de Lamarck (1744-1829), was struck by the close relationships between various animal species; and in 1809 he published a book entitled *Philosophie Zoologique*, in which he tried to explain this interrelatedness in terms of a theory of evolution. Lamarck explained the close similarity of the species within a genus by supposing these species to have evolved from a common ancestor. However, the mechanism of evolution which he postulated was seriously wrong, since he believed that acquired characteristics could be inherited.

Lamarck believed, for example, that giraffes stretched their necks slightly by reaching upward to eat the leaves of high trees. He believed that these slightly-stretched necks could be inherited; and in this way, Lamarck thought, the necks of giraffes have gradually become longer over many generations. Although his belief in the inheritability of acquired characteristics was a serious mistake, Lamarck deserves much credit for correctly maintaining that the close similarity between the species of a genus is due to their descent from a common ancestral species.

Meanwhile, in England, the brilliant physician-poet, Erasmus Darwin (1731-1802), who was considered by Coleridge to have "...a greater range of knowledge than any other man in Europe", had published *The Botanic Garden* and *Zoonomia* (1794). Darwin's first book, *The Botanic Garden*, was written in verse, and in the preface he stated that his purpose was "...to inlist imagination under the banner of science.." and to call the reader's attention to "the immortal works of the celebrated Swedish naturalist, Linnaeus". This book was immensely popular during Darwin's lifetime, but modern readers might find themselves wishing that he had used prose instead of poetry.

Darwin's second book, *Zoonomia*, is more interesting, since it contains a clear statement of the theory of evolution:

"...When we think over the great changes introduced into various animals", Darwin wrote, "as in horses, which we have exercised for different purposes of strength and swiftness, carrying burthens or in running races; or in dogs, which have been cultivated for strength and courage, as the bull-dog; or for acuteness of his sense of smell, as in the hound and spaniel; or for the swiftness of his feet, as the greyhound; or for his swimming in the water, or for drawing snow-sledges, as the rough-haired dogs of the north... and add to these the great change of shape and colour which we daily see produced in smaller animals from our domestication of them, as rabbits or pigeons;... when we revolve in our minds the great similarity of structure which obtains in all the warm-blooded animals, as well as quadrupeds, birds and amphibious animals, as in mankind, from the mouse and the bat to the elephant and whale; we are led to conclude that they have alike been produced from a similar living filament."

Erasmus Darwin's son, Robert, married Suzannah Wedgwood, the pretty and talented daughter of the famous potter, Josiah Wedgwood; and in 1809, (the same year in which Lamarck published his *Philosophie Zoologique*), she became the mother of Charles Darwin.

Charles Darwin

As a boy, Charles Darwin was fond of collecting and hunting, but he showed no special ability in school. His father, disappointed by his mediocre performance, once said to him: "You care for nothing but shooting, dogs and rat-catching; and you will be a disgrace to yourself, and to all your family."

Robert Darwin was determined that his son should not turn into an idle, sporting man, as he seemed to be doing, and when Charles was sixteen, he was sent to the University of Edinburgh to study medicine. However, Charles Darwin had such a sensitive and gentle disposition that he could not stand to see operations (performed, in those days, without chloroform). Besides, he had found out that his father planned to leave him enough money to live on comfortably; and consequently he didn't take his medical studies very seriously. However, some of his friends were scientists, and through them, Darwin became interested in geology and zoology.

Robert Darwin realized that his son did not want to become a physician, and, as an alternative, he sent Charles to Cambridge to prepare for the clergy. At Cambridge, Charles Darwin was very popular because of his cheerful, kind and honest character; but he was not a very serious student. Among his many friends, however, there were a few scientists, and they had a strong influence on him. The most important of Darwin's scientific friends were John Stevens Henslow, the Professor of Botany at Cambridge, and Adam Sedgwick, the Professor of Geology.

Remembering the things which influenced him at that time, Darwin wrote:

"During my last year at Cambridge, I read with care and profound interest Humboldt's *Personal Narrative of Travels to the Equinoctial Regions of America*. This work, and Sir J. Herschel's *Introduction to the Study of Natural Philosophy*, stirred up in me a burning desire to add even the most humble contribution to the noble structure of Natural Science. No one of a dozen books influenced me nearly so much as these. I copied out from Humboldt long passages about Teneriffe, and read them aloud to Henslow, Ramsay and Dawes... and some of the party declared that they would endeavour to go there; but I think they were only half in earnest. I was, however, quite in earnest, and got an introduction to a merchant in London to enquire about ships."

During the summer of 1831, Charles Darwin went to Wales to help Professor Sedgwick, who was studying the extremely ancient rock formations found there. When he returned to his father's house after this geological expedition, he found a letter from Henslow. This letter offered Darwin the post of unpaid naturalist on the *Beagle*, a small brig which was being sent by the British government to survey the coast of South America and to carry a chain of chronological measurements around the world.

Darwin was delighted and thrilled by this offer. He had a burning desire both to visit the glorious, almost-unknown regions described by his hero, Alexander von Humboldt, and to "add even the most humble contribution to the noble structure of Natural Science". His hopes and plans were blocked, however, by the opposition of his father, who felt that Charles was once again changing his vocation and drifting towards a life of sport and idleness. "If you can find any man of common sense who advises you to go", Robert

Darwin told his son, "I will give my consent".

Deeply depressed by his father's words, Charles Darwin went to visit the estate of his uncle, Josiah Wedgwood, at Maer, where he always felt more comfortable than he did at home. In Darwin's words what happened next was the following:

"...My uncle sent for me, offering to drive me over to Shrewsbury and talk with my father, as my uncle thought that it would be wise in me to accept the offer. My father always maintained that my uncle was one of the most sensible men in the world, and he at once consented in the kindest possible manner. I had been rather extravagant while at Cambridge, and to console my father, I said that 'I should be deuced clever to spend more than my allowance whilst on board the *Beagle*', but he answered with a smile, 'But they tell me you are very clever!'."

Thus, on December 27, 1831, Charles Darwin started on a five-year voyage around the world. Not only was this voyage destined to change Darwin's life, but also, more importantly, it was destined to change man's view of his place in nature.

Lyell's hypothesis

As the *Beagle* sailed out of Devonport in gloomy winter weather, Darwin lay in his hammock, 22 years old, miserably seasick and homesick, knowing that he would not see his family and friends for many years. To take his mind away from his troubles, Darwin read a new book, which Henslow had recommended: Sir Charles Lyell's *Principles of Geology*. "Read it by all means", Henslow had written, "for it is very interesting; but do not pay any attention to it except in regard to facts, for it is altogether wild as far as theory goes."

Reading Lyell's book with increasing excitement and absorption, Darwin could easily see what Henslow found objectionable: Lyell, a follower of the great Scottish geologist, James Hutton (1726-1797), introduced a revolutionary hypothesis into geology. According to Lyell, "No causes whatever have, from the earliest times to which we can look back, to the present, ever acted, but those now acting; and they have never acted with different degrees of energy from those which they now exert".

This idea seemed dangerous and heretical to deeply religious men like Henslow and Sedgwick. They believed that the earth's geology had been shaped by Noah's flood, and perhaps by other floods and catastrophes which had occurred before the time of Noah. The great geological features of the earth, its mountains, valleys and planes, they viewed as marks left behind by the various catastrophes through which the earth had passed.

All this was now denied by Lyell. He believed the earth to be enormously old - thousands of millions of years old. Over this vast period of time, Lyell believed, the long-continued action of slow forces had produced the geological features of the earth. Great valleys had been carved out by glaciers and by the slow action of rain and frost; and gradual changes in the level of the land, continued over enormous periods of time, had built up towering mountain ranges.

Lyell's belief in the immense age of the earth, based on geological evidence, made the evolutionary theories of Darwin's grandfather suddenly seem more plausible. Given such

vast quantities of time, the long-continued action of small forces might produce great changes in biology as well as in geology!

By the time the *Beagle* had reached San Thiago in the Cape Verde Islands, Darwin had thoroughly digested Lyell's book, with its dizzying prospects. Looking at the geology of San Thiago, he realized "the wonderful superiority of Lyell's manner of treating geology". Features of the island which would have been incomprehensible on the basis of the usual Catastrophist theories were clearly understandable on the basis of Lyell's hypothesis.

As the *Beagle* slowly made its way southward along the South American coast, Darwin went on several expeditions to explore the interior. On one of these trips, he discovered some fossil bones in the red mud of a river bed. He carefully excavated the area around them, and found the remains of nine huge extinct quadrupeds. Some of them were as large as elephants, and yet in structure they seemed closely related to living South American species. For example, one of the extinct animals which Darwin discovered resembled an armadillo except for its gigantic size.

The *Beagle* rounded Cape Horn, lashed by freezing waves so huge that it almost floundered. After the storm, when the brig was anchored safely in the channel of Tierra del Fuego, Darwin noticed how a Fuegian woman stood for hours and watched the ship, while sleet fell and melted on her naked breast, and on the new-born baby she was nursing. He was struck by the remarkable degree to which the Fuegians had adapted to their frigid environment, so that they were able to survive with almost no shelter, and with no clothes except a few stiff animal skins, which hardly covered them, in weather which would have killed ordinary people.

In 1835, as the *Beagle* made its way slowly northward, Darwin had many chances to explore the Chilean coast - a spectacularly beautiful country, shadowed by towering ranges of the Andes. One day, near Concepcion Bay, he experienced the shocks of a severe earthquake.

"It came on suddenly, and lasted two minutes", Darwin wrote, "The town of Concepcion is now nothing more than piles and lines of bricks, tiles and timbers."

Measurements which Darwin made showed him that the shoreline near Concepcion had risen at least three feet during the quake; and thirty miles away, Fitzroy, the captain of the *Beagle*, discovered banks of mussels ten feet above the new high-water mark. This was dramatic confirmation of Lyell's theories! After having seen how much the level of the land was changed by a single earthquake, it was easy for Darwin to imagine that similar events, in the course of many millions of years, could have raised the huge wall of the Andes mountains.

In September, 1835, the *Beagle* sailed westward to the Galapagos Islands, a group of small rocky volcanic islands off the coast of Peru. On these islands, Darwin found new species of plants and animals which did not exist anywhere else in the world. In fact, he discovered that each of the islands had its own species, similar to the species found on the other islands, but different enough to be classified separately.

The Galapagos Islands contained thirteen species of finches, found nowhere else in the world, all basically alike in appearance, but differing in certain features especially related to their habits and diet. As he turned these facts over in his mind, it seemed to Darwin that

the only explanation was that the thirteen species of Galapagos finches were descended from a single species, a few members of which had been carried to the islands by strong winds blowing from the South American mainland.

“Seeing this gradation and diversity of structure in one small, intimately related group of birds”, Darwin wrote, “one might really fancy that from an original paucity of birds in this archipelago, one species had been taken and modified for different ends... Facts such as these might well undermine the stability of species.”

As Darwin closely examined the plants and animals of the Galapagos Islands, he could see that although they were not quite the same as the corresponding South American species, they were so strongly similar that it seemed most likely that all the Galapagos plants and animals had reached the islands from the South American mainland, and had since been modified to their present form.

The idea of the gradual modification of species could also explain the fact, observed by Darwin, that the fossil animals of South America were more closely related to African and Eurasian animals than were the living South American species. In other words, the fossil animals of South America formed a link between the living South American species and the corresponding animals of Europe, Asia and Africa. The most likely explanation for this was that the animals had crossed to America on a land bridge which had since been lost, and that they had afterwards been modified.

The Beagle continued its voyage westward, and Darwin had a chance to study the plants and animals of the Pacific Islands. He noticed that there were no mammals on these islands, except bats and a few mammals brought by sailors. It seemed likely to Darwin that all the species of the Pacific Islands had reached them by crossing large stretches of water after the volcanic islands had risen from the ocean floor; and this accounted for the fact that so many classes were missing. The fact that each group of islands had its own particular species, found nowhere else in the world, seemed to Darwin to be strong evidence that the species had been modified after their arrival. The strange marsupials of the isolated Australian continent also made a deep impression on Darwin.

The Origin of Species

Darwin had left England on the Beagle in 1831, an immature young man of 22, with no real idea of what he wanted to do with his life. He returned from the five-year voyage in 1836, a mature man, confirmed in his dedication to science, and with formidable powers of observation, deduction and generalization. Writing of the voyage, Darwin says:

“I have always felt that I owe to the voyage the first real education of my mind... Everything about which I thought or read was made to bear directly on what I had seen, or was likely to see, and this habit was continued during the five years of the voyage. I feel sure that it was this training which has enabled me to do whatever I have done in science.”

Darwin returned to England convinced by what he had seen on the voyage that plant and animal species had not been independently and miraculously created, but that they had been gradually modified to their present form over millions of years of geological time.



Figure 2.16: A young Charles Darwin after the Beagle voyage, in a portrate by George Richmond. By this time, he had already joined the scientific elite.

Darwin was delighted to be home and to see his family and friends once again. To his uncle, Josiah Wedgwood, he wrote:

“My head is quite confused from so much delight, but I cannot allow my sister to tell you first how happy I am to see all my dear friends again... I am most anxious once again to see Maer and all its inhabitants.”

In a letter to Henslow, he said:

“My dear Henslow, I do long to see you. You have been the kindest friend to me that ever man possessed. I can write no more, for I am giddy with joy and confusion.”

In 1837, Darwin took lodgings at Great Marlborough Street in London, where he could work on his geological and fossil collections. He was helped in his work by Sir Charles Lyell, who became Darwin's close friend. In 1837 Darwin also began a notebook on *Transmutation of Species*. His *Journal of researches into the geology and natural history of the various countries visited by the H.M.S. Beagle* was published in 1839, and it quickly became a best-seller. It is one of the most interesting travel books ever written, and since its publication it has been reissued more than a hundred times.

These were very productive years for Darwin, but he was homesick, both for his father's

home at the Mount and for his uncle's nearby estate at Maer, with its galaxy of attractive daughters. Remembering his many happy visits to Maer, he wrote:

"In the summer, the whole family used often to sit on the steps of the old portico, with the flower-garden in front, and with the steep, wooded bank opposite the house reflected in the lake, with here and there a fish rising, or a water-bird paddling about. Nothing has left a more vivid picture in my mind than these evenings at Maer."

In the summer of 1838, tired of his bachelor life in London, Darwin wrote in his diary:

"My God, it is intolerable to think of spending one's whole life like a neuter bee, working, working, and nothing after all! Imagine living all one's days in smoky, dirty London! Only picture to yourself a nice soft wife on a sofa with a good fire, and books and music perhaps.. Marry! Marry! Marry! Q.E.D."

Having made this decision, Darwin went straight to Maer and proposed to his pretty cousin, Emma Wedgwood, who accepted him at once, to the joy of both families. Charles and Emma Darwin bought a large and pleasant country house at Down, fifteen miles south of London; and there, in December, 1839, the first of their ten children was born.

Darwin chose this somewhat isolated place for his home because he was beginning to show signs of a chronic illness, from which he suffered for the rest of his life. His strength was very limited, and he saved it for his work by avoiding social obligations. His illness was never accurately diagnosed during his own lifetime, but the best guess of modern doctors is that he had Chagas' disease, a trypanosome infection transmitted by the bite of a South American blood-sucking bug.

Darwin was already convinced that species had changed over long periods of time, but what were the forces which caused this change? In 1838 he found the answer:

"I happened to read for amusement Malthus on *Population*", he wrote, "and being well prepared to appreciate the struggle for existence which everywhere goes on from long-continued observation of the habits of animals and plants, it at once struck me that under these circumstances favorable variations would tend to be preserved, and unfavorable ones destroyed. The result would be the formation of new species"

"Here, then, I had at last got a theory by which to work; but I was so anxious to avoid prejudice that I determined not for some time to write down even the briefest sketch of it. In June, 1842, I first allowed myself the satisfaction of writing a very brief abstract of my theory in pencil in 33 pages; and this was enlarged during the summer of 1844 into one of 230 pages".

All of Darwin's revolutionary ideas were contained in the 1844 abstract, but he did not publish it! Instead, in an incredible Copernicus-like procrastination, he began a massive treatise on barnacles, which took him eight years to finish! Probably Darwin had a premonition of the furious storm of hatred and bigotry which would be caused by the publication of his heretical ideas.

Finally, in 1854, he wrote to his friend, Sir Joseph Hooker (the director of Kew Botanical Gardens), to say that he was at last resuming his work on the origin of species. Both Hooker and Lyell knew of Darwin's work on evolution, and for many years they had been urging him to publish it. By 1835, he had written eleven chapters of a book on the origin of species through natural selection; but he had begun writing on such a vast scale that the

book might have run to four or five heavy volumes, which could have taken Darwin the rest of his life to complete.

Fortunately, this was prevented by the arrival at Down House of a bombshell in the form of a letter from a young naturalist named Alfred Russell Wallace. Like Darwin, Wallace had read Malthus' book *On Population*, and in a flash of insight during a period of fever in Malaya, he had arrived at a theory of evolution through natural selection which was precisely the same as the theory on which Darwin had been working for twenty years! Wallace enclosed with his letter a short paper entitled *On the Tendency of Varieties to Depart Indefinitely From the Original Type*. It was a perfect summary of Darwin's theory of evolution!

"I never saw a more striking coincidence", the stunned Darwin wrote to Lyell, "If Wallace had my MS. sketch, written in 1842, he could not have made a better short abstract! Even his terms now stand as heads of my chapters... I should be extremely glad now to publish a sketch of my general views in about a dozen pages or so; but I cannot persuade myself that I can do so honourably... I would far rather burn my whole book than that he or any other man should think that I have behaved in a paltry spirit."

Both Lyell and Hooker acted quickly and firmly to prevent Darwin from suppressing his own work, as he was inclined to do. In the end, they found a happy solution: Wallace's paper was read to the Linnean Society together with a short abstract of Darwin's work, and the two papers were published together in the proceedings of the society. The members of the Society listened in stunned silence. As Hooker wrote to Darwin the next day, the subject was "too novel and too ominous for the old school to enter the lists before armouring."

Lyell and Hooker then persuaded Darwin to write a book of moderate size on evolution through natural selection. As a result, in 1859, he published *The Origin of Species*, which ranks, together with Newton's *Principia* as one of the two greatest scientific books of all time. What Newton did for physics, Darwin did for biology: He discovered the basic theoretical principle which brings together all the experimentally-observed facts and makes them comprehensible; and he showed in detail how this basic principle can account for the facts in a very large number of applications.

Darwin's *Origin of Species* can still be read with enjoyment and fascination by a modern reader. His style is vivid and easy to read, and almost all of his conclusions are still believed to be true. He begins by discussing the variation of plants and animals under domestication, and he points out that the key to the changes produced by breeders is selection: If we want to breed fast horses, we select the fastest in each generation, and use them as parents for the next generation.

Darwin then points out that a closely similar process occurs in nature: Every plant or animal species produces so many offspring that if all of them survived and reproduced, the population would soon reach astronomical numbers. This cannot happen, since the space and food supply are limited; and therefore, in nature there is always a struggle for survival. Accidental variations which increase an organism's chance of survival are more likely to be propagated to subsequent generations than are harmful variations. By this mechanism, which Darwin called "natural selection", changes in plants and animals occur in nature

just as they do under domestication.

If we imagine a volcanic island, pushed up from the ocean floor and completely uninhabited, we can ask what will happen as plants and animals begin to arrive. Suppose, for example, that a single species of bird arrives on the island. The population will first increase until the environment cannot support larger numbers, and it will then remain constant at this level. Over a long period of time, however, variations may accidentally occur in the bird population which allow the variant individuals to make use of new types of food; and thus, through variation, the population may be further increased. In this way, a single species “radiates” into a number of sub-species which fill every available ecological niche. The new species produced in this way will be similar to the original ancestor species, although they may be greatly modified in features which are related to their new diet and habits. Thus, for example, whales, otters and seals retain the general structure of land-going mammals, although they are greatly modified in features which are related to their aquatic way of life. This is the reason, according to Darwin, why vestigial organs are so useful in the classification of plant and animal species.

The classification of species is seen by Darwin as a genealogical classification. All living organisms are seen, in his theory, as branches of a single family tree! This is a truly remarkable assertion, since the common ancestors of all living things must have been extremely simple and primitive; and it follows that the marvelous structures of the higher animals and plants, whose complexity and elegance utterly surpasses the products of human intelligence, were all produced, over thousands of millions of years, by random variation and natural selection!

Each structure and attribute of a living creature can therefore be seen as having a long history; and a knowledge of the evolutionary history of the organs and attributes of living creatures can contribute much to our understanding of them. For instance, studies of the evolutionary history of the brain and of instincts can contribute greatly to our understanding of psychology, as Darwin pointed out.

Among the many striking observations presented by Darwin to support his theory, are facts related to morphology and embryology. For example, Darwin includes the following quotation from the naturalist, von Baer:

“In my possession are two little embryos in spirit, whose names I have omitted to attach, and at present I am quite unable to say to what class they belong. They may be lizards or small birds, or very young mammalia, so complete is the similarity in the mode of formation of the head and trunk in these animals. The extremities, however, are still absent in these embryos. But even if they had existed in the earliest stage of their development, we should learn nothing, for the feet of lizards and mammals, the wings and feet of birds, no less than the hands and feet of man, all arise from the same fundamental form.”

Darwin also quotes the following passage from G.H. Lewis:

“The tadpole of the common Salamander has gills, and passes its existence in the water; but the *Salamandra atra*, which lives high up in the mountains, brings forth its young full-formed. This animal never lives in the water. Yet if we open a gravid female, we find tadpoles inside her with exquisitely feathered gills; and when placed in water, they swim about like the tadpoles of the common Salamander or water-newt. Obviously this aquatic

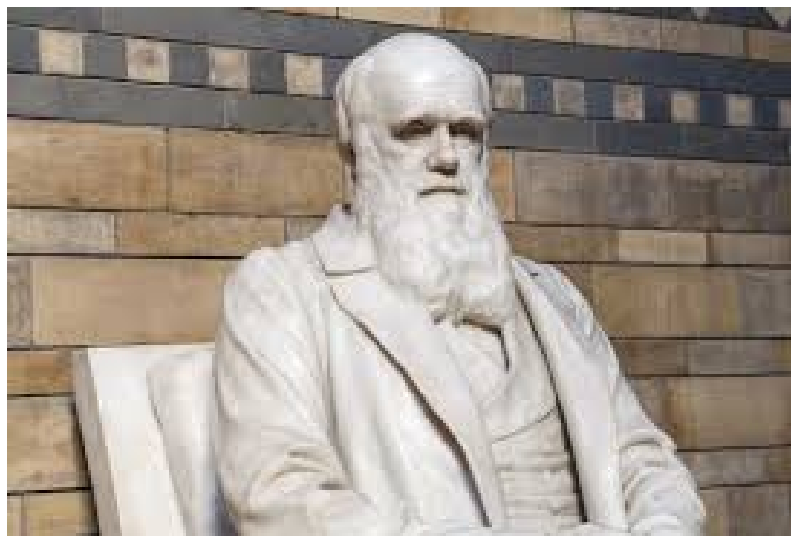


Figure 2.17: A statue of Charles Darwin, “the Newton of biology”, in the Natural History Museum, London.

organization has no reference to the future life of the animal, nor has it any adaption to its embryonic condition; it has solely reference to ancestral adaptations; it repeats a phase in the development of its progenitors.”

Darwin points out that, “...As the embryo often shows us more or less plainly the structure of the less modified and ancient progenitor of the group, we can see why ancient and extinct forms so often resemble in their adult state the embryos of existing species.”

No abstract of Darwin’s book can do justice to it. One must read it in the original. He brings forward an overwhelming body of evidence to support his theory of evolution through natural selection; and he closes with the following words:

“It is interesting to contemplate a tangled bank, clothed with many plants of many different kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependant upon each other in so complex a manner, have all been produced by laws acting around us... There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning, endless forms most beautiful and wonderful have been and are being evolved.”

2.14 The abolition of serfdom and slavery

The ideals of the Enlightenment led to movements for the abolition of both serfdom and slavery. John Locke had expressed these ideals in the famous words: “Men living together according to reason, without a common superior on earth with authority to judge between



Figure 2.18: Reeve and serfs in feudal England, c. 1310.

them, is properly the state of nature... A state also of equality, wherein all the power and jurisdiction is reciprocal, no one having more than another; there being nothing more evident than that creatures of the same species, promiscuously born to all the same advantages of nature and the use of the same facilities, should also be equal amongst one another without subordination or subjection..."

The same ideals are echoed in the American Declaration of Independence: "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain inalienable rights, and that among these are the rights to life, liberty and the pursuit of happiness, that to secure these rights Governments are instituted among men, deriving their just powers from the consent of the governed."

The political philosophers of the Enlightenment could see no rational argument for "the divine right of kings", nor for serfdom, nor for slavery. The ideal of human equality, liberty and brotherhood led to revolutions in America, France and Russia, and to movements in many countries for the abolition of serfdom and slavery. Despite the successes of these revolutions and movements, both slavery and extreme inequality still exists. Today, child labor accounts for 22% of the workforce in Asia, 32% in Africa, and 17% in Latin America. Large-scale slavery also exists today, although there are formal laws against it in every country. There are more slaves now than ever before - their number is estimated to be between 12 million and 27 million. Besides outright slaves, who are bought and sold for as little as 100 dollars, there many millions of workers whose lack of options and dreadful working conditions must be described as slavlike.

Extreme financial inequality also exists today, both between countries and within countries; and as the result of the control of wealth over politics, many nations that claim to be democracies, are in fact oligarchies.



Figure 2.19: Punishment with a knout. Whipping was a common punishment for Russian serfs.

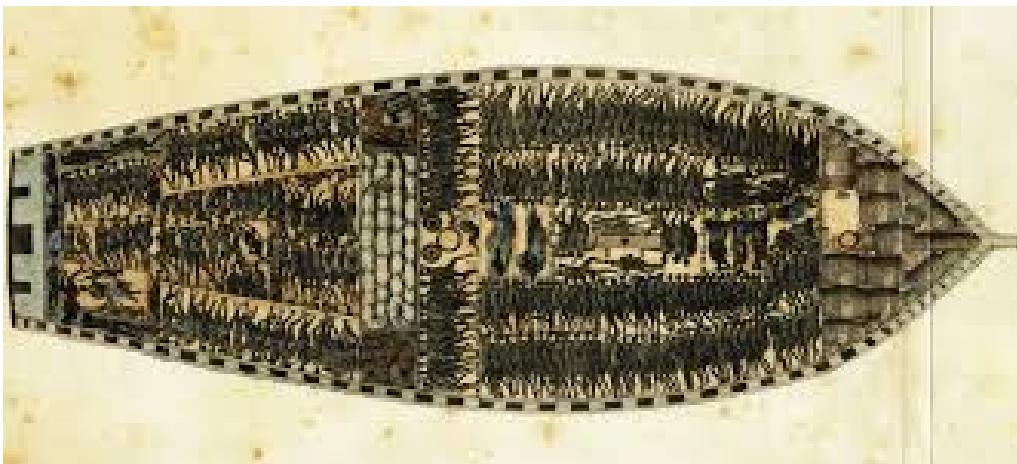


Figure 2.20: Diagram of a slave ship.



Figure 2.21: “Am I not a man and a brother?”, a medallion designed by Charles Darwin’s uncle, Josiah Wedgewood, for the British anti-slavery campaign.



Figure 2.22: The Chevalier de Saint-Georges. sometimes called the “Black Mozart”.



Figure 2.23: “Abolition of slavery in the French colonies, 1848”. a painting by Auguste Biard



Figure 2.24: William Wilberforce (1759-1833), a leader of the British movement to abolish the slave trade.

Suggestions for further reading

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Chapter 3

LESSONS FROM TWO REVOLUTIONS

3.1 The United States Constitution and Bill of Rights

The history of the Federal Constitution of the United States is an interesting one. It was preceded by the Articles of Confederation, which were written by the Second Continental Congress between 1776 and 1777, but it soon became clear that Confederation was too weak a form of union for a collection of states.

George Mason, one of the drafters of the Federal Constitution, believed that “such a government was necessary as could directly operate on individuals, and would punish those only whose guilt required it”, while another drafter, James Madison, wrote that the more he reflected on the use of force, the more he doubted “the practicality, the justice and the efficacy of it when applied to people collectively, and not individually.”

Finally, Alexander Hamilton, in his Federalist Papers, discussed the Articles of Confederation with the following words: “To coerce the states is one of the maddest projects that was ever devised... Can any reasonable man be well disposed towards a government which makes war and carnage the only means of supporting itself, a government that can exist only by the sword? Every such war must involve the innocent with the guilty. The single consideration should be enough to dispose every peaceable citizen against such government... What is the cure for this great evil? Nothing, but to enable the... laws to operate on individuals, in the same manner as those of states do.”

In other words, the essential difference between a confederation and a federation, both of them unions of states, is that a federation has the power to make and to enforce laws that act on individuals, rather than attempting to coerce states (in Hamilton’s words, “one of the maddest projects that was ever devised.”) The fact that a confederation of states was found to be far too weak a form of union is especially interesting because our present United Nations is a confederation. We are at present attempting to coerce states with sanctions that are “applied to people collectively and not individually.” The International Criminal Court, which we will discuss below, is a development of enormous importance,

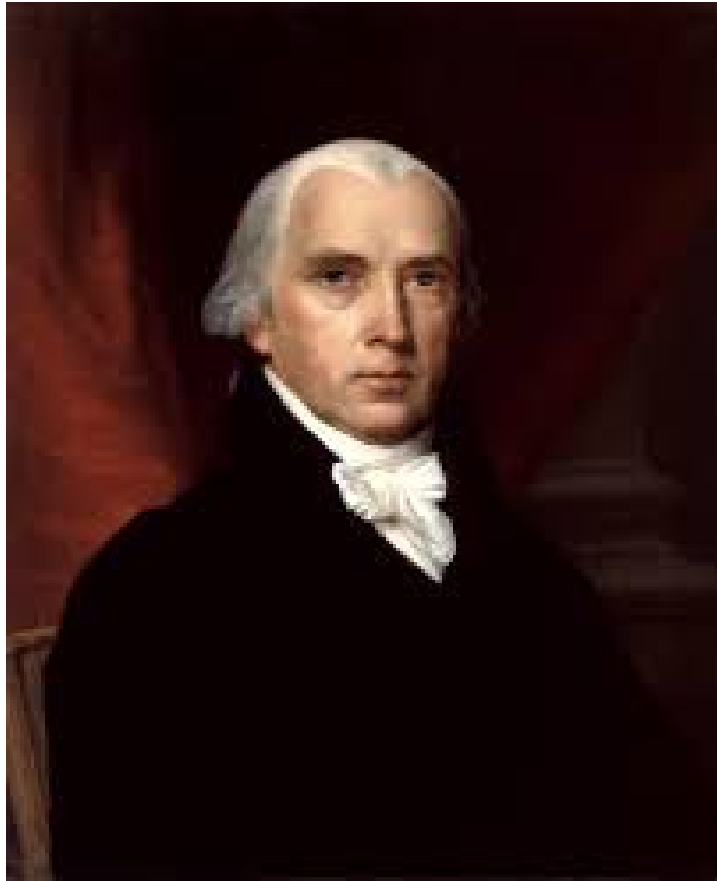


Figure 3.1: **James Madison, wrote that the more he reflected on the use of force, the more he doubted “the practicality, the justice and the efficacy of it when applied to people collectively, and not individually.” He later introduced the Constitutional amendments that became the U.S. Bill of Rights.**

because it acts on individuals, rather than attempting to coerce states.

There are many historical examples of successful federations; but in general, unions of states based on the principle of confederation have proved to be too weak. Probably our best hope for the future lies in gradually reforming and strengthening the United Nations, until it becomes a federation.

In the case of the Federal Constitution of the United States, there were Anti-Federalists who opposed its ratification because they feared that it would be too powerful. Therefore, on June 8, 1789, James Madison introduced in the House of Representatives a series of 39 amendments to the constitution, which would limit the government’s power. Of these, only amendments 3 to 12 were adopted, and these have become known collectively as the Bill of Rights.

Of the ten amendments that constitute the original Bill of Rights, we should take particular notice of the First, Fourth and Sixth, because they have been violated repeatedly

and grossly by the present government of the United States.

The First Amendment requires that “Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.” The right to freedom of speech and freedom of the press has been violated by the punishment of whistleblowers. The right to assemble peaceably has also been violated repeatedly and brutally by the present government’s militarized police.

The Fourth Amendment states that “The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.” It is hardly necessary to elaborate on the U.S. Government’s massive violations of the Fourth Amendment. Edward Snowden’s testimony has revealed a huge secret industry carrying out illegal and unwarranted searches and seizures of private data, not only in the United States, but also throughout the world. This data can be used to gain power over citizens and leaders through blackmail. True democracy and dissent are thereby eliminated.

The Sixth Amendment requires that “In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the Assistance of Counsel for his defense.” This constitutional amendment has also been grossly violated.

In the context of federal unions of states, the Tenth Amendment is also interesting. This amendment states that “The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.” We mentioned above that historically, federations have been very successful. However, if we take the European Union as an example, it has had some problems connected with the principle of subsidiarity, according to which as few powers as possible should be decided centrally, and as many issues as possible should be decided locally. The European Union was originally designed as a free trade area, and because of its history commercial considerations have trumped environmental ones. The principle of subsidiarity has not been followed, and enlightened environmental laws of member states have been declared to be illegal by the EU because they conflicted with free trade. These are difficulties from which we can learn as we contemplate the conversion of the United Nations into a federation.

The United States Bill of Rights was influenced by John Locke and by the French philosophers of the Enlightenment. The French Declaration of the Rights of Man (August, 1789) was almost simultaneous with the U.S. Bill of Rights.

We can also see the influence of Enlightenment philosophy in the wording of the U.S. Declaration of independence (1776): “We hold these truths to be self-evident, that all men

are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness.—That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed...” Another criticism that can be leveled against the present government of the United States is that its actions seem to have nothing whatever to do with the consent of the governed, not to mention the violations of the rights to life, liberty and the pursuit of happiness implicit in extrajudicial killings.

Here are a few things that Hamilton said:

Men give me credit for some genius. All the genius I have lies in this; when I have a subject in hand, I study it profoundly. Day and night it is before me. My mind becomes pervaded with it. Then the effort that I have made is what people are pleased to call the fruit of genius. It is the fruit of labor and thought.

Give all the power to the many, they will oppress the few. Give all the power to the few, they will oppress the many.

Those who stand for nothing fall for everything.

The art of reading is to skip judiciously.

There are seasons in every country when noise and impudence pass current for worth; and in popular commotions especially, the clamors of interested and factious men are often mistaken for patriotism.

Safety from external danger is the most powerful director of national conduct. Even the ardent love of liberty will, after a time, give way to its dictates. The violent destruction of life and property incident to war, the continual effort and alarm attendant on a state of continual danger, will compel nations the most attached to liberty to resort for repose and security to institutions which have a tendency to destroy their civil and political rights. To be more safe, they at length become willing to run the risk of being less free.

The sacred rights of mankind are not to be rummaged for among old parchments or musty records. They are written, as with a sunbeam, in the whole volume of human nature, by the Hand of Divinity itself, and can never be erased or obscured by mortal power.

Why has government been instituted at all? Because the passions of man will not conform to the dictates of reason and justice without constraint.

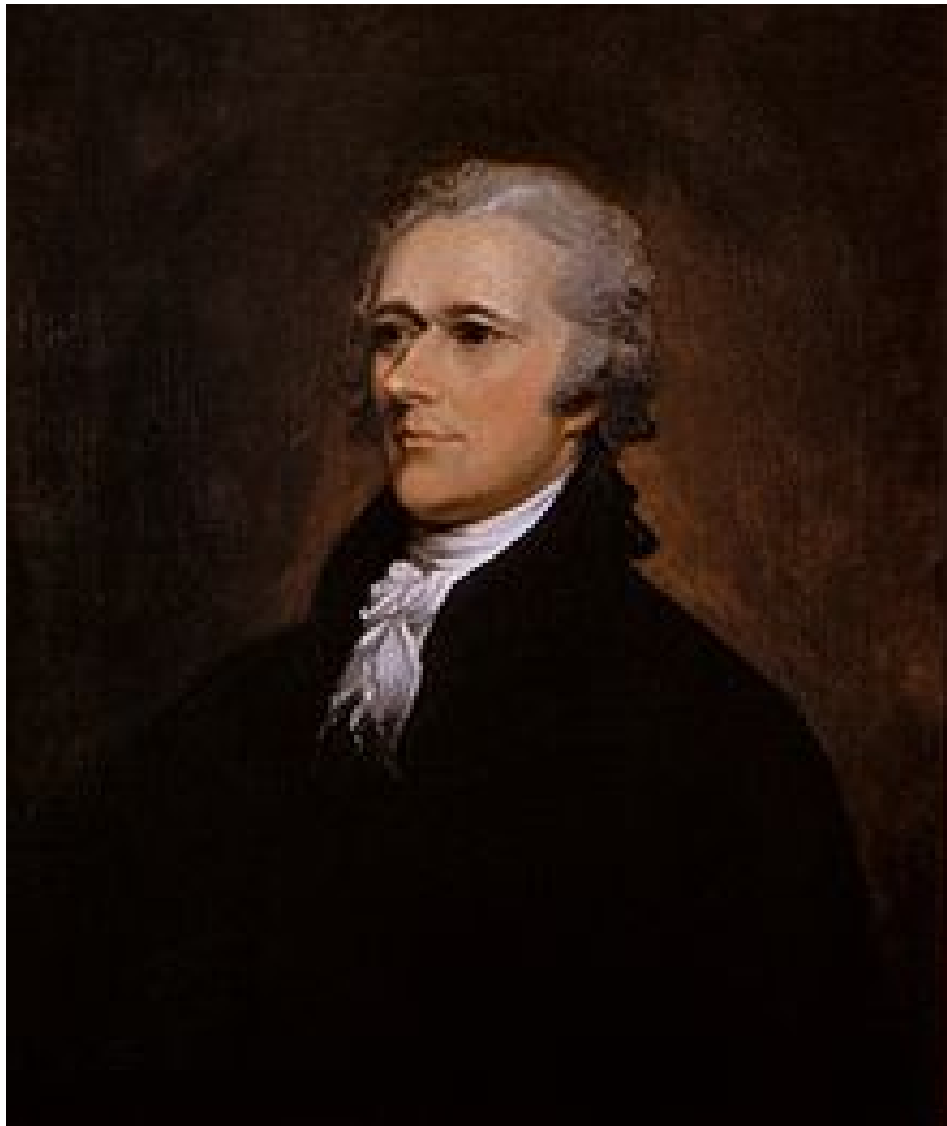


Figure 3.2: Alexander Hamilton in a 1807 portrait by John Turnbull.

Hard words are very rarely useful. Real firmness is good for every thing. Strut is good for nothing.

I have thought it my duty to exhibit things as they are, not as they ought to be.

For in politics, as in religion, it is equally absurd to aim at making proselytes by fire and sword. Heresies in either can rarely be cured by persecution.

The republican principle demands that the deliberate sense of the community should govern the conduct of those to whom they intrust the management of their affairs; but it does not require an unqualified complaisance to every sudden breeze of passion or to every transient impulse which the people may receive from the arts of men, who flatter their prejudices to betray their interests.

Here, sir, the people govern; here they act by their immediate representatives.

Vigor of government is essential to the security of liberty.

It will be of little avail to the people, that the laws are made by men of their own choice, if the laws be so voluminous that they cannot be read, or so incoherent that they cannot be understood.

3.2 Thomas Paine

Early life

Thomas Paine was born in 1737 in Thetford, Norfolk, England. His father was a manufacturer of rope stays used on ships, and after attending grammar school, Paine was apprenticed to his father. Later, he held a variety of positions in England, including excise officer and school-teacher.

Paine also opened a tobacco shop, but it failed, and the resulting financial difficulties put Paine in danger of debtor's prison. He was saved from this fate by Benjamin Franklin, to whom he had been introduced by a fellow excise officer. Franklin suggested to Paine that he should emigrate to America, and he set sail in 1774.

Thomas Paine barely survived the voyage to America. The water on board had been polluted with typhoid fever, and when the ship arrived in Pennsylvania, Paine was so ill that he had to be carried ashore. Franklin's physician nursed the sick man back to health. Paine then became a citizen of Pennsylvania, and in 1775 he found work as editor of the *Pennsylvania Magazine*, a post which he filled with distinction.

Common sense, 1776

In Pennsylvania, Thomas Paine became an enthusiastic supporter American independence movement, and in 1776 he published an immensely successful pamphlet entitled *Common Sense*. Ultimately half a million copies of this pamphlet were sold in the American colonies, whose population at that time was only 2.5 million. In proportion to the total population, Paine's pamphlet sold more copies than any printed work ever published in America, before or since.

Besides readers who owned copies of *Common Sense*, many others heard it read aloud in homes or taverns. The revolution against the English monarchy had already started, but Paine's pamphlet encouraged enlistment in George Washington's Continental Army and it supplied the the colonists with strong arguments for independence. Because of this, Paine is often called "the father of the American Revolution".

In his introduction to *Common Sense*, Paine wrote: "The cause of America is, to a great extent, the cause of all mankind. Many circumstances have, and will, arise, which are not local but universal, and through which principles all lovers of mankind are affected, and in the event of which their affections are interested. The laying of a country desolate with fire and sword, declaring war against the natural rights of all mankind, and extirpating the defenders thereof from the face of the earth, is the concern of every man to whom nature hath given the power of feeling; of which class, regardless of party censure, is the author."

In the main body of the pamphlet he opposed the idea that the English constitution is a good for America: "I know that it is difficult to get over long standing prejudices, yet if we suffer ourselves to examine the component parts of the English constitution, we shall find them to be the base remains of two ancient tyrannies, compounded with some new republican materials.

First: The remains of the monarchical tyranny in the person of the king.

Secondly: The remains of the aristocratical tyranny in the persons of the peers.

Thirdly: The new republican materials in the persons of the commons, on whose virtue depends the freedom of England."

"There is something exceedingly ridiculous in the composition of monarchy; it first excludes a man from the means of information, yet empowers him to act in cases where the highest judgement is required. The state of a king shuts him off from the world; yet the business of a king requires him to know it thoroughly; whereof the different parts, by opposing and destroying each other, prove the whole character to be absurd and useless."

"That the crown is the overbearing part of the English constitution, needs not be mentioned, and that it derives its whole consequence merely from being the giver of places and pensions is self-evident, whereof, although we have been wise enough to shut an lock a door against absolute monarchy, we at the same time have been foolish enough to put the crown in possession of the key."

The Rights of Man, (1791)

The Continental Congress sought financial help from France to support the revolutionary war against England. Thomas Paine was sent to France as one of two negotiators. He landed there in March 1781 and returned to America in August with 2.5 million livres in silver, as part of a “present” of 6 million and a loan of 10 million.

Paine returned to England in 1787 and he soon became involved a debate concerning the French Revolution. In 1790, the conservative writer Edmond Burke issued a pamphlet entitled *Reflections on the Revolution in France*. Burke’s pamphlet was an argument for retaining traditional methods of government. Since they had evolved slowly and had been tested over long periods of time, Burke argued, traditional forms of government were more trustworthy than institutions that was newly invented.

Burke’s pamphlet provoked a storm of refutations, and Thomas Paine joined the chorus with a pamphlet entitled *The Rights of Man*. He first offered this pamphlet to the liberal published Joseph Johnson. However, Johnson had been especially warned by government agents that if he printed anything by Paine, he would be speedily imprisoned. Paine himself was warned by William Blake that if he returned to his lodgings, he too would be imprisoned. Blake advised him to flee to France.

Before leaving for France, Paine entrusted *The Rights of Man* to another printer, J.S. Jordan, who risked arrest by publishing it. Nearly a million copies were sold! Details of the publication were handled by William Godwin, Thomas Brand Hollis and Thomas Holcroft, all of whom were close friends of Paine.

In England, Thomas Paine was tried *in absentia* for writing *The Rights of Man*, and he was convicted of seditious libel against the King. Of course he could not be arrested and hanged by the English government, because he was in France.

Despite not being able to speak French, Paine was elected to the French National Convention. However, France at that time was not a safe place, since rival revolutionary factions were fighting for control of the country. Paine was arrested in 1793 by Robespierre’s party because he supported the rival Girondists. After narrowly escaping execution, Paine was finally released from prison through the diplomatic efforts of the future American President, James Monroe. Thus Paine survived the critical days until the fall of Robespierre, after which he lived safely in France for a number of years.

In his 90,000-word book, *The Rights of Man*, Paine argued that human rights originate in Nature, thus, rights cannot be granted via political charter, because that implies that rights are legally revocable, hence, would be privileges:

“It is a perversion of terms”, Paine wrote, “to say that a charter gives rights. It operates by a contrary effect - that of taking rights away. Rights are inherently in all the inhabitants; but charters, by annulling those rights, in the majority, leave the right, by exclusion, in the hands of a few... They... consequently are instruments of injustice ... The fact, therefore, must be that the individuals, themselves, each, in his own personal and sovereign right, entered into a contract with each other to produce a government: and this is the only mode in which governments have a right to arise, and the only principle on which they have a right to exist.”



Figure 3.3: Thomas Paine in a portrait by Mathew Pratt (Wikipedia).

Thomas Paine argued that government's only purpose is safeguarding the individual's safety and inherent, inalienable rights; each societal institution that does not benefit the nation is illegitimate - especially monarchy and aristocracy.

Many of these ideas were already circulating during the Enlightenment period, for example in John Locke's *Second Treatise of Government*. Paine developed these ideas further, helped by conversations with Thomas Jefferson, who was also in Paris at that time.

In the final part of *The Rights of Man*, Paine proposes that a reformed English Constitution should be drafted, along the lines of the American Constitution. He advocated the elimination of aristocratic titles, a budget without military allocations, lower taxes and subsidized education for the poor, and a progressively weighted and increased income tax for the wealthy.

The Impact of Thomas Paine's Ideas

Napoleon claimed that he slept with a copy of Paine's *The Rights of Man* under his pillow. Napoleon was once friendly with Paine, but when he assumed the title of Emperor, Paine denounced him as a charlatan.

Abraham Lincoln's writing style was very much influenced by Paine's. Roy Basler, the editor of Lincoln's papers, said: "Paine had a strong influence on Lincoln's style: No other writer of the eighteenth century, with the exception of Jefferson, parallels more closely the temper or gist of Lincoln's later thought. In style, Paine above all others affords the variety of eloquence which, chastened and adapted to Lincoln's own mood, is revealed in Lincoln's formal writings."

Thomas Edison wrote: "I have always regarded Paine as one of the greatest of all Americans. Never have we had a sounder intelligence in this republic ... It was my good fortune to encounter Thomas Paine's works in my boyhood ... it was, indeed, a revelation to me to read that great thinker's views on political and theological subjects. Paine educated me, then, about many matters of which I had never before thought. I remember, very vividly, the flash of enlightenment that shone from Paine's writings, and I recall thinking, at that time, 'What a pity these works are not today the schoolbooks for all children!' My interest in Paine was not satisfied by my first reading of his works. I went back to them time and again, just as I have done since my boyhood days."

The Uruguayan national hero Jose Gervasio Artigas became familiar with and embraced Paine's ideas. In turn, many of Artigas's writings drew directly from Paine's, including the Instructions of 1813, which Uruguayans consider to be one of their country's most important constitutional documents; it was one of the earliest writings to articulate a principled basis for an identity independent of Buenos Aires.

Interestingly, like his lifelong friend and mentor Benjamin Franklin, Thomas Paine was also an inventor. Single-span iron bridges designed by him have been constructed in many parts of the world, and he contributed to the improvement of the steam engine.

In 2002, Paine was voted number 34 of "100 Greatest Britons" in a public poll conducted by the BBC.

3.3 Thomas Jefferson

Jefferson's Education

Thomas Jefferson (1743-1826) was born in the British Colony of Virginia. His father, Peter Jefferson, who was a planter and surveyor, died when Thomas Jefferson was 14 years old, and Thomas inherited an estate of approximately 5000 acres.

At the age of 16, Jefferson entered the College of William and Mary in Williamsburg Virginia. His studies there included mathematics and philosophy. He became familiar with John Locke, Francis Bacon and Isaac Newton. Jefferson also improved his knowledge of languages and his skill in playing the violin. He graduated in two years and afterwards studied law. Jefferson was an avid reader, and his personal library ultimately included 6,500 books.

When the British government passed the Intolerable Acts in 1774, Jefferson wrote a resolution calling for a day of fasting and prayer in protest, as well as a boycott of all British goods. He later expanded this into a larger publication with the title *A Summary View of the Rights of British America*.

Monticello

In 1768, Jefferson began construction his home, Monticello, on a hilltop overlooking his estate. It was a large mansion in the Palladian style, designed by Jefferson. He worked to improve it throughout most of his life. It is now a much-visited museum and national monument.

In 1772, Jefferson married his third cousin, the 23-year old widow Martha Wayles Skelton. The marriage was an extremely happy one, and they had six children. However, weakened by the birth of her last child, Martha died at the age of 33. Before her death she made her heartbroken husband promise never to marry again because she could not bear to think of her children being brought up by a stepmother. Through Martha, Jefferson inherited an additional estate of 11,000 acres, but he also inherited the debts of the estate, and this contributed to his financial worries. However, he was finally able to pay all of the debts.

Political service to Virginia and to the United States

At 33, Jefferson represented Virginia at the Continental Congress, where he was one of the youngest delegates. He was the main author of the *Declaration of Independence*. In writing it, he drew on his deep knowledge of Enlightenment thought, for example the writings of John Locke and Montaigne.

As a Virginia legislator, Jefferson drafted a law for religious freedom. He also served as Virginia's wartime governor (1779-1781).

In 1785, Jefferson became the United States' Minister to France. Later, from 1790 to 1793 he served as Secretary of State under President George Washington. He was America's

second Vice President, under John Adams. Finally, from 1801 to 1809 he served as the third President of the United States.

A few things that Thomas Jefferson said

I tremble for my country when I reflect that God is just; that his justice cannot sleep forever.

Educate and inform the whole mass of the people... They are the only sure reliance for the preservation of our liberty.

We hold these truths to be self-evident: that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness.

Do you want to know who you are? Don't ask. Act! Action will delineate and define you.

I like the dreams of the future better than the history of the past.

I know of no safe depository of the ultimate powers of the society but the people themselves; and if we think them not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them but to inform their discretion.

The care of human life and happiness, and not their destruction, is the first and only object of good government.

I never considered a difference of opinion in politics, in religion, in philosophy, as cause for withdrawing from a friend.

All, too, will bear in mind this sacred principle, that though the will of the majority is in all cases to prevail, that will to be rightful must be reasonable; that the minority possess their equal rights, which equal law must protect, and to violate would be oppression.

Our country is now taking so steady a course as to show by what road it will pass to destruction, to wit: by consolidation of power first, and then corruption, its necessary consequence.

Sometimes it is said that man cannot be trusted with the government of himself. Can he, then be trusted with the government of others? Or have we found

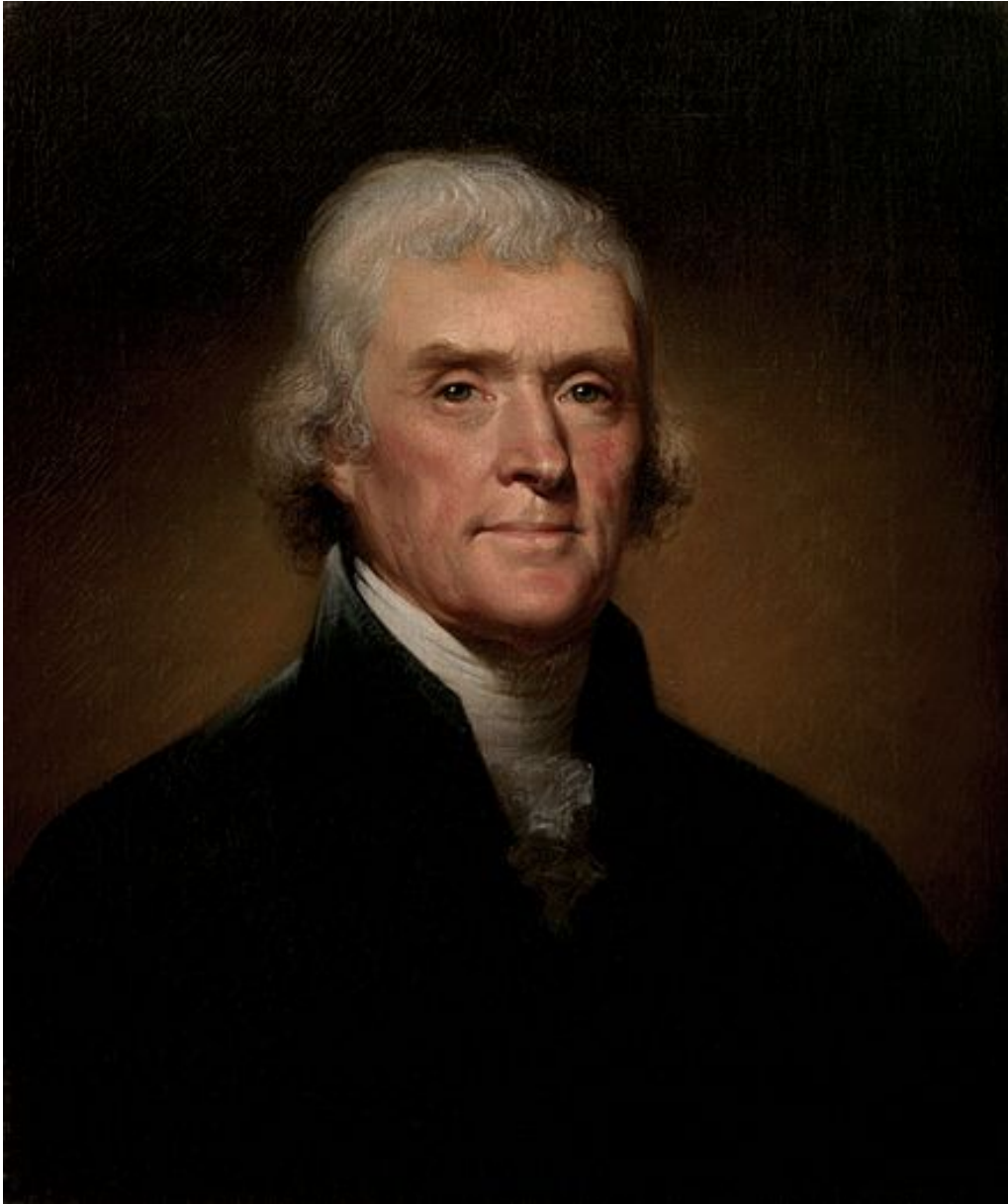


Figure 3.4: Thomas Jefferson in a painting by R. Peale (Wikipedia).

angels in the form of kings to govern him? Let history answer this question.

The world is indebted for all triumphs which have been gained by reason and humanity over error and oppression. Conquest is not in our principles. It is inconsistent with our government.

The spirit of this country is totally adverse to a large military force. I have seen enough of one war never to wish to see another.

I have sworn upon the altar of God, eternal hostility against every form of tyranny over the mind of man.

If there is one principle more deeply rooted in the mind of every American, it is that we should have nothing to do with conquest.

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness. That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed...

3.4 Benjamin Franklin

From humble origins to international fame

Benjamin Franklin (1705-1790) was born in Boston to a father with seventeen children. Because of his very large family Franklin's father, who was a candle and soap maker, could only afford to send him to school for two years. Franklin was largely self-educated through voracious reading.

After leaving school, Benjamin Franklin at first worked for his father, but soon he was apprenticed to his elder brother James, who was a printer, and who also had founded a newspaper. *The New England Courant*, the first truly independent newspaper in the America Colonies.

Young Ben was already full of ideas, and he strongly wished to contribute articles to James' newspaper, but his somewhat tyrannical elder brother forbade him to do so. To get around this prohibition, Ben secretly invented a fictitious middle-aged widow named Silence Dogood, and submitted many articles in her name. These articles proved to be extremely popular with readers of *The New England Courant*, but when James discovered the ruse, he was furious.

The result of the soured relationship between the two brothers was that Benjamin Franklin broke off the apprenticeship without James' permission and fled to another colony,



Figure 3.5: A portrait of Benjamin Franklin by Joseph Duplessis, 1778.



Figure 3.6: Franklin's kite experiment, as visualized by the artist Benjamin West, who added some cherubs. Franklin's kite experiment led him to invent the lightning rod. His other inventions included bifocal glasses, the glass harmonica and the Franklin stove. In science, Franklin was an early supporter of the wave theory of light; and he made important contributions to demographics, the study of ocean currents and the theory of electricity. He discovered the principle of conservation of electrical charge and constructed a multiple plate capacitor.



Figure 3.7: Franklin (center) at work with his printing press, in a reproduction of a painting by Charles Mills.



Figure 3.8: A political cartoon by Benjamin Franklin urging the American colonies to unite.



Figure 3.9: A painting by John Turnbull showing the Committee of Five presenting the Declaration of Independence. Although illness made him unable to be present at the moment of presentation shown in the painting, Franklin made important contributions to the Declaration.



Figure 3.10: A painting showing Franklin as Ambassador to France, surrounded by French ladies, with whom he was very popular. When one of them rebuked him for not having come to see her, he replied, “Madam, I am waiting until the nights are longer”.

Pennsylvania. He arrived there at the age of 17, almost penniless, but he soon found work in the printing shops of the newly-founded city of Philadelphia.

Before long, Benjamin Franklin became a highly successful independent printer, writer and publisher. His publications, such as *The Pennsylvania Gazette*, *Poor Richard's Almanac*, *The Busy-Body*, *The General Magazine and Historical Chronicle for all the British Plantations in America*, and *Abraham's Sermon*, eventually made him a wealthy man.

The Wikipedia article about Franklin states that he was "...an American polymath and one of the Founding Fathers of the United States. Franklin was a leading author, printer, political theorist, politician, freemason, postmaster, scientist, inventor, humorist, civic activist, statesman, and diplomat. As a scientist, he was a major figure in the American Enlightenment and the history of physics for his discoveries and theories regarding electricity. As an inventor, he is known for the lightning rod, bifocals, and the Franklin stove, among other inventions. He founded many civic organizations, including the Library Company, Philadelphia's first fire department and the University of Pennsylvania.

"Franklin earned the title of 'The First American' for his early and indefatigable campaigning for colonial unity, initially as an author and spokesman in London for several colonies. As the first United States Ambassador to France, he exemplified the emerging American nation. Franklin was foundational in defining the American ethos as a marriage of the practical values of thrift, hard work, education, community spirit, self-governing institutions, and opposition to authoritarianism both political and religious, with the scientific and tolerant values of the Enlightenment."

Here are a few things that Benjamin Franklin said:

They who can give up essential liberty to obtain a little temporary safety deserve neither liberty nor safety.

Three may keep a secret, if two of them are dead.

Either write something worth reading or do something worth writing [about].

Tell me and I forget, teach me and I may remember, involve me and I learn.

He that can have patience can have what he will.

A Penny Saved is a Penny Earned.

You may delay, but time will not.

Many people die at twenty five and aren't buried until they are seventy five.

Never ruin an apology with an excuse.

We are all born ignorant, but one must work hard to remain stupid.

Justice will not be served until those who are unaffected are as outraged as those who are.

By failing to prepare, you are preparing to fail.

How many observe Christ's birthday! How few, His precepts!

Well done is better than well said.

Hide not your talents, they for use were made, What's a sundial in the shade?

Being ignorant is not so much a shame, as being unwilling to learn.

An investment in knowledge always pays the best interest

Lost Time is never found again.

It is the first responsibility of every citizen to question authority.

Instead of cursing the darkness, light a candle.

If all printers were determined not to print anything till they were sure it would offend nobody, there would be very little printed.

The Constitution only guarantees the American people the right to pursue happiness. You have to catch it yourself.

Be at war with your vices, at peace with your neighbors, and let every new year find you a better man.

3.5 Beethoven and Napoleon

Beethoven's 5th symphony is one of the most famous works in the history of music. It contains the dot-dot-dot-dash theme that was used in World War II to symbolize the Morse code for V, meaning Victory for the Allies in their struggle against Hitler. The theme has variously been interpreted as Fate, knocking on the door, or Beethoven, railing against his increasing deafness. But recent research points to another interpretation: The famous dot-dot-dot-dash theme of Beethoven's 5th symphony, both in rhythm and in tones, echos a revolutionary song with the words "Nous jourons tous, le fer en main!"

According to a recent article¹, “...those first four notes, once heard, are never forgotten. The traditional wisdom has been that in the Fifth, Beethoven is railing against fate and his increasing deafness. But conductor John Eliot Gardiner believes that it contains a hidden, radical message. Expressing the composer’s sympathy with the ideals of the French Revolution. Liberty, equality and brotherhood. It’s not just a matter of his expressing his inner turmoil, it’s also him nailing his colours to the political mast of the French Revolution. ‘I believe in the rights of man, I believe in the brotherhood of all men.’”

When he composed his 5th symphony, Beethoven was living in Vienna, and the highly reactionary Austrian government would have arrested him if they had known the hidden meaning of the 5th symphony’s famous theme. The French Revolution was followed by a period of reaction, during which the monarchies of Europe all united to overthrow the revolutionary government of France. Beethoven initially saw Napoleon as a defender of the ideals of the Enlightenment, and he dedicated his 3rd symphony to Napoleon. However, when Napoleon crowned himself as Emperor, Beethoven tore up the dedication in rage and disillusion. Napoleon, with his invasion of Russia, proved himself to be a megalomaniac, indifferent to the loss of innocent lives. The French Revolution itself degenerated into an orgy of violence and killing. Nevertheless, the ideals of the Enlightenment, the ideals that inspired Beethoven, can inspire us today.

¹<https://subsaga.com/bbc/documentaries/music/2016/the-secret-of-beethovens-fifth-symphony.html>



Figure 3.11: Beethoven, a revolutionary in music, was profoundly sympathetic with the ideals of freedom, equality and brotherhood which inspired the French Revolution.



Figure 3.12: Revolutionary France. Although at its start it embraced the ideals of the Enlightenment, the French Revolution later degenerated into an orgy of bloodshed, Robespierre's "Terror".

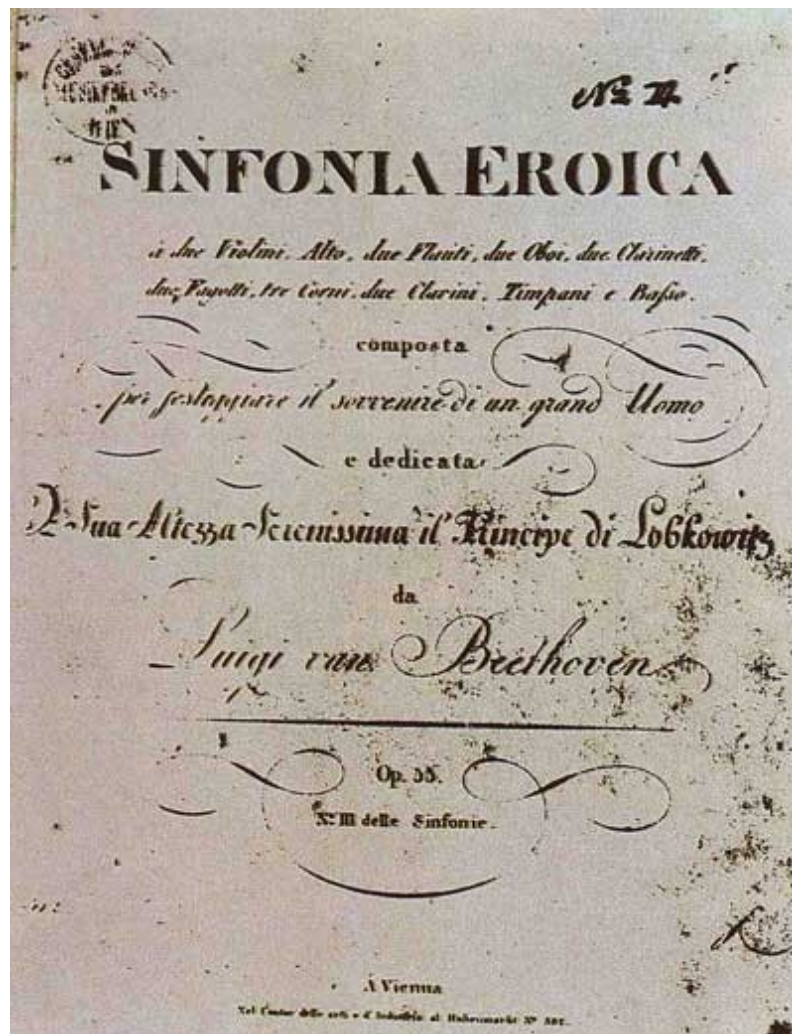


Figure 3.13: Beethoven's Third Symphony was originally dedicated to Napoleon; but when Napoleon crowned himself as Emperor, Beethoven was filled with rage and disillusion, and he tore up the dedication.



Figure 3.14: Napoleon's retreat from Moscow. Napoleon showed himself to be totally self-centered and indifferent to human suffering and death as long as it served his personal ambitions.



Figure 3.15: An old, disheveled and completely deaf Beethoven, conducting his great 9th Symphony. The ideals of the Enlightenment remain to inspire us today. In Beethoven's choral symphony, his great music combined with Schiller's words give today's world an anthem of universal human solidarity: All men and women are brothers and sisters! Not just some but all! All!

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Chapter 4

NONVIOLENT REVOLUTIONISTS

4.1 Percy Bysshe Shelley

A pioneer of non-violent resistance to tyranny

Largely unrecognized during his lifetime, Shelley is today considered to be one of the major English-language poets. Less well known is the fact that he was a pioneer of non-violent resistance to tyranny, whose ideas influenced Henry David Thoreau, Leo Tolstoy and Mahatma Gandhi.

Percy Bysshe Shelley was the eldest legitimate son of Sir Timothy Shelley, Baronet and Whig Member of Parliament. His mother was a wealthy Sussex landowner. Shelley was thus the heir to a baronetcy and a large estate. He had a happy childhood, but was unhappy at Eton College, where he was regularly mobbed because of his strong principles and his refusal to take part in sports.

In 1810, after graduating from Eton, Shelley became a student at Oxford University. Legend has it that he attended only one lecture. However, while at Oxford, he was extremely active as a writer, publishing a series of books: the Gothic novel, *Zastrozzi* (1810), *St. Irvyne; or, The Rosicrucian: A Romance* (dated 1811), *Original Poetry by Victor and Cazire* (written together with his sister Elizabeth) and a collection of poetry entitled *Posthumous Fragments of Margaret Nicholson* (written in collaboration with Thomas Jefferson Hogg).

Expelled from Oxford

All these books could have been considered subversive by the Oxford authorities, but no action was taken. However, when Shelley anonymously published *The Necessity of Atheism* in 1811, the University authorities threatened to expel him if he did not renounce his authorship. Shelley refused and was expelled. His influential father then intervened, and persuaded the authorities to reinstate his son if he would renounce his authorship as well as the principles expressed in the pamphlet. However, Shelley once again refused. This led to an estrangement between father and son.



Figure 4.1: Percy Bysshe Shelley in a portrait by Alfred Clint (Wikipedia).

Sir Thomas cut off his son's allowance, and from then on, Shelley's financial circumstances became precarious. He was still the heir to an estate with an income of 6,000 pounds per year, in those days an enormous sum, and he could (and did) borrow money against his future inheritance, but the amount that he could raise in that way was limited.

Godwin's disciple

After being expelled from Oxford, Shelley visited the poet Robert Southey, who informed him that William Godwin was still alive. Shelley who had always been an ardent admirer of Godwin's writing, was greatly excited by the news, and he immediately contacted Godwin, offering himself as a disciple.

At that time, England was going through a period of reaction against the excesses of the French Revolution, and Godwin's books and articles were no longer popular. Left with two infant daughters to care for after the death of his wife, Godwin had been driven to marry his neighbor, Mary Jane Claremont, a widow who herself had a young daughter. Thus, when Shelley arrived at Godwin's household he met three attractive young girls, Fanny Imlay, Jane Claremont and Mary Wollstonecraft Godwin. All three had been educated by Godwin.

Here is Jane Claremont's description of the household: "All the family worked hard, learning and studying: We all took the liveliest interest in the great questions of the day. Common topics, gossiping, scandal, found no entrance in our circle for we had been taught by Mr. Godwin to think it the greatest misfortune to be fond of the world, or worldly pleasures or of luxury or money; and that there was no greater happiness than to think well of those around us, to love them, and to delight in being useful or pleasing to them".

"The name of Godwin has been used to excite in me feelings of reverence and admiration", the 20-year-old Shelley had written in his letter to Godwin. "...I had enrolled your name on the list of the honourable dead. I had felt regret that the glory of your being had passed from this earth of ours. It is not so. You still live, and I firmly believe are still planning the welfare of human kind.

"I am young", Shelley wrote, "You have gone before me, I doubt not a veteran to me in the years of persecution. Is it strange that, defying persecution as I have done, I should outstep the limits of custom's prescription, and endeavour to make my desire useful by friendship with William Godwin?"

Godwin answered immediately, and in the voluminous correspondence which followed he soon recognized Shelley's genius.

Inspired by Godwin's *Political Justice*, Shelley had decided to devote both his life and his fortune to political reform. (The fortune, however, was only a distant future prospect.) In his letters, Godwin advised slow changes through education as the best means of reform but Shelley's whole temperament rebelled against caution and gradualism.

During the spring of 1812 Shelley wrote *An Address to the Irish People* and travelled to Ireland to work for the cause of Catholic emancipation. He assured the worried Godwin that the pamphlet contained 'no religion but benevolence, no cause but virtue, no party

but the world'. Shelley soon found himself so surrounded by beggars and government spies that he was forced to leave Ireland.

Shelley's letters had by this time captured the imagination of the entire Godwin household, and whenever a new one arrived with its familiar handwriting, all three daughters and Mary Jane waited excitedly "on tiptoe" to know the news. Shelley, who dreamed of establishing a utopian community of free and enlightened friends, invited Godwin to come to Devon for a visit and Godwin (who was in the habit of making a small excursion during his summer vacation) did so; but after a terrible journey by boat in stormy weather he arrived at Lynemouth only to find Shelley gone. Alarmed by the arrest of his servant Dan (who had been posting Shelley's *Declaration of Rights* and his ballad *The Devil's Walk*), the young poet had left quietly with his entourage before he himself was arrested.

A wild romance

In 1814, Shelley had lodgings in Fleet Street but, between May and July, he lived mainly with the Godwin family. Mary Wollstonecraft Godwin was at that time sixteen and a half years old and extremely pretty, with long blond hair and her father's expressive eyes. She had just returned from Scotland, where she had lived for two years with family friends, ostensibly for the sake of her health. Probably the real reason for Mary's stay in Scotland was friction with her step-mother: Mary's affection for her father had been enough to excite the jealousy of the new Mrs Godwin.

Shelley was immediately electrified by meeting Mary. As she told him of her daydreams, of her writing, and of the wild Scottish landscapes which she had just experienced, Mary seemed to him to combine the emotional sensitivity of Mary Wollstonecraft with the imagination and mental power of William Godwin. In an ode to Mary, Shelley wrote:

**They say that thou wert lovely from thy birth,
Of glorious parents, thou aspiring Child.
I wonder not, for One then left this earth
Whose life was like a setting planet mild,
Which clothed thee in a radiance undefiled
Of its departing glory, still her fame
Shines on thee through the tempests dark and wild
Which shake these latter days; and thou canst claim
The shelter from thy Sire of an immortal name.**

For her part, Mary was fascinated by the openness, generosity and warmth of the brilliant young writer who was her father's best-loved disciple. In her copy of Shelley's revolutionary poem *Queen Mab*, she wrote: 'This book is sacred to me... I love the author beyond all power of expression...'

Because of her step-mother's jealousy, it was uncomfortable for Mary to be at home; and she was in the habit of taking a book to the old St Pancreas churchyard where her mother was buried. Shelley followed her there and under the willow tree beside Mary

Wollstonecraft's grave they declared their love for each other. Meanwhile, Mary's step-sister Jane, who had stage-managed the meeting, watched from a distant tombstone. Jane was (of course) also in love with Shelley and Fanny, the third sister, was in love with him too.

On 28 July 1814, Godwin awoke to find a note on his dressing table: Shelley had eloped with Mary and, amazingly, he and Mary had taken Jane with them. Mary was 16 years old, Jane 15, and Shelley 21.

The fugitives had left at five in the morning and hurried to Dover where they embarked for France in a small boat. After a stormy and dangerous night on the Channel, they arrived at Calais. Meanwhile, Mrs Godwin set off in pursuit, hoping to rescue Jane and with the help of information from the London stables, she traced the runaways to their lodgings in Calais. Jane spent the next night with her mother, but in the morning she decided firmly to continue with Mary and Shelley.

Why had Shelley and Mary taken Jane? For one thing, Jane was the only one of the three who spoke fluent French and she was good at making practical arrangements. Shelley also thought that Jane needed to be rescued from the influence of the new Mrs Godwin. "I am not in the least in love with her", Shelley is said to have explained, "but she is a nice little girl, and her mother is such a vulgar, commonplace woman, without an idea of philosophy. I do not think she is a proper person to form the mind of a young girl."

After arriving in Paris, Shelley, Mary and Jane bought a mule and they set out for Switzerland, sometimes riding the mule but for the most part walking. Switzerland was the country of Rousseau and the setting of Godwin's novel, *Fleetwood*. They hoped that it would prove to be a land of enlightenment and freedom. After a few weeks in Switzerland, however, Shelley's financial problems forced them to return to England. Mary later described the journey in her *History of a Six Week's Tour*.

Mary Shelley's *Frankenstein*

Jane now changed her name to one which she considered to be more romantic: Claire. Since she was no longer permitted a share of Shelley, Claire decided to capture a poet of her own and with remarkable resourcefulness and determination she managed to seduce Lord Byron, then at the height of his fame. This was an extraordinary accomplishment since Byron was being pursued by hordes of fashionable and beautiful women, including the famous Lady Caroline Lamb. However, Byron was soon forced to leave England because of scandals resulting from his affairs, especially his relationship with his half-sister Augusta.

On 2 May 1816, Shelley and Mary left England too, planning never to return. Shelley's financial position had improved following the death of his grandfather in 1815. Shelley and Mary took Claire Clairmont with them. She was already pregnant with Lord Byron's child, although probably none of them knew it. They headed for Geneva, hoping to meet Lord Byron there. Claire was anxious to show off her catch to Shelley and the two poets were looking forward to meeting each other. Although Shelley was not yet famous as a writer, Byron had read and admired his work.

Byron had rented a large house called Villa Diodati, near Lake Geneva, and he was

staying there with his personal physician, Dr Polidori. Shelley, Mary and Claire found quarters at the nearby Maison Chapuis, and before long the whole Villa Diodati group had settled into a routine of excursions on the lake or walks along the shore, followed by long evenings of conversation at Villa Diodati. Whenever the weather was bad, as it frequently was that summer, Shelley, Mary and Claire spent the night at Diodati instead of returning to Maison Chapuis.

Because of Byron's fame, their movements were followed avidly by scandalized English tourists, who spent hours looking at the party through field-glasses and telescopes. Stories of immorality filtered back to England; and the rumors had some foundation, since Byron had resumed his affair with Claire. He looked down on her, but Claire was very pretty, and, as Byron explained, "I could not exactly play the stoic with a woman who has scrambled eight hundred miles to unphilosophize me".

Byron was writing the third canto of *Childe Harold*, and in the evenings he often read new sections of it to the others. The romantic mood of the poem and the splendor of the distant Alps contributed to the atmosphere of the summer evenings at Diodati.

Byron also retold for his friends the myth of Prometheus Porphyros, which he had translated from Aeschylus at Harrow. In this myth, Prometheus steals the sacred fire of the gods and gives it to mankind. Punished by Zeus, Prometheus is chained forever to a rock in the Caucasus, while an eagle tears out his vitals. A later version of the myth, Prometheus Plasticator, was popular among the Romans, and in this later version, Prometheus creates or recreates mankind by giving life to a figure of clay.

Both Byron and Shelley recognized the symbolic possibilities of the myth. Prometheus had already been used as a symbol of the creative artist but Shelley, with his interest in science, saw that Prometheus could also stand as a symbol for scientific creativity. Benjamin Franklin had recently performed the famous experiment in which he flew a kite during a thunderstorm, thus drawing down lightning and showing it to be identical with electricity. Franklin, Shelley realized, could be thought of as a modern Prometheus, who defied the thunderbolts of Zeus and brought the sacred fire of the gods down from heaven for the use of mankind.

The weather worsened at Diodati, and for many days, heavy rain and lightning confined the party to the villa. To pass the time, they read aloud to each other from a book of German ghost stories. The storm outside and the strange Gothic stories had a strong effect on Shelley's imagination, and one night he rushed out of the room with a cry of terror, explaining later that he had seen a vision of a woman with eyes instead of breasts.

"We will each write a ghost story", Byron said, and his idea was adopted with enthusiasm. Dr Polidori began a tale of a skull-headed woman; and both Byron and Shelley began stories too but, being poets, they soon tired of writing prose. Mary was unable to think of an idea sufficiently horrible to produce terror in a reader. Every morning she was asked whether she had found a theme and she was forced to answer sadly that she had not.

Meanwhile, Byron and Shelley continued to talk of the possibilities of the myth of Prometheus, especially as a symbol for scientific creativity. Perhaps, one day, science might achieve the Promethean feat of creating life. Shelley was especially interested in experiments with electricity, such as the discovery by Galvani that an electrical current

could cause the legs of a dismembered frog to move.

“Many and long were the conversations between Lord Byron and Shelley”, Mary wrote later. Finally, well past midnight, Mary went to bed; but she was unable to sleep. Images from the conversation, to which she had been an attentive but almost silent listener, passed uncontrollably through her mind. Later, remembering this half-waking dream, she wrote:

“I saw, with shut eyes, but acute mental vision, I saw the pale student of unhallowed arts kneeling beside the thing he had put together. I saw the hideous phantasm of a man stretched out, and then, on the working of some powerful engine, show signs of life, and stir with an uneasy, half vital motion. Frightful must it be; for supremely frightful would be the effect of any human endeavour to mock the stupendous mechanism of the Creator of the world.”

Mary realized that she had found her theme. In fact, Mary Wollstonecraft Shelley, not yet 19 years old, had discovered an enduring symbol for science out of control, science pursued without regard for its social consequences. The next day, encouraged by Shelley, she began to write *Frankenstein, or The Modern Prometheus*,

A few poems by Shelley

Ozymandias

I met a traveller from an antique land,
 Who said: “Two vast and trunkless legs of stone
 Stand in the desert. . . . Near them, on the sand,
 Half sunk a shattered visage lies, whose frown,
 And wrinkled lip, and sneer of cold command,
 Tell that its sculptor well those passions read
 Which yet survive, stamped on these lifeless things,
 The hand that mocked them, and the heart that fed;
 And on the pedestal, these words appear:
 My name is Ozymandias, King of Kings;
 Look on my Works, ye Mighty, and despair!
 Nothing beside remains. Round the decay
 Of that colossal Wreck, boundless and bare
 The lone and level sands stretch far away.

The Peterloo Massacre and *The Masque of Anarchy*

Shelley wrote his poem *The Masque of Anarchy* in response to the Peterloo Massacre, which took place at St. Peter's field, Manchester on the 16th of August 1819. Cavalry soldiers of the government charged a crowd of 50,000 citizens who were peacefully assembled to ask for better representation in Parliament. They were suffering from unemployment and from famine produced by the Corn Laws. The cavalry slashed down hundreds of the protesters with their sabres. including women and children. Shelley's poem advocating non-violent

resistance to tyranny was an inspiration to Thoreau, Tolstoy and Gandhi. Here is the poem:

Stand ye calm and resolute,
Like a forest close and mute,
With folded arms and looks which are
Weapons of unvanquished war.

And if then the tyrants dare,
Let them ride among you there;
Slash, and stab, and maim and hew;
What they like, that let them do.

With folded arms and steady eyes,
And little fear, and less surprise,
Look upon them as they slay,
Till their rage has died away:

Then they will return with shame,
To the place from which they came,
And the blood thus shed will speak
In hot blushes on their cheek:

Rise, like lions after slumber
In unvanquishable number!
Shake your chains to earth like dew
Which in sleep had fallen on you:
Ye are many, they are few!

A few verses from *Prometheus Unbound*

This is the day, which down the void abysm
At the Earth-born's spell yawns for Heaven's despotism,
And Conquest is dragged captive through the deep:
Love, from its awful throne of patient power
In the wise heart, from the last giddy hour
Of dead endurance, from the slippery, steep,
And narrow verge of crag-like agony, springs
And folds over the world its healing wings.

Gentleness, Virtue, Wisdom, and Endurance,
These are the seals of that most firm assurance
Which bars the pit over Destruction's strength;

And if, with infirm hand, Eternity,
Mother of many acts and hours, should free
The serpent that would clasp her with his length;
These are the spells by which to re-assume
An empire o'er the disentangled doom.

To suffer woes which Hope thinks infinite;
To forgive wrongs darker than death or night;
To defy Power, which seems omnipotent;
To love, and bear; to hope till Hope creates
From its own wreck the thing it contemplates;
Neither to change, nor falter, nor repent;
This, like thy glory, Titan, is to be
Good, great and joyous, beautiful and free;
This is alone Life, Joy, Empire, and Victory.

4.2 Henry David Thoreau

In the distant future (and perhaps even in the not-so-distant future) industrial civilization will need to abandon its relentless pursuit of unnecessary material goods and economic growth. Modern society will need to re-establish a balanced and harmonious relationship with nature. In preindustrial societies harmony with nature is usually a part of the cultural tradition. In our own time, the same principle has become central to the ecological counter-culture while the main-stream culture thunders blindly ahead, addicted to wealth, power and growth.

In the 19th century the American writer, Henry David Thoreau (1817-1862), pioneered the concept of a simple life, in harmony with nature. Today, his classic book, *Walden*, has become a symbol for the principles of ecology, simplicity, and respect for nature.

Thoreau was born in Concord Massachusetts, and he attended Harvard from 1833 to 1837. After graduation, he returned home, worked in his family's pencil factory, did odd jobs, and for three years taught in a progressive school founded by himself and his older brother, John. When John died of lockjaw in 1842, Henry David was so saddened that he felt unable to continue the school alone.

Nonviolent civil disobedience

Thoreau refused to pay his poll tax because of his opposition to the Mexican War and to the institution of slavery. Because of his refusal to pay the tax (which was in fact a very small amount) he spent a night in prison. To Thoreau's irritation, his family paid the poll tax for him and he was released. He then wrote down his ideas on the subject in an essay entitled *The Duty of Civil Disobedience*, where he maintains that each person has a

duty to follow his own individual conscience even when it conflicts with the orders of his government.

In his essay, Thoreau said: “A common and natural result of an undue respect for law is that you may see a file of soldiers, colonel, captain, corporal, privates, powder-monkeys, and all marching in admirable order over hill and dale to the wars, against their wills, ay, against their common sense and consciences, which makes it very steep marching indeed, and produces a palpitation of the heart. They have no doubt that it is a damnable business in which they are concerned; they are all peaceably inclined. Now, what are they? Men at all? or small movable forts and magazines, at the service of some unscrupulous man in power?”

“Under a government that which imprisons any unjustly”, Thoreau wrote, “the true place for a just man is in prison.” Civil Disobedience influenced Tolstoy, Gandhi and Martin Luther King, and it anticipated the Nuremberg Principles.

Harmony with nature

Thoreau became the friend and companion of the transcendentalist writer Ralph Waldo Emerson (1803 1882), who introduced him to a circle of New England writers and thinkers that included Ellery Channing, Margaret Fuller and Nathaniel Hawthorne.

Nathaniel Hawthorne described Thoreau in the following words: “Mr. Thorow [sic] is a keen and delicate observer of nature, a genuine observer, which, I suspect, is almost as rare a character as even an original poet; and Nature, in return for his love, seems to adopt him as her especial child, and shows him secrets which few others are allowed to witness. He is familiar with beast, fish, fowl, and reptile, and has strange stories to tell of adventures, and friendly passages with these lower brethren of mortality. Herb and flower, likewise, wherever they grow, whether in garden, or wild wood, are his familiar friends. He is also on intimate terms with the clouds and can tell the portents of storms. It is a characteristic trait, that he has a great regard for the memory of the Indian tribes, whose wild life would have suited him so well; and strange to say, he seldom walks over a plowed field without picking up an arrow-point, a spear-head, or other relic of the red men, as if their spirits willed him to be the inheritor of their simple wealth.”

Walden, an experiment in simple living

At Emerson’s suggestion, Thoreau opened a journal, in which he recorded his observations concerning nature and his other thoughts. Ultimately the journal contained more than 2 million words. Thoreau drew on his journal when writing his books and essays, and in recent years, many previously unpublished parts of his journal have been printed.

From 1845 until 1847, Thoreau lived in a tiny cabin that he built with his own hands. The cabin was in a second-growth forest beside Walden Pond in Concord, on land that belonged to Emerson. Thoreau regarded his life there as an experiment in simple living. He described his life in the forest and his reasons for being there in his book *Walden*,



Figure 4.2: **Henry David Thoreau (1817-1862).** Public domain, Wikimedia Commons

“Most of the luxuries”, Thoreau wrote, “and many of the so-called comforts of life, are not only not indispensable, but positive hindrances to the elevation of mankind. With respect to luxuries, the wisest have ever lived a more simple and meager life than the poor. The ancient philosophers, Chinese, Hindoo, Persian, and Greek, were a class than which none has been poorer in outward riches, none so rich in inward.”

Elsewhere in “Walden”, Thoreau remarks, “It is never too late to give up your prejudices”, and he also says, “Why should we be in such desperate haste to succeed, and in such desperate enterprises? If a man does not keep pace with his companions, perhaps it is because he hears a different drummer.” Other favorite quotations from Thoreau include “Rather than love, than money, than fame, give me truth”, “Beware of all enterprises that require new clothes”, “Most men lead lives of quiet desperation” and “Men have become tools of their tools.”

Thoreau’s closeness to nature can be seen from the following passage, written by his friend Frederick Willis, who visited him at Walden Pond in 1847, together with the Alcott family: “He was talking to Mr. Alcott of the wild flowers in Walden woods when, suddenly stopping, he said: ‘Keep very still and I will show you my family.’ Stepping quickly outside the cabin door, he gave a low and curious whistle; immediately a woodchuck came running towards him from a nearby burrow. With varying note, yet still low and strange, a pair of gray squirrels were summoned and approached him fearlessly. With still another note several birds, including two crows flew towards him, one of the crows nestling upon his shoulder. I remember that it was the crow resting close to his head that made the most vivid impression on me, knowing how fearful of man this bird is. He fed them all from his hand, taking food from his pocket, and petted them gently before our delighted gaze; and then dismissed them by different whistling, always strange and low and short, each wild thing departing instantly at hearing his special signal.”

Thoreau’s views on religion

Towards the end of his life, when he was very ill, someone asked Thoreau whether he had made his peace with God. “We never quarreled”, he answered.

In an essay published by the Atlantic Monthly in 1853, Thoreau described a pine tree in Maine with the words: “It is as immortal as I am, and perchance will go to as high a heaven, there to tower above me still.” However, the editor (James Russell Lowell) considered the sentence to be blasphemous, and removed it from Thoreau’s essay.

In one of his essays, Thoreau wrote: “If a man walk in the woods for love of them half of each day, he is in danger of being regarded as a loafer; but if he spends his whole day as a speculator, shearing off those woods and making the earth bald before her time, he is esteemed an industrious and enterprising citizen.”

A few more things that Thoreau said

It is the beauty within us that makes it possible for us to recognize the beauty around us. The question is not what you look at, but what you see.

Simplify your life. Don't waste the years struggling for things that are unimportant. Don't burden yourself with possessions. Keep your needs and wants simple and enjoy what you have. Don't destroy your peace of mind by looking back, worrying about the past. Live in the present. Simplify!

Go confidently in the direction of your dreams. Live the life you've imagined.

Happiness is like a butterfly; the more you chase it, the more it will elude you, but if you turn your attention to other things, it will come and sit softly on your shoulder.

Rather than love, than money, than fame, give me truth.

The mass of men lead lives of quiet desperation.

You must live in the present, launch yourself on every wave, find your eternity in each moment. Fools stand on their island of opportunities and look toward another land. There is no other land; there is no other life but this

Be not simply good, be good for something,

Books are the treasured wealth of the world and the fit inheritance of generations and nations.

If you have built castles in the air, your work need not be lost; that is where they should be. Now put the foundations under them.

If a man does not keep pace with his companions, perhaps it is because he hears a different drummer. Let him step to the music he hears, however measured or far away.

The greatest compliment that was ever paid me was when one asked me what I thought, and attended to my answer.

We need the tonic of wildness...At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be indefinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of nature.

4.3 Count Leo Tolstoy

Leo Tolstoy was born in 1828. While he was still a child, his parents died, and he became Count Tolstoy, with responsibility for the family estate at Yasnaya Polyana. As a young man, he was attracted to the gay and worldly social life of Moscow, but his diary during this period shows remorse over his pursuit of sensual pleasures. Disgusted with himself, he entered the army, and during idle periods he began his career as a writer. While still a soldier, he published a beautiful nostalgic work entitled “Childhood” as well as a number of skillful stories describing army life.

Schools and textbooks for peasants

At the age of 28, Tolstoy left the army and spent a brief period as a literary idol in St. Petersburg. He then became concerned about lack of education among Russian peasants, and he traveled widely in Europe, studying educational theory and methods. Returning to Yasnaya Polyana, he established schools for the peasants, published an educational magazine and compiled a number of textbooks whose simplicity and attractiveness anticipated modern teaching methods.

Tolstoy’s great novels

Tolstoy married in 1862 at the age of 34. His wife, Sonya Bers, shared his wide intellectual interests, and they had a happy family life with thirteen children¹. During this period, Tolstoy managed his estate with much success, and he produced his great literary masterpieces “War and Peace” and “Anna Karenina”. He modeled the characters in “War and Peace” after members of his own family. For example, Tolstoy’s famous heroine, Natasha, is modeled after his sister-in-law, Tanya Bers. Pierre in “War and Peace” and Levin in “Anna Karenina” reflect Tolstoy’s own efforts to understand the meaning of life, his concern with the misery of the Russian peasants, and his ultimate conclusion that true happiness and peace of mind can only be found in a simple life devoted to the service of others.

Search for life’s meaning

By the time Tolstoy had finished “Anna Karenina”, he had become very dissatisfied with the life that he was leading. Despite having achieved in great measure all of the goals for which humans usually strive, he felt that his existence lacked meaning; and in 1879 he even contemplated suicide. He looked for life’s purpose by systematically studying the writings of scientists and philosophers, but he could not find an answer there that satisfied him.

Finally Tolstoy found inspiration in the humble and devout lives of the peasants. He decided that the teachings of Jesus, as recorded in the New Testament, could provide the answer for which he was searching. Tolstoy published an account of his spiritual crisis in a book entitled “A Confession”, in which he says:

“I searched for enlightenment everywhere in the hard-won accumulated knowledge of mankind. I searched passionately and long, not in a lazy way, but with my whole soul, day and night. I searched like a drowning man looking for safety - and found nothing. I searched all the sciences, and not only did I find nothing, but I also came to the conclusion that everyone who, like myself, had searched in the sciences for life’s meaning had also found nothing.”

“I then diligently studied the teachings of Buddhism and Islam in the holy books of those religions; but most of all I studied Christianity as I met it in the holy Scriptures and in the living Christians around me...”

Love for the poor

“I began to approach the believers among the poor, simple ignorant people: pilgrims, monks and peasants... The whole life of Christians of our own circle seemed to be a contradiction of their faith. By contrast, the whole life of Christians of the peasant class was an affirmation of the view of life which their religious faith gave to them. I looked more and more deeply into the faith of these people, and the more deep my insight became, the more I became convinced that they had a genuine belief, that their faith was essential to them, and that it was their faith alone which gave their life a meaning and made it possible for them to live... I developed a love for these simple people.”

Moved by the misery of the urban poor whom he encountered in the slums of Moscow, Tolstoy wrote: “Between us, the rich and the poor, there is a wall of false education, and before we can help the poor, we must first tear down that wall. I was forced to the conclusion that our own wealth is the true cause of the misery of the poor.”

What Then Must We Do?

Tolstoy’s book, “What Then Must We Do?”, tells of his experiences in the slums and analyses the causes of poverty. Tolstoy felt that the professed Christian belief of the Czarist state was a thin cosmetic layer covering a structure that was fundamentally built on violence. Violence was used to maintain a huge gap between the rich and the poor, and violence was used in international relations. Tolstoy felt especially keenly the contradiction between Christianity and war. In a small book entitled “The Kingdom of God is Within Us” he wrote:

The contradiction between Christianity and war

“All other contradictions are insignificant compared with the contradiction which now faces humankind in international relations, and which cries out for a solution, since it brings the

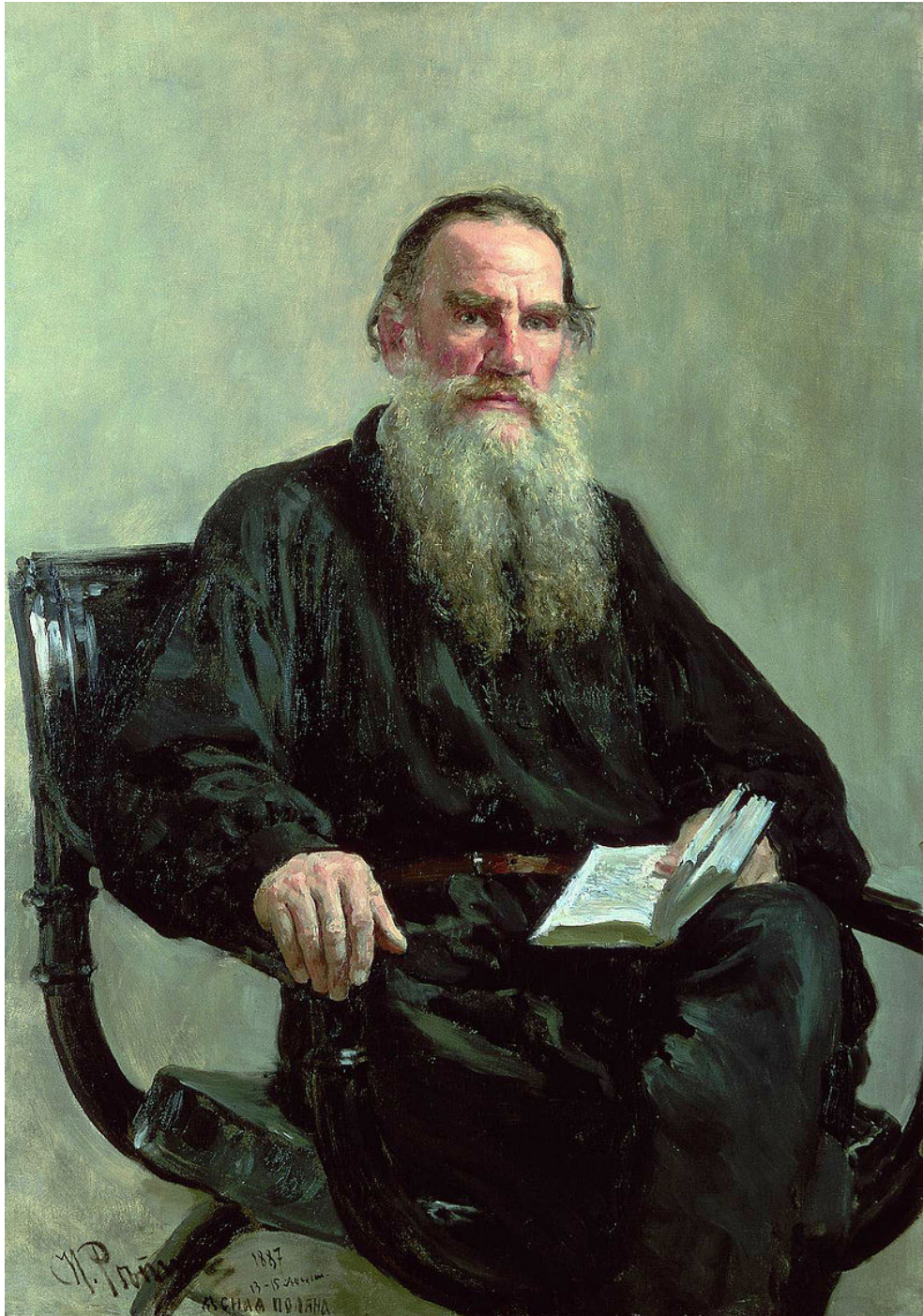


Figure 4.3: Portrait of Count Leo Tolstoy made in 1887 by Ilia Repin. Public domain, Wikimedia Commons

very existence of civilization into danger. This is the contradiction between the Christian conscience and war.”

“All of the Christian peoples of the world, who all follow one and the same spiritual life, so that any good and fruitful thought which is put forward in any corner of the world is immediately communicated to all of Christendom, where it arouses feelings of pride and happiness in us regardless of our nationality; we who simply love the thinkers, humanitarians, and poets of other countries; we who not only admire their achievements, but also feel delight in meeting them and greet them with friendly smiles; we will all be forced by the state to participate in a murderous war against these same people, a war which if it does not break out today will do so tomorrow.”

“...The sharpest of all contradictions can be seen between the government’s professed faith in the Christian law of the brotherhood of all humankind, and the military laws of the state, which force each young man to prepare himself for enmity and murder, so that each must be simultaneously a Christian and a gladiator.”

Banned and excommunicated

Tolstoy’s writings on Christianity and on social questions were banned by the public censor, and he was excommunicated from the Russian Orthodox Church. However, his universally recognized stature as one of the world’s greatest writers was undiminished, and his beliefs attracted many followers, both inside and outside of Russia.

Tolstoy and Gandhi

In 1894, the young Indian lawyer, Mohandas K. Gandhi, (who was then working for the civil rights of Indians in South Africa), read Tolstoy’s books on Christianity and was greatly influenced by them. Gandhi wrote a review of “The Kingdom of God is Within Us”, and in 1909 he sent Tolstoy an account of the activities of the civil rights movement in South Africa. He received a reply in which Tolstoy said:

“...The longer I live, and especially now, when I vividly feel the nearness of death, the more I want to tell others what I feel so particularly clearly and what to my mind is of great importance, namely that which is called passive resistance, but which is in reality nothing else but the teaching of love, uncorrupted by false interpretations. That love, i.e. the striving for the union of human souls and the activity derived from that striving, is the highest and only law of human life, and in the depth of his soul every human being knows this (as we most clearly see in children); he knows this until he is entangled in the false teachings of the world. This law was proclaimed by all, by the Indian as by the Chinese, Hebrew, Greek and Roman sages of the world. I think that this law was most clearly expressed by Christ, who plainly said that in this alone is all the law and the prophets...”

“...The peoples of the Christian world have solemnly accepted this law, while at the same time they have permitted violence and built their lives on violence; and that is why the whole life of the Christian peoples is a continuous contradiction between what they profess, and the principles on which they order their lives - a contradiction between love

accepted as the law of life, and violence which is recognized and praised, acknowledged even as a necessity in different phases of life, such as the power of rulers, courts, and armies...”

Nonviolent resistance to governmental violence

Tolstoy believed that violence can never under any circumstances be justified, and that therefore an individual’s resistance to governmental violence must be passive and non-violent. He also believed that each individual ought to reduce his needs to a minimum in order to avoid exploiting the labor of others.

Tolstoy gave up meat, alcohol, tobacco, and hunting. He began to clean his own room, wore simple peasant clothes, worked in the fields, and made his own boots. He participated in famine relief, and he would have liked to give away all of his great wealth to feed the poor, but bowing to the protests of his family, he gave his wealth to them instead. Because he had been unable to convert his family to his beliefs, Tolstoy left home secretly on a November night in 1910, accompanied, like King Lear, by his youngest daughter. He died of pneumonia a few days later at a remote railway junction.

4.4 Mahatma Gandhi

If humans are ever to achieve a stable global society in the future, they will have to become much more modest in their economic behavior and much more peaceful in their politics. For both modesty and peace, Gandhi is a useful source of ideas. The problems with which he struggled during his lifetime are extremely relevant to us in the 21st Century, when both nuclear and ecological catastrophes threaten the world.

Avoiding escalation of conflicts

Today we read almost every day of killings that are part of escalating cycles of revenge and counter-revenge, for example in the Middle East. Gandhi’s experiences both in South Africa and in India convinced him that such cycles could only be ended by unilateral acts of kindness and understanding from one of the parties in a conflict. He said, “An eye for an eye makes the whole world blind”.

To the insidious argument that “the end justifies the means”, Gandhi answered firmly: “They say that ‘means are after all means’. I would say that ‘means are after all everything’. As the means, so the end. Indeed, the Creator has given us limited power over means, none over end... The means may be likened to a seed, and the end to a tree; and there is the same inviolable connection between the means and the end as there is between the seed and the tree. Means and end are convertible terms in my philosophy of life.”

Gandhi’s advocacy of non-violence is closely connected to his attitude towards ends and means. He believed that violent methods for achieving a desired social result would inevitably result in an escalation of violence. The end achieved would always be contaminated

by the methods used. He was influenced by Leo Tolstoy with whom he exchanged many letters, and he in turn influenced Martin Luther King and Nelson Mandela.

The power of truth

Gandhi was trained as a lawyer, and when he began to practice in South Africa, in his first case, he was able to solve a conflict by proposing a compromise that satisfied both parties. Of this result he said, “My joy was boundless. I had learnt the true practice of law. I had learnt to find out the better side of human nature and to enter men’s hearts. I realized that the true function of a lawyer was to unite parties riven asunder.” When Gandhi became involved with the struggle for civil rights of the Indian minority in South Africa, his background as a lawyer once more helped him. This time his jury was public opinion in England. When Gandhi lead the struggle for reform, he insisted that the means of protest used by his followers should be non-violent, even though violence was frequently used against them. In this way they won their case in the court of public opinion. Gandhi called this method of protest “satyagraha”, a Sanskrit word meaning “the power of truth”. In today’s struggles for justice and peace, the moral force of truth and nonviolence can win victories in the court of world public opinion.

Harmony between religious groups

Gandhi believed that at their core, all religions are based on the concepts of truth, love, compassion, nonviolence and the Golden Rule. When asked whether he was a Hindu, Gandhi answered, “Yes I am. I am also a Christian, a Muslim, a Buddhist and a Jew.” When praying at his ashram, Gandhi made a point of including prayers from many religions. One of the most serious problems that he had to face in his efforts to free India from British rule was disunity and distrust, even hate, between the Hindu and Muslim communities. Each community felt that with the British gone, they might face violence and repression from the other. Gandhi made every effort to bridge the differences and to create unity and harmony. His struggles with this problem are highly relevant to us today, when the world is split by religious and ethnic differences.

Solidarity with the poor

Today’s world is characterized by intolerable economic inequalities, both between nations and within nations. 8 million children die each year from poverty-related causes. 1.3 billion people live on less than 1.25 dollars a day. Gandhi’s concern for the poor can serve as an example to us today, as we work to achieve a more equal world. He said, “There is enough for every man’s need, but not for every man’s greed.”

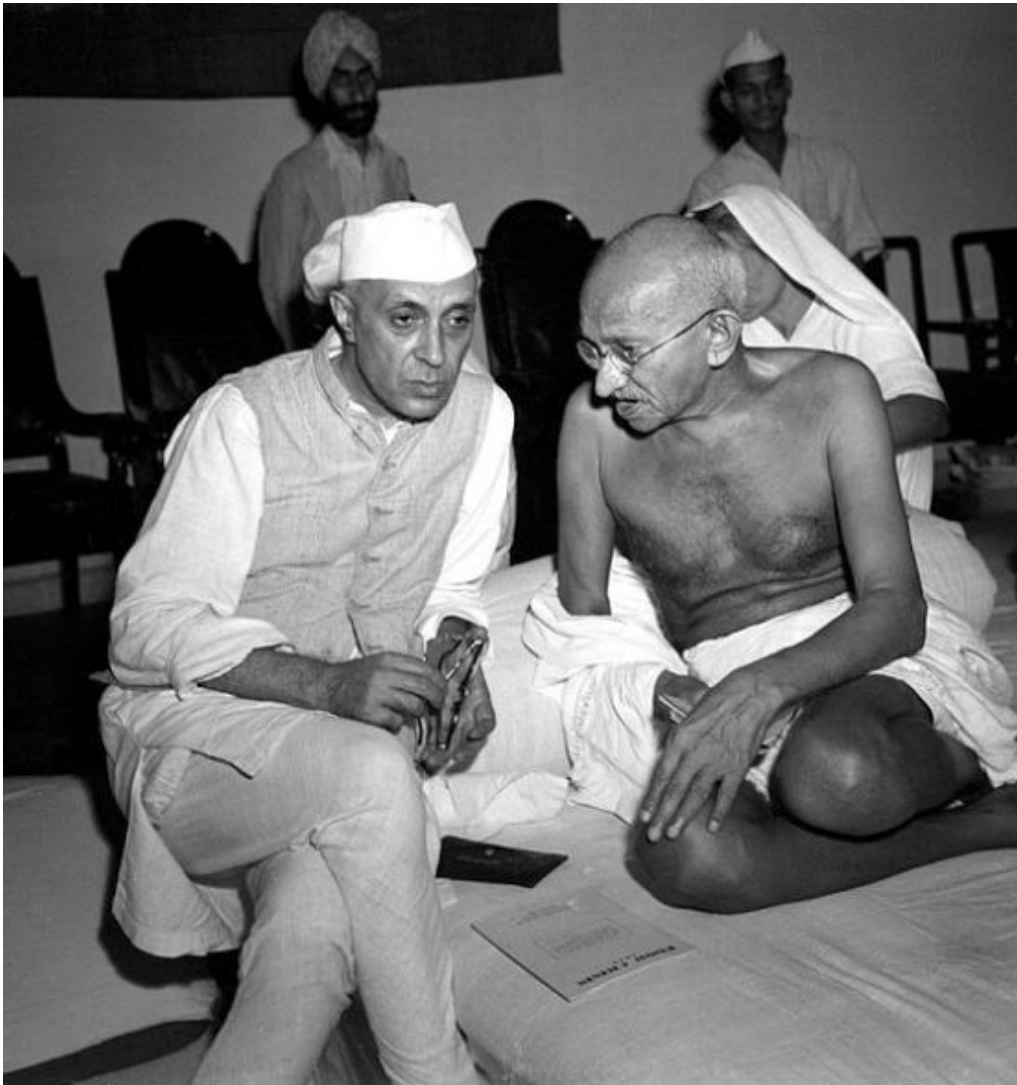


Figure 4.4: Gandhi and Nehru at a meeting of the Congress Party. After India gained its independence, it was Nehru's vision of an urbanized and industrialized India that prevailed. Gandhi's much more sustainable vision of "India of villages" was lost. (Wikimedia Commons)

Voluntary reduction of consumption

After Gandhi's death, someone took a photograph of all his worldly possessions. It was a tiny heap, consisting of his glasses, a pair of sandals, a homespun cloth (his only garment) and a watch. That was all. By reducing his own needs and possessions to an absolute minimum, Gandhi had tried to demonstrate that the commonly assumed connection between wealth and merit is false. This is relevant today, in a world where we face a crisis of diminishing resources. Not only fossil fuels, but also metals and arable land per capita will become scarce in the future. This will force a change in lifestyle, particularly in the industrialized countries, away from consumerism and towards simplicity. Gandhi's example can teach us that we must cease to use wealth and "conspicuous consumption" as a measure of merit.

Gandhian economics

In his autobiography, Mahatma Gandhi says: "Three moderns have left a deep impression on my life and captivated me: Raychandbhai (the Indian philosopher and poet) by his living contact; Tolstoy by his book 'The Kingdom of God is Within You'; and Ruskin by his book 'Unto This Last'." Ruskin's book, "Unto This Last", which Gandhi read in 1904, is a criticism of modern industrial society. Ruskin believed that friendships and warm interpersonal relationships are a form of wealth that economists have failed to consider. He felt that warm human contacts are most easily achieved in small agricultural communities, and that therefore the modern tendency towards centralization and industrialization may be a step backward in terms of human happiness. While still in South Africa, Gandhi founded two religious Utopian communities based on the ideas of Tolstoy and Ruskin, Phoenix Farm (1904) and Tolstoy Farm (1910).

Because of his growing fame as the leader of the Indian civil rights movement in South Africa, Gandhi was persuaded to return to India in 1914 and to take up the cause of Indian home rule. In order to reacquaint himself with conditions in India, he travelled tirelessly, now always going third class as a matter of principle.

During the next few years, Gandhi worked to reshape the Congress Party into an organization which represented not only India's Anglicized upper middle class but also the millions of uneducated villagers who were suffering under an almost intolerable burden of poverty and disease. In order to identify himself with the poorest of India's people, Gandhi began to wear only a white loincloth made of rough homespun cotton. He traveled to the remotest villages, recruiting new members for the Congress Party, preaching non-violence and "firmness in the truth", and becoming known for his voluntary poverty and humility. The villagers who flocked to see him began to call him "Mahatma" (Great Soul).

Disturbed by the spectacle of unemployment and poverty in the villages, Gandhi urged the people of India to stop buying imported goods, especially cloth, and to make their own. He advocated the reintroduction of the spinning wheel into village life, and he often spent some hours spinning himself. The spinning wheel became a symbol of the Indian

independence movement, and was later incorporated into the Indian flag.

The movement for boycotting British goods was called the “Swadeshi movement”. The word Swadeshi derives from two Sanskrit roots: Swa, meaning self, and Desh, meaning country. Gandhi described Swadeshi as “a call to the consumer to be aware of the violence he is causing by supporting those industries that result in poverty, harm to the workers and to humans or other creatures.”

Gandhi tried to reconstruct the crafts and self-reliance of village life that he felt had been destroyed by the colonial system. “I would say that if the village perishes, India will perish too”, he wrote, “India will be no more India. Her own mission in the world will get lost. The revival of the village is only possible when it is no more exploited. Industrialization on a mass scale will necessarily lead to passive or active exploitation of the villagers as problems of competition and marketing come in. Therefore we have to concentrate on the village being self-contained, manufacturing mainly for use. Provided this character of the village industry is maintained, there would be no objection to villagers using even the modern machines that they can make and can afford to use. Only they should not be used as a means of exploitation by others.”

“You cannot build nonviolence on a factory civilization, but it can be built on self-contained villages... Rural economy as I have conceived it, eschews exploitation altogether, and exploitation is the essence of violence... We have to make a choice between India of the villages that are as ancient as herself and India of the cities which are a creation of foreign domination...”

“Machinery has its place; it has come to stay. But it must not be allowed to displace necessary human labour. An improved plow is a good thing. But if by some chances, one man could plow up, by some mechanical invention of his, the whole of the land of India, and control all the agricultural produce, and if the millions had no other occupation, they would starve, and being idle, they would become dunces, as many have already become. There is hourly danger of many being reduced to that unenviable state.”

In these passages we see Gandhi not merely as a pioneer of nonviolence; we see him also as an economist. Faced with misery and unemployment produced by machines, Gandhi tells us that social goals must take precedence over blind market mechanisms. If machines are causing unemployment, we can, if we wish, and use labor-intensive methods instead. With Gandhi, the free market is not sacred; we can do as we wish, and maximize human happiness, rather than maximizing production and profits.

Mahatma Gandhi was assassinated by a Hindu extremist on January 30, 1948. After his death, someone collected and photographed all his worldly goods. These consisted of a pair of glasses, a pair of sandals, a pocket watch and a white homespun loincloth. Here, as in the Swadeshi movement, we see Gandhi as a pioneer of economics. He deliberately reduced his possessions to an absolute minimum in order to demonstrate that there is no connection between personal merit and material goods. Like Veblen, Mahatma Gandhi told us that we must stop using material goods as a means of social competition. We must start to judge people not by what they have, but by what they are.

4.5 Martin Luther King, Jr.

King applies the teachings of Thoreau and Gandhi to the Civil Rights movement

The son of a southern Baptist minister, Martin Luther King, Jr received his Ph.D. in theology from Boston University in 1955. During his studies, he had admired Thoreau's essay "On the Duty of Civil Disobedience," and he had also been greatly moved by the life and teachings of Mahatma Gandhi.

Martin Luther King Jr. had been pastor of the Dexter Avenue Baptist Church in Montgomery Alabama for only a year when he was chosen to lead a boycott protesting segregation in the Montgomery buses. Suddenly thrust into this situation of intense conflict, he remembered both the Christian principle of loving one's enemies and Gandhi's methods of non-violent protest. In his first speech as President of the Montgomery Improvement Association (a speech which the rapid pace of events had forced him to prepare in only twenty minutes, five of which he spent in prayer), he said:

"Our method will be that of persuasion, not coercion. We will only say to people, 'Let your conscience be your guide'. Our actions must be guided by the deepest principles of our Christian faith. Love must be our regulating ideal. Once again we must hear the words of Jesus echoing across the centuries: 'Love your enemies, bless them that curse you, and pray for them that despitefully use you.' If we fail to do this, our protest will end up as a meaningless drama on the stage of history, and its memory will be shrouded by the ugly garments of shame. In spite of the mistreatment that we have confronted, we must not become bitter and end up by hating our white brothers. As Booker T. Washington said, 'Let no man pull you down so low as to make you hate him.'"

"If you will protest courageously, and yet with dignity and Christian love, when the history books are written in future generations, the historians will have to pause and say, 'There lived a great people, a black people, who injected new meaning and dignity into the veins of civilization.' This is our challenge and our overwhelming responsibility."

Victory in the court of public opinion

This speech, which Dr. King made in December 1955, set the tone of the black civil rights movement. Although the protesters against racism were often faced with brutality and violence; although many of them, including Dr. King were unjustly jailed; although the homes of the leaders were bombed; although they constantly received telephone calls threatening their lives; although many civil rights workers were severely beaten, and several of them killed, they never resorted to violence in their protests against racial discrimination. Because of this adherence to Christian ethics, public opinion shifted to the side of the civil rights movement, and the United States Supreme Court ruled bus segregation to be unconstitutional.

Welcomed to India by Nehru

In 1959, while recovering from an almost-fatal stabbing, Martin Luther King Jr. visited India at the invitation of Prime Minister Jawaharlal Nehru. Dr. King and his wife Coretta were warmly welcomed by Nehru, who changed his schedule in order to meet them. They had an opportunity to visit a religious community or “ashram” that Gandhi had founded, and they discussed non-violence with many of Gandhi’s disciples.

King is awarded the Nobel Peace Prize

In 1964, the change in public opinion produced by the non-violent black civil rights movement resulted in the passage of the civil rights act. In the same year, Dr. King was awarded the Nobel Peace Prize. He accepted it, not as an individual, but on behalf of all civil rights workers; and he immediately gave all the prize money to the movement.

Opposition to the Viet Nam War

In 1967, a year before his assassination, Dr. King forcefully condemned the Viet Nam war in an address at a massive peace rally in New York City. He felt that opposition to war followed naturally from his advocacy of non-violence. Speaking against the Viet Nam War, Dr. King said: “We have corrupted their women and children and killed their men. They move sadly and apathetically as we herd them off the land of their fathers into concentration camps where minimal social needs are rarely met. They know they must move on or be destroyed by our bombs ... primarily women and children and the aged watch as we poison their water, as we kill a million acres of their crops. They must weep as the bulldozers roar through their areas preparing to destroy the precious trees. They wander into the hospitals. So far we may have killed a million of them, [in Vietnam by 1967] mostly children. They wander into the towns and see thousands of the children, homeless, without clothes, running in packs on the streets like animals. They see the children degraded by our soldiers as they beg for food. They see the children selling their sisters to our soldiers, soliciting for their mothers.”

Opposition to nuclear weapons

In his book, “Strength to Love”, Dr. King wrote, “Wisdom born of experience should tell us that war is obsolete. There may have been a time when war served a negative good by preventing the spread of an evil force, but the power of modern weapons eliminates even the possibility that war may serve as a negative good. If we assume that life is worth living, and that man has a right to survival, then we must find an alternative to war ... I am convinced that the Church cannot be silent while mankind faces the threat of nuclear annihilation. If the church is true to her mission, she must call for an end to the nuclear arms race.”



Figure 4.5: Martin Luther King Jr. speaking in Washington. “I have a dream that one day this nation will rise up and live out the true meaning of its creed: ‘We hold these truths to be self-evident: that all men are created equal.’ I have a dream that one day on the red hills of Georgia the sons of former slaves and the sons of former slave owners will be able to sit down together at the table of brotherhood... I have a dream that my four little children will one day live in a nation where they will not be judged by the color of their skin but by the content of their character... This is our hope. This is the faith that I go back to the South with. With this faith we will be able to hew out of the mountain of despair a stone of hope. With this faith we will be able to transform the jangling discords of our nation into a beautiful symphony of brotherhood. With this faith we will be able to work together, to pray together, to struggle together, to go to jail together, to stand up for freedom together, knowing that we will be free one day.

Assassination

On April 4, 1968, Dr. King was shot and killed. A number of people, including members of his own family, believe that he was killed because of his opposition to the Viet Nam War. This conclusion is supported by the result of a 1999 trial initiated by members of the King family. Summing up the arguments to the jury, the family's lawyer said "We are dealing in conspiracy with agents of the City of Memphis and the governments of the State of Tennessee and the United States of America. We ask that you find that a conspiracy existed." After two and a half hour's deliberation, the jury found that Lloyd Jowers and "others, including governmental agencies, were parties to this conspiracy". The verdict of the jury remains judicially valid today, and it has never been overturned in a court of law, although massive efforts have been made to discredit it.

Redemptive love

Concerning the Christian principle of loving one's enemies, Dr. King wrote: "Why should we love our enemies? Returning hate for hate multiplies hate, adding deeper darkness to a night already devoid of stars. Darkness cannot drive out darkness; only light can do that. Hate cannot drive out hate. Only love can do that ... Love is the only force capable of transforming an enemy into a friend. We never get rid of an enemy by meeting hate with hate; we get rid of an enemy by getting rid of enmity... It is this attitude that made it possible for Lincoln to speak a kind word about the South during the Civil War, when feeling was most bitter. Asked by a shocked bystander how he could do this, Lincoln said, 'Madam, do I not destroy my enemies when I make them my friends?' This is the power of redemptive love."

To a large extent, the black civil rights movement of the '50's and '60's succeeded in ending legalized racial discrimination in America. If the methods used had been violent, the movement could easily have degenerated into a nightmare of interracial hatred; but by remembering the Christian message, "Love your enemy; do good to them that spitefully use you", Martin Luther King Jr. raised the ethical level of the civil rights movement; and the final result was harmony and understanding between the black and white communities. Later the nonviolent methods of Gandhi and King were successfully applied to the South African struggle against Apartheid by Nelson Mandela and his followers.

Here are a few more things that Martin Luther King said

I have decided to stick to love...Hate is too great a burden to bear

Faith is taking the first step even when you can't see the whole staircase.

Our lives begin to end the day we become silent about things that matter.

In the end, we will remember not the words of our enemies, but the silence of our friends.

If you can't fly then run, if you can't run then walk, if you can't walk then crawl, but whatever you do you have to keep moving forward.

Only in the darkness can you see the stars.

There comes a time when a person must take a position that is neither safe, nor politic, nor popular, but he must take it because conscience tells him it is right.

Everybody can be great...because anybody can serve. You don't have to have a college degree to serve. You don't have to make your subject and verb agree to serve. You only need a heart full of grace. A soul generated by love.

Forgiveness is not an occasional act, it is a constant attitude.

We must accept finite disappointment, but never lose infinite hope.

There is some good in the worst of us and some evil in the best of us. When we discover this, we are less prone to hate our enemies.

We must live together as brothers or perish together as fools.

Intelligence plus character - that is the goal of true education

True peace is not merely the absence of tension; it is the presence of justice.

Science investigates; religion interprets. Science gives man knowledge, which is power; religion gives man wisdom, which is control. Science deals mainly with facts; religion deals mainly with values. The two are not rivals.

The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy.

We know through painful experience that freedom is never voluntarily given by the oppressor, it must be demanded by the oppressed.

Injustice anywhere is a threat to justice everywhere. We are caught in an inescapable network of mutuality, tied in a single garment of destiny. Whatever affects one directly, affects all indirectly.

We have also come to this hallowed spot to remind America of the fierce urgency of Now. This is no time to engage in the luxury of cooling off or to take the tranquilizing drug of gradualism. Now is the time to make real the promises of democracy.

The time is always right to do what is right.

For when people get caught up with that which is right and they are willing to sacrifice for it, there is no stopping point short of victory.

All we say to America is, ‘Be true to what you said on paper.’ If I lived in... any totalitarian country, maybe I could understand the denial of certain basic First Amendment privileges, because they hadn’t committed themselves to that over there. But somewhere I read of the freedom of assembly. Somewhere I read of the freedom of speech. Somewhere I read of the freedom of the press. Somewhere I read that the greatness of America is the right to protest for right.

We’ve got some difficult days ahead. But it really doesn’t matter with me now because I’ve been to the mountaintop . . . I’ve looked over and I’ve seen the promised land. I may not get there with you. But I want you to know tonight that we as a people will get to the promised land.

4.6 Albert Einstein

“The unleashed power of the atom has changed everything except our ways of thinking, and thus we drift towards unparalleled catastrophes.”

“I don’t know what will be used in the next world war, but the 4th will be fought with stones.”

Albert Einstein (1879-1955)

Besides being one of the greatest physicists of all time, Albert Einstein was a lifelong pacifist, and his thoughts on peace can speak eloquently to us today. We need his wisdom today, when the search for peace has become vital to our survival as a species.

Family background

Albert Einstein was born in Ulm, Germany, in 1879. He was the son of middle-class, irreligious Jewish parents, who sent him to a Catholic school. Einstein was slow in learning to speak, and at first his parents feared that he might be retarded; but by the time he was eight, his grandfather could say in a letter: “Dear Albert has been back in school for a

week. I just love that boy, because you cannot imagine how good and intelligent he has become.”

Remembering his boyhood, Einstein himself later wrote: “When I was 12, a little book dealing with Euclidean plane geometry came into my hands at the beginning of the school year. Here were assertions, as for example the intersection of the altitudes of a triangle in one point, which, though by no means self-evident, could nevertheless be proved with such certainty that any doubt appeared to be out of the question. The lucidity and certainty made an indescribable impression on me.”

When Albert Einstein was in his teens, the factory owned by his father and uncle began to encounter hard times. The two Einstein families moved to Italy, leaving Albert alone and miserable in Munich, where he was supposed to finish his course at the gymnasium. Einstein’s classmates had given him the nickname “Beidermeier”, which means something like “Honest John”; and his tactlessness in criticizing authority soon got him into trouble. In Einstein’s words, what happened next was the following: “When I was in the seventh grade at the Lutpold Gymnasium, I was summoned by my home-room teacher, who expressed the wish that I leave the school. To my remark that I had done nothing wrong, he replied only, ‘Your mere presence spoils the respect of the class for me’.”

Einstein left gymnasium without graduating, and followed his parents to Italy, where he spent a joyous and carefree year. He also decided to change his citizenship. “The over-emphasized military mentality of the German State was alien to me, even as a boy”, Einstein wrote later. “When my father moved to Italy, he took steps, at my request, to have me released from German citizenship, because I wanted to be a Swiss citizen.”

Special and general relativity theory

The financial circumstances of the Einstein family were now precarious, and it was clear that Albert would have to think seriously about a practical career. In 1896, he entered the famous Zürich Polytechnic Institute with the intention of becoming a teacher of mathematics and physics. However, his undisciplined and nonconformist attitudes again got him into trouble. His mathematics professor, Hermann Minkowski (1864-1909), considered Einstein to be a “lazy dog”; and his physics professor, Heinrich Weber, who originally had gone out of his way to help Einstein, said to him in anger and exasperation: “You’re a clever fellow, but you have one fault: You won’t let anyone tell you a thing! You won’t let anyone tell you a thing!”

Einstein missed most of his classes, and read only the subjects which interested him. He was interested most of all in Maxwell’s theory of electromagnetism, a subject which was too “modern” for Weber. There were two major examinations at the Zürich Polytechnic Institute, and Einstein would certainly have failed them had it not been for the help of his loyal friend, the mathematician Marcel Grossman.

Grossman was an excellent and conscientious student, who attended every class and took meticulous notes. With the help of these notes, Einstein managed to pass his examinations; but because he had alienated Weber and the other professors who could have helped him,

he found himself completely unable to get a job. In a letter to Professor F. Ostwald on behalf of his son, Einstein's father wrote: "My son is profoundly unhappy because of his present joblessness; and every day the idea becomes more firmly implanted in his mind that he is a failure, and will not be able to find the way back again."

From this painful situation, Einstein was rescued (again!) by his friend Marcel Grossman, whose influential father obtained for Einstein a position at the Swiss Patent Office: Technical Expert (Third Class). Anchored at last in a safe, though humble, position, Einstein married one of his classmates. He learned to do his work at the Patent Office very efficiently; and he used the remainder of his time on his own calculations, hiding them guiltily in a drawer when footsteps approached.

In 1905, this Technical Expert (Third Class) astonished the world of science with five papers, written within a few weeks of each other, and published in the *Annalen der Physik*. Of these five papers, three were classics: One of these was the paper in which Einstein applied Planck's quantum hypothesis to the photoelectric effect. The second paper discussed "Brownian motion", the zig-zag motion of small particles suspended in a liquid and hit randomly by the molecules of the liquid. This paper supplied a direct proof of the validity of atomic ideas and of Boltzmann's kinetic theory. The third paper was destined to establish Einstein's reputation as one of the greatest physicists of all time. It was entitled "On the Electrodynamics of Moving Bodies", and in this paper, Albert Einstein formulated his special theory of relativity. Essentially, this theory maintained that all of the fundamental laws of nature exhibit a symmetry with respect to rotations in a 4-dimensional space-time continuum.

Gradually, the importance of Einstein's work began to be realized, and he was much sought after. He was first made Assistant Professor at the University of Zürich, then full Professor in Prague, then Professor at the Zürich Polytechnic Institute; and finally, in 1913, Planck and Nernst persuaded Einstein to become Director of Scientific Research at the Kaiser Wilhelm Institute in Berlin. He was at this post when the First World War broke out

While many other German intellectuals produced manifestos justifying Germany's invasion of Belgium, Einstein dared to write and sign an anti-war manifesto. Einstein's manifesto appealed for cooperation and understanding among the scholars of Europe for the sake of the future; and it proposed the eventual establishment of a League of Europeans. During the war, Einstein remained in Berlin, doing whatever he could for the cause of peace, burying himself unhappily in his work, and trying to forget the agony of Europe, whose civilization was dying in a rain of shells, machine-gun bullets, and poison gas.

The work into which Einstein threw himself during this period was an extension of his theory of relativity. He already had modified Newton's equations of motion so that they exhibited the space-time symmetry required by his Principle of Special Relativity. However, Newton's law of gravitation. remained a problem.

Obviously it had to be modified, since it disagreed with his Special Theory of Relativity; but how should it be changed? What principles could Einstein use in his search for a more correct law of gravitation? Certainly whatever new law he found would have to give results very close to Newton's law, since Newton's theory could predict the motions of the planets

with almost perfect accuracy. This was the deep problem with which he struggled.

In 1907, Einstein had found one of the principles which was to guide him, the Principle of Equivalence of inertial and gravitational mass. After turning Newton's theory over and over in his mind, Einstein realized that Newton had used mass in two distinct ways: His laws of motion stated that the force acting on a body is equal to the mass of the body multiplied by its acceleration; but according to Newton, the gravitational force on a body is also proportional to its mass. In Newton's theory, gravitational mass, by a coincidence, is equal to inertial mass; and this holds for all bodies. Einstein decided to construct a theory in which gravitational and inertial mass necessarily have to be the same.

He then imagined an experimenter inside a box, unable to see anything outside it. If the box is on the surface of the earth, the person inside it will feel the pull of the earth's gravitational field. If the experimenter drops an object, it will fall to the floor with an acceleration of 32 feet per second per second. Now suppose that the box is taken out into empty space, far away from strong gravitational fields, and accelerated by exactly 32 feet per second per second. Will the enclosed experimenter be able to tell the difference between these two situations? Certainly no difference can be detected by dropping an object, since in the accelerated box, the object will fall to the floor in exactly the same way as before.

With this "thought experiment" in mind, Einstein formulated a general Principle of Equivalence: He asserted that no experiment whatever can tell an observer enclosed in a small box whether the box is being accelerated, or whether it is in a gravitational field. According to this principle, gravitation and acceleration are locally equivalent, or, to say the same thing in different words, gravitational mass and inertial mass are equivalent.

Einstein soon realized that his Principle of Equivalence implied that a ray of light must be bent by a gravitational field. This conclusion followed because, to an observer in an accelerated frame, a light beam which would appear straight to a stationary observer, must necessarily appear very slightly curved. If the Principle of Equivalence held, then the same slight bending of the light ray would be observed by an experimenter in a stationary frame in a gravitational field.

Another consequence of the Principle of Equivalence was that a light wave propagating upwards in a gravitational field should be very slightly shifted to the red. This followed because in an accelerated frame, the wave crests would be slightly farther apart than they normally would be, and the same must then be true for a stationary frame in a gravitational field. It seemed to Einstein that it ought to be possible to test experimentally both the gravitational bending of a light ray and the gravitational red shift.

This seemed promising; but how was Einstein to proceed from the Principle of Equivalence to a formulation of the law of gravitation? Perhaps the theory ought to be modeled after Maxwell's electromagnetic theory, which was a field theory, rather than an "action at a distance" theory. Part of the trouble with Newton's law of gravitation was that it allowed a signal to be propagated instantaneously, contrary to the Principle of Special Relativity. A field theory of gravitation might cure this defect, but how was Einstein to find such a theory? There seemed to be no way.

From these troubles Albert Einstein was rescued (a third time!) by his staunch friend Marcel Grossman. By this time, Grossman had become a professor of mathematics in

Zürich, after having written a doctoral dissertation on tensor analysis and non-Euclidean geometry, the very things that Einstein needed. The year was then 1912, and Einstein had just returned to Zürich as Professor of Physics at the Polytechnic Institute. For two years, Einstein and Grossman worked together; and by the time Einstein left for Berlin in 1914, the way was clear. With Grossman's help, Einstein saw that the gravitational field could be expressed as a curvature of the 4-dimensional space-time continuum.

In 1919, a British expedition, headed by Sir Arthur Eddington, sailed to a small island off the coast of West Africa. Their purpose was to test Einstein's prediction of the bending of light in a gravitational field by observing stars close to the sun during a total eclipse. The observed bending agreed exactly with Einstein's predictions; and as a result he became world-famous. The general public was fascinated by relativity, in spite of the abstruseness of the theory (or perhaps because of it). Einstein, the absent-minded professor, with long, uncombed hair, became a symbol of science. The world was tired of war, and wanted something else to think about.

Einstein met President Harding, Winston Churchill and Charlie Chaplin; and he was invited to lunch by the Archbishop of Canterbury. Although adulated elsewhere, he was soon attacked in Germany. Many Germans, looking for an excuse for the defeat of their nation, blamed it on the pacifists and Jews; and Einstein was both these things.

Einstein's letter to Freud: Why war?

Because of his fame, Einstein was asked to make several speeches at the Reichstag. and in all these speeches he condemned violence and nationalism, urging that these be replaced by and international cooperation and law under an effective international authority. He also wrote many letters and articles pleading for peace and for the renunciation of militarism and violence.

Einstein believed that the production of armaments is damaging, not only economically, but also spiritually. In 1930 he signed a manifesto for world disarmament sponsored by the Womens International League for Peace and Freedom. In December of the same year, he made his famous statement in New York that if two percent of those called for military service were to refuse to fight, governments would become powerless, since they could not imprison that many people. He also argued strongly against compulsory military service and urged that conscientious objectors should be protected by the international community. He argued that peace, freedom of individuals, and security of societies could only be achieved through disarmament, the alternative being "slavery of the individual and annihilation of civilization".

In letters, and articles, Einstein wrote that the welfare of humanity as a whole must take precedence over the goals of individual nations, and that we cannot wait until leaders give up their preparations for war. Civil society, and especially public figures, must take the lead. He asked how decent and self-respecting people can wage war, knowing how many innocent people will be killed.

In 1931, the International Institute for Intellectual Cooperation invited Albert Einstein to enter correspondence with a prominent person of his own choosing on a subject of

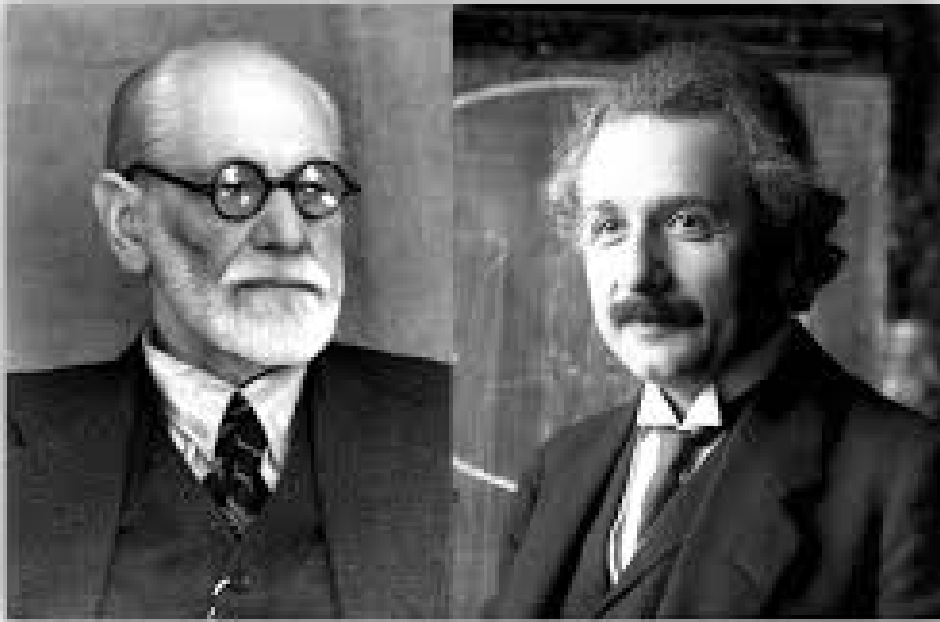


Figure 4.6: Sigmund Freud and Albert Einstein (public domain). Their exchange of letters entitled “Why War?” deserves to be read by everyone concerned with the human future.

importance to society. The Institute planned to publish a collection of such dialogues. Einstein accepted at once, and decided to write to Sigmund Freud to ask his opinion about how humanity could free itself from the curse of war. A translation from German of part of the long letter that he wrote to Freud is as follows:

“Dear Professor Freud, The proposal of the League of Nations and its International Institute of Intellectual Cooperation at Paris that I should invite a person to be chosen by myself to a frank exchange of views on any problem that I might select affords me a very welcome opportunity of conferring with you upon a question which, as things are now, seems the most important and insistent of all problems civilization has to face. This is the problem: Is there any way of delivering mankind from the menace of war? It is common knowledge that, with the advance of modern science, this issue has come to mean a matter of life or death to civilization as we know it; nevertheless, for all the zeal displayed, every attempt at its solution has ended in a lamentable breakdown.”

“I believe, moreover, that those whose duty it is to tackle the problem professionally and practically are growing only too aware of their impotence to deal with it, and have now a very lively desire to learn the views of men who, absorbed in the pursuit of science, can see world-problems in the perspective distance lends. As for me, the normal objective of my thoughts affords no insight into the dark places of human will and feeling. Thus in the enquiry now proposed, I can do little more than seek to clarify the question at issue and,

clearing the ground of the more obvious solutions, enable you to bring the light of your far-reaching knowledge of man's instinctive life upon the problem..”

“As one immune from nationalist bias, I personally see a simple way of dealing with the superficial (i.e. administrative) aspect of the problem: the setting up, by international consent, of a legislative and judicial body to settle every conflict arising between nations... But here, at the outset, I come up against a difficulty; a tribunal is a human institution which, in proportion as the power at its disposal is... prone to suffer these to be deflected by extrajudicial pressure...”

Freud replied with a long and thoughtful letter in which he said that a tendency towards conflict is an intrinsic part of human emotional nature, but that emotions can be overridden by rationality, and that rational behavior is the only hope for humankind.

The fateful letter to Roosevelt

Albert Einstein's famous relativistic formula, relating energy to mass, soon yielded an understanding of the enormous amounts of energy released in radioactive decay. Marie and Pierre Curie had noticed that radium maintains itself at a temperature higher than its surroundings. Their measurements and calculations showed that a gram of radium produces roughly 100 gram-calories of heat per hour. This did not seem like much energy until Rutherford found that radium has a half-life of about 1,000 years. In other words, after a thousand years, a gram of radium will still be producing heat, its radioactivity only reduced to one-half its original value. During a thousand years, a gram of radium produces about a million kilocalories, an enormous amount of energy in relation to the tiny size of its source! Where did this huge amount of energy come from? Conservation of energy was one of the most basic principles of physics. Would it have to be abandoned?

The source of the almost-unbelievable amounts of energy released in radioactive decay could be understood through Einstein's formula equating the energy of a system to its mass multiplied by the square of the velocity of light, and through accurate measurements of atomic weights. Einstein's formula asserted that mass and energy are equivalent. It was realized that in radioactive decay, neither mass nor energy is conserved, but only a quantity more general than both, of which mass and energy are particular forms. Scientists in several parts of the world realized that Einstein's discovery of the relationship between mass and energy, together with the discovery of fission of the heavy element uranium meant that it might be possible to construct a uranium-fission bomb of immense power.

Meanwhile night was falling on Europe. In 1929, an economic depression had begun in the United States and had spread to Europe. Without the influx of American capital, the postwar reconstruction of the German economy collapsed. The German middle class, which had been dealt a severe blow by the great inflation of 1923, now received a second heavy blow. The desperate economic chaos drove German voters into the hands of political extremists.

On January 30, 1933, Adolf Hitler was appointed Chancellor and leader of a coalition cabinet by President Hindenburg. Although Hitler was appointed legally to this post, he quickly consolidated his power by unconstitutional means: On May 2, Hitler's police

seized the headquarters of all trade unions, and arrested labor leaders. The Communist and Socialist parties were also banned, their assets seized and their leaders arrested. Other political parties were also smashed. Acts were passed eliminating Jews from public service; and innocent Jewish citizens were boycotted, beaten and arrested. On March 11, 1938, Nazi troops entered Austria.

On March 16, 1939, the Italian physicist Enrico Fermi (who by then was a refugee in America) went to Washington to inform the Office of Naval Operations that it might be possible to construct an atomic bomb; and on the same day, German troops poured into Czechoslovakia.

A few days later, a meeting of six German atomic physicists was held in Berlin to discuss the applications of uranium fission. Otto Hahn, the discoverer of fission, was not present, since it was known that he was opposed to the Nazi regime. He was even said to have exclaimed: "I only hope that you physicists will never construct a uranium bomb! If Hitler ever gets a weapon like that, I'll commit suicide."

The meeting of German atomic physicists was supposed to be secret; but one of the participants reported what had been said to Dr. S. Flügge, who wrote an article about uranium fission and about the possibility of a chain reaction. Flügge's article appeared in the July issue of *Naturwissenschaften*, and a popular version in the *Deutsche Allgemeine Zeitung*. These articles greatly increased the alarm of American atomic scientists, who reasoned that if the Nazis permitted so much to be printed, they must be far advanced on the road to building an atomic bomb.

In the summer of 1939, while Hitler was preparing to invade Poland, alarming news reached the physicists in the United States: A second meeting of German atomic scientists had been held in Berlin, this time under the auspices of the Research Division of the German Army Weapons Department. Furthermore, Germany had stopped the sale of uranium from mines in Czechoslovakia.

The world's most abundant supply of uranium, however, was not in Czechoslovakia, but in Belgian Congo. Leo Szilard, a refugee Hungarian physicist who had worked with Fermi to measure the number of neutrons produced in uranium fission, was deeply worried that the Nazis were about to construct atomic bombs; and it occurred to him that uranium from Belgian Congo should not be allowed to fall into their hands.

Szilard knew that his former teacher, Albert Einstein, was a personal friend of Elizabeth, the Belgian Queen Mother. Einstein had met Queen Elizabeth and King Albert of Belgium at the Solvay Conferences, and mutual love of music had cemented a friendship between them. When Hitler came to power in 1933, Einstein had moved to the Institute of Advanced Studies at Princeton; and Szilard decided to visit him there. Szilard reasoned that because of Einstein's great prestige, and because of his long-standing friendship with the Belgian Royal Family, he would be the proper person to warn the Belgians not to let their uranium fall into the hands of the Nazis. Einstein agreed to write to the Belgian king and queen.

On August 2, 1939, Szilard again visited Einstein, accompanied by Edward Teller and Eugene Wigner, who (like Szilard) were refugee Hungarian physicists. By this time, Szilard's plans had grown more ambitious; and he carried with him the draft of another letter, this time to the American President, Franklin D. Roosevelt. Einstein made a few

corrections, and then signed the fateful letter, which reads (in part) as follows:

“Some recent work of E. Fermi and L. Szilard, which has been communicated to me in manuscript, leads me to expect that the element uranium may be turned into an important source of energy in the immediate future. Certain aspects of the situation seem to call for watchfulness and, if necessary, quick action on the part of the Administration. I believe, therefore, that it is my duty to bring to your attention the following..”

“It is conceivable that extremely powerful bombs of a new type may be constructed. A single bomb of this type, carried by boat and exploded a port, might very well destroy the whole port, together with some of the surrounding territory..”

The letter also called Roosevelt’s attention to the fact that Germany had already stopped the export of uranium from the Czech mines under German control. After making a few corrections, Einstein signed it. On October 11, 1939, three weeks after the defeat of Poland, Roosevelt’s economic adviser, Alexander Sachs, personally delivered the letter to the President. After discussing it with Sachs, the President commented, “This calls for action.” Later, when atomic bombs were dropped on civilian populations in an already virtually-defeated Japan, Einstein bitterly regretted having signed Szilard’s letter to Roosevelt. He said repeatedly that signing the letter was the greatest mistake of his life, and his remorse was extreme.

Throughout the remainder of his life, in addition to his scientific work, Einstein worked tirelessly for peace, international understanding and nuclear disarmament. His last public act, only a few days before his death in 1955, was to sign the Russell-Einstein Manifesto, warning humankind of the catastrophic consequences that would follow from a war with nuclear weapons.

A few more things that Einstein said about peace:

We cannot solve our problems with the same thinking that we used when we created them.

It has become appallingly obvious that our technology has exceeded our humanity.

Peace cannot be kept by force; it can only be achieved by understanding.

The world is a dangerous place to live; not because of the people who are evil, but because of the people who don’t do anything about it.

Insanity: doing the same thing over and over again and expecting to get different results.

Nothing will end war unless the people themselves refuse to go to war.

Past thinking and methods did not prevent world wars. Future thinking must prevent war.

You cannot simultaneously prevent and prepare for war.

Never do anything against conscience, even if the state demands it.

Taken as a whole, I would believe that Gandhi's views were the most enlightened of all political men of our time.

Without ethical culture, there is no salvation for humanity.

War seems to me to be a mean, contemptible thing: I would rather be hacked in pieces than take part in such an abominable business. And yet so high, in spite of everything, is my opinion of the human race that I believe this bogey would have disappeared long ago, had the sound sense of the nations not been systematically corrupted by commercial and political interests acting through the schools and the Press.

4.7 Bertrand Russell

Bertrand Arthur William Russell, 3rd Earl Russell, OM, FRS, (1872-1970), was born into a wealthy and influential English family, whose members had been active in politics since the time of the Tudors. Bertrand Russell's grandfather, Lord John Russell, the third son of the Duke of Bedford and 1st Earl Russell, had twice served as Prime Minister during Queen Victoria's reign.

Because of the early death of his parents (Viscount and Viscountess Amberly) Bertrand Russell was brought up by his grandparents, Lord John Russell and Lady Russell, who lived at Pembroke Lodge near Richmond Park, about fifteen miles west of London. Bertrand Russell's grandfather soon died too, and his grandmother became the dominant influence on the boy's early life. Although she was a religious conservative, Russell's grandmother nevertheless believed in independence of thought, accepted Darwinism, and supporter Irish Home Rule. She also had the motto (taken from the Bible) "Thou shalt not follow a multitude to do evil."

Bertrand Russell and his elder brother Frank were educated at home by tutors, and they had rather lonely and unhappy childhoods in the emotionally repressed atmosphere of Pembroke Lodge. However, when Bertrand was eleven years old, Frank introduced him to the work of Euclid. Bertrand Russell later described this event in his autobiography as "one of the great events of my life, as dazzling as first love". It is interesting that Albert Einstein had similar feelings when he encountered the works of Euclid at almost the same age.

During these early years Russell also discovered the writings of the poet Shelley, and he later wrote: "I spent all my spare time reading him, and learning him by heart, knowing no one to whom I could speak of what I thought or felt, I used to reflect how wonderful it would have been to know Shelley, and to wonder whether I should meet any live human being with whom I should feel so much sympathy".

In 1890, when Bertrand Russell was 18, he started his studies in mathematics at Trinity College, Cambridge University. He graduated with distinction, but because of his agnostic religious beliefs, he encountered difficulties. Nevertheless he continued to teach at Cambridge University, his most notable student being the Austrian-British philosopher Ludwig Wittgenstein (1889-1951).

During the years 1910-1913, Russell collaborated with his former teacher. Alfred North Whitehead (1861-1947) to write a 3-volume treatise entitled *Principia Mathematica*, which dealt with the logical foundations of mathematics and languages. At the end of the huge effort which he had devoted to writing this enormous work, Russell underwent a sudden conversion, during which all the aims of his life changed completely. Observing the terrible isolation of Whitehead's wife while she suffered an attack of angina, he had a sudden insight into the isolation of each human being and the need for better communication to break this isolation. As a result of this moment of intuition, Bertrand Russell resolved to abandon mathematics, and instead devote his life to making human existence happier and better.

Russell's idealism, honesty and humor shine from the pages of the enormous number of books, articles and letters that he wrote during the remainder of his life. His wide-ranging and influential writing won him not only great fame, but also the 1950 Nobel Prize in Literature.

Bertrand Russell was the author of the Russell-Einstein Declaration of 1955, the founding document of Pugwash Conferences on Science and World Affairs, an organization which won the Nobel Peace Prize in 1995. Russell devoted much of the last part of his life to working for the complete abolition of nuclear weapons.

Here are a few things that Bertrand Russell said:

War does not determine who is right, but only who is left.

The world is full of magical things patiently waiting for our wits to become sharper.

Men are born ignorant, not stupid. They are made stupid by education.

To fear love is to fear life, and those who gear life are already three parts dead.

The only thing that will redeem mankind is cooperation.

The trouble with the world is that the stupid are cocksure, and the intelligent are full of doubt.

Love is something more than desire for sexual intercourse; it is the principle means of escape from the loneliness which afflicts men and women throughout the greater part of their lives.

The good life is one inspired by love and guided by knowledge.

Those who have never known the deep intimacy and the intense companionship of mutual love have missed the best thing that life has to give.

Science is what you know, philosophy is what you don't know.

I would never die for my beliefs, because I might be wrong.

Extreme hopes are born from extreme misery.

To conquer fear is the beginning of wisdom.

The fact that an opinion has been widely held is no evidence whatever that it is not utterly absurd.

I have made an odd discovery. Every time I talk with a savant, I am convinced that happiness is no longer possible. Yet when I talk with my gardener, I'm convinced of the opposite.

Patriotism is the willingness to kill and be killed for trivial reasons.

Three passions, simple but overwhelmingly strong, have governed my life: the longing for love, the search for knowledge, and unbearable pity for the suffering of mankind.

There lies before us, if we choose, continual progress in happiness, knowledge, and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? We appeal, as human beings, to human beings: Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise; if you cannot, there lies before you the risk of universal death.



Figure 4.7: Pembroke Lodge, near Richmond Park, Bertrand Russell's childhood home.



Figure 4.8: Russell at the age of four.



Figure 4.9: Russell at Trinity College Cambridge in 1893.



Figure 4.10: Russell with two of his children, John and Kate. His second son, Conrad (1937-2004, not shown here) became the 5th Earl Russell, and had a very distinguished career as a liberal parliamentarian and historian.

4.8 Joseph Rotblat

Pugwash Conferences on Science and World Affairs

In March, 1954, the US tested a hydrogen bomb at the Bikini Atoll in the Pacific Ocean. It was 1000 times more powerful than the Hiroshima bomb. The Japanese fishing boat, Lucky Dragon, was 130 kilometers from the Bikini explosion, but radioactive fallout from the test killed one crew member and made all the others seriously ill.

In England, Prof. Joseph Rotblat, a Polish scientist who had resigned from the Manhattan Project for moral reasons when it became clear that Germany would not develop nuclear weapons, was asked to appear on a BBC program to discuss the Bikini test. He was asked to discuss the technical aspects of H-bombs, while the Archbishop of Canterbury and the philosopher Lord Bertrand Russell were asked to discuss the moral aspects.

Rotblat had become convinced that the Bikini bomb must have involved a third stage, where fast neutrons from the hydrogen thermonuclear reaction produced fission in a casing of ordinary uranium. Such a bomb would produce enormous amounts of highly dangerous radioactive fallout, and Rotblat became extremely worried about the possibly fatal effect on all living things if large numbers of such bombs were ever used in a war. He confided his worries to Bertrand Russell, whom he had met on the BBC program.

After discussing the Bikini test and its radioactive fallout with Joseph Rotblat, Lord Russell became concerned for the future of the human gene pool if large numbers of such bombs should ever be used in a war. After consultations with Albert Einstein and others, he drafted a document warning of the grave dangers presented by fission-fusion-fission bombs. On July 9, 1955, with Rotblat in the chair, Russell read the Manifesto to a packed press conference.

The document contains the words: “Here then is the problem that we present to you, stark and dreadful and inescapable: Shall we put an end to the human race, or shall mankind renounce war?... There lies before us, if we choose, continual progress in happiness, knowledge and wisdom. Shall we, instead, choose death because we cannot forget our quarrels? We appeal as human beings to human beings: Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise; if you cannot, there lies before you the risk of universal death.”

In 1945, with the horrors of World War II fresh in everyone’s minds, the United Nations had been established with the purpose of eliminating war. A decade later, the Russell-Einstein Manifesto reminded the world that war *must* be abolished as an institution because of the constantly increasing and potentially catastrophic power of modern weapons.

The Russell-Einstein Manifesto called for a meeting of scientists from both sides of the Cold War to try to minimize the danger of a thermonuclear conflict. The first meeting took place at the summer home of the Canadian philanthropist Cyrus Eaton at the small village of Pugwash, Nova Scotia.

From this small beginning, a series of conferences developed, in which scientists, especially physicists, attempted to work for peace, and tried to address urgent problems related to science. These conferences were called Pugwash Conferences on Science and World Affairs,



Figure 4.11: Joseph Rotblat believed that the Bikini bomb was of a fission-fusion-fission type. Besides producing large amounts of fallout, such a bomb can be made enormously powerful at very little expense.

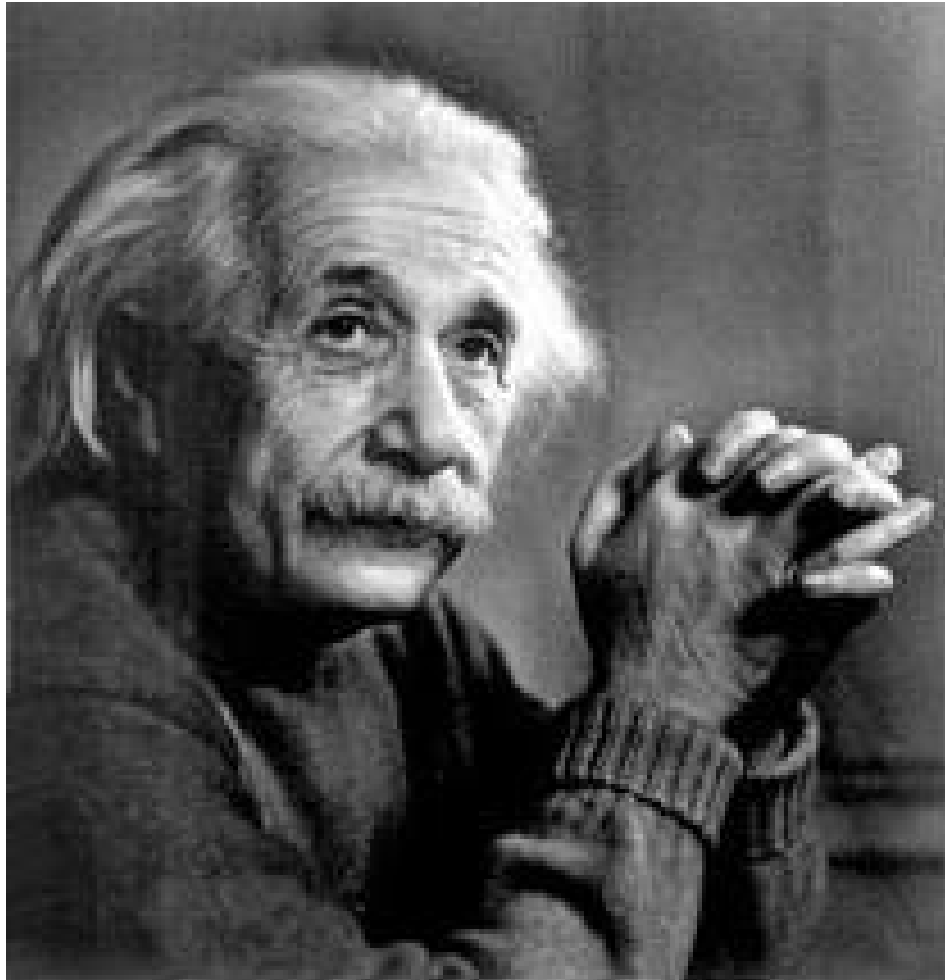


Figure 4.12: Signing the Russell-Einstein declaration was the last public act of Einstein's life.



Figure 4.13: Lord Russell devoted much of the remainder of his life to working for the abolition of nuclear weapons. Here he is seen in 1962 in Trafalgar Square, London, addressing a meeting of the Campaign for Nuclear Disarmament.

taking their name from the small village in Nova Scotia where the first meeting was held. From the start, the main aim of the meetings was to reduce the danger that civilization would be destroyed in a thermonuclear war.

It can be seen from what has been said that the Pugwash Conferences began during one of the tensest periods of the Cold War, when communication between the Communist and Anti-communist blocks was difficult. During this period, the meetings served the important purpose of providing a forum for informal diplomacy. The participants met, not as representatives of their countries, but as individuals, and the discussions were confidential.

This method of operation proved to be effective, and the initial negotiations for a number of important arms control treaties were aided by Pugwash Conferences. These include the START treaties, the treaties prohibiting chemical and biological weapons, the Nuclear Nonproliferation Treaty (NPT), and the Comprehensive Test Ban Treaty (CTBT).

Former Soviet President Gorbachev has said that discussions with Pugwash scientists helped him to conclude that the policy of nuclear confrontation was too dangerous to be continued.

Over the years, the number of participants attending the annual Pugwash Conference has grown, and the scope of the problems treated has broadened. Besides scientists, the participants now include diplomats, politicians, economists, social scientists and military experts. Normally the number attending the yearly conference is about 150.

Besides plenary sessions, the conferences have smaller working groups dealing with specific problems. There is always a working group aimed at reducing nuclear dangers, and also groups on controlling or eliminating chemical and biological weapons. In addition, there may now be groups on subjects such as climate change, poverty, United Nations reform, and so on.

Invitations to the conferences are issued by the Secretary General to participants nominated by the national groups. The host nation usually pays for the local expenses, but participants finance their own travel.

In addition to the large annual meeting, the Pugwash organization also arranges about ten specialized workshops per year, with 30-40 participants each.

Although attendance at the conferences and workshops is by invitation, everyone is very welcome to join one of the national Pugwash groups. The international organization's website is at www.pugwash.org.

In 1995, the Nobel Peace Prize was awarded jointly to Prof. Joseph Rotblat and to Pugwash Conferences on Science and World Affairs as an organization, "...for their efforts to diminish the part played by nuclear arms in international politics and in the longer run to eliminate such arms." The award was made 50 years after the tragic destruction of Hiroshima and Nagasaki.

In his acceptance speech, Sir Joseph Rotblat (as he soon became) emphasized the same point that has been made by the Russell-Einstein Manifesto - that war itself must be eliminated in order to free civilization from the danger of nuclear destruction. The reason for this is that knowledge of how to make nuclear weapons can never be forgotten. Even if they were eliminated, these weapons could be rebuilt during a major war. Thus the final



Figure 4.14: This photo shows Sir Joseph Rotblat in his London office shortly after he had been informed about the award of the Nobel Peace Prize. The bundles of manuscripts in the background are there because he edited the proceedings of each large yearly Pugwash Conference. The resulting books were then distributed to governments and to decision-makers.

abolition of nuclear weapons is linked to a change of heart in world politics and to the abolition of nuclear war.

“The quest for a war-free world”, Sir Joseph concluded, “has a basic purpose: survival. But if, in the process, we can learn to achieve it by love rather than by fear, by kindness rather than compulsion; if in the process we can learn to combine the essential with the enjoyable, the expedient with the benevolent, the practical with the beautiful, this will be an extra incentive to embark on this great task. Above all, remember your humanity”

Text of the Russell-Einstein Manifesto

Issued in London, 9 July, 1955

In the tragic situation which confronts humanity, we feel that scientists should assemble in conference to appraise the perils that have arisen as a result of the development of weapons of mass destruction, and to discuss a resolution in the spirit of the appended draft.

We are speaking on this occasion, not as members of this or that nation, continent, or creed, but as human beings, members of the species Man, whose continued existence is in doubt. The world is full of conflicts; and, overshadowing all minor conflicts, the titanic struggle between Communism and anti-Communism.

Almost everybody who is politically conscious has strong feelings about one or more of these issues; but we want you, if you can, to set aside such feelings and consider yourselves only as members of a biological species which has had a remarkable history, and whose disappearance none of us can desire.

We shall try to say no single word which should appeal to one group rather than to another. All, equally, are in peril, and, if the peril is understood, there is hope that they may collectively avert it.

We have to learn to think in a new way. We have to learn to ask ourselves, not what steps can be taken to give military victory to whatever group we prefer, for there no longer are such steps; the question we have to ask ourselves is: what steps can be taken to prevent a military contest of which the issue must be disastrous to all parties?

The general public, and even many men in positions of authority, have not realized what would be involved in a war with nuclear bombs. The general public still thinks in terms of the obliteration of cities. It is understood that the new bombs are more powerful than the old, and that, while one A-bomb could obliterate Hiroshima, one H-bomb could obliterate the largest cities, such as London, New York, and Moscow.

No doubt in an H-bomb war great cities would be obliterated. But this is one of the minor disasters that would have to be faced. If everybody in London, New York, and Moscow were exterminated, the world might, in the course of a few centuries, recover from the blow. But we now know, especially since the

Bikini test, that nuclear bombs can gradually spread destruction over a very much wider area than had been supposed.

It is stated on very good authority that a bomb can now be manufactured which will be 2,500 times as powerful as that which destroyed Hiroshima. Such a bomb, if exploded near the ground or under water, sends radioactive particles into the upper air. They sink gradually and reach the surface of the earth in the form of a deadly dust or rain. It was this dust which infected the Japanese fishermen and their catch of fish.

No one knows how widely such lethal radioactive particles might be diffused, but the best authorities are unanimous in saying that a war with H-bombs might possibly put an end to the human race. It is feared that if many H-bombs are used there will be universal death, sudden only for a minority, but for the majority a slow torture of disease and disintegration.

Many warnings have been uttered by eminent men of science and by authorities in military strategy. None of them will say that the worst results are certain. What they do say is that these results are possible, and no one can be sure that they will not be realized. We have not yet found that the views of experts on this question depend in any degree upon their politics or prejudices. They depend only, so far as our researches have revealed, upon the extent of the particular expert's knowledge. We have found that the men who know most are the most gloomy.

Here, then, is the problem which we present to you, stark and dreadful and inescapable: Shall we put an end to the human race; or shall mankind renounce war? People will not face this alternative because it is so difficult to abolish war.

The abolition of war will demand distasteful limitations of national sovereignty. But what perhaps impedes understanding of the situation more than anything else is that the term "mankind" feels vague and abstract. People scarcely realize in imagination that the danger is to themselves and their children and their grandchildren, and not only to a dimly apprehended humanity. They can scarcely bring themselves to grasp that they, individually, and those whom they love are in imminent danger of perishing agonizingly. And so they hope that perhaps war may be allowed to continue provided modern weapons are prohibited.

This hope is illusory. Whatever agreements not to use H-bombs had been reached in time of peace, they would no longer be considered binding in time of war, and both sides would set to work to manufacture H-bombs as soon as war broke out, for, if one side manufactured the bombs and the other did not, the side that manufactured them would inevitably be victorious.

Although an agreement to renounce nuclear weapons as part of a general reduction of armaments would not afford an ultimate solution, it would serve certain important purposes. First: any agreement between East and West is to the good in so far as it tends to diminish tension. Second: the abolition of

thermonuclear weapons, if each side believed that the other had carried it out sincerely, would lessen the fear of a sudden attack in the style of Pearl Harbor, which at present keeps both sides in a state of nervous apprehension. We should, therefore, welcome such an agreement though only as a first step. Most of us are not neutral in feeling, but, as human beings, we have to remember that, if the issues between East and West are to be decided in any manner that can give any possible satisfaction to anybody, whether Communist or anti-Communist, whether Asian or European or American, whether White or Black, then these issues must not be decided by war. We should wish this to be understood, both in the East and in the West. There lies before us, if we choose, continual progress in happiness, knowledge, and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? We appeal, as human beings, to human beings: Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise; if you cannot, there lies before you the risk of universal death.

Resolution

We invite this Congress, and through it the scientists of the world and the general public, to subscribe to the following resolution: “In view of the fact that in any future world war nuclear weapons will certainly be employed, and that such weapons threaten the continued existence of mankind, we urge the Governments of the world to realize, and to acknowledge publicly, that their purpose cannot be furthered by a world war, and we urge them, consequently, to find peaceful means for the settlement of all matters of dispute between them.”

The document was signed by Max Born, Perry W. Bridgman, Albert Einstein, Leopold Infeld, Frederic Joliot-Curie, Herman J. Muller, Linus Pauling, Cecil F. Powell, Joseph Rotblat, Bertrand Russell, and Hideki Yukawa

4.9 Margaret Sanger

The Comstock Laws

Anthony Comstock (1844-1915) was a United States Postal Inspector, which is to say that he was the head of a department of the US Postal Service that had the responsibility of preventing the mail from being used for illegal or immoral purposes. Unfortunately, in his view, this included any information or materials related to birth control.

According to the Wikipedia article about him, “In 1873, Comstock created the New York Society for the Suppression of Vice, an institution dedicated to supervising the morality of the public. Later that year, Comstock successfully influenced the United States Congress

to pass the Comstock Law, which made illegal the delivery by U.S. mail, or by other modes of transportation, of 'obscene, lewd, or lascivious' material, as well as prohibiting any methods of production or publication of information pertaining to the procurement of abortion, the prevention of conception and the prevention of venereal disease.

"During his career, Comstock clashed with Emma Goldman and Margaret Sanger. In her autobiography, Goldman referred to Comstock as the leader of America's 'moral eunuchs'. Comstock had numerous enemies, and in later years his health was affected by a severe blow to the head from an anonymous attacker. He lectured to college audiences and wrote newspaper articles to sustain his causes. Before his death, Comstock attracted the interest of a young law student, J. Edgar Hoover, who was interested in his causes and methods.

"Comstock is also known for his opposition to suffragists Victoria Woodhull and Tennessee Celeste Claflin, and those associated with them. The men's journal *The Days' Doings* had popularized images of the sisters for three years and was instructed by its editor (while Comstock was present) to stop producing lewd images. Comstock also took legal action against the paper for advertising contraceptives. When the sisters published an expose of an adulterous affair between Reverend Henry Ward Beecher and Elizabeth Tilton, he had the sisters arrested under laws forbidding the use of the postal service to distribute 'obscene material'

"Comstock's ideas of what might be 'obscene, lewd, or lascivious' were quite broad. During his time of greatest power, even some anatomy textbooks were prohibited from being sent to medical students by the United States Postal Service.

"Through his various campaigns, he destroyed 15 tons of books, 284,000 pounds of plates for printing 'objectionable' books, and nearly 4,000,000 pictures. Comstock boasted that he was responsible for 4,000 arrests and claimed he drove fifteen persons to suicide."

"In 1915, architect William Sanger was charged under the New York law against disseminating contraceptive information.[24] His wife Margaret Sanger was similarly charged in 1915 for her work *The Woman Rebel*. Sanger circulated this work through the U.S. postal service, effectively violating the Comstock Law. On appeal, her conviction was reversed on the grounds that contraceptive devices could legally be promoted for the cure and prevention of disease.

"The prohibition of devices advertised for the explicit purpose of birth control was not overturned for another eighteen years. During World War I, U.S. servicemen were the only members of the Allied forces sent overseas without condoms.

"In 1932, Sanger arranged for a shipment of diaphragms to be mailed from Japan to a sympathetic doctor in New York City. When U.S. customs confiscated the package as illegal contraceptive devices, Sanger helped file a lawsuit. In 1936, a federal appeals court ruled in *United States v. One Package of Japanese Pessaries* that the federal government could not interfere with doctors providing contraception to their patients.

"*Griswold v. Connecticut* (1965) struck down one of the remaining contraception Comstock laws in Connecticut and Massachusetts. However, *Griswold* only applied to marital relationships. *Eisenstadt v. Baird* (1972) extended its holding to unmarried persons as well."

Margaret Sanger is widely regarded as the founder of the modern birth control movement.



Figure 4.15: Margaret Sanger (1879-1966) is considered to be the founder of the modern birth control movement. Defying threats of arrest, she founded the first birth control clinic in America as well as an organization that developed into the Planned Parenthood Federation of America. In 1925 Sanger organized the Sixth International Neo-Malthusian Birth Control Conference. From 1952 to 1959, she served as President of the International Planned Parenthood Federation.

She was born in 1879 in New York State, to Irish-American parents. Margaret Sanger's mother, Anne Higgins, went through 18 pregnancies, resulting in 11 live births, before dying, exhausted, at the age of 49. Of the 11 surviving children, Margaret was the sixth, and she spent much of her youth caring for her younger siblings. Nevertheless, with the help of her two older sisters, she attended Claverack College and the Hudson River Institute. She became a nurse, and in 1902 she married William Sanger, who was both a socialist and a successful architect.

In the years 1911-1912, Margaret Sanger wrote a series of articles for the magazine *The New York Call* entitled *What Every Mother Should Know* and in 1912-1913 *What Every Girl Should Know*. Both of these series appeared as books in 1916. Many New York readers were outraged by the frankness of the articles, but many others praised them for their honesty. One reader stated that the articles contained "a purer morality than whole libraries full of hypocritical cant about modesty".

Margaret Sanger's work as a nurse among poor immigrant women convinced her that birth control information was urgently needed to avoid excessive family size and deaths from the consequences of back-street abortions. Throughout her career, Sanger disapproved of abortion, and believed that preventative birth control is the only practical way to avoid it.

One of her patients, Sadie Sachs, died after a self-induced abortion. Remembering this event, Margaret Sanger said later: "I threw my nursing bag in the corner and announced ... that I would never take another case until I had made it possible for working women in America to have the knowledge to control birth".

4.10 Emmeline Pankhurst

The daughter of politically active parents, Emmeline was introduced to the campaign for women's suffrage at the age of 14. In 1879 she married Richard Pankhurst. He was a barrister, sympathetic to the cause of votes for women, and 24 years older than she. Of the five children born to the marriage Emmeline and Richard's daughters Christobel and Sylvia became active in the fight for the political rights of women.

In 1903, a year after the death of her husband, Emmeline Pankhurst founded what was to become the most radical and controversial branch of the campaign for women's rights: the Women's Social and Political Union (WSPU). This organization, consisting entirely of women, believed that little progress would be made through polite requests for reform. Therefore WSPU members chained themselves to railings, broke the windows of prominent buildings, set fire to postboxes, attacked policemen, and, when arrested, went on hunger strikes. The hunger striking women were force-fed, their jaws being held open by steel clamps and tubes forced down their throats. Of course newspapers reported all of this, and debate about the issues reached a high pitch.

After World War I, the Representation of the People Act of 1918 extended the right to vote to men over 21, and to women property owners over 30.



Figure 4.16: Emmeline Pankhurst (1858-1928). In 1999, Time Magazine named Emmeline Pankhurst as one of the 100 most important people of the 20th century, noting that “she shaped an idea of women for our time; she shook society into a new pattern from which there could be no going back”.



Figure 4.17: **A suffragette who has chained herself to a railing.**



Figure 4.18: The arrest of a suffragette.

4.11 Daniel Ellsberg

Here are some of the things that Daniel Ellsberg said:

Only we, the public, can force our representatives to reverse their abdication of the war powers that the Constitution gives exclusively to the Congress.

Yet what seems to me beyond question is that any social system (not only ours) that has created and maintained a Doomsday Machine and has put a trigger to it, including first use of nuclear weapons, in the hands of one human being - anyone, not just this man, still worse in the hands of an unknown number of persons - is in core aspects mad. Ours is such a system. We are in the grip of institutionalized madness.

These two systems still risk doomsday: both are still on hair-trigger alert that makes their joint existence unstable. They are susceptible to being triggered on a false alarm, a terrorist action, unauthorized launch, or a desperate decision to escalate. They would kill billions of humans, perhaps ending complex life on earth. This is true even though the Cold War that rationalized their existence and hair-trigger status - and their supposed necessity to national security - ended thirty years ago. Does the United States still need a Doomsday Machine? Does Russia? Did they ever? Does the existence of such a capability serve any national or international interest whatsoever to a degree that would justify its obvious danger to human life? I ask the questions not merely rhetorically. They deserve sober, reflective consideration. The answers do seem obvious, but so far as I know they have never been addressed. There follows another question: Does any nation on earth have a right to possess such a capability?

The public is lied to every day by the President, by his spokespeople, by his officers. If you can't handle the thought that the President lies to the public for all kinds of reasons, you couldn't stay in the government at that level, or you're made aware of it, a week. ... The fact is Presidents rarely say the whole truth - essentially, never say the whole truth - of what they expect and what they're doing and what they believe and why they're doing it and rarely refrain from lying, actually, about these matters.

That exchange did it. Already oppressed by the briefings up to that point, I shrank within, horrified. I thought of the Wannsee Conference in January 1942, when an assemblage of German bureaucrats swiftly agreed on a program to exterminate every last Jew they could find anywhere in Europe, using methods of mass extermination more technologically efficient than the vans filled with exhaust gases, the mass shootings, or incineration in barns and synagogues used until then. I felt as if I were witnessing a comparable descent into the deep

heart of darkness, a twilight underworld governed by disciplined, meticulous and energetically mindless groupthink aimed at wiping out half the people living on nearly one third of the earth's surface. Those feelings have not entirely abated, even though more than forty years have passed since that dark moment.

Far from being accompanied by any offers to resign, there was no evident embarrassment, no shame, apology, or evasion: no apparent awareness of any need for an explanation of this answer to the new president. I thought: this was what the United States had come to, sixteen years after Hiroshima. Plans and preparations, awaiting only presidential order to execute (and, I'd discovered, not requiring even that in some circumstances), for whose foreseen consequences the term "genocidal" was totally inadequate.

One can ask why they didn't explore more vigorously the possible environmental consequences of this unprecedented ecological experiment - an all-out thermonuclear war - for which they were preparing. Or why, more than thirty years since scientists first posited these dangers, and more than ten years since scientific uncertainties about their calculations have been put to rest, our plans have continued to include "options" for detonating hundreds of nuclear explosions near cities, which would loft enough soot and smoke into the upper stratosphere to lead to death by starvation of nearly everyone on earth, including, after all, ourselves.

The fact is that the estimate of fatalities, in terms of what was calculable at that time - even before the discovery of nuclear winter - was a fantastic underestimate. More than forty years later, Dr. Lynn Eden, a scholar at Stanford's Center for International Security and Cooperation, revealed in *Whole World on Fire*⁷¹ the bizarre fact that the war planners of SAC and the Joint Chiefs - throughout the nuclear era to the present day - have deliberately omitted entirely from their estimates of the destructive effects of U.S. or Russian nuclear attacks the effects of fire. They have done so on the questionable grounds that these effects are harder to predict than the effects of blast or fallout, on which their estimates of fatalities are exclusively based, even though, as Eden found, experts including Hal Brode have disputed such conclusions for decades. (A better hypothesis for the tenacious lack of interest is that accounting for fire would reduce the number of USAF warheads and vehicles required to achieve the designated damage levels: which were themselves set high enough to preclude coverage by available Navy submarine-launched missiles.) Yet even in the sixties the firestorms caused by thermonuclear weapons were known to be predictably the largest producers of fatalities in a nuclear war. Given that for almost all strategic nuclear weapons, the damage radius of firestorms would be two to five times the radius destroyed by the blast, a more realistic estimate of the fatalities caused directly by the planned U.S. attacks on the Sino-Soviet bloc, even in 1961, would surely have been double the summary in the graph

I held in my hand, for a total death toll of a billion or more: a third of the earth's population, then three billion. Moreover, what no one would recognize for another twenty-two years were the indirect effects of our planned first strike that gravely threatened the other two thirds of humanity. These effects arose from another neglected consequence of our attacks on cities: smoke. In effect, in ignoring fire the Chiefs and their planners ignored that where there's fire there's smoke. But what is dangerous to our survival is not the smoke from ordinary fires, even very large ones - smoke that remained in the lower atmosphere and would soon be rained out - but smoke propelled into the upper atmosphere from the firestorms that our nuclear weapons were sure to create in the cities we targeted. Ferocious updrafts from these multiple firestorms would loft millions of tons of smoke and soot into the stratosphere, where it would not be rained out and would quickly encircle the globe, forming a blanket blocking most sunlight around the earth for a decade or more. This would reduce sunlight and lower temperatures⁷² worldwide to a point that would eliminate all harvests and starve to death - not all but nearly all - humans (and other animals that depend on vegetation for food). The population of the southern hemisphere - spared nearly all direct effects from nuclear explosions, even from fallout - would be nearly annihilated, as would that of Eurasia (which the Joint Chiefs already foresaw, from direct effects), Africa, and North America.

This mortal predicament did not begin with Donald J. Trump, and it will not end with his departure. The obstacles to achieving these necessary changes are posed not so much by the majority of the American public - though many in recent years have shown dismaying manipulability - but by officials and elites in both parties and by major institutions that consciously support militarism, American hegemony, and arms production and sales.

We humans almost universally have a false self-image of our species. We think that monstrous, wicked policies must be, can only be, conceived and directed and carried out by monsters, wicked or evil people, or highly aberrant, clinically "disturbed" people. People not like "us." That is mistaken. Those who have created a continuing nuclear threat to the existence of humanity have been normal, ordinary politicians, analysts, and military strategists. To them and to their subordinates, Hannah Arendt's controversial proposition regarding the "banality of evil" I believe applies, though it might better have been stated as the "banality of evildoing, and of most evildoers".

What is missing - what is foregone - in the typical discussion and analysis of historical or current nuclear policies is the recognition that what is being discussed is dizzyingly insane and immoral: in its almost-incalculable and inconceivable destructiveness and deliberate murderousness, its disproportionality of risked and planned destructiveness to either declared or unacknowledged objectives,



Figure 4.19: Peter Sellers (left) listens while Brigadier General Jack D. Ripper tells him about the Soviet conspiracy to steal his “precious bodily fluids”.

the infeasibility of its secretly pursued aims (damage limitation to the United States and allies, “victory” in two-sided nuclear war), its criminality (to a degree that explodes ordinary visions of law, justice, crime), its lack of wisdom or compassion, its sinfulness and evil.

An accident waiting to happen

In Stanley Kubrick’s film, “Dr. Strangelove”, a paranoid ultra-nationalist brigadier general, Jack D. Ripper, orders a nuclear attack on the Soviet Union because he believes that the Soviets are using water fluoridation as a means to rob Americans of their “precious bodily fluids”. Efforts are made to recall the US bombers, but this proves to be impossible, and the attack triggers the Soviet “Doomsday Machine”. The world is destroyed.

Kubrick’s film is a black comedy, and we all laugh at it, especially because of the brilliant performance of Peter Sellers in multiple roles. Unfortunately, however, the film comes uncomfortably close to reality. An all-destroying nuclear war could very easily be started by an insane or incompetent person whose hand happens to be on the red button.

The probability of a catastrophic nuclear war occurring by accident is made greater by the fact that several thousand nuclear weapons are kept on “hair-trigger alert” with a quasi-automatic reaction time measured in minutes. There is a constant danger that a



Figure 4.20: Peter Sellers as Dr. Strangelove. He has to restrain his black-gloved crippled hand, which keeps trying to give a Nazi salute.



Figure 4.21: General Buck Turgidson (George C. Scott) struggles with the Russian Ambassador. Peter Sellers (right) playing the US President, rebukes them for fighting in the War Room.



Figure 4.22: Major T. “King” Kong rides a nuclear bomb on its way down, where it will trigger the Soviet Doomsday Machine and ultimately destroy the world.

nuclear war will be triggered by an error in evaluating a signal on a radar screen.

A number of prominent political and military figures (many of whom have ample knowledge of the system of deterrence, having been part of it) have expressed concern about the danger of accidental nuclear war. Colin S. Grey (Chairman of the National Institute of Public Policy) expressed this concern as follows: “The problem, indeed the enduring problem, is that we are resting our future on a deterrence system concerning which we cannot tolerate even a single malfunction.”

General Curtis E. Lemay, has written: “In my opinion a general war will grow through a series of political miscalculations and accidents, rather than through any deliberate attack by either side.”

Bruce G. Blair of Brookings Institution has remarked that “It is obvious that the rushed nature of the process, from warning to decision to action, risks causing a catastrophic mistake... This system is an accident waiting to happen.”

Fred Ikle of the Rand Corporation has written: “But nobody can predict that a fatal accident or unauthorized act will never happen... Given the huge and far-flung missile forces, ready to be launched from land or sea on both sides, the scope for disaster by accident is immense,.. In a matter of seconds, through technical accident or human failure, mutual deterrence might thus collapse.”

In the perilous situation in which we find ourselves today, the only way that we can ensure that our children and grandchildren will live to enjoy our beautiful world, is to get rid of nuclear weapons entirely. To do so is the ardent wish of the vast majority of the

world's peoples.

4.12 Mairead Corrigan Maguire

Mairead Corrigan was born in 1944. She was the second of eight children of a Catholic family in Belfast, Ireland. In 1976, an event occurred which led Mairead to become a peace activist. Her sister Anne Maguire and three of Anne's children were run over and killed by a car driven by a Provisional Irish Republican Army (PIRA) member who had been fatally shot by British troops while trying to escape. Mairead Corrigan and Betty Williams became leaders of a "virtually spontaneous mass movement" of both Catholic and Protestant women protesting against violence and urging both sides to settle the conflict peacefully.

A march of 10,000 women to the burial place of the three Maguire children, in which both Catholics and Protestants took part, was physically attacked by members of the PIRA. Later the same month, the movement mobilized 35,000 protesters against violence on the streets of Belfast. The movement was initially called "Women for Peace", but later changed its name to the gender-neutral "Community of Peace People", or simply "Peace People". The movement's two leaders, Betty Williams and Mairead Corrigan, were awarded the 1976 Nobel Peace Prize.

In 1980, after a prolonged struggle with depression following the loss of three of her children, Mairead's sister, Anne Maguire committed suicide. A year and a half later, Mairead Corrigan married her sister's widower, Jackie Maguire.

Although Mairead Corrigan Maguire has continued to work with Peace People until the present, the scope of her work for peace and non-violence has broadened greatly. Here are a few things that Mairead Corrigan Maguire said:

Our common humanity is more important than all the things that divide us.

It's okay to be scared, but fear is different. Fear is when we let being scared prevent us from doing what love requires of us.

We have really got to create a culture in our world today where we recognize that every human life is sacred and precious and we have no right to take another human life.

We frail humans are at one time capable of the greatest good and, at the same time, capable of the greatest evil. Change will only come about when each of us takes up the daily struggle ourselves to be more forgiving, compassionate, loving, and above all joyful in the knowledge that, by some miracle of grace, we can change as those around us can change too.

We are all invited to work together for peace. We shall join hands and minds

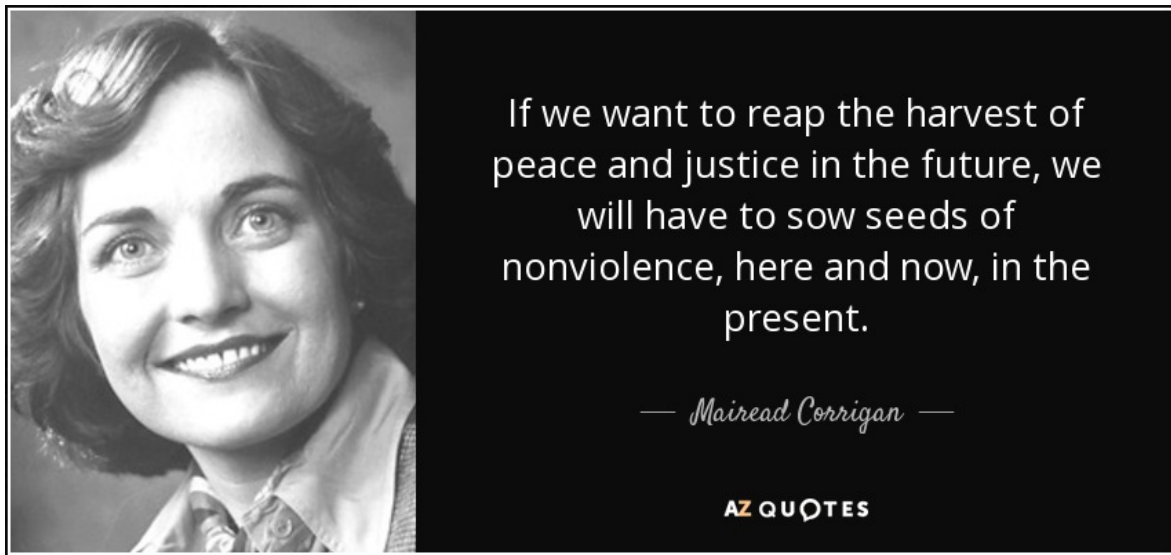


Figure 4.23:

to work for peace through active nonviolence. We shall help one another, encourage one another and learn from one another how to bring peace to our children and to all.

We have to start from the fact that there are always alternatives to violence.

We need radical thinking, creative ideas, and imagination.

I witnessed a lot of violence, and I found myself asking the question: Do you ever use violence to try to bring about political change?

Love for others and respect for their rights and their human dignity, irrespective of who or what they are, no matter what religion - or none - that they choose to follow, will bring about real change and set in motion proper relationships. With such relationships built on equality and trust, we can work together on so many of the threats to our common humanity.

Every day there are people in our world that do absolutely amazing things. People of all ages are very capable of doing tremendous, courageous things in spite of their fear.

Perhaps the greatest contribution that those of us who come from a Christian tradition can make is to throw out the old just-war theory, embrace the nonviolence of Jesus, refuse to kill one another, and truly follow his commandment to “love our enemies”.



Figure 4.24: Mairead Corrigan Maguire (born 1944). She and Betty Williams shared the 1976 Nobel Peace Prize for founding and leading Peace People, an organization working for peace in Northern Ireland. Today Maguire's concerns are global. She opposed the Iraq Wars of 1990 and 2003, and the sanctions that caused hundreds of thousands of deaths among the civilians of Iraq. She is critical of US militarism and wars, nuclear weapons wherever they are found, and Israel's occupation of Gaza. At the Russell Tribunal in 2012, she "asked the question that seems to be taboo in the U.S.: Why does President Barack Obama allow Israel to threaten Iran with war when Iran has signed the NPT and Israel has at least 200 nuclear weapons? Why does the president not demand that Israel sign the NPT?" Regarding nuclear weapons, she said "I have for years been speaking out against nuclear weapons. I am actively opposed to nuclear weapons in Britain, in the United States, in Israel, in any country, because nuclear weapons are the ultimate destruction of humankind." Together with Desmond Tutu and Adolfo Pérez Esquivel, Mairead Maguire has also published a letter in support of Chelsea Manning. In 2019, she nominated Julian Assange for the Nobel Peace Prize.

I believe that hope for the future depends on each of us taking nonviolence into our hearts and minds and developing new and imaginative structures which are nonviolent and life-giving for all.

We need now to build a culture of genuine nonviolence and real democracy.

One great hope lies in the fact that there is a new consciousness in our World, particularly among young people.

Once we link up and network, there will be new institutions, new beginnings, and a change in the economy because capitalism is destroying many people's lives. It's just one leap to think in a different way.

To enable consensus politics to develop we need to empower people where they live. This means devolving financial resources and political power down to the community level. One of the greatest blocks to movement is fear. This fear can only be removed when people feel their voices are being heard by government and when they have a say in their own lives and communities.

...I believe, with Gandhi, that we need to take an imaginative leap forward toward fresh and generous idealism for the sake of all humanity - that we need to renew this ancient wisdom of nonviolence, to strive for a disarmed world, and to create a culture of nonviolence.

I have always been inspired by the American peace movement because it is operating in a very hard and militarist environment.

I believe we are on the edge of a quantum leap into a whole new way of organizing and living as a human family.

When I visited Auschwitz I was horrified. And when I visited Iraq, I thought to myself, 'What will we tell our children in fifty years when they ask what we did when the people in Iraq were dying.'

I think Assange has been very courageous. I've also defended Bradley Manning. I think they've been tremendously courageous in telling the truth, and the public has the right to the truth.



Figure 4.25: In 1981, Maired Corrigan married her sister Anne's widower, Jackie Maguire.

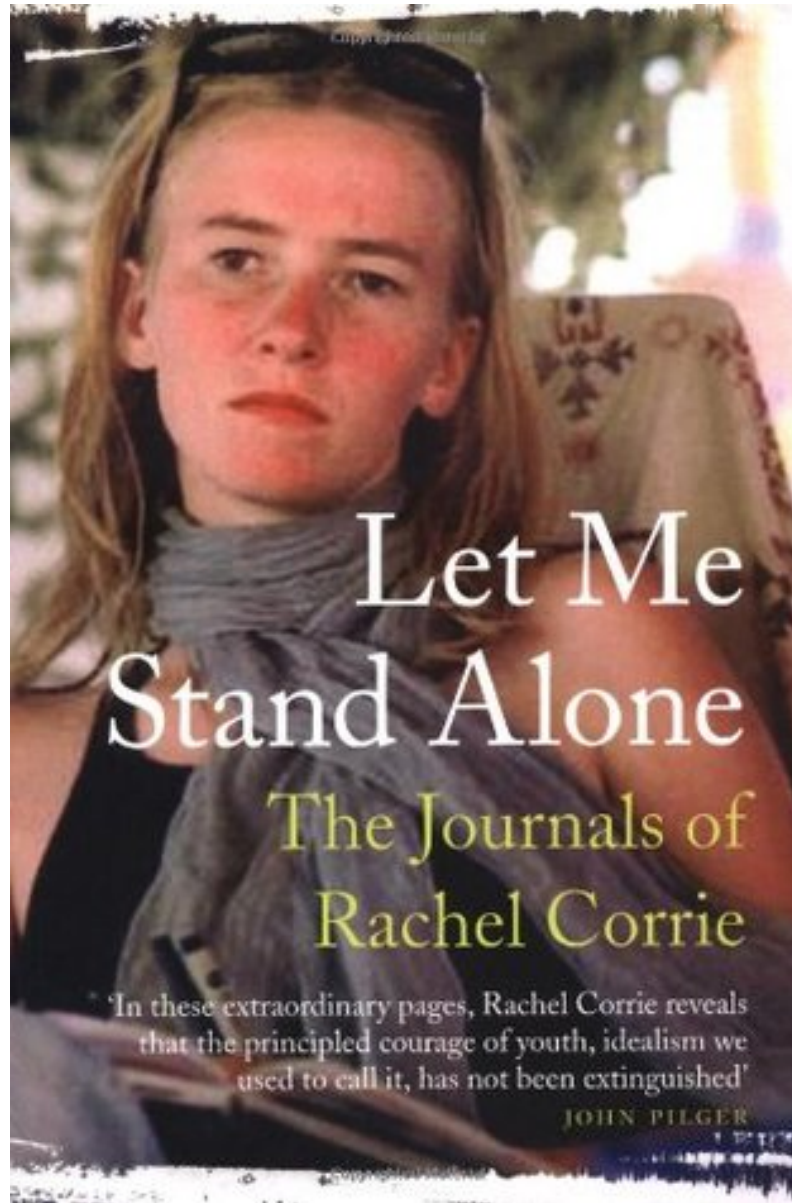


Figure 4.26: Rachael Corrie was killed when she stood in front of an Israeli bulldozer to prevent it from destroying the houses of Palestinians. The bulldozer driver ran over Rachael repeatedly to make sure that she was dead. Mairead Corrigan Maguire recently sailed on a small ship named after Rachael Corrie in an attempt to break Israel's illegal blockade of Gaza.

4.13 Julian Assange

“Every government degenerates when trusted to the rulers of the people alone. The people themselves, therefore, are its only safe depositories.” Thomas Jefferson, (1743-1826)

“The jaws of power are always open to devour, and her arm is always stretched out, if possible, to destroy the freedom of thinking, speaking, and writing.” John Adams, (1735-1826)

We do not know what will happen to Julian Assange. If his captors send him to the US, and if he is imprisoned or executed there for the crime of publishing leaked documents (a crime that he shares with the New York Times), he will not be the first martyr to the truth. The ageing Galileo was threatened with torture and forced to recant his heresy - that the earth moves around the sun. Galileo spent the remainder of his days in house arrest. Giordano Bruno was less lucky. He was burned at the stake for maintaining that the universe is larger than it was then believed to be. If Julian Assange becomes a martyr to the truth like Galileo or Bruno, his name will be honored by generations in the future, and the shame of his captors will be remembered too.

According to the Nuremberg Principles, the citizens of a country have a responsibility for the crimes that their governments commit. But to prevent these crimes, the people need to have some knowledge of what is going on. Indeed, democracy cannot function at all without this knowledge.

What are we to think when governments make every effort to keep their actions secret from their own citizens? We can only conclude that although they may call themselves democracies, such governments are in fact oligarchies or dictatorships .

At the end of World War I, it was realized that secret treaties had been responsible for its outbreak, and an effort was made to ensure that diplomacy would be more open in the future. Needless to say, these efforts did not succeed, and diplomacy has remained a realm of secrecy.

Many governments have agencies for performing undercover operations (usually very dirty ones). We can think, for example of the KGB, the CIA, M5, or Mossad. How





Figure 4.27: Julian Assange in c. 2006.

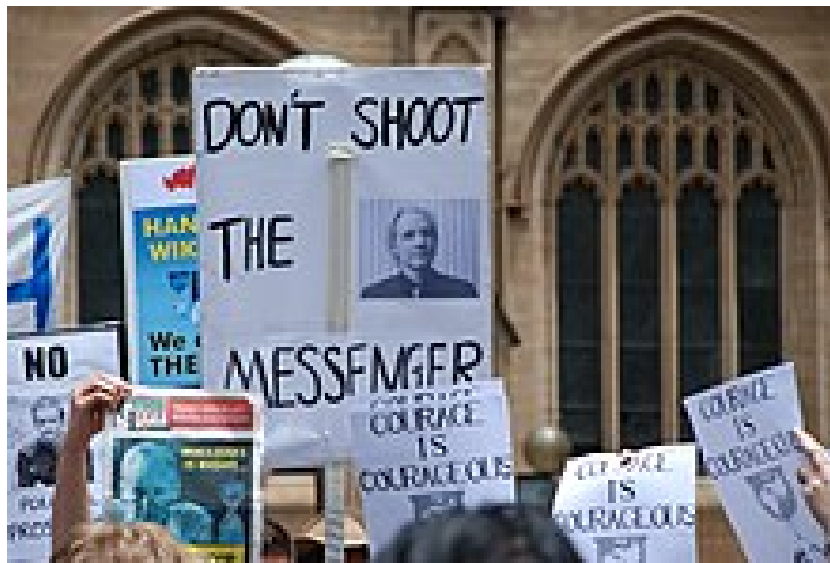


Figure 4.28: Demonstration in support of Assange in front of Sydney Town Hall, 10 December, 2010.



Figure 4.29: Julian Assange speaks on the steps of Saint Paul's Cathedral in London, 16 October, 2011.

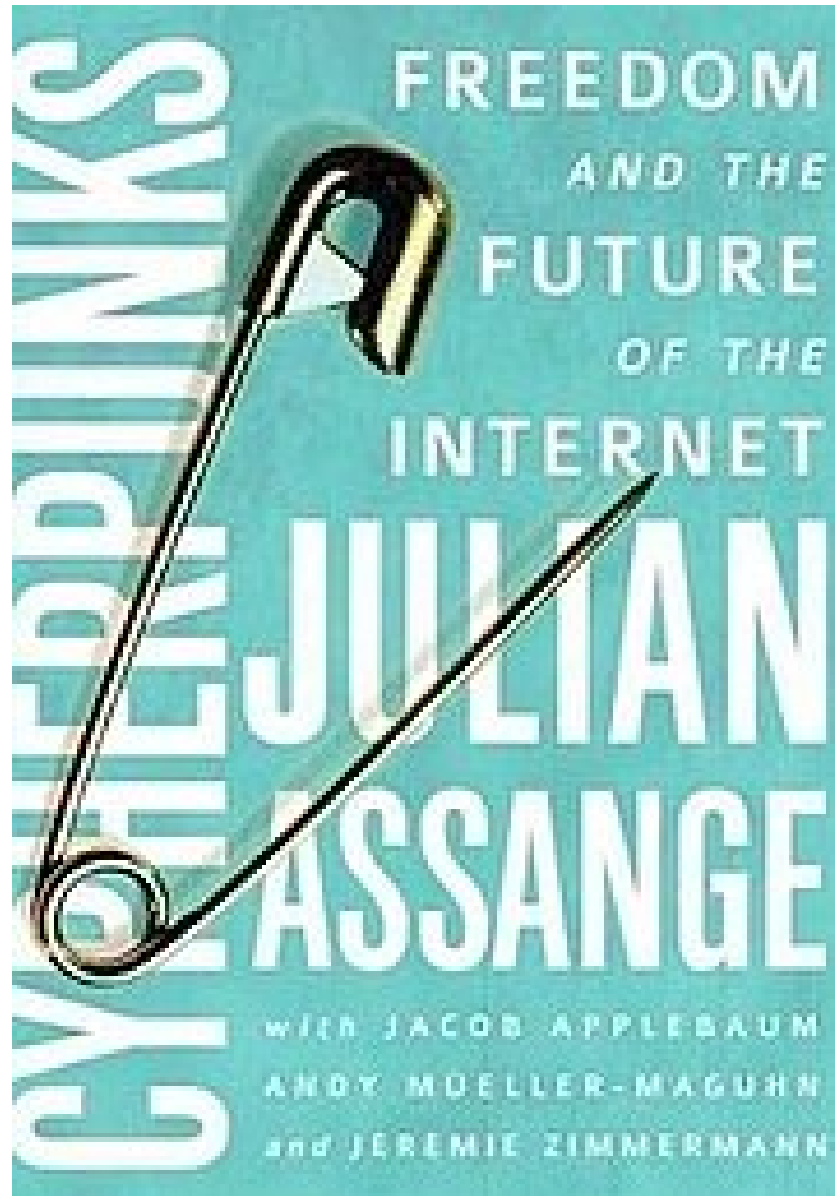


Figure 4.30: “Cypherpunks: Freedom and the Future of the Internet”, a 2012 book by Julian Assange.

can countries that have such agencies claim to be democracies, when the voters have no knowledge of or influence over the acts that are committed by the secret agencies of their governments?

Nuclear weapons were developed in secret. It is doubtful whether the people of the United States would have approved of the development of such antihuman weapons, or their use against an already-defeated Japan, if they had known that these things were going to happen. The true motive for the nuclear bombings was also kept secret. In the words of General Groves, speaking confidentially to colleagues at Los Alamos, the real motive was “to control the Soviet Union”.

The true circumstances surrounding the start of the Vietnam war would never have been known if Daniel Ellsberg had not leaked the Pentagon Papers. Ellsberg thought that once the American public realized that their country’s entry into the war was based on a lie, the war would end. It did not end immediately, but undoubtedly Ellsberg’s action contributed to the end of the war.

We do not know what will happen to Julian Assange. If his captors send him to the US, and if he is executed there for the crime of publishing leaked documents (a crime that he shares with the New York Times), he will not be the first martyr to the truth. The ageing Galileo was threatened with torture and forced to recant his heresy - that the earth moves around the sun. Galileo spent the remainder of his days in house arrest. Giordano Bruno was less lucky. He was burned at the stake for maintaining that the universe is larger than it was then believed to be. If Julian Assange becomes a martyr to the truth like Galileo or Bruno, his name will be honored by generations in the future, and the shame of his captors will be remembered too.

Can a government, many of whose operations are secret, be a democracy? Obviously this is impossible. The recent attempts of the United States to arrest whistleblower Edward Snowden call attention to the glaring contradiction between secrecy and democracy.

In a democracy, the power of judging and controlling governmental policy is supposed to be in the hands of the people. It is completely clear that if the people do not know what their government is doing, then they cannot judge or control governmental policy, and democracy has been abolished. There has always been a glaring contradiction between democracy and secret branches of the government, such as the CIA, which conducts its assassinations and its dirty wars in South America without any public knowledge or control.

The gross, wholesale electronic spying on citizens revealed by Snowden seems to be specifically aimed at eliminating democracy. It is aimed at instilling universal fear and conformity, fear of blackmail and fear of being out of step, so that the public will not dare to oppose whatever the government does, no matter how criminal or unconstitutional.

Henry Kissinger famously remarked: “The illegal we do at once. The unconstitutional takes a little longer”. Well, Henry, that may have been true in your time, but today the unconstitutional does not take long at all.

The Magna Carta is trashed. No one dares to speak up. Habeas Corpus is trashed. No one dares to speak up. The United Nations Charter is trashed. No one dares to speak up. The Universal Declaration of Human Rights is trashed. No one dares to speak up. The

Fourth Amendment to the US Constitution is trashed. No one dares to speak up. The President claims the right to kill both US and foreign citizens, at his own whim. No one dares to speak up.

But perhaps this is unjust. Perhaps some people would dare to protest, except that they cannot get their protests published in the mainstream media. We must remember that the media are owned by the same corporate oligarchs who own the government.

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Globally, the number of people killed by terrorism is vanishingly small compared to the number of children who die from starvation every year. It is even vanishingly small compared with the number of people who are killed in automobile accidents. It is certainly small compared with the number of people killed in wars aimed at gaining western hegemony over oil-rich regions of the world.

In order to make the American people really fear terrorism, and in order to make them willing to give up their civil liberties, a big event was needed, something like the 9/11 attacks on the World Trade Center.

There is strong evidence, available on the Internet for anyone who wishes to look at it, that the US government knew well in advance that the 9/11 attacks would take place, and that government agents made the disaster worse than it otherwise would have been by planting explosives in the buildings of the World Trade Center.

But in Shelly's words, "Ye are many, they are few!" The people who want democracy greatly outnumber those who profit from maintaining a government based on secrecy and fear. Let us "rise like lions after slumbers, in unvanquishable numbers". Let us abolish governmental secrecy and reclaim our democracy.

Here are a few things that Julian Assange said:

Every time we witness an injustice and do not act, we train our character to be passive in its presence and thereby eventually lose all ability to defend ourselves and those we love. In a modern economy it is impossible to seal oneself off from injustice.

If we have brains or courage, then we are blessed and called on not to frit these qualities away, standing agape at the ideas of others, winning pissing contests, improving the efficiencies of the neocorporate state, or immersing ourselves in obscuranta, but rather to prove the vigor of our talents against the strongest opponents of love we can find.

If we can only live once, then let it be a daring adventure that draws on all our powers. Let it be with similar types whose hearts and heads we may be proud of. Let our grandchildren delight to find the start of our stories in their ears but the endings all around in their wandering eyes. The whole universe or the structure that perceives it is a worthy opponent, but try as I may I can not escape the sound of suffering.

Capable, generous men do not create victims, they nurture victims.

What we know is everything, it is our limit, of what we can be

Non-conformity is the only real passion worth being ruled by.

You have to start with the truth. The truth is the only way that we can get anywhere. Because any decision-making that is based upon lies or ignorance can't lead to a good conclusion.

One of the best ways to achieve justice is to expose injustice.

Big Brother is home. He is installed in the item you just dragged home from the Apple store.

The west has fiscalised its basic power relationships through a web of contracts, loans, shareholdings, bank holdings and so on. In such an environment it is easy for speech to be "free" because a change in political will rarely leads to any change in these basic instruments. Western speech, as something that rarely has any effect on power, is, like badgers and birds, free. In states like China, there is pervasive censorship, because speech still has power and power is scared of it. We should always look at censorship as an economic signal that reveals the potential power of speech in that jurisdiction.

The sense of perspective that interaction with multiple cultures gives you I find to be extremely valuable, because it allows you to see the structure of a country with greater clarity, and gives you a sense of mental independence.

The only way to keep a secret is to never have one.

Where they couldn't pick holes in our arguments they would drive horses and carriages through my character.

Courage is not the absence of fear. Only fools have no fear. Rather, courage is the intellectual mastery of fear by understanding the true risks and opportunities of the situation and keeping those things in balance.

The world is not sliding, but galloping into a new transnational dystopia. This development has not been properly recognized outside of national security circles. It has been hidden by secrecy, complexity and scale. The internet, our greatest tool of emancipation, has been transformed into the most dangerous facilitator of totalitarianism we have ever seen. The internet is a threat to human civilization.

These transformations have come about silently, because those who know what is going on work in the global surveillance industry and have no incentives to speak out. Left to its own trajectory, within a few years, global civilization will be a postmodern surveillance dystopia, from which escape for all but the most skilled individuals will be impossible. In fact, we may already be there.

While many writers have considered what the internet means for global civilization, they are wrong. They are wrong because they do not have the sense of perspective that direct experience brings. They are wrong because they have never met the enemy.

A great number of those working for liberal causes are not only shy but borderline collusive. They want change to happen nicely, and it won't. They want decency to come about without anybody suffering or being embarrassed, and it won't. And most of all they want to give many of the enemies of open government the benefit of the doubt, and I don't. It's not just a difference of approach, it's a complete schism in our respective philosophy. You can't go about disclosure in the hope that it won't spoil anybody's dinner.

Google's colourful, playful logo is imprinted on human retinas just under six billion times each day, 2.1 trillion times a year - an opportunity for respondent conditioning enjoyed by no other company in history.

So when Putin goes out to buy a Coke, thirty seconds later it is known in Washington DC.

Reality is an aspect of property. It must be seized. And investigative journalism is the noble art of seizing reality back from the powerful.

The internet has become a political space. I think that is one of the most important developments in the past decade.

The received wisdom in advanced capitalist societies is that there still exists an organic "civil society sector" in which institutions form autonomously and come together to manifest the interests and will of citizens. The fable has it that the boundaries of this sector are respected by actors from government and the "private sector," leaving a safe space for NGOs and nonprofits to advocate

for things like human rights, free speech, and accountable government.

This sounds like a great idea. But if it was ever true, it has not been for decades. Since at least the 1970s, authentic actors like unions and churches have folded under a sustained assault by free-market statism, transforming “civil society” into a buyer’s market for political factions and corporate interests looking to exert influence at arm’s length. The last forty years have seen a huge proliferation of think tanks and political NGOs whose purpose, beneath all the verbiage, is to execute political agendas by proxy.

Smears don’t have much staying power on their own because they deviate from the foundations of reality (what actually happened). They require constant energy from our opponents to keep going. The truth has a habit of reasserting itself.

The act of assassination - the targeting of visible individuals, is the result of mental inclinations honed for the pre-literate societies in which our species evolved.

4.14 Edward Snowden

The revelations of Edward Snowden and others have shown that the number of people involved in secret operations of the United States government is now as large as the entire population of Norway: roughly 5 million. The influence of this dark side of government has become so great that no president is able to resist it.

In a recent article, John Chuckman remarked that “The CIA is now so firmly entrenched and so immensely well financed (much of it off the books, including everything from secret budget items to the peddling of drugs and weapons) that it is all but impossible for a president to oppose it the way Kennedy did. Obama, who has proved himself to be a fairly weak character from the start, certainly has given the CIA anything it wants. The dirty business of ISIS in Syria and Iraq is one project. The coup in Ukraine is another. The pushing of NATO’s face right against Russia’s borders is another. Several attempted coups in Venezuela are still more. And the creation of a drone air force for extra-judicial killings in half a dozen countries is yet another. They don’t resemble projects we would expect from a smiley-faced intelligent man who sometimes wore sandals and refused to wear a flag pin on his lapel during his first election campaign.”¹

Of course the United States government is by no means alone in practicing excessive secrecy: Scott Horton recently wrote an article entitled *How to Rein in a Secretive Shadow Government Is Our National Security Crisis*. He dedicated the article to the Soviet dissident Andrei Sakharov because, as he said, “Sakharov recognized that the Soviet Union

¹<http://www.informationclearinghouse.info/article41222.htm>

rested on a colossal false premise: it was not so much socialism (though Sakharov was certainly a critic of socialism) as it was the obsession with secrecy, which obstructed the search for truth, avoided the exposure of mistakes, and led to the rise of powerful bureaucratic elites who were at once incompetent and prone to violence.”

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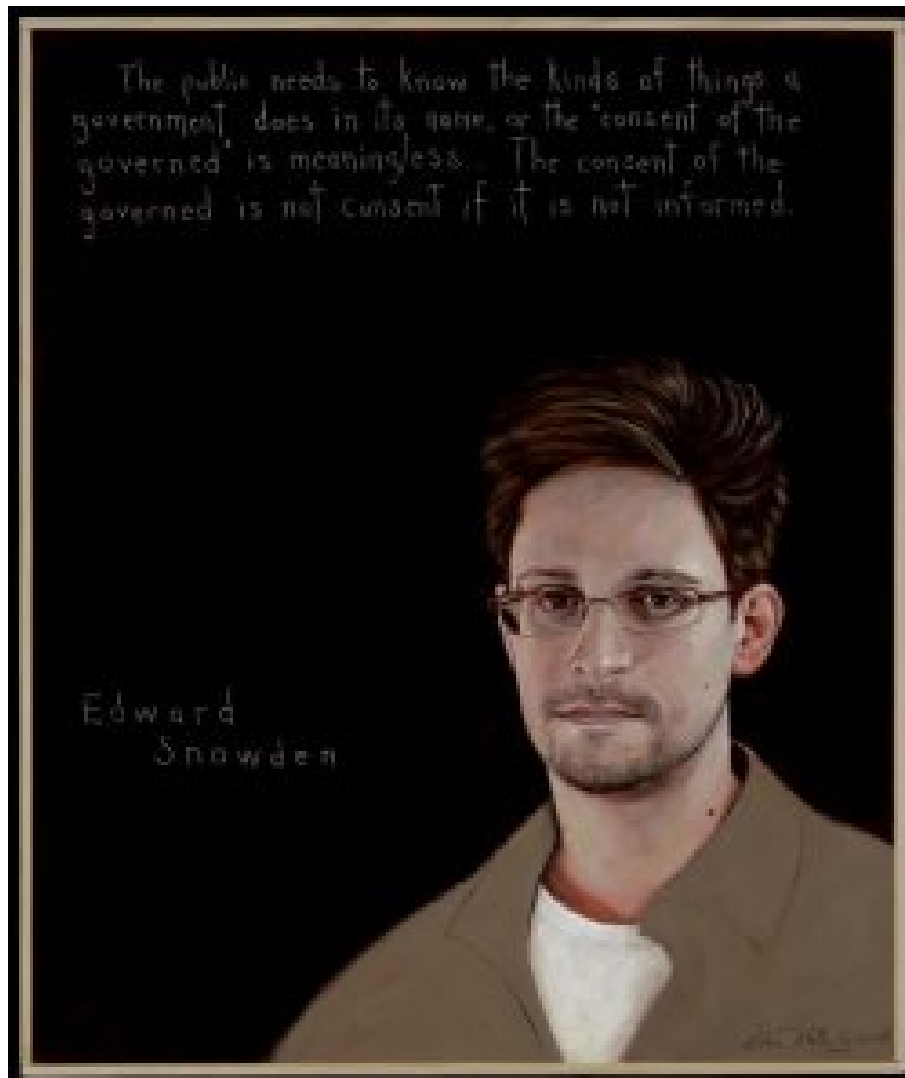


Figure 4.31: The revelations of Edward Snowden and others have shown that the number of people involved in secret operations of the United States government is now as large as the entire population of Norway: roughly 5 million.

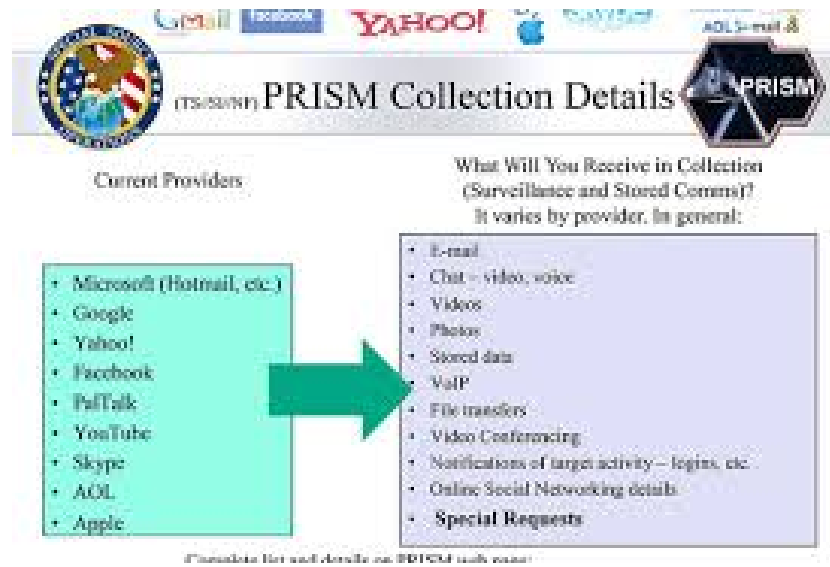


Figure 4.32: One of the power points used by NSA to sell their comprehensive collection of private data.



Figure 4.33: These huge buildings in Fort Meade, Maryland, are the main headquarters of NSA.



Figure 4.34: Angela Merkel's telephone was bugged by NSA. In a cartoon depicting the incident, she says "Tell the Americans to stop listening to our telephone conversations". Her aide replies, "You just did".



Figure 4.35: Big Brother is watching you.



Figure 4.36: The sales of George Orwell's 1984 soared after Snowden's revelations.



In order to make the American people really fear terrorism, and in order to make them willing to give up their civil liberties, a big event was needed, something like the 9/11 attacks on the World Trade Center.

Here are a few things that Edward Snowden said:

Under observation, we act less free, which means we effectively are less free.

Being called a traitor by Dick Cheney is the highest honor you can give to an American.

These programs were never about terrorism: they're about economic spying, social control, and diplomatic manipulation. They're about power.

Study after study has show that human behavior changes when we know we're being watched. Under observation, we act less free, which means we effectively ARE less free.

We'd do well to remember that at the end of the day, the law doesn't defend us; we defend the law. And when it becomes contrary to our morals, we have both the right and the responsibility to rebalance it toward just ends.

Ultimately, if people lose their willingness to recognize that there are times in our history when legality becomes distinct from morality, we aren't just ceding control of our rights to government, but our agency in determining our futures.

If we sacrifice our values because we're afraid, we don't care about those values very much.

My sole motive is to inform the public as to that which is done in their name and that which is done against them.

When we've got these people who have practically limitless powers within a society, if they get a pass without so much as a slap on the wrist, what example does that set for the next group of officials that come into power? To push the lines a little bit further, a little bit further, a little bit further, and we'll realize that we're no longer citizens - we're subjects.

I don't want to live in a world where everything that I say, everything I do, everyone I talk to, every expression of creativity or love or friendship is recorded.

I understand that I will be made to suffer for my actions, and that the return of this information to the public marks my end. I will be satisfied if the federation of secret law, unequal pardon, and irresistible executive powers that rule the world that I love are revealed for even an instant. If you seek to help, join the open source community and fight to keep the spirit of the press alive and the internet free. I have been to the darkest corners of government, and what they fear is light.

Suggestions for further reading

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15. Amanda Taub and Max Fisher, *As Leaks Multiply, Fears of a 'Deep State' in America.* The New York Times, (February 16, 2017).
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17. Jeremy Scahill, *Donald Trump and the Coming Fall of the American Empire.* The Intercept, (2017-07-22).
18. Alana Abramson, *President Trump's Allies Keep Talking About the 'Deep State.' What's That?.* Time, (8 March 2017).
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20. Michael Crowley, *The Deep State Is Real.* Politico Magazine, (September-October 2017).
21. Julie Hirschfeld Davis, *Rumblings of a 'Deep State' Undermining Trump? It Was Once a Foreign Concept.* The New York Times, (March 6, 2017).
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Chapter 5

THE 1960'S COUNTERCULTURE

Young people reject money-centered life and war-centered politics

One of the slogans of the 1960's counterculture was "Make love, not war". Wikipedia states that "The counterculture of the 1960s was an anti-establishment cultural phenomenon that developed first in the United Kingdom (UK) and then the United States (US) and then spreading throughout much of the Western world between the mid-1960s and the mid-1970s, with London, New York City, and San Francisco being hotbeds of early countercultural activity. The aggregate movement gained momentum as the Civil Rights Movement continued to grow, and would later become revolutionary with the expansion of the US government's extensive military intervention in Vietnam. As the 1960s progressed, widespread social tensions also developed concerning other issues, and tended to flow along generational lines regarding human sexuality, women's rights, traditional modes of authority, experimentation with psychoactive drugs, and differing interpretations of the American Dream. Many key movements related to these issues were born or advanced within the counterculture of the 1960s.

"As the era unfolded, new cultural forms and a dynamic subculture which celebrated experimentation, modern incarnations of Bohemianism, and the rise of the hippie and other alternative lifestyles, emerged. This embracing of creativity is particularly notable in the works of British Invasion bands such as the Beatles, and filmmakers whose works became far less restricted by censorship. In addition to the trendsetting Beatles, many other creative artists, authors, and thinkers, within and across many disciplines, helped define the counterculture movement...

"The Vietnam War, and the protracted national divide between supporters and opponents of the war, were arguably the most important factors contributing to the rise of the larger counterculture movement.

"The widely accepted assertion that anti-war opinion was held only among the young is a myth, but enormous war protests consisting of thousands of mostly younger people in every major US city, and elsewhere across the Western world, effectively united millions against the war, and against the war policy that prevailed under five US congresses and during two presidential administrations."



Figure 5.1: Free speech activist Mario Savo on the steps of Sprout Hall, University of California. He said: “There is a time when the operation of the machine becomes so odious, makes you so sick at heart, that you can’t take part. You can’t even passively take part! And you’ve got to put your bodies upon the gears and upon the wheels, upon the levers, upon all the apparatus, and you’ve got to make it stop! And you’ve got to indicate to the people who run it, to the people who own it - that unless you’re free, the machine will be prevented from working at all!”



Figure 5.2: King's "I Have a Dream" speech, given in front of the Lincoln Memorial during the 1963 March on Washington.



Figure 5.3: Anti-war protesters.



Figure 5.4: Three radical icons of the 60's. An encounter between Simone de Beauvoir, Jean-Paul Sartre, And Ernesto "Che" Guevara in Cuba in 1960.



Figure 5.5: Eugene McCarthy, anti-war candidate for the Democratic nomination for the US presidency in 1968.



Figure 5.6: A small part of the crowd of 400,000, after the rain, Woodstock, United States, August 1969.



Figure 5.7: Recording “Give Peace a Chance”. Left to right: Rosemary Leary (face not visible), Tommy Smothers (with back to camera), John Lennon, Timothy Leary, Yoko Ono, Judy Marcioni and Paul Williams, June 1, 1969.

5.1 Greenham Common

The Women’s Peace Camps at Greenham Commons, Berkshire, England, refer to a 19-year-long series of women’s protests against the use of common land, which ought to belong to the people, to house a base with US nuclear weapons. The women in the movement used their identity as mothers and grandmothers to protest against preparations for a nuclear war that could kill hundreds of millions of young children and make large portions of the earth uninhabitable.

The first protests began in 1981, when a Welsh group, *Women for Life on Earth* arrived at Greenham Common to protest the decision to store US Cruise Missiles at an army base there. In December, 1982, 30,000 women participated in an *Embrace the Base* event, when they joined hands to encircle the Greenham military base. Another such event took place in 1983, when 70,000 women joined hands to form a human chain between Greenham Common and the munitions plants at Aldermaston.

Frequently, during the 19 years of protests, the women chained themselves to the fence surrounding the Greenham military base, or cut down sections of the fence, or even entered the base, activities for which many of them were arrested and imprisoned.

The Greenham Commons women often composed songs, and used them as an instrument of protest. Holger Terp, the founder and editor of the Danish Peace Academy’s enormous and popular website, has compiled an extensive study of the Greenham Common protests, which includes the songs composed and sung at the camps. Holger’s study can be found on the following link:

<http://www.fredsakademiet.dk/abase/sange/greenham/greenham.pdf>

Many other peace songs, as well as their recorded performances, can be found on Holger’s website by typing **fredsakademiet.dk sange** into a search engine.



Figure 5.8: Women at Greenham Common protesting the use of common land for a US nuclear weapons base.



Figure 5.9: Although what the government was doing was illegal, many of the women were arrested.



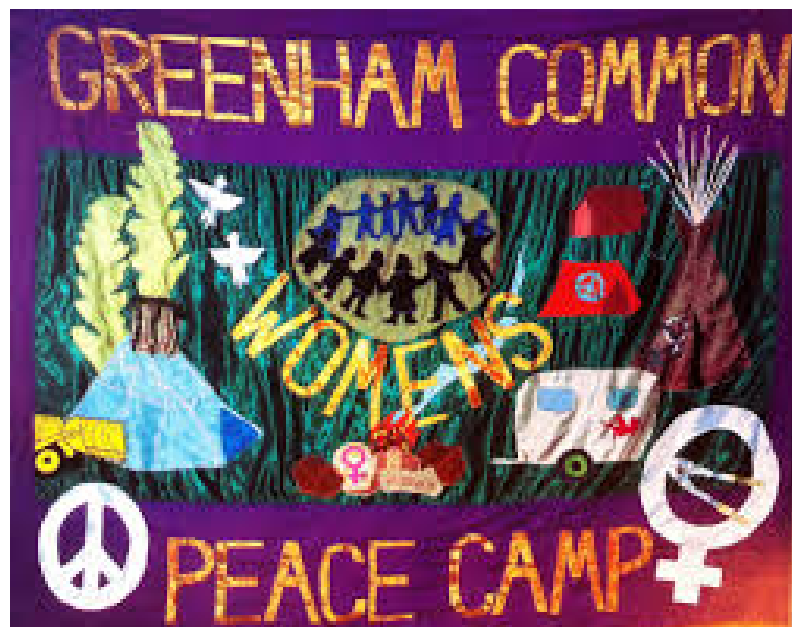
Figure 5.10: The best defense of any country against nuclear weapons is to be free of them.



Figure 5.11: Future generations depend on our actions today.



Figure 5.12: What we all want.



5.2 Woodstock

Wikipedia states that “Woodstock was a music festival held on a dairy farm in the Catskill Mountains, northwest of New York City, between August 15-18, 1969, which attracted an audience of more than 400,000.

“Billed as ‘An Aquarian Exposition: 3 Days of Peace & Music’, it was held at Max Yasgur’s 600-acre dairy farm near White Lake in Bethel, New York, 43 miles (70 km) southwest of Woodstock.

“Over the sometimes rainy weekend, 32 acts performed outdoors. It is widely regarded as a pivotal moment in popular music history, as well as the definitive nexus for the larger counterculture generation. Rolling Stone listed it as number 19 of the 50 Moments That Changed the History of Rock and Roll.

“The event was captured in the Academy Award-winning 1970 documentary movie *Woodstock*, an accompanying soundtrack album, and Joni Mitchell’s song ‘Woodstock’, which commemorated the event and became a major hit for both Crosby, Stills, Nash & Young and Matthews Southern Comfort. Joni Mitchell said, ‘Woodstock was a spark of beauty’ where half-a-million kids ‘saw that they were part of a greater organism’. In 2017, the festival site was listed on the National Register of Historic Places...

“There was worldwide media interest in the 40th anniversary of Woodstock in 2009. A number of activities to commemorate the festival took place around the world. On August 15, at the Bethel Woods Center for the Arts overlooking the original site, the largest assembly of Woodstock performing alumni since the original 1969 festival performed in an eight-hour concert in front of a sold-out crowd...

“Another event occurred in Hawkhurst, Kent (UK), at a Summer of Love party, with acts including two of the participants at the original Woodstock, Barry Melton of Country Joe and the Fish and Robin Williamson of The Incredible String Band, plus Santana and Grateful Dead cover bands. On August 14 and 15, 2009, a 40th anniversary tribute concert was held in Woodstock, Illinois, and was the only festival to receive the official blessing of the ‘Father of Woodstock’, Artie Kornfeld. Kornfeld later made an appearance in Woodstock with the event’s promoters.

“Also in 2009, Michael Lang and Holly George-Warren published *The Road to Woodstock*, which describes Lang’s involvement in the creation of the Woodstock Music & Arts Festival, and includes personal stories and quotes from central figures involved in the event...

“Reports in late 2018 confirmed the plans for a 50th Anniversary event on the original site to be operated by the Bethel Woods Centre for the Arts. The scheduled date for the *Bethel Woods Music and Culture Festival: Celebrating the golden anniversary at the historic site of the 1969 Woodstock festival* was August 16-18 2019. Partners in the event are Live Nation and INVNT. Bethel Woods described the festival as a ‘pan-generational music, culture and community event’.”



Figure 5.13: The Woodstock Festival, 1969: “Give peace a chance!”. An estimated 400,000 people attended the event.



Figure 5.14: Part of the crowd on the first day of the festival.

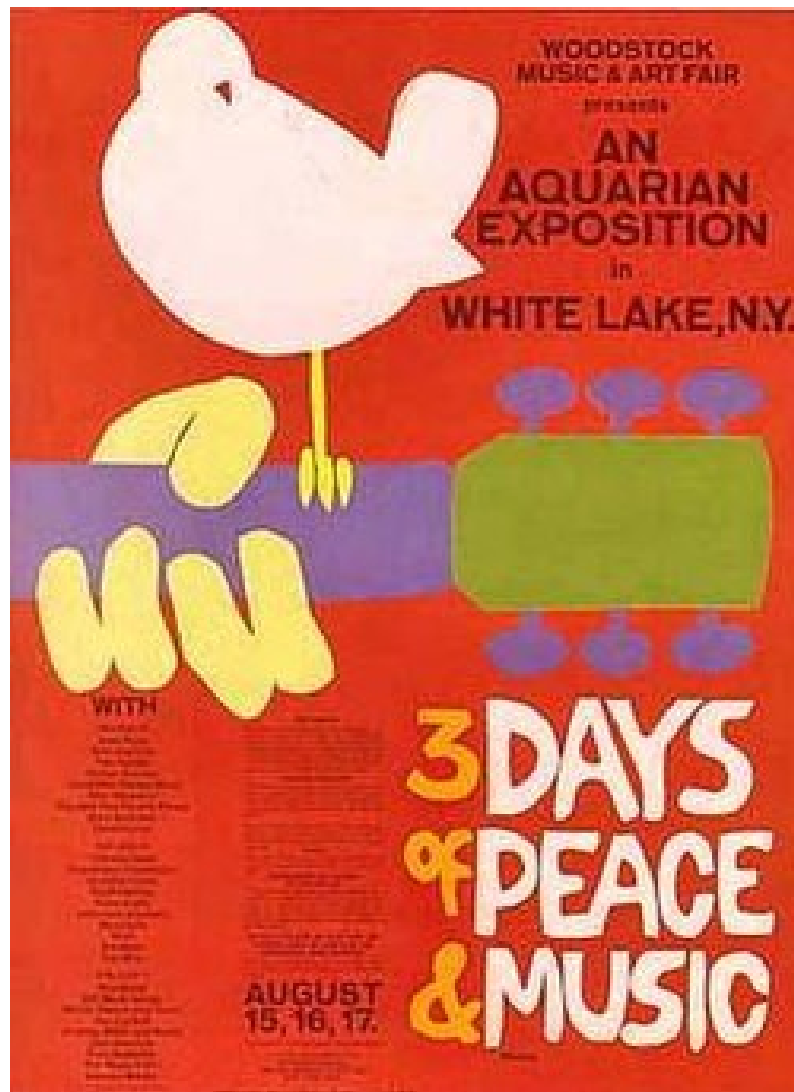


Figure 5.15: The Woodstock logo.



Figure 5.16: Yes!.



Figure 5.17: The 50th anniversary event.

5.3 Joan Baez

Joan Baez is an American folk-singer and activist who has been highly influential since her breakthrough 60 years ago. Her father was a Mexican-American physicist who is credited with inventing the X-ray microscope. While her father was working at MIT, Joan Baez gave her first concert in 1958 at Club 47 in Cambridge. In 1959, Bob Gibson invited Baez to perform at the Newport Folk Festival, where her astonishingly clear and expressive voice produced a sensation. Joan Baez promoted the career of Bob Dylan, at a time when she was a star while he was unknown, by inviting him to join her on the stage for duets. Wholeheartedly engaged in many anti-war, human rights and environmental causes, including opposition to the Viet Nam and Iraq wars, she regards her activism as more important than her singing. In 2011, Amnesty International introduced the yearly Joan Baez Award for outstanding service to human rights, giving the first award to Baez herself.

A few things that Joan Baez said

I would say that I'm a nonviolent soldier. In place of weapons of violence, you have to use your mind, your heart, your sense of humor, every faculty available to you...because no one has the right to take the life of another human being.

Action is the antidote to despair.

You don't get to choose how you're going to die, or when. You can only decide how you're going to live. Now.

I went to jail for 11 days for disturbing the peace; I was trying to disturb the war.

I think music has the power to transform people, and in doing so, it has the power to transform situations - some large and some small.

To sing is to love and affirm, to fly and to soar, to coast into the hearts of the people who listen to tell them that life is to live, that love is there, that nothing is a promise, but that beauty exists, and must be hunted for and found.

The easiest kind of relationship for me is with ten thousand people. The hardest is with one.

I have hope in people, in individuals. Because you don't know what's going to rise from the ruins.

As long as one keeps searching, the answers will come.

Only you and I can help the sun rise each coming morning. If we don't, it may drench itself out in sorrow.

All of us are survivors, but how many of us transcend survival?

If you don't have music, you have silence. There is power in both.

To sing is to praise God and the daffodils, and to praise God is to thank Him, in every note within my small range, and every color in the tones of my voice, with every look into the eyes of my audience, to thank Him. Thank you, God, for letting me be born, for giving me eyes to see the daffodils lean in the wind, all my brothers, all my sisters, for giving me ears to hear crying, legs to come running, hands to smooth damp hair, a voice to laugh with and to sing with...to sing to you and the daffodils.

The point on nonviolence is to build a floor, a strong new floor, beneath which we can no longer sink.

There's a consensus out that it's OK to kill when your government decides who to kill. If you kill inside the country you get in trouble. If you kill outside the country, right time, right season, latest enemy, you get a medal.

If you're going to sing meaningful songs, you have to be committed to living a life that backs that up.

Instead of getting hard ourselves and trying to compete, women should try and give their best qualities to men - bring them softness, teach them how to cry.

We're not really pacifists, we're nonviolent soldiers.

If it's natural to kill, how come men have to go into training to learn how?

If people have to put labels on me, I'd prefer the first label to be human being, the second label to be pacifist, and the third to be folk singer.

You may not know it, but at the far end of despair, there is a white clearing where one is almost happy.

I don't think of myself as a symbol of the sixties, but I do think of myself as a symbol of following through on your beliefs.



Figure 5.18: Joan Baez (born 1941) on the 1962 cover of Time Magazine.



What have they done to the rain?

Just a little rain falling all around
The grass lifts its head to the heavenly sound
Just a little rain, just a little rain
What have they done to the rain
Just a little boy standing in the rain
The gentle rain that falls for years
And the grass is gone, the boy disappears
And rain keeps falling like helpless tears
And what have they done to the rain
Just a little breeze out of the sky
The leaves nod their head as the breeze blows by
Just a little breeze with some smoke in its eye
What have they done to the rain

Just a little boy standing in the rain
The gentle rain that falls for years
And the grass is gone, the boy disappears
And rain keeps falling like helpless tears
And what have they done to the rain
What have they done to the rain

We shall overcome

We shall overcome,
We shall overcome,
We shall overcome, some day.

Oh, deep in my heart,
I do believe
We shall overcome, some day.

We'll walk hand in hand,
We'll walk hand in hand,
We'll walk hand in hand, some day.

Oh, deep in my heart,
I do believe
We'll walk hand in hand, some day.

We shall live in peace,

We shall live in peace,
We shall live in peace, some day.

Oh, deep in my heart,
I do believe
We shall live in peace, some day.

We shall all be free,
We shall all be free,
We shall all be free, some day.

Oh, deep in my heart,
I do believe
We shall all be free, some day.

We are not afraid,
We are not afraid,
We are not afraid, today.

Oh, deep in my heart,
I do believe
We are not afraid, today.

We shall overcome,
We shall overcome,
We shall overcome, some day.

Oh, deep in my heart,
I do believe
We shall overcome, some day.

5.4 Bob Dylan

An outstanding influence on music, poetry and the anti-war movement over six decades, Bob Dylan was awarded the Nobel Prize for Literature in 2016.

Bob Dylan was born in 1941 into a Jewish immigrant family named Zimmerman. He later changed his name to Dylan because of his admiration for the Welsh poet, Dylan Thomas. As a highschool student Bob Dylan initially formed a rock and roll band, but later realized that folk music was much more meaningful. Explaining this change, he said “The thing about rock’n’roll is that for me anyway it wasn’t enough... There were great catch-phrases and driving pulse rhythms... but the songs weren’t serious or didn’t reflect

life in a realistic way. I knew that when I got into folk music, it was more of a serious type of thing. The songs are filled with more despair, more sadness, more triumph, more faith in the supernatural, much deeper feelings.”

Bob Dylan greatly admired folk singer Woodie Guthrie. Describing Guthrie’s influence, he wrote: “The songs themselves had the infinite sweep of humanity in them... [He] was the true voice of the American spirit. I said to myself I was going to be Guthrie’s greatest disciple.”

Wikipedia states that “Many early songs reached the public through more palatable versions by other performers, such as Joan Baez, who became Dylan’s advocate as well as his lover. Baez was influential in bringing Dylan to prominence by recording several of his early songs and inviting him on stage during her concerts. ‘It didn’t take long before people got it, that he was pretty damned special,’ says Baez.”

Here are a few things that Bob Dylan said:

Behind every beautiful thing, there’s some kind of pain.

I accept chaos, I’m not sure whether it accepts me.

Don’t criticize what you can’t understand.

Sometimes it’s not enough to know what things mean, sometimes you have to know what things don’t mean.

I think women rule the world and that no man has ever done anything that a woman either hasn’t allowed him to do or encouraged him to do.

People seldom do what they believe in. They do what is convenient, then repent.

Gonna change my way of thinking, make myself a different set of rules. Gonna put my good foot forward and stop being influenced by fools.

When you’ve got nothing, you’ve got nothing to lose.

You can never be wise and be in love at the same time.

When you feel in your gut what you are and then dynamically pursue it - don’t back down and don’t give up - then you’re going to mystify a lot of folks.

It frightens me, the awful truth, of how sweet life can be...

Blowin' in the wind

How many roads must a man walk down
Before you call him a man?
How many seas must a white dove sail
Before she sleeps in the sand?
Yes, and how many times must the cannonballs fly
Before they're forever banned?

The answer, my friend, is blowin' in the wind
The answer is blowin' in the wind

Yes, and how many years can a mountain exist
Before it's washed to the sea?
Yes, and how many years can some people exist
Before they're allowed to be free?
Yes, and how many times can a man turn his head
And pretend that he just doesn't see?

The answer, my friend, is blowin' in the wind
The answer is blowin' in the wind

Yes, and how many times must a man look up
Before he can see the sky?
Yes, and how many ears must one man have
Before he can hear people cry?
Yes, and how many deaths will it take 'til he knows
That too many people have died?

The answer, my friend, is blowin' in the wind
The answer is blowin' in the wind



Figure 5.19: One of Bob Dylan's paintings



Figure 5.20: Another Dylan painting. His work has been exhibited by major museums.

5.5 Pete Seeger

Here are a few things that Pete Seeger said:

Do you know the difference between education and experience? Education is when you read the fine print; experience is what you get when you don't.

Any darn fool can make something complex; it takes a genius to make something simple.

If it can't be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, redesigned or removed from production.

Participation - that's what's gonna save the human race.

Well, normally I'm against big things. I think the world is going to be saved by millions of small things. Too many things can go wrong when they get big.

Once upon a time, wasn't singing a part of everyday life as much as talking, physical exercise, and religion? Our distant ancestors, wherever they were in this world, sang while pounding grain, paddling canoes, or walking long journeys. Can we begin to make our lives once more all of a piece? Finding the right songs and singing them over and over is a way to start. And when one person taps out a beat, while another leads into the melody, or when three people discover a harmony they never knew existed, or a crowd joins in on a chorus as though to raise the ceiling a few feet higher, then they also know there is hope for the world.

I've never sung anywhere without giving the people listening to me a chance to join in - as a kid, as a lefty, as a man touring the U.S.A. and the world, as an oldster. I guess it's kind of a religion with me. Participation. That's what's going to save the human race.

It's a very important thing to learn to talk to people you disagree with.

This banjo surrounds hate and forces it to surrender.

Singing with children in the schools has been the most rewarding experience of my life.

The key to the future of the world, is finding the optimistic stories and letting them be known.

The nice thing about poetry is that you're always stretching the definitions of words. Lawyers and scientists and scholars of one sort or another try to restrict the definitions, hoping that they can prevent people from fooling each other. But that doesn't stop people from lying.

Cezanne painted a red barn by painting it ten shades of color: purple to yellow. And he got a red barn. Similarly, a poet will describe things many different ways, circling around it, to get to the truth.

My father also had a nice little simile. He said, "The truth is a rabbit in a bramble patch. And you can't lay your hand on it. All you do is circle around and point, and say, 'It's in there somewhere'."

Keep your sense of humor. There is a 50-50 chance the world can be saved. You - yes you - might be the grain of sand that tips the scales the right way.

The world is like a seesaw out of balance: on one side is a box of big rocks, tilting it its way. On the other side is a box, and a bunch of us with teaspoons, adding a little sand at a time. One day, all of our teaspoons will add up, and the whole thing will tip, and people will say, 'How did it happen so fast?'

Our technology and our economic system seem to produce the present bad situation: millions of people feel themselves poor and powerless; millions feel that music is something to be made only by experts.

It all boils down to what I would most like to do as a musician. Put songs on people's lips instead of just in their ears.

Where have all the flowers gone?

Where have all the flowers men gone,
Long time passing,
Where have all the flowers men gone,
Long time ago,
Where have all the flowers men gone,
Young girls picked them every one,
When will they ever learn?
When will they ever learn?

Where have all the young girls gone,
Long time passing,
Where have all the young girls gone,
Long time ago,

Where have all the young girls gone,
Gone to husbands every one,
When will they ever learn?
When will they ever learn?

Where have all the young men gone,
Long time passing,
Where have all the young men gone,
Long time ago,
Where have all the young men gone,
Gone to soldiers every one,
When will they ever learn?
When will they ever learn?

Where have all the soldiers gone,
Long time passing,
Where have all the soldiers gone,
Long time ago,
Where have all the soldiers gone,
They've gone to graveyards every one,
When will they ever learn?
When will they ever learn?

Where have all the graveyards gone,
Long time passing,
Where have all the graveyards gone,
Long time ago,
Where have all the graveyards gone,
Gone to flowers every one,
When will we ever learn?
When will we ever learn?

What did you learn in school today?

What did you learn in school today,
Dear little boy of mine?
What did you learn in school today,
Dear little boy of mine?

I learned that Washington never told a lie.
I learned that soldiers seldom die.
I learned that everybody's free,

And that's what the teacher said to me.

I learned our Government must be strong;
It's always right and never wrong;
Our leaders are the finest men
And we elect them again and again.

I learned that war is not so bad;
I learned about the great ones we have had;
We fought in Germany and in France
And someday I might get my chance.

That's what I learned in school today,
That's what I learned in school.

Die gedanken sind frei

Die gedanken sind frei
My thoughts freely flower
Die gedanken sind frei
My thoughts give me power
No scholar can map them
No hunter can trap them
No man can deny
Die gedanken sind frei

I think as I please
And this gives me pleasure
My conscience decrees
This right I must treasure
My thoughts will not cater
To duke or dictator
No man can deny
Die gedanken sind frei

Tyrants can take me
And throw me in prison
My thoughts will burst forth
Like blossoms in season
Foundations may crumble
And structures may tumble
But free men shall cry

Die gedanken sind frei

We will love, or we will perish

We will love or we will perish

We will learn the rainbow to cherish

Dare to struggle, dare to danger

Dare to touch the hand of a stranger



Figure 5.21: Pete Seeger (on his father's lap) with his musicologist father and mother, Charles and Constance Seeger, and brothers on a camping trip, 23 May, 1921.



Figure 5.22: Pete Seeger entertaining Eleanor Roosevelt (center), honored guest at a racially integrated Valentine's Day party marking the opening of a Canteen of the United Federal Labor, CIO, in then-segregated Washington, D.C., 1944.



Figure 5.23: Pete Seeger in 1979.



Figure 5.24: Pete Seeger at the Ckewwater Festival in June, 2007.



Figure 5.25: Seeger at 86 on the cover of Sing Out! (Summer 2005), a magazine he helped found in 1950.

5.6 Protests against the Vietnam War

An excerpt from Martin Luther King, Jr.'s Riverside Church speech

This I believe to be the privilege and the burden of all of us who deem ourselves bound by allegiances and loyalties which are broader and deeper than nationalism and which go beyond our nation's self-defined goals and positions. We are called to speak for the weak, for the voiceless, for the victims of our nation and for those it calls "enemy," for no document from human hands can make these humans any less our brothers.

And as I ponder the madness of Vietnam and search within myself for ways to understand and respond in compassion, my mind goes constantly to the people of that peninsula. I speak now not of the soldiers of each side, not of the ideologies of the Liberation Front, not of the junta in Saigon, but simply of the people who have been living under the curse of war for almost three continuous decades now. I think of them, too, because it is clear to me that there will be no meaningful solution there until some attempt is made to know them and hear their broken cries.

They must see Americans as strange liberators. The Vietnamese people proclaimed their own independence in 1954 – in 1945 rather – after a combined French and Japanese occupation and before the communist revolution in China. They were led by Ho Chi Minh. Even though they quoted the American Declaration of Independence in their own document of freedom, we refused to recognize them. Instead, we decided to support France in its reconquest of her former colony. Our government felt then that the Vietnamese people were not ready for independence, and we again fell victim to the deadly Western arrogance that has poisoned the international atmosphere for so long. With that tragic decision we rejected a revolutionary government seeking self-determination and a government that had been established not by China – for whom the Vietnamese have no great love – but by clearly indigenous forces that included some communists. For the peasants this new government meant real land reform, one of the most important needs in their lives.

For nine years following 1945 we denied the people of Vietnam the right of independence. For nine years we vigorously supported the French in their abortive effort to recolonize Vietnam. Before the end of the war we were meeting eighty percent of the French war costs. Even before the French were defeated at Dien Bien Phu, they began to despair of their reckless action, but we did not. We encouraged them with our huge financial and military supplies to continue the war even after they had lost the will. Soon we would be paying almost the full costs of this tragic attempt at recolonization.

After the French were defeated, it looked as if independence and land reform would come again through the Geneva Agreement. But instead there

came the United States, determined that Ho should not unify the temporarily divided nation, and the peasants watched again as we supported one of the most vicious modern dictators, our chosen man, Premier Diem. The peasants watched and cringed as Diem ruthlessly rooted out all opposition, supported their extortionist landlords, and refused even to discuss reunification with the North. The peasants watched as all this was presided over by United States' influence and then by increasing numbers of United States troops who came to help quell the insurgency that Diem's methods had aroused. When Diem was overthrown they may have been happy, but the long line of military dictators seemed to offer no real change, especially in terms of their need for land and peace.

The only change came from America, as we increased our troop commitments in support of governments which were singularly corrupt, inept, and without popular support. All the while the people read our leaflets and received the regular promises of peace and democracy and land reform. Now they languish under our bombs and consider us, not their fellow Vietnamese, the real enemy. They move sadly and apathetically as we herd them off the land of their fathers into concentration camps where minimal social needs are rarely met. They know they must move on or be destroyed by our bombs.

So they go, primarily women and children and the aged. They watch as we poison their water, as we kill a million acres of their crops. They must weep as the bulldozers roar through their areas preparing to destroy the precious trees. They wander into the hospitals with at least twenty casualties from American firepower for one Vietcong-inflicted injury. So far we may have killed a million of them, mostly children. They wander into the towns and see thousands of the children, homeless, without clothes, running in packs on the streets like animals. They see the children degraded by our soldiers as they beg for food. They see the children selling their sisters to our soldiers, soliciting for their mothers.

What do the peasants think as we ally ourselves with the landlords and as we refuse to put any action into our many words concerning land reform? What do they think as we test out our latest weapons on them, just as the Germans tested out new medicine and new tortures in the concentration camps of Europe? Where are the roots of the independent Vietnam we claim to be building? Is it among these voiceless ones?

We have destroyed their two most cherished institutions: the family and the village. We have destroyed their land and their crops. We have cooperated in the crushing – in the crushing of the nation's only non-Communist revolutionary political force, the unified Buddhist Church. We have supported the enemies of the peasants of Saigon. We have corrupted their women and children and killed their men.

Now there is little left to build on, save bitterness. Soon, the only solid – solid physical foundations remaining will be found at our military bases and in the

concrete of the concentration camps we call "fortified hamlets." The peasants may well wonder if we plan to build our new Vietnam on such grounds as these. Could we blame them for such thoughts? We must speak for them and raise the questions they cannot raise. These, too, are our brothers.

Perhaps a more difficult but no less necessary task is to speak for those who have been designated as our enemies. What of the National Liberation Front, that strangely anonymous group we call "VC" or "communists"? What must they think of the United States of America when they realize that we permitted the repression and cruelty of Diem, which helped to bring them into being as a resistance group in the South? What do they think of our condoning the violence which led to their own taking up of arms? How can they believe in our integrity when now we speak of "aggression from the North" as if there were nothing more essential to the war? How can they trust us when now we charge them with violence after the murderous reign of Diem and charge them with violence while we pour every new weapon of death into their land? Surely we must understand their feelings, even if we do not condone their actions. Surely we must see that the men we supported pressed them to their violence. Surely we must see that our own computerized plans of destruction simply dwarf their greatest acts.

How do they judge us when our officials know that their membership is less than twenty-five percent communist, and yet insist on giving them the blanket name? What must they be thinking when they know that we are aware of their control of major sections of Vietnam, and yet we appear ready to allow national elections in which this highly organized political parallel government will not have a part? They ask how we can speak of free elections when the Saigon press is censored and controlled by the military junta. And they are surely right to wonder what kind of new government we plan to help form without them, the only party in real touch with the peasants. They question our political goals and they deny the reality of a peace settlement from which they will be excluded. Their questions are frighteningly relevant. Is our nation planning to build on political myth again, and then shore it up upon the power of new violence?

Here is the true meaning and value of compassion and nonviolence, when it helps us to see the enemy's point of view, to hear his questions, to know his assessment of ourselves. For from his view we may indeed see the basic weaknesses of our own condition, and if we are mature, we may learn and grow and profit from the wisdom of the brothers who are called the opposition.

So, too, with Hanoi. In the North, where our bombs now pummel the land, and our mines endanger the waterways, we are met by a deep but understandable mistrust. To speak for them is to explain this lack of confidence in Western words, and especially their distrust of American intentions now. In Hanoi are the men who led the nation to independence against the Japanese and the French, the men who sought membership in the French Commonwealth

and were betrayed by the weakness of Paris and the willfulness of the colonial armies. It was they who led a second struggle against French domination at tremendous costs, and then were persuaded to give up the land they controlled between the thirteenth and seventeenth parallel as a temporary measure at Geneva. After 1954 they watched us conspire with Diem to prevent elections which could have surely brought Ho Chi Minh to power over a united Vietnam, and they realized they had been betrayed again. When we ask why they do not leap to negotiate, these things must be remembered.

Also, it must be clear that the leaders of Hanoi considered the presence of American troops in support of the Diem regime to have been the initial military breach of the Geneva Agreement concerning foreign troops. They remind us that they did not begin to send troops in large numbers and even supplies into the South until American forces had moved into the tens of thousands.

Hanoi remembers how our leaders refused to tell us the truth about the earlier North Vietnamese overtures for peace, how the president claimed that none existed when they had clearly been made. Ho Chi Minh has watched as America has spoken of peace and built up its forces, and now he has surely heard the increasing international rumors of American plans for an invasion of the North. He knows the bombing and shelling and mining we are doing are part of traditional pre-invasion strategy. Perhaps only his sense of humor and of irony can save him when he hears the most powerful nation of the world speaking of aggression as it drops thousands of bombs on a poor, weak nation more than eight hundred – rather, eight thousand miles away from its shores.

At this point I should make it clear that while I have tried in these last few minutes to give a voice to the voiceless in Vietnam and to understand the arguments of those who are called "enemy," I am as deeply concerned about our own troops there as anything else. For it occurs to me that what we are submitting them to in Vietnam is not simply the brutalizing process that goes on in any war where armies face each other and seek to destroy. We are adding cynicism to the process of death, for they must know after a short period there that none of the things we claim to be fighting for are really involved. Before long they must know that their government has sent them into a struggle among Vietnamese, and the more sophisticated surely realize that we are on the side of the wealthy, and the secure, while we create a hell for the poor.

Somehow this madness must cease. We must stop now. I speak as a child of God and brother to the suffering poor of Vietnam. I speak for those whose land is being laid waste, whose homes are being destroyed, whose culture is being subverted. I speak of the – for the poor of America who are paying the double price of smashed hopes at home, and death and corruption in Vietnam. I speak as a citizen of the world, for the world as it stands aghast at the path we have taken. I speak as one who loves America, to the leaders of our own nation: The great initiative in this war is ours; the initiative to stop it must be ours.

This is the message of the great Buddhist leaders of Vietnam. Recently one of them wrote these words, and I quote: "Each day the war goes on the hatred increases in the heart of the Vietnamese and in the hearts of those of humanitarian instinct. The Americans are forcing even their friends into becoming their enemies. It is curious that the Americans, who calculate so carefully on the possibilities of military victory, do not realize that in the process they are incurring deep psychological and political defeat. The image of America will never again be the image of revolution, freedom, and democracy, but the image of violence and militarism".

If we continue, there will be no doubt in my mind and in the mind of the world that we have no honorable intentions in Vietnam. If we do not stop our war against the people of Vietnam immediately, the world will be left with no other alternative than to see this as some horrible, clumsy, and deadly game we have decided to play. The world now demands a maturity of America that we may not be able to achieve. It demands that we admit that we have been wrong from the beginning of our adventure in Vietnam, that we have been detrimental to the life of the Vietnamese people. The situation is one in which we must be ready to turn sharply from our present ways. In order to atone for our sins and errors in Vietnam, we should take the initiative in bringing a halt to this tragic war.

I would like to suggest five concrete things that our government should do [immediately] to begin the long and difficult process of extricating ourselves from this nightmarish conflict:

Number one: End all bombing in North and South Vietnam.

Number two: Declare a unilateral cease-fire in the hope that such action will create the atmosphere for negotiation.

Three: Take immediate steps to prevent other battlegrounds in Southeast Asia by curtailing our military buildup in Thailand and our interference in Laos.

Four: Realistically accept the fact that the National Liberation Front has substantial support in South Vietnam and must thereby play a role in any meaningful negotiations and any future Vietnam government.

Five: Set a date that we will remove all foreign troops from Vietnam in accordance with the 1954 Geneva Agreement...

In 1957, a sensitive American official overseas said that it seemed to him that our nation was on the wrong side of a world revolution. During the past ten years, we have seen emerge a pattern of suppression which has now justified the presence of U.S. military advisors in Venezuela. This need to maintain social stability for our investments accounts for the counterrevolutionary action of American forces in Guatemala. It tells why American helicopters are being used against guerrillas in Cambodia and why American napalm and Green Beret forces have already been active against rebels in Peru.

It is with such activity in mind that the words of the late John F. Kennedy

come back to haunt us. Five years ago he said, "Those who make peaceful revolution impossible will make violent revolution inevitable." Increasingly, by choice or by accident, this is the role our nation has taken, the role of those who make peaceful revolution impossible by refusing to give up the privileges and the pleasures that come from the immense profits of overseas investments. I am convinced that if we are to get on the right side of the world revolution, we as a nation must undergo a radical revolution of values. We must rapidly begin...we must rapidly begin the shift from a thing-oriented society to a person-oriented society. When machines and computers, profit motives and property rights, are considered more important than people, the giant triplets of racism, extreme materialism, and militarism are incapable of being conquered.

A true revolution of values will soon cause us to question the fairness and justice of many of our past and present policies. On the one hand, we are called to play the Good Samaritan on life's roadside, but that will be only an initial act. One day we must come to see that the whole Jericho Road must be transformed so that men and women will not be constantly beaten and robbed as they make their journey on life's highway. True compassion is more than flinging a coin to a beggar. It comes to see that an edifice which produces beggars needs restructuring.

A true revolution of values will soon look uneasily on the glaring contrast of poverty and wealth. With righteous indignation, it will look across the seas and see individual capitalists of the West investing huge sums of money in Asia, Africa, and South America, only to take the profits out with no concern for the social betterment of the countries, and say, "This is not just." It will look at our alliance with the landed gentry of South America and say, "This is not just." The Western arrogance of feeling that it has everything to teach others and nothing to learn from them is not just.

A true revolution of values will lay hand on the world order and say of war, "This way of settling differences is not just." This business of burning human beings with napalm, of filling our nation's homes with orphans and widows, of injecting poisonous drugs of hate into the veins of peoples normally humane, of sending men home from dark and bloody battlefields physically handicapped and psychologically deranged, cannot be reconciled with wisdom, justice, and love. A nation that continues year after year to spend more money on military defense than on programs of social uplift is approaching spiritual death.



Figure 5.26: Protests against the Vietnam War in Washington, D.C., on October 21, 1967.



Figure 5.27: U.S. Marshals dragging away a Vietnam War protester in Washington, D.C., 1967.



Figure 5.28: German students protest against the Vietnam War in 1968.



Figure 5.29: John Filo's Pulitzer Prize-winning photograph of Mary Ann Vecchio kneeling over the body of Jeffrey Miller minutes after he was fatally shot by the Ohio National Guard.



Figure 5.30: Berkeley anti-war protests.



Figure 5.31: Photo taken by United States Army photographer Ronald L. Haeberle on March 16, 1968, in the aftermath of the My Lai Massacre showing mostly women and children dead on a road.



Figure 5.32: Frightened children fleeing from bombs in Vietnam.

Suggestions for further reading

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Chapter 6

INDUSTRIAL CIVILIZATION'S SUDDEN CRISIS

6.1 Unprecedented dangers

“Today we are heading for unprecedented dangers and conflicts, up to and including the end of a habitable planet in the foreseeable future, depriving all future generations of their right to life and the lives of preceding generations of meaning and purpose.

“This apocalyptic reality is the elephant in the room. Current policies threaten temperature increases triggering permafrost melting and the release of ocean methane hydrates which would make our earth unliveable, according to research presented by the British Government Met office at the Paris Climate Conference.

“The myth that climate change is conspiracy to reduce freedom is spread by a powerful and greedy elite which has largely captured governments to preserve their privileges in an increasingly unequal world.” Jakob von Uexküll

“When I was about 8 years old, I first heard about something called ‘climate change’ or ‘global warming’. Apparently, that was something humans had created by our way of living. I was told to turn off the lights to save energy and to recycle paper to save resources. I remember thinking that it was very strange that humans, who are an animal species among others, could be capable of changing the Earth’s climate. Because, if we were, and if it was really happening, we wouldn’t be talking about anything else. As soon as you turn on the TV, everything would be about that. Headlines, radio, newspapers: You would never read or hear about anything else. As if there was a world war going on, but no one ever talked about it. If burning fossil fuels was so bad that it threatened our very existence, how could we just continue like before? Why were there no restrictions? Why wasn’t it made illegal?” Greta Thunberg



Figure 6.1: Carl Wolmar Jakob, Baron von Uexküll (born 1944) co-founded the World Future Council and the Other Economic Summit, as well as contributing the money needed to fund the Right Livelihood Award. Concerning the future, he says: “Today we are heading for unprecedented dangers and conflicts, up to and including the end of a habitable planet”.



Figure 6.2: Swedish climate activist Greta Thunberg was 15 years old at the time of the COP24 climate conference in Poland. After the UN Secretary General had spoken to the opening session, Greta made a short but very clear and powerful speech, making a plea for strong climate action on behalf of civil society, and especially on behalf of the world's children. At the age of 8, Greta had asked herself "If burning fossil fuels was so bad that it threatened our very existence, how could we just continue like before? Why were there no restrictions? Why wasn't it made illegal?"

Why do we not respond to the crisis?

Today we are faced with multiple interrelated crises, for example the threat of catastrophic climate change or equally catastrophic thermonuclear war, and the threat of widespread famine. These threats to human existence and to the biosphere demand a prompt and rational response; but because of institutional and cultural inertia, we are failing to take the steps that are necessary to avoid disaster.

Only immediate climate action can save the future

Immediate action to halt the extraction of fossil fuels and greatly reduce the emission of CO₂ and other greenhouse gasses is needed to save the long-term future of human civilization and the biosphere.

At the opening ceremony of United Nations-sponsored climate talks in Katowice, Poland, Sir David Attenborough said “Right now, we are facing a man-made disaster of global scale. Our greatest threat in thousands of years. Climate change. If we don’t take action, the collapse of our civilizations and the extinction of much of the natural world is on the horizon. The world’s people have spoken. Their message is clear. Time is running out. They want you, the decision-makers, to act now.”

Antonio Guterres, UN Secretary-General, said climate change was already “a matter of life and death” for many countries. He added that the world is “nowhere near where it needs to be” on the transition to a low-carbon economy.

Swedish student Greta Thunberg, is a 15-year-old who has launched a climate protest movement in her country. She said, in a short but very clear speech after that of UN leader Antonio Guterres: “Some people say that I should be in school instead. Some people say that I should study to become a climate scientist so that I can ‘solve the climate crisis’. But the climate crisis has already been solved. We already have all the facts and solutions.”

She added: “Why should I be studying for a future that soon may be no more, when no one is doing anything to save that future? And what is the point of learning facts when the most important facts clearly mean nothing to our society?”

Thunberg continued: “Today we use 100 million barrels of oil every single day. There are no politics to change that. There are no rules to keep that oil in the ground. So we can’t save the world by playing by the rules. Because the rules have to be changed.”

She concluded by saying that “since our leaders are behaving like children, we will have to take the responsibility they should have taken long ago.”

Institutional inertia

Our collective failure to respond adequately to the current crisis is very largely due to institutional inertia. Our financial system is deeply embedded and resistant to change. Our entire industrial infrastructure is based on fossil fuels; but if the future is to be saved, the use of fossil fuels must stop. International relations are still based based on the concept of absolutely sovereign nation states, even though this concept has become a dangerous

anachronism in an era of instantaneous global communication and economic interdependence. Within nations, systems of law and education change very slowly, although present dangers demand rapid revolutions in outlook and lifestyle.

The failure of the recent climate conferences to produce strong final documents can be attributed to the fact that the nations attending the conferences felt themselves to be in competition with each other, when in fact they ought to have cooperated in response to a common danger. The heavy hand of the fossil fuel industry also made itself felt at the conferences.

Until the development of coal-driven steam engines in the 19th century humans lived more or less in harmony with their environment. Then, fossil fuels, representing many millions of years of stored sunlight, were extracted and burned in two centuries, driving a frenzy of growth of population and industry that has lasted until the present. But today, the party is over. Coal, oil and gas are nearly exhausted, and what remains of them must be left in the ground to avoid existential threats to humans and the biosphere. Big coal and oil corporations base the value of their stocks on ownership of the remaining resources that are still buried, and they can be counted on to use every trick, fair or unfair, to turn those resources into money.

In general corporations represent a strong force resisting change. By law, the directors of corporations are obliged to put the profits of stockholders above every other consideration. No room whatever is left for an ecological or social conscience. Increasingly, corporations have taken control of our mass media and our political system. They intervene in such a way as to make themselves richer, and thus to increase their control of the system.

Polite conversation and cultural inertia

Each day, the conventions of polite conversation contribute to our sense that everything is as it always was. Politeness requires that we do not talk about issues that might be contrary to another person's beliefs. Thus polite conversation is dominated by trivia, entertainment, sports, the weather, gossip, food, and so on. Worries about the distant future, the danger of nuclear war, the danger of uncontrollable climate change, or the danger of widespread famine seldom appear in conversations at the dinner table, over coffee or at the pub. In conversations between polite people, we obtain the false impression that all is well with the world. But in fact, all is not well. We have to act promptly and adequately to save the future.

The situation is exactly the same in the mass media. The programs and articles are dominated by trivia and entertainment. Serious discussions of the sudden crisis which civilization now faces are almost entirely absent, because the focus is on popularity and ratings. As Niel Postman remarked, we are entertaining ourselves to death.

Further growth implies future collapse

We have to face the fact that endless economic growth on a finite planet is a logical impossibility, and that we have reached or passed the sustainable limits to growth.

In today's world, we are pressing against the absolute limits of the earth's carrying capacity, and further growth carries with it the danger of future collapse. In the long run, neither the growth of industry nor that of population is sustainable; and we have now reached or exceeded the sustainable limits.

The size of the human economy is, of course, the product of two factors: the total number of humans, and the consumption per capita. Let us first consider the problem of reducing the per-capita consumption in the industrialized countries. The whole structure of western society seems designed to push its citizens in the opposite direction, towards ever-increasing levels of consumption. The mass media hold before us continually the ideal of a personal utopia, filled with material goods.

Every young man in a modern industrial society feels that he is a failure unless he fights his way to the "top"; and in recent years, women too have been drawn into the competition. Of course, not everyone can reach the top; there would not be room for everyone; but society urges us all to try, and we feel a sense of failure if we do not reach the goal. Thus, modern life has become a competition of all against all for power and possessions.

When possessions are used for the purpose of social competition, demand has no natural upper limit; it is then limited only by the size of the human ego, which, as we know, is boundless. This would be all to the good if unlimited industrial growth were desirable; but today, when further industrial growth implies future collapse, western society urgently needs to find new values to replace our worship of power, our restless chase after excitement, and our admiration of excessive consumption.

If you turn on your television set, the vast majority of the programs that you will be offered give no hint at all of the true state of the world or of the dangers which we will face in the future. Part of the reason for this willful blindness is that no one wants to damage consumer confidence. No one wants to bring on a recession. No one wants to shoot Santa Claus.

But sooner or later a severe recession will come, despite our unwillingness to recognize this fact. Perhaps we should prepare for it by reordering the world's economy and infrastructure to achieve long-term sustainability, i.e. steady-state economics, population stabilization, and renewable energy.

Our responsibility to future generations and to the biosphere

All of the technology needed for the replacement of fossil fuels by renewable energy is already in place. Although renewable sources currently supply only 19 percent of the world's energy requirements, they are growing rapidly. For example, wind energy is growing at the rate of 30 percent per year. Because of the remarkable properties of exponential growth, this will mean that wind will soon become a major supplier of the world's energy requirements, despite bitter opposition from the fossil fuel industry.

Both wind and solar energy can now compete economically with fossil fuels, and this situation will become even more pronounced if more countries put a tax on carbon emissions, as Finland, the Netherlands, Norway, Costa Rica, the United Kingdom and Ireland

already have done.¹

Much research and thought have also been devoted to the concept of a steady-state economy. The only thing that is lacking is political will. It is up to the people of the world to make their collective will felt.²

History has given to our generation an enormous responsibility towards future generations. We must achieve a new kind of economy, a steady-state economy. We must stabilize global population. We must replace fossil fuels by renewable energy. We must abolish nuclear weapons. We must end the institution of war. We must reclaim democracy in our own countries when it has been lost. We must replace nationalism by a just system of international law. We must prevent degradation of the earth's environment. We must act with dedication and fearlessness to save the future of the earth for human civilization and for the plants and animals with which we share the gift of life.

“And yes, we do need hope. Of course, we do. But the one thing we need more than hope is action. Once we start to act, hope is everywhere. So instead of looking for hope, look for action. Then and only then, hope will come today.”

Greta Thunberg

6.2 Al Gore

Here are a few things that Al Gore said:

Here is the truth: The Earth is round; Saddam Hussein did not attack us on 9/11; Elvis is dead; Obama was born in the United States; and the climate crisis is real.

The planet is in distress and all of the attention is on Paris Hilton.

In a time of social fragmentation, vulgarity becomes a way of life. To be shocking becomes more important - and often more profitable - than to be civil or creative or truly original.

As many know, the Chinese expression for “crisis” consists of two characters side by side. The first is the symbol for “danger,” the second the symbol for “opportunity”.

Global warming, along with the cutting and burning of forests and other critical habitats, is causing the loss of living species at a level comparable to the extinction event that wiped out the dinosaurs 65 million years ago. That event was believed to have been caused by a giant asteroid. This time it is not an

¹<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>

²<http://steadystate.org/category/herman-daly/>



Figure 6.3: **Former US Vice President Al Gore (born in 1948).** Because of his outstanding work to make the public aware of the danger of catastrophic climate change, he shared the 2007 Nobel Peace Prize with the IPCC.

asteroid colliding with the Earth and wreaking havoc: it is us.

The global environment crisis is, as we say in Tennessee, real as rain, and I cannot stand the thought of leaving my children with a degraded earth and a diminished future.

We have to abandon the conceit that isolated personal actions are going to solve this crisis. Our policies have to shift.

We can believe in the future and work to achieve it and preserve it, or we can whirl blindly on, behaving as if one day there will be no children to inherit our legacy. The choice is ours; the earth is in balance.

I actually thought and believed that the story would be compelling enough to cause a real sea change in the way Congress reacted to that issue. I thought they would be startled, too. And they weren't.

The 'well-informed citizenry' is in danger of becoming the 'well-amused audience'.

Repeating the same threat over and over again, misdirecting attention (from al-Qaeda to Saddam Hussein), and using vivid imagery (a "mushroom cloud over an American city"). September 11 had a profound impact on all of us. But after initially responding in an entirely appropriate way, the administration began to heighten and distort public fear of terrorism to create a political case for attacking Iraq. Despite the absence of proof, Iraq was said to be working hand in hand with al-Qaeda and to be on the verge of a nuclear weapons capability. Defeating Saddam was conflated with bringing war to the terrorists, even though it really meant diverting attention and resources from those who actually attacked us.

Bernays's business partner, Paul Mazur, said, "We must shift America from a needs to a desires culture... People must be trained to desire, to want new things, even before the old have been entirely consumed. We must shape a new mentality. Man's desires must overshadow his needs." As Bernays later wrote, in 1928, the conscious and intelligent manipulation of the organized habits and opinions of the masses is an important element in democratic society. Those who manipulate this unseen mechanism of society constitute an invisible government that is the true ruling power of this country. We are governed, our minds molded, our tastes formed, our ideas suggested, largely by men we have never heard of. This is a logical result of the way in which our democratic society is organized... In almost every act of our daily lives, whether in the sphere of politics or business, in our social conduct or our ethical thinking, we

are dominated by the relatively small number of persons... who understand the mental processes and social patterns of the masses. It is they who pull the wires which control the public mind.

The derivation of just power from the consent of the governed depends upon the integrity of the reasoning process through which that consent is given. If the reasoning process is corrupted by money and deception, then the consent of the governed is based on false premises, and any power thus derived is inherently counterfeit and unjust. If the consent of the governed is extorted through the manipulation of mass fears, or embezzled with claims of divine guidance, democracy is impoverished. If the suspension of reason causes a significant portion of the citizenry to lose confidence in the integrity of the process, democracy can be bankrupted.

6.3 Leonardo DiCaprio

The famous Academy Award winning actor and environmental activist Leonardo DiCaprio (born in 1974) has produced several documentaries on climate change, most notably “Before the Flood”. He also established a foundation to promote public awareness of climate change. In 2014 DiCaprio was chosen to address the opening ceremony of the UN Climate Summit. In accepting the 2016 Best Actor Academy Award, he said: “Climate change is real, it is happening right now. It is the most urgent threat facing our entire species, and we need to work collectively together and stop procrastinating. We need to support leaders around the world who do not speak for the big polluters, but who speak for all of humanity, for the indigenous people of the world, for the billions and billions of underprivileged people out there who would be most affected by this. For our children’s children, and for those people out there whose voices have been drowned out by the politics of greed.”

Leonardo DiCaprio and his father collaborated with radio broadcaster Thom Hartmann to produce an important video documentary entitled “Last Hours”³, which discusses the possibility of a human-caused mass extinction comparable with the Permian-Triassic event, during which 70% of all terrestrial vertebrate species were lost forever.

In 2014 he was appointed as a United Nations representative on climate change, and later that year he made an opening statement to members of the UN Climate Summit. He again spoke at the UN in April 2016 prior to the signing of Paris Climate Change Agreement.

Wikipedia states that “In April 2017, he promoted and protested President Trump’s inaction on climate change by attending the 2017 People’s Climate March. Leonardo DiCaprio is identified as one of the most active celebrities in the climate change movement. Not only did he highlight the topic at the Oscars but he is a constant source of information on the matter.”

³<https://www.youtube.com/watch?v=2bRrg96UtMc>



Figure 6.4: The Academy Award winning actor and environmental activist Leonardo DiCaprio (born in 1974) has produced several documentaries on climate change, most notably “Before the Flood”.

6.4 Bill McKibben

Bill McKibben's biography (from the 350.org website)

Bill McKibben is an author and environmentalist who in 2014 was awarded the Right Livelihood Prize, sometimes called the “alternative Nobel”. His 1989 book *The End of Nature* is regarded as the first book for a general audience about climate change, and has appeared in 24 languages; he's gone on to write a dozen more books. He is a founder of 350.org, the first planet-wide, grassroots climate change movement, which has organized twenty thousand rallies around the world in every country save North Korea, spearheaded the resistance to the Keystone Pipeline, and launched the fast-growing fossil fuel divestment movement.

The Schumann Distinguished Scholar in Environmental Studies at Middlebury College and a fellow of the American Academy of Arts and Sciences, he was the 2013 winner of the Gandhi Prize and the Thomas Merton Prize, and holds honorary degrees from 18 colleges and universities. *Foreign Policy* named him to their inaugural list of the world's 100 most important global thinkers, and the *Boston Globe* said he was “probably America's most important environmentalist.”

A former staff writer for the *New Yorker*, he writes frequently for a wide variety of publications around the world, including the *New York Review of Books*, *National Geographic*, and *Rolling Stone*. He lives in the mountains above Lake Champlain with his wife, the writer Sue Halpern, where he spends as much time as possible outdoors. In 2014, biologists honored him by naming a new species of woodland gnat - *Megophthalmidia mckibbeni* - in his honor.

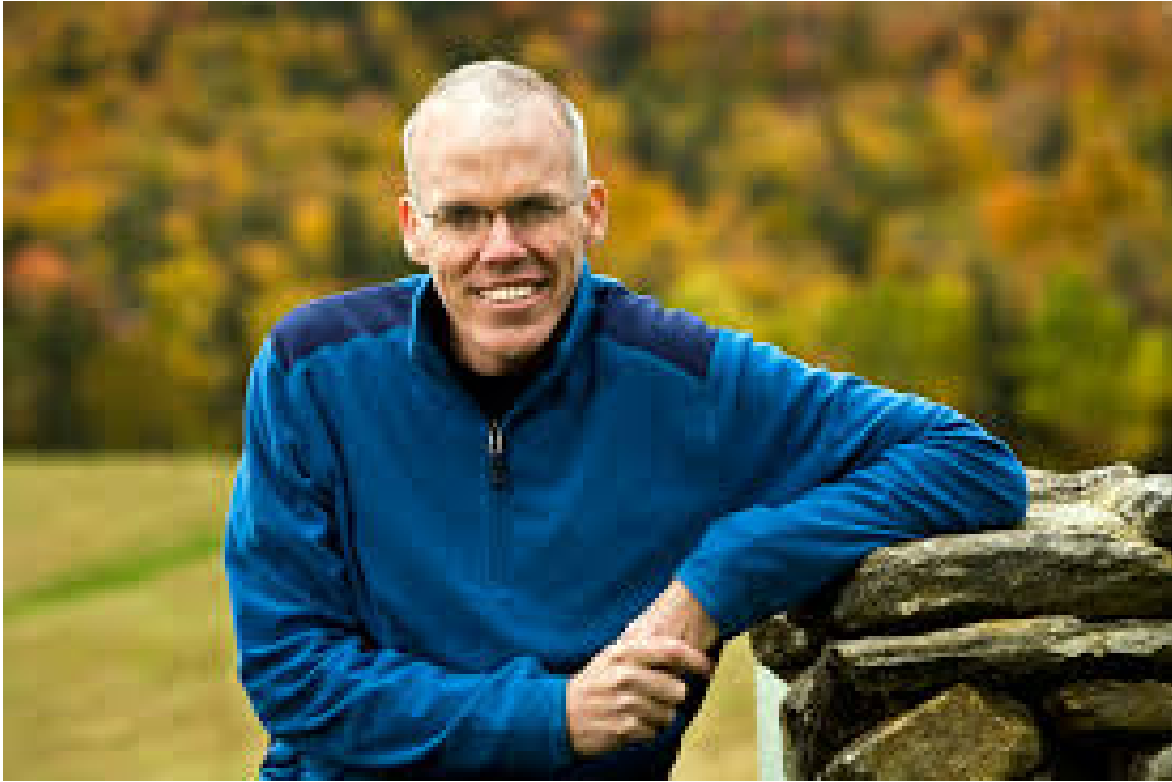


Figure 6.5: The American author, journalist and environmental activist Bill McKibben (born in 1960) is the founder and leader of 350.org, an important organization that campaigns world-wide for the immediate reduction of CO₂ emissions. Wikipedia writes of him: “In 2009, he led 350.org’s organization of 5,200 simultaneous demonstrations in 181 countries. In 2010, McKibben and 350.org conceived the 10/10/10 Global Work Party, which convened more than 7,000 events in 188 countries.” After graduating from Harvard in 1982, McKibben worked for five years as a writer for the New Yorker Magazine, after which he produced numerous books on the dangers of climate change. 350.org takes its name from James Hansen’s statement that “If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO₂ will need to be reduced from its current 385 ppm to at most 350 ppm, but likely less than that.” (Today the atmospheric CO₂ concentration has exceeded 400 ppm!). In 2014, Bill McKibben and 350.org shared the Right Livelihood Award, which is often called the “Alternative Nobel Prize”.

6.5 Noam Chomsky

Here are a few things that Noam Chomsky said:

We shouldn't be looking for heroes, we should be looking for good ideas.

If we don't believe in freedom of expression for people we despise, we don't believe in it at all.

The whole educational and professional training system is a very elaborate filter, which just weeds out people who are too independent, and who think for themselves, and who don't know how to be submissive, and so on – because they're dysfunctional to the institutions.

The smart way to keep people passive and obedient is to strictly limit the spectrum of acceptable opinion, but allow very lively debate within that spectrum.

Optimism is a strategy for making a better future. Because unless you believe that the future can be better, you are unlikely to step up and take responsibility for making it so.

Everyone's worried about stopping terrorism. Well, there's really an easy way: Stop participating in it.

I was never aware of any other option but to question everything.

All over the place, from the popular culture to the propaganda system, there is constant pressure to make people feel that they are helpless, that the only role they can have is to ratify decisions and to consume.

It is the responsibility of intellectuals to speak the truth and expose lies.

For the powerful, crimes are those that others commit.

If you assume that there is no hope, you guarantee that there will be no hope. If you assume that there is an instinct for freedom, that there are opportunities to change things, then there is a possibility that you can contribute to making a better world.

I think it only makes sense to seek out and identify structures of authority, hierarchy, and domination in every aspect of life, and to challenge them; unless a justification for them can be given, they are illegitimate, and should be

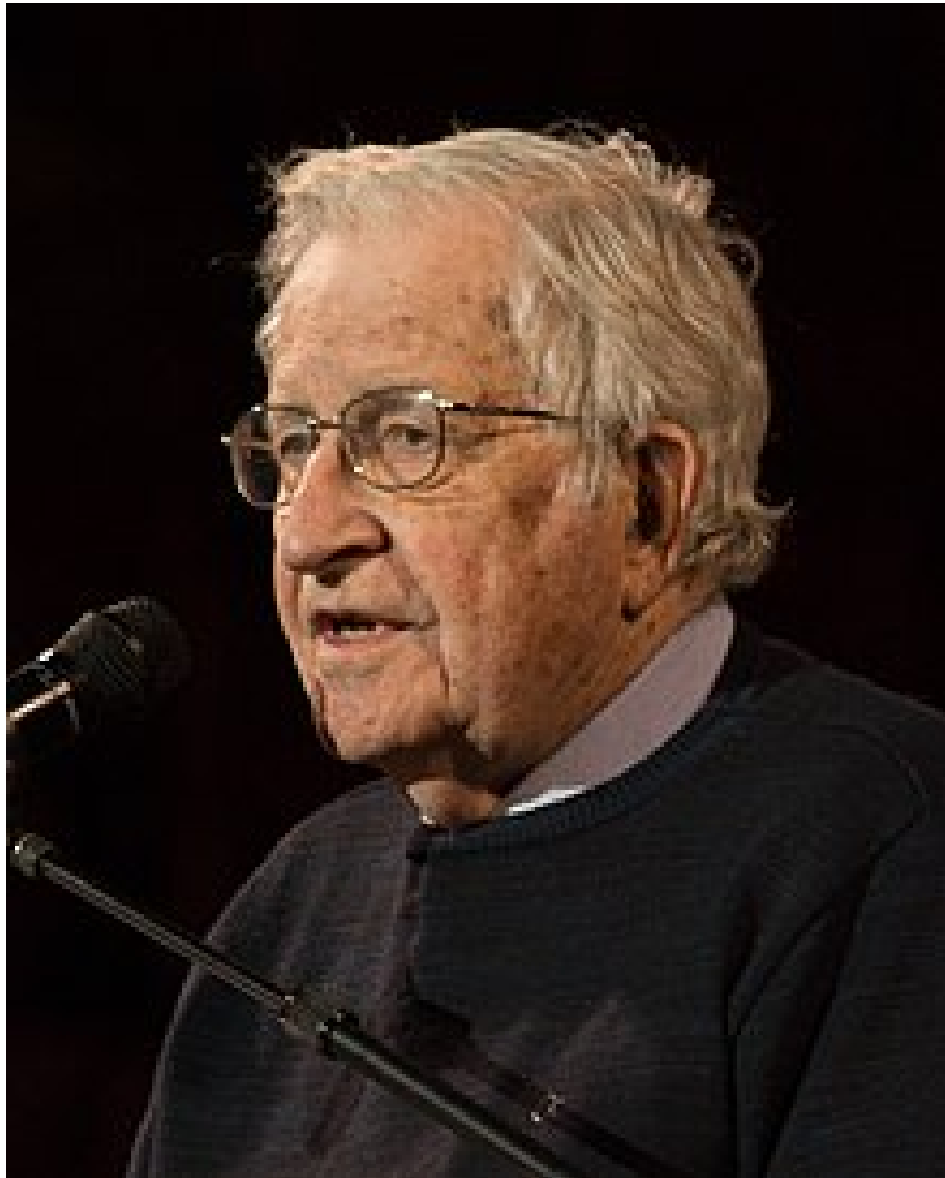


Figure 6.6: Born in 1928, Institute Professor Emeritus Noam Chomsky of MIT and the University of Arizona is considered to be one of the greatest public intellectuals in the world. As a linguist and cognitive scientist, he revolutionized our ideas of the inherited universal grammar of humans. He is also a philosopher and historian, and has written more than 100 important books, many of which criticize the the mass media and US government policies. Professor Chomsky has stated that because of its climate change denial, the US Republican Party is the most dangerous organization in history, since its actions may lead to catastrophic climate change and perhaps the extinction of the human species.

dismantled, to increase the scope of human freedom.

Either you repeat the same conventional doctrines everybody is saying, or else you say something true, and it will sound like it's from Neptune.

It's not radical Islam that worries the US – it's independence.

The more you can increase fear of drugs, crime, welfare mothers, immigrants and aliens, the more you control all of the people.

That's the whole point of good propaganda. You want to create a slogan that nobody's going to be against, and everybody's going to be for. Nobody knows what it means, because it doesn't mean anything.

How it is we have so much information, but know so little?

It is quite possible—overwhelmingly probable, one might guess—that we will always learn more about human life and personality from novels than from scientific psychology.

Neoliberal democracy. Instead of citizens, it produces consumers. Instead of communities, it produces shopping malls. The net result is an atomized society of disengaged individuals who feel demoralized and socially powerless.

In sum, neoliberalism is the immediate and foremost enemy of genuine participatory democracy, not just in the United States but across the planet, and will be for the foreseeable future.

Propaganda is to a democracy what the bludgeon is to a totalitarian state.

Responsibility I believe accrues through privilege. People like you and me have an unbelievable amount of privilege and therefore we have a huge amount of responsibility. We live in free societies where we are not afraid of the police; we have extraordinary wealth available to us by global standards. If you have those things, then you have the kind of responsibility that a person does not have if he or she is slaving seventy hours a week to put food on the table; a responsibility at the very least to inform yourself about power. Beyond that, it is a question of whether you believe in moral certainties or not.

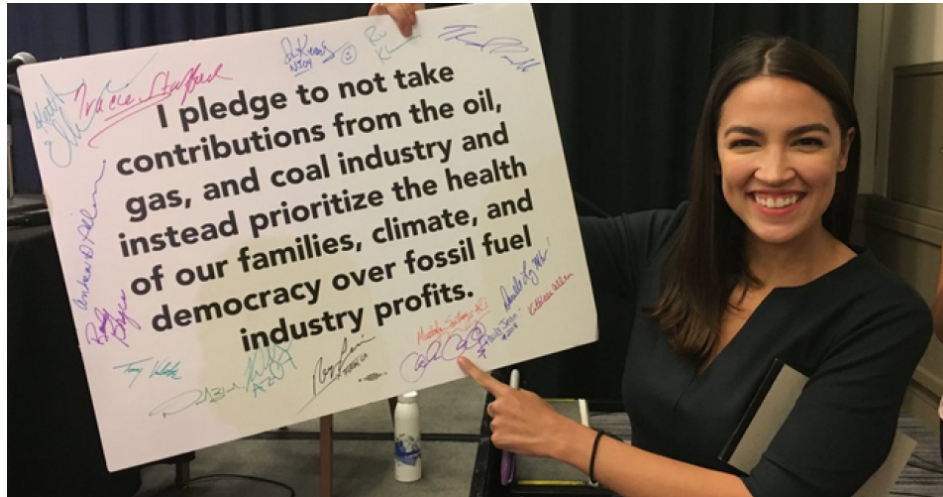


Figure 6.7: 28-year-old Alexandria Ocasio-Cortez (born in 1989) won a stunning victory in the Democratic Party primary election of June 26, 2018. Although outspent by a factor of 18 to 1 by her opponent (Democratic Caucus Chair, Joseph Crowley), she won the primary by 57% to 42%. Her campaign contributions came from small individual donors, while his came in large blocks, from corporations. Ocasio-Cortez calls for the United States to transition by 2035 to an electrical grid running on 100% renewable-energy production and end the use of fossil fuels. She calls healthcare “a human right”, and says: “Almost every other developed nation in the world has universal healthcare. It’s time the United States catch up to the rest of the world in ensuring all people have real healthcare coverage that doesn’t break the bank”. The Guardian called her victory “one of the biggest upsets in recent American political history”, and Senator Bernie Sanders commented “She took on the entire local Democratic establishment in her district and won a very strong victory. She demonstrated once again what progressive grassroots politics can do”. The lesson that the US Democratic Party must learn from this is that in order to overthrow Donald Trump’s openly racist Republican Party in the 2018 midterm elections, they must free themselves from the domination of corporate oligarchs, and instead stand for honest government and progressive values.

6.6 Alexandria Ocasio-Cortez

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Even before taking her place in the US House of Representatives, with its newly-won Democratic majority, Alexandria Ocasio-Cortez became the leader of a campaign for a Green New Deal. This program takes its inspiration from the massive Federal government program by which Franklin Delano Roosevelt ended the depression of the 1930’s. FDR’s New Deal built dams, planted forests, and in general to create much needed infrastructure, while at the same time addressing the problem of unemployment by providing jobs. Wikipedia describes FDR’s New Deal as follows:

“The New Deal was a series of programs, public work projects, financial reforms and regulations enacted by President Franklin D. Roosevelt in the United States between 1933 and 1936. It responded to needs for relief, reform and recovery from the Great Depression. Major federal programs included the Civilian Conservation Corps (CCC), the Civil Works Administration (CWA), the Farm Security Administration (FSA), the National Industrial Recovery Act of 1933 (NIRA) and the Social Security Administration (SSA). They provided support for farmers, the unemployed, youth and the elderly. The New Deal included new constraints and safeguards on the banking industry and efforts to re-inflate the economy after prices had fallen sharply. New Deal programs included both laws passed by Congress as well as presidential executive orders during the first term of the presidency of Franklin D. Roosevelt. The programs focused on what historians refer to as the ‘3 Rs’: relief for the unemployed and poor, recovery of the economy back to normal levels and reform of the financial system to prevent a repeat depression.”

Alexandria Ocasio-Cortez believes that the climate emergency that the world now faces is a much more severe emergency than the great depression. Indeed, if quick action is not taken immediately, the long-term effects of catastrophic climate change pose existential threats to human civilization and the biosphere. Therefore she advocates a massive governmental program to create renewable energy infrastructure. Such a program, like



Figure 6.8: The Green New Deal advocated by Ocasio-Cortez proposes to use jobs creating renewable energy infrastructure to ensure full employment, in a manner analogous to Roosevelt’s New Deal.

FDR’s New Deal, would simultaneously solve the problem of unemployment. Money for the program could be taken from the Pentagon’s obscenely bloated budget. Ocasio-Cortez has also proposed a 70% income tax for the ultra-wealthy.

According to a January 24 2019 article by Robert R. Raymond, “When polled, 92 percent of registered Democratic voters say they support the Green New Deal. But perhaps more importantly, a full 81 percent of all registered voters support it - a number that includes both Republicans and Democrats.”⁴

House Speaker Nancy Pelosi is facing criticism from some climate activists for failing to back a Green New Deal. Last week Pelosi announced the formation of a new Select Committee on the Climate Crisis, headed by long-standing Florida Congressman Kathy Castor. But the committee is far weaker than what backers of a Green New Deal had envisioned. The committee will not have subpoena power or the power to draft legislation. We speak with Varshini Prakash, founder of the Sunrise Movement, a youth-led climate group that has occupied and lobbied at congressional offices, risking arrest to demand adoption of the Green New Deal and bold climate leadership.

⁴<https://truthout.org/articles/the-democratic-party-is-further-to-the-right-than-most-voters/>



Figure 6.9: Members of the Sunrise movement in the office of House Majority Leader Nancy Pelosi, protesting against her lack of support for the Green New Deal.



6.7 Naomi Klein

Naomi Klein on the urgency of the Green New Deal

A recent article by journalist Naomi LaChance describes a meeting at the Sanders Institute (founded by Senator Bernie Sanders and his wife Jane) at which the famous author and activist Naomi Klein and others spoke about the scope and urgency of the Green New Deal. Here are some excerpts from the article:

Progressive journalist and activist Naomi Klein urged sweeping change that tackles the climate crisis, capitalism, racism and economic inequality in tandem on Friday in Burlington, Vt. If that seems challenging, add the fact that the clock is ticking⁵ and there might not be another chance.

“We need to have started yesterday”, Klein said at the three-day Sanders Institute Gathering on a panel moderated by environmental activist Bill McKibben. “What all of us who follow the science know is that we just can’t lose these four years”, she said, referring to the presidency of climate change denier Donald Trump. The conference, organized by the think tank founded by Vermont Sen. Bernie Sanders’ wife, Jane, is aimed at forming bold progressive agendas for the future.

Progressives are looking to incoming Democratic New York Rep. Alexandria Ocasio-Cortez for leadership as she galvanizes a grassroots effort by the youth-led climate change group Sunrise Movement⁶ to reduce fossil fuel dependence. Eighteen members of Congress support the idea of creating a House select committee to look at making a realistic plan by January 2020.

Uniting for a Green New Deal

Here are excerpts from an article entitled “Uniting for a Green New Deal”, by Margaret Flowers and Kevin Zeese. It was published on January 15, 2019.

Support is growing in the United States for a Green New Deal. Though there are competing visions for what that looks like, essentially, a Green New Deal includes a rapid transition to a clean energy economy, a jobs program and a stronger social safety net.

We need a Green New Deal for many reasons, most obviously the climate crisis and growing economic insecurity. Each new climate report describes the severe consequences of climate change with increasing alarm and the window of opportunity for action is closing. At the same time, wealth inequality is

⁵<https://www.theguardian.com/environment/2018/oct/08/global-warming-must-not-exceed-15c-warns-landmark-un-report>

⁶<https://www.truthdig.com/articles/will-democrats-back-a-green-new-deal/>



Figure 6.10: Award-winning Canadian author Naomi Klein, speaking at the Sanders Institute in January, 2019. Her book “This Changes Everything: Capitalism vs. the Climate” (2014) was a New York Times Bestseller List non-fiction bestseller and the winner of the Hilary Weston Writers’ Trust Prize for Nonfiction in its year. In 2016 Klein was awarded the Sydney Peace Prize for her activism on climate justice. Klein frequently appears on global and national lists of top influential thinkers. Writing in the wake of Hurricane Sandy she warned that the climate crisis constitutes a massive opportunity for disaster capitalists and corporations seeking to profit from crisis. But equally, the climate crisis “can be a historic moment to usher in the next great wave of progressive change”. On November 9, 2016, following the election of Donald Trump as the 45th President of the United States, Klein called for an international campaign to impose economic sanctions on the United States if his administration refuses to abide by the terms of the Paris Agreement.

also growing. Paul Bucheit writes that more than half of the population in the United States is suffering from poverty.

The Green New Deal provides an opportunity for transformational changes, not just reform, but changes that fundamentally solve the crises we face. This is the time to be pushing for a Green New Deal at all levels, in our towns and cities, states and nationally.

The idea of a Green New Deal seems to have arisen in early 2007 when the Green New Deal Group started meeting to discuss it, specifically as a plan for the United Kingdom. They published their report in July 2008. In April 2009, the United Nations Environmental Program also issued a plan for a global Green New Deal.

In the United States, Barack Obama included a Green New Deal in his 2008 presidential campaign and conservative Thomas Friedman started talking about it in 2007. Howie Hawkins, a Green Party gubernatorial candidate in New York, campaigned on a Green New Deal starting in 2010. Listen to our interview with Hawkins about how we win the Green New Deal on Clearing the FOG. Jill Stein campaigned on it during her presidential runs in 2012 and 2016, as have many Green Party candidates.

Alexandria Ocasio Cortez (AOC), who ran for Congress as a Democrat and won in 2018, has made the Green New Deal a major priority. With the backing of the Sunrise Movement, AOC pushed for a congressional committee tasked with developing a Green New Deal and convinced dozens of members of Congress to support it. Speaker of the House Nancy Pelosi sidelined that idea by creating a climate committee headed by Kathy Castor, which has no mandate to do anything and lacks the power to write legislation and issue subpoenas. Now the Sunrise Movement is planning a tour to build support for the Green New Deal. At each stop they will provide organizing tools to make the Green New Deal a major issue in the 2020 election season.

This week, more than 600 organizations, mostly environmental groups, sent a letter to Congress calling on it to take climate change seriously and design a plan to end dependence on fossil fuels, a transition to 100% clean energy by 2035, create jobs and more. Indigenous leaders are also organizing to urge Congress to pass a Green New Deal that is “Indigenized,” meaning it prioritizes input from and the inclusion of Indigenous Peoples.

Roosevelt’s original New Deal

In the United States, President Franklin D. Roosevelt was faced with the difficult problems of the depression during his first few years in office. Roosevelt introduced a number of special governmental programs, such as the WPA, the Civilian Construction Corps and the Tennessee Valley Authority, which were designed to create new jobs on projects directed towards socially useful goals - building highways, airfields, auditoriums, harbors, housing projects, schools and dams. The English economist John Maynard Keynes, (1883-1946),



provided an analysis of the factors that had caused the 1929 depression, and a theoretical justification of Roosevelt's policies.

The transition to a sustainable global society will require a similar level of governmental responsibility, although the measures needed are not the same as those which Roosevelt used to end the great depression. Despite the burst of faith in the free market which has followed the end of the Cold War, it seems unlikely that market mechanisms alone will be sufficient to solve problems of unemployment in the long-range future, or to achieve conservation of land, natural resources and environment.

6.8 Greta Thunberg

Greta Thunberg's address to the opening session

Greta Thunberg (born 3 January 2003) is a Swedish climate activist. She is known for protesting outside the Swedish parliament building to raise climate change activism.

On 20 August 2018, Thunberg, then in 9th grade, decided to not attend school until the 2018 Sweden general election on 9 September after heat waves and wildfires in Sweden. Her demands were that the Sweden government reduce carbon emissions as per the Paris Agreement, and she protested via sitting outside the Riksdag every day during school hours with the sign "Skolstrejk för klimatet" (school strike for the climate). After the general elections, she continued to strike only on Fridays. The strike is now in its 17th week. The transcript of her address to the opening session of COP24^{78 9 10} is given below,

⁷<https://www.youtube.com/watch?v=VFkQSGyeCWg>

⁸<https://www.youtube.com/watch?v=0TYyBtb1PH4>

⁹<https://www.youtube.com/watch?v=DdAOgNTxxt0>

¹⁰<https://www.youtube.com/watch?v=pJ1HRGA8g10>



Figure 6.11: Greta: “Many people say that Sweden is just a small country, and it doesn’t matter what we do. But I’ve learned that you are never too small to make a difference. And if a few children can get headlines all over the world just by not going to school, then imagine what we could all do together if we really wanted to.”



Figure 6.12: Greta: “You only talk about moving forward with the same bad ideas that got us into this mess, even when the only sensible thing to do is pull the emergency brake. You are not mature enough to tell it like it is. Even that burden you leave to us children.”

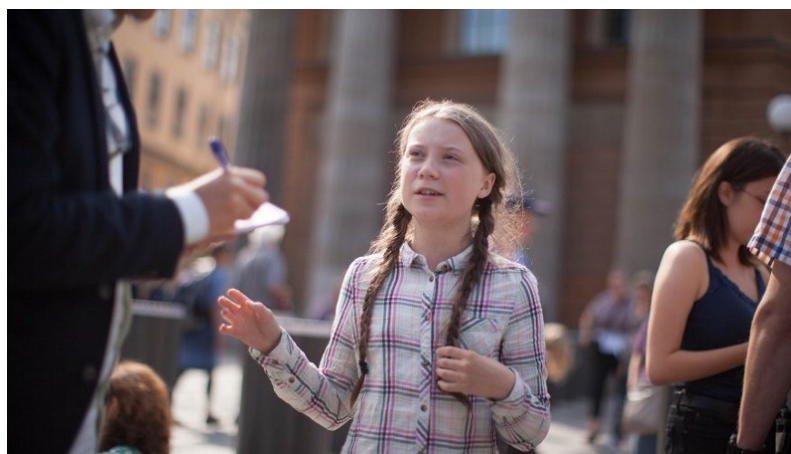


Figure 6.13: Greta: “Until you start focusing on what needs to be done, rather than what is politically possible, there is no hope. We cannot solve a crisis without treating it as a crisis. We need to keep the fossil fuels in the ground, and we need to focus on equity. And if solutions within the system are so impossible to find, then maybe we should change the system itself.”

My name is Greta Thunberg. I am 15 years old, and I’m from Sweden. I speak on behalf of Climate Justice Now!

Many people say that Sweden is just a small country, and it doesn’t matter what we do. But I’ve learned that you are never too small to make a difference. And if a few children can get headlines all over the world just by not going to school, then imagine what we could all do together if we really wanted to.

But to do that, we have to speak clearly, no matter how uncomfortable that may be. You only speak of green eternal economic growth because you are too scared of being unpopular. You only talk about moving forward with the same bad ideas that got us into this mess, even when the only sensible thing to do is pull the emergency brake. You are not mature enough to tell it like it is. Even that burden you leave to us children.

But I don’t care about being popular. I care about climate justice and the living planet. Our civilization is being sacrificed for the opportunity of a very small number of people to continue making enormous amounts of money. Our biosphere is being sacrificed so that rich people in countries like mine can live in luxury. It is the sufferings of the many which pay for the luxuries of the few.

The year 2078, I will celebrate my 75th birthday. If I have children, maybe they will spend that day with me. Maybe they will ask me about you. Maybe they will ask why you didn’t do anything while there still was time to act. You say you love your children above all else, and yet you are stealing their future in front of their very eyes.

Until you start focusing on what needs to be done, rather than what is politically possible, there is no hope. We cannot solve a crisis without treating it as a crisis. We need to keep the fossil fuels in the ground, and we need to focus on equity. And if solutions within the system are so impossible to find, then maybe we should change the system itself.

We have not come here to beg world leaders to care. You have ignored us in the past, and you will ignore us again. We have run out of excuses, and we are running out of time. We have come here to let you know that change is coming, whether you like it or not. The real power belongs to the people. Thank you.

Greta Thunberg's TED talk

In November, 2018, Greta Thunberg gave an impressively clear TEDx talk in Stockholm, the video of which was recently released.¹¹ Here is a transcript of the talk.

When I was about 8 years old, I first heard about something called ‘climate change’ or ‘global warming’. Apparently, that was something humans had created by our way of living. I was told to turn off the lights to save energy and to recycle paper to save resources. I remember thinking that it was very strange that humans, who are an animal species among others, could be capable of changing the Earth’s climate. Because, if we were, and if it was really happening, we wouldn’t be talking about anything else. As soon as you turn on the TV, everything would be about that. Headlines, radio, newspapers: You would never read or hear about anything else. As if there was a world war going on, but no one ever talked about it. If burning fossil fuels was so bad that it threatened our very existence, how could we just continue like before? Why were there no restrictions? Why wasn’t it made illegal?

To me, that did not add up. It was too unreal.

So, when I was 11, I became ill, I fell into depression, I stopped talking, and I stopped eating. In two months, I lost about 10 kilos of weight. Later on, I was diagnosed with Asperger’s syndrome, OCD and selective mutism. This basically means, I only speak, when I think it is necessary.

Now is one of those moments.

For those of us, who are on the spectrum, almost everything is black or white. We aren’t very good at lying and we usually don’t enjoy participating in the social games that the rest of you seem so fond of. I think, in many ways, that we autistic are the normal ones and the rest of the people are pretty strange. Especially when it comes to the sustainability crisis: Where everyone keeps saying that climate change is an existential threat and the most important

¹¹<https://www.dailykos.com/stories/2018/12/16/1819508/-A-Call-to-Action-on-Climate-Change-by-15-year-Old-Greta-Thunberg>

issue of all. And yet, they just carry on like before.

I don't understand that. Because if the emissions have to stop, then we must stop the emissions. To me, that is black or white. There are no gray areas when it comes to survival. Either we go on as a civilization or we don't.

We have to change.

Rich countries like Sweden need to start reducing emissions by at least 15% every year. And that is so that we can stay below a 2 degrees warming target. Yet, as the IPCC has recently demonstrated, aiming instead for 1.5 degrees Celsius would significantly reduce the climate impacts. But we can only imagine what that means for reducing emissions.

You would think the media and every one of our leaders would be talking about nothing else. But they never even mention it.

Nor does anyone ever mentioned the greenhouse gases already locked in the system. Nor that air pollution is hiding some warming; so that, when we stop burning fossil fuels, we already have an extra level of warming - perhaps as high as 0.5 to 1.1 degrees Celsius.

Furthermore, does hardly anyone speak about the fact that we are in the midst of the sixth mass extinction: With up to 200 species going extinct every single day. That the extinction rate is today between 1000 and 10,000 times higher than what is seen as normal.

Nor does hardly anyone ever speak about the aspect of equity or climate justice, clearly stated everywhere in the Paris agreement, which is absolutely necessary to make it work on a global scale. That means that rich countries need to get down to zero emissions within 6 to 12 years with today's emission speed. And that is so that people in poorer countries can have a chance to heighten their standard of living by building some of the infrastructures that we have already built, such as roads, schools, hospitals, clean drinking water, electricity, and so on. Because, how can we expect countries like India or Nigeria to care about the climate crisis if we, who already have everything, don't care even a second about it or our actual commitments to the Paris agreement?

So why are we not reducing our emissions? Why are they in fact still increasing? Are we knowingly causing a mass extinction? Are we evil?

No, of course, not. People keep doing what they do because the vast majority doesn't have a clue about the actual consequences for their everyday life. And they don't know that rapid change is required.

We all think we know and we all think everybody knows. But we don't.

Because, how could we? If there really was a crisis, and if this crisis was caused by our emissions, you would at least see some signs. Not just flooded cities. Tens of thousands of dead people and whole nations leveled to piles of torn down buildings. You would see some restrictions.

But no. And no one talks about it. There are no emergency meetings, no headlines, no breaking news. No one is acting as if we were in a crisis.

Even most climate scientists or green politicians keep on flying around the world, eating meat and dairy.

If I live to be 100, I will be alive in the year 2103. When you think about the future today, you don't think beyond the year 2050. By then I will, in the best case, not even have lived half of my life. What happens next? In the year 2078, I will celebrate my 75th birthday. If I have children or grandchildren, maybe they will spend that day with me. Maybe they will ask me about you, the people who were around back in 2018. Maybe they will ask why you didn't do anything while there still was time to act. What we do or don't do right now, will affect my entire life and the lives of my children and grandchildren. What we do or don't do right now, me and my generation can't undo in the future.

So, when school started in August of this year, I decided that this was enough. I set myself down on the ground outside the Swedish parliament. I school-striking for the climate.

Some people say that I should be in school instead. Some people say that I should study, to become a climate scientist so that I can solve the climate crisis.

But the climate crisis has already been solved. We already have all the facts and solutions. All we have to do is to wake up and change.

And why should I be studying for a future that soon will be no more, when no one is doing anything whatsoever to save that future? And what is the point of learning facts in the school system, when the most important facts given by the finest science of that same school system clearly means nothing to our politicians and our society?

Some people say that Sweden is just a small country and that it doesn't matter what we do. But I think that if a few children can get headlines all over the world just by not coming to school for a few weeks, imagine what we could all do together if we wanted to?

Now we're almost at the end of my talk and this is where people usually people usually start talking about hope. Solar panels, wind power, circular economy, and so on. But I'm not going to do that. We've had 30 years of pep talking and selling positive ideas. And I'm sorry but it doesn't work because if it would have, the emissions would have gone down by now. They haven't.

And yes, we do need hope. Of course, we do. But the one thing we need more than hope is action. Once we start to act, hope is everywhere. So instead of looking for hope, look for action. Then and only then, hope will come today.

Today we use 100 million barrels of oil every single day. There are no politics to change that. There are no rules to keep that oil in the ground. So, we can't save the world by playing by the rules, because the rules have to be changed.

Everything needs to change and it has to start today.

Thank you.

The coal industry's heavy hand at COP24

After learning of the Trump Administration's plans to sponsor a pro-coal exhibition at COP24, May Boeve, Executive Director of 350.org, issued the following statement:

"Trump's COP24 coal convention is a disgraceful clown show. As the world transitions away from coal, oil, and gas, fossil fuel CEOs and their political puppets are trying to keep us hooked. Meanwhile, communities here at home - from California to Puerto Rico and more - are attempting to rebuild from devastating and worsening fires and storms.

"Last week's National Climate Assessment doubled down on IPCC warnings: the climate crisis is already here, and the costs are being paid for in our lives and livelihoods. Instead of propping up sunset industry, we should be investing in a Green New Deal that prioritizes frontline and coal-communities, nurtures a livable planet, and creates millions of good jobs in the process.

"Led by Indigenous Peoples, youth, and frontline communities, people across the US are already hard at work building real solutions to the climate crisis: from solar panels in the path of Keystone XL, to offshore wind, and a community-owned solar plant in Brooklyn. In the face of a federal administration exploiting our health and safety, we need to pressure elected officials at all levels to take action at the scale of the crisis; that means stopping all fossil fuel projects and transitioning to 100% renewables for all."

Coal was not only visible everywhere at COP24. It could literally be breathed in with the air. Smokestacks and coal plumes are visible from the spaceship-shaped conference center, and the Wujek coal mine is less than three miles away. And if you thought Poland would try to downplay its historical (and, well, current) reliance on coal, you'd be wrong: The booth for the town of Katowice, sitting right next to the official one for all of Poland, proudly touts coal. And not just a little coal - coal made into soap, coal made into earrings and other jewelry, coal under glass, coal in cages - lots and lots of coal.

"Every government in Poland is coal, coal," Monika Sadkowska, a Warsaw-based climate activist, said. "The only strong worker union in Poland is mining. And every government is afraid of them."

The 2019 Davos Economic Forum

Interviewed at the Davos Economic Forum at the end of January, 2019, Greta Thunberg said: "Some people say we are not doing enough to fight climate change. That is not true, because to not do enough, you have to do something, and the truth is that we are basically not doing anything."

Speaking of the powerholders at Davos, she said: "They have known exactly what price-less values they have been sacrificing to continue making unimaginable amounts of money.

"I think it is very unfair that the older generations have done this to us and future generations... and that we will have to clean up after them. Young people need to realize that their future is at risk. They need to do something about that and get angry, and form that anger into action," she said, insisting that when children speak up they can have a



Figure 6.14: An estimated 30,000 students participated in a school strike for climate action in Brussels. Such strikes have spread from Sweden to a number of other countries, such as Belgium, Germany, Poland and Australia.

“huge impact”.

Transcript of Greta’s speech at Davos

Here is a transcript of remarks that Greta Thunberg made at Davos on Friday, January 25, 2019:

Our house is on fire. I am here to say, our house is on fire.

According to the IPCC (Intergovernmental Panel on Climate Change), we are less than 12 years away from not being able to undo our mistakes. In that time, unprecedented changes in all aspects of society need to have taken place, including a reduction of our CO₂ emissions by at least 50%.

And please note that those numbers do not include the aspect of equity, which is absolutely necessary to make the Paris agreement work on a global scale. Nor does it include tipping points or feedback loops like the extremely powerful methane gas released from the thawing Arctic permafrost.

At places like Davos, people like to tell success stories. But their financial success has come with an unthinkable price tag. And on climate change, we have to acknowledge we have failed. All political movements in their present form have done so, and the media has failed to create broad public awareness.



Figure 6.15: Greta Thunberg at the Davos Economic Forum in Switzerland, January 2019. Appearing among billionaires, corporate CEO's and heads of state like a new Joan of Arc, she called on decision-makers to fulfil their responsibilities to future generations.

But *Homo sapiens* have not yet failed.

Yes, we are failing, but there is still time to turn everything around. We can still fix this. We still have everything in our own hands. But unless we recognize the overall failures of our current systems, we most probably don't stand a chance.

We are facing a disaster of unspoken sufferings for enormous amounts of people. And now is not the time for speaking politely or focusing on what we can or cannot say. Now is the time to speak clearly.

Solving the climate crisis is the greatest and most complex challenge that *Homo sapiens* have ever faced. The main solution, however, is so simple that even a small child can understand it. We have to stop our emissions of greenhouse gases.

Either we do that or we don't.

You say nothing in life is black or white. But that is a lie. A very dangerous lie. Either we prevent 1.5C of warming or we don't. Either we avoid setting off that irreversible chain reaction beyond human control or we don't.

Either we choose to go on as a civilization or we don't. That is as black or white as it gets. There are no grey areas when it comes to survival.

We all have a choice. We can create transformational action that will safeguard the living conditions for future generations. Or we can continue with our business as usual and fail.

That is up to you and me.

Some say we should not engage in activism. Instead we should leave everything to our politicians and just vote for a change instead. But what do we do when there is no political will? What do we do when the politics needed are nowhere in sight?

Here in Davos - just like everywhere else - everyone is talking about money. It seems money and growth are our only main concerns.

And since the climate crisis has never once been treated as a crisis, people are simply not aware of the full consequences on our everyday life. People are not aware that there is such a thing as a carbon budget, and just how incredibly small that remaining carbon budget is. That needs to change today.

No other current challenge can match the importance of establishing a wide, public awareness and understanding of our rapidly disappearing carbon budget, that should and must become our new global currency and the very heart of our future and present economics.

We are at a time in history where everyone with any insight of the climate crisis that threatens our civilization - and the entire biosphere - must speak out in clear language, no matter how uncomfortable and unprofitable that may be.

We must change almost everything in our current societies. The bigger your carbon footprint, the bigger your moral duty. The bigger your platform, the



bigger your responsibility.

Adults keep saying: "We owe it to the young people to give them hope." But I don't want your hope. I don't want you to be hopeful. I want you to panic. I want you to feel the fear I feel every day. And then I want you to act.

I want you to act as you would in a crisis. I want you to act as if our house is on fire. Because it is.

Greta Thunberg spoke at the European Union's climate meeting, February, 2019

Here are a few excerpts from her speech

There is simply not enough time to wait for us to grow up and become the ones in charge...

The EU wants to cut greenhouse gas emissions by at least 40% by 2030, compared with 1990 levels.

Some people say that is good, that is ambitious; but this new target is still not enough to keep global warming below 1.5C

This target is not sufficient to protect the future for children growing up today. If the EU is to make its fair contribution to stay within the carbon budget for the 2C limit then it needs a minimum of 80% reduction by 2030, and that includes aviation and shipping.

Perhaps influenced by Greta Thunberg's speech, European Commission President Jean-Claude Juncker announced that a quarter of the European Union budget would be spent



Figure 6.16: A schoolgirl in England demanding climate action. Currently about 70,000 schoolchildren worldwide are participating in strikes for climate change. When British Prime Minister Theresa May criticized them for wasting valuable study time, Greta Thunberg replied: “British PM says that the children on school strike are ‘wasting lesson time’. That may well be the case. But then again, political leaders have wasted 30 years in inaction and denial. And that is slightly worse.”



Figure 6.17: **Greta Thunberg shakes the hand of European Commission President Jean-Claude Juncker.**

on tackling climate change.

“In the next financial period, 2021-2027, every fourth euro spent in the EU budget will go towards climate mitigation actions”, Juncker said.

The EU budget is usually 1 percent of its economic output, or 1 trillion euros across seven years, according to Reuters.

Worldwide school strike, 15 March, 2019

Here are excerpts from an article by Louise Hazen, posted on March 16, 2019 on the website of 350.org.¹²

Over 1.5 million young students in more than 300 cities across all continents took to the streets on Friday March 15th on the first ever global climate strike. Messages in more than 40 languages were loud and clear: world leaders must act now to address the climate crisis and save our future.

“The governments failed to respond properly to the dramatic challenge of our climate crisis. Our generation, the least responsible for the acts of the polluters, will be the ones to see the most devastating impacts of climate change. World

¹²<https://350.org/massive-school-strikes-worldwide/>



Figure 6.18: On March 15, 2015, over 1.5 million schoolchildren in 2083 places on all continents participated in the biggest climate action ever.



Figure 6.19: Because of the relationship between climate change, the refugee crisis and the threat of war, three Norwegian parliamentarians have nominated Greta Thunberg for the Nobel Peace Prize.

leaders are losing the window to act, but we are not [going to] stand still watching their inertia.” Greta Thunberg.

In Europe hundreds of thousands of students left their classrooms and joined hundreds marches. France alone gathered 195 thousand in more than 110 cities while Italian students held over 200 events.

In India, more than 15 cities were involved in the strikes. In Colombia around 2.5 thousand gathered in the streets of Bogotá whilst Cape Town reported 2000 and 1,000 in Hong Kong. Numbers are still pouring in from over 2000 other events worldwide.

Despite years of talks, governments have lost many opportunities to commit to concrete action and global emissions are reaching an inevitable level.

The most recent UN Environment report, released in Nairobi on Wednesday, estimates that winter temperatures at the North Pole are likely to rise by at least 3°C above pre-industrial levels by 2050. And that even if global emissions were to halt overnight, winter temperatures in the Arctic would still increase 4°C to 5°C by 2100 compared to the late 20th century.

Over the coming months strikes are set to continue across the globe, with organizers already planning the next ones.

In September world leaders will be gathered once again and will have a chance to come with concrete, ambitious plans to reduce drastically their national emissions by shifting off coal, oil and gas immediately. By doing that they will show the young people that their voices were heard and that their effort was not in vain.

IN THEIR OWN WORDS

“In India, no one talks about climate change. You don’t see it on the news or in the papers or hear about it from government. We want global leaders to declare a climate emergency. If we don’t act today, then we will have no tomorrow. ” - Vidit Baya, 17, Udaipur, India.

“We face heartbreaking loss due to increasingly extreme weather events. We urge the Taiwanese government to implement mitigation measures and face up to the vulnerability of indigenous people, halt construction projects in the indigenous traditional realm, and recognize the legal status of Plains Indigenous People, in order to implement environmental protection as a bottom-up approach” - Kaisanan Ahuan, Puli City, Taiwan.

“We have reached a point in history when we have the technical capacities to solve poverty, malnutrition, inequality and of course global warming. The deciding factors for whether we take advantage of our potential will be our activism, our international unity and our ability to develop the art of making the impossible possible. Whether we succeed or not depends on our political

will” - Eyal Weintraub, 18, and Bruno Rodriguez, 18, Argentina.

“I want to be certain that our government is committed to investing in a just transition to a more sustainable country, that we will lower carbon emissions and curb climate change. I am joining this strike to demand that decisions are more future-focused and that policy will reflect our environmental rights as written in our constitution” - Dona Van Eeden, 21, Cape Town, South Africa.

“The damage done by multinationals is enormous: the lack of transparency, dubious contracts, the weakening of the soil, the destruction of flora and fauna, the lack of respect for mining codes, the contamination of groundwater. In Mali, the state exercises insufficient control over the practices of the multinationals, and it is us, the citizens, who suffer the consequences. The climate alarm has sounded, and the time has come for us all to realize that there is still time to act locally, in our homes, our villages, our cities” - Mone Fousseny, 22, Mali.

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Chapter 7

SYSTEM CHANGE, NOT CLIMATE CHANGE

7.1 Limits to growth

We need a new economic system

The Industrial Revolution marked the start of massive human use of fossil fuels. The stored energy from several hundred million years of plant growth began to be used at roughly a million times the rate at which it had been formed. The effect on human society was like that of a narcotic. There was a euphoric (and totally unsustainable) surge of growth of both population and industrial production. Meanwhile, the carbon released into the atmosphere from the burning of fossil fuels began to duplicate the conditions which led to the 5 geologically-observed mass extinctions, during each of which more than half of all living species disappeared forever.

Economists (with a few notable exceptions, such as Nicholas Georgescu-Roegen, Herman Daly and Aurelio Peccei) have long behaved as though growth were synonymous with economic health. If the gross national product of a country increases steadily by 4% per year, most economists express approval and say that the economy is healthy. If the economy could be made to grow still faster (they maintain), it would be still more healthy. If the growth rate should fall, economic illness would be diagnosed.

However, it is obvious that on a finite Earth, neither population growth nor economic growth can continue indefinitely. A 4% rate of growth corresponds to an increase by a factor of 50 every century. No one can maintain that this is sustainable in the long run except by refusing to look more than a short distance into the future.

Of course, it is necessary to distinguish between industrial growth, and growth of culture and knowledge, which can and should continue to grow. Qualitative improvements in human society are possible and desirable, but resource-using and pollution-producing industrial growth is reaching its limits, both because of ecological constraints and because of the exhaustion of petroleum, natural gas and other non-renewable resources, such as metals. The threat of catastrophic climate change makes it imperative for us to stop using

fossil fuels within very few decades.

Today, as economic growth falters, the defects and injustices of our banking system have come sharply into focus, and light has also been thrown onto the much-too-cozy relationship between banking and government. The collapse of banks during the sub-prime mortgage crisis of 2008 and their subsequent bailout by means of the taxpayer's money can give us an insight into both phenomena, the faults of our banking system and its infiltration into the halls of government. The same can be said of the present national debt crisis in the Euro zone and elsewhere.

One feature of banking that cries out for reform is "fractional reserve banking", i.e. the practice whereby private banks keep only a tiny fraction of the money entrusted to them by their depositors, and lend out all the remaining amount. By doing so, the banks are in effect coining their own money and putting it into circulation, a prerogative that ought to be reserved for governments. Under the system of fractional reserve banking, profits from any expansion of the money supply go to private banks rather than being used by the government to provide social services. This is basically unjust; the banks are in effect issuing their own counterfeit money.

When the economy contracts instead of expanding, the effect of fractional reserve banking is still worse. In that case the depositors ask the banks for their money, which it is their right to do. But the banks do not have the money; they have lent it out, and thus they fail. However, the bankers have insured themselves against this eventuality by buying the votes of government officials. Thus the banks are bailed out and the taxpayers are left with the bill, as in the recent example in which the US Federal Reserve secretly gave 7.7 trillion of the taxpayers' dollars to bail out various banks.

In a later section (on entropy and economics) we will discuss in detail Frederick Soddy's criticisms of the fractional reserve banking system, and his proposals for monetary reform.

The fact that our fractional reserve banking system is stable when the economy is expanding, but collapses when the economy contracts explains, in part, the irrational and almost religious belief of governments and economists in perpetual growth. Also contributing to growth-worship are the unearned profits that investors reap when they own property in growing cities, or shares of growing businesses. But growth cannot continue forever. It is destroying the earth.

Pope Francis has called for economic reform. Our battered earth calls for it. The case of Greece shows clearly that our present economic system is not working; it is destroying nature and at the same time producing human misery. We need to replace our present economic system by one that has both an ecological conscience and a social conscience.¹

¹<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>
<http://www.theguardian.com/environment/2015/jul/08/exxon-climate-change-1981-climate-denier-funding>
<http://human-wrongs-watch.net/2015/06/25/militarisms-hostages/>
<http://www.commondreams.org/news/2015/07/13/pope-calls-world-youth-rise-against-global-capitalism>
<https://www.transcend.org/tms/2015/07/tpp-ttip-tisa-a-tipping-edge-from-democracy/>
<http://dissidentvoice.org/2015/05/secretcy-and-democracy-are-incompatible/>
<http://www.countercurrents.org/roberts100715.htm>

The Club of Rome

In 1968 Aurelio Peccei, Thorkil Kristensen and others founded the Club of Rome, an organization of economists and scientists devoted to studying the predicament of human society. One of the first acts of the organization was to commission an MIT study of future trends using computer models. The result was a book entitled “Limits to Growth”, published in 1972. From the outset the book was controversial, but it became a best-seller. It was translated into many languages and sold 30 million copies. The book made use of an exponential index for resources, i.e. the number of years that a resource would last if used at an exponentially increasing rate.

Today the more accurate Hubbert Peak model is used instead to predict rate of use of a scarce resource as a function of time. Although the specific predictions of resource availability in “Limits to Growth” lacked accuracy, its basic thesis, that unlimited industrial growth on a finite planet is impossible, was indisputably correct. Nevertheless the book was greeted with anger and disbelief by the community of economists, and these emotions still surface when it is mentioned.

Economic activity is usually divided into two categories, 1) production of goods and 2) provision of services. It is the rate of production of goods that will be limited by the carrying capacity of the global environment. Services that have no environmental impact will not be constrained in this way. Thus a smooth transition to a sustainable economy will involve a shift of a large fraction the work force from the production of goods to the provision of services.

In his recent popular book “The Rise of the Creative Class” the economist Richard Florida points out that in a number of prosperous cities, for example Stockholm, a large fraction of the population is already engaged in what might be called creative work, a type of work that uses few resources, and produces few waste products, work which develops knowledge and culture rather than producing material goods. For example, producing computer software requires few resources and results in few waste products. Thus it is an activity with a very small ecological footprint.

Similarly, education, research, music, literature and art are all activities that do not weigh heavily on the carrying capacity of the global environment. Furthermore, cultural activities lead in a natural way to global cooperation and internationalism, since cultural achievements are shared by the people of the entire world. Indeed, the shared human inheritance of culture and knowledge is growing faster than ever before.

Florida sees this as a pattern for the future, and maintains that everyone is capable of creativity. He visualizes the transition to a sustainable future economy as one in which a large fraction of the work force moves from industrial jobs to information-related work. Meanwhile, as Florida acknowledges, industrial workers feel uneasy and threatened by such

<http://eruditio.worldacademy.org/issue-6/article/institutional-and-cultural-inertia>

<http://human-wrongs-watch.net/2015/07/04/will-the-real-issues-be-discussed-in-2016/>

<https://www.youtube.com/watch?v=AjZaFjXfLec>

<http://www.theguardian.com/environment/video/2012/oct/25/david-attenborough-climate-change-video>

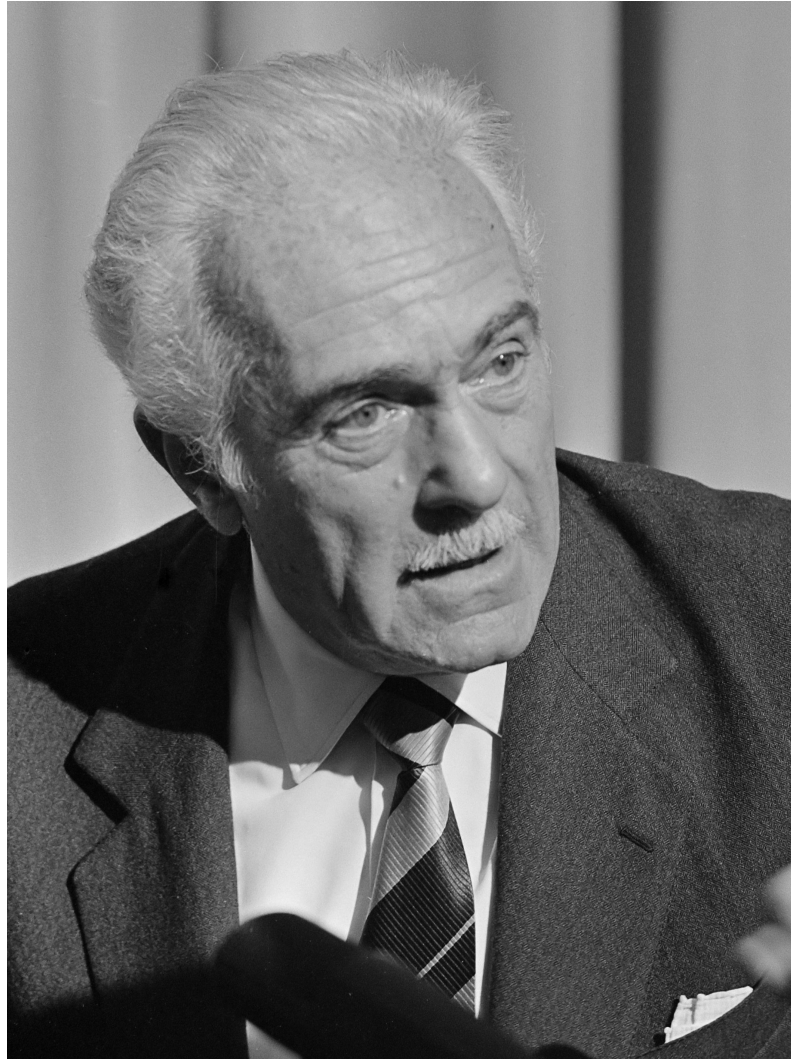


Figure 7.1: Aurelio Peccei (1908-1984), main founder of the Club of Rome. Concerning our present economic system, he wrote: “The only way we have devised to meet the surging waves of our rampant militarism and consumerism is to draw increasingly on the natural environment and to exploit, indiscriminately, the most accessible mineral and fuel deposits and all living resources we can lay our hands on. Such actions irreversibly impoverish our unique, irreplaceable, world, whose bounty and generosity are not infinite. Even if all the other adverse situations we find ourselves in today were to be alleviated, in itself, our high-handed treatment of Nature can bring about our doom.” Photograph by Koen Suyk/Anefo (Nationaal Archief), CC BY-SA 3.0, Wikimedia Commons

trends.²

Biological Carrying capacity and Economics

Classical economists pictured the world as largely empty of human activities. According to the empty-world picture of economics, the limiting factors in the production of food and goods are shortages of human capital and labor. The land, forests, fossil fuels, minerals, oceans filled with fish, and other natural resources upon which human labor and capital operate, are assumed to be present in such large quantities that they are not limiting factors. In this picture, there is no naturally-determined upper limit to the total size of the human economy. It can continue to grow as long as new capital is accumulated, as long as new labor is provided by population growth, and as long as new technology replaces labor by automation.

Biology, on the other hand, presents us with a very different picture. Biologists remind us that if any species, including our own, makes demands on its environment which exceed the environment's carrying capacity, the result is a catastrophic collapse both of the environment and of the population which it supports. Only demands which are within the carrying capacity are sustainable. For example, there is a limit to regenerative powers of a forest.

It is possible to continue to cut trees in excess of this limit, but only at the cost of a loss of forest size, and ultimately the collapse and degradation of the forest. Similarly, cattle populations may for some time exceed the carrying capacity of grasslands, but the ultimate penalty for overgrazing will be degradation or desertification of the land. Thus, in biology, the concept of the carrying capacity of an environment is extremely important; but in economic theory this concept has not yet been given the weight which it deserves.

Exponential growth of human population and economic activity have brought us, in a surprisingly short time, from the empty-world situation to a full-world situation. In today's world, we are pressing against the absolute limits of the earth's carrying capacity, and further growth carries with it the danger of future collapse.

Full-world economics, the economics of the future, will no longer be able to rely on industrial growth to give profits to stockbrokers or to solve problems of unemployment or to alleviate poverty. In the long run, neither the growth of industry nor that of population is sustainable; and we have now reached or exceeded the sustainable limits.

The limiting factors in economics are no longer the supply of capital or human labor or even technology. The limiting factors are the rapidly vanishing supplies of petroleum and metal ores, the forests damaged by acid rain, the diminishing catches from over-fished oceans, and the cropland degraded by erosion or salination, or lost to agriculture under a cover of asphalt.

Neoclassical economists have maintained that it is generally possible to substitute man-made capital for natural resources; but a closer examination shows that there are only very

²<http://www.clubofrome.org/?p=326>

<http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf>
<http://www.donellameadows.org/archives/a-synopsis-limits-to-growth-the-30-year-update/>



Figure 7.2: **When a forest is destroyed, topsoil is often lost to erosion. Source: United Nations.**

few cases where this is really practical. (See G.E. Tverberg, “Thoughts on why energy use and CO₂ emissions are rising as fast as GDP”, www.ourfinitemworld.com, November 30, 2011.)

The size of the human economy is, of course, the product of two factors the total number of humans, and the consumption per capita. If we are to achieve a sustainable global society in the future, a society whose demands are within the carrying capacity of of the global environment, then both these factors must be reduced.

The responsibility for achieving sustainability is thus evenly divided between the North and the South: Where there is excessively high consumption per capita, it must be reduced; and this is primarily the responsibility of the industrialized countries. High birth rates must also be reduced; and this is primarily the responsibility of the developing countries. Both of these somewhat painful changes are necessary for sustainability; but both will be extremely difficult to achieve because of the inertia of institutions, customs and ways of thought which are deeply embedded in society, in both the North and the South.

Population and food supply

Let us look first at the problem of high birth rates: The recent spread of modern medical techniques throughout the world has caused death rates to drop sharply; but since social customs and attitudes are slow to change, birth rates have remained high. As a result, between 1930 and 2011, the population of the world increased with explosive speed from



Figure 7.3: Our global food system is broken. Source: Oxfam

two billion to seven billion.

During the last few decades, the number of food-deficit countries has lengthened; and it now reads almost like a United Nations roster. The food-importing nations are dependent, almost exclusively, on a single food-exporting region, the grain belt of North America. In the future, this region may be vulnerable to droughts produced by global warming.

An analysis of the global ratio of population to cropland shows that we probably already have exceeded the sustainable limit of population through our dependence on petroleum: Between 1950 and 1982, the use of cheap petroleum-derived fertilizers increased by a factor of 8, and much of our present agricultural output depends their use. Furthermore, petroleum-derived synthetic fibers have reduced the amount of cropland needed for growing natural fibers, and petroleum-driven tractors have replaced draft animals which required cropland for pasturage. Also, petroleum fuels have replaced fuelwood and other fuels derived for biomass. The reverse transition, from fossil fuels back to renewable energy sources, will require a considerable diversion of land from food production to energy production.

As population increases, the cropland per person will continue to fall, and we will be forced to make still heavier use of fertilizers to increase output per hectare. Also marginal land will be used in agriculture, with the probable result that much land will be degraded through erosion or salination.

Reserves of oil are likely to be exhausted by the middle of this century. Thus there is a danger that just as global population reaches the unprecedented level of 9 billion or more, the agricultural base for supporting it may suddenly collapse. The resulting catastrophe, possibly compounded by war and other disorders, could produce famine and death on a scale unprecedented in history, a disaster of unimaginable proportions, involving billions rather than millions of people. The present tragic famine in Africa is to this possible future disaster what Hiroshima is to the threat of thermonuclear war a tragedy of smaller scale, whose horrors should be sufficient, if we are wise, to make us take steps to avoid the larger

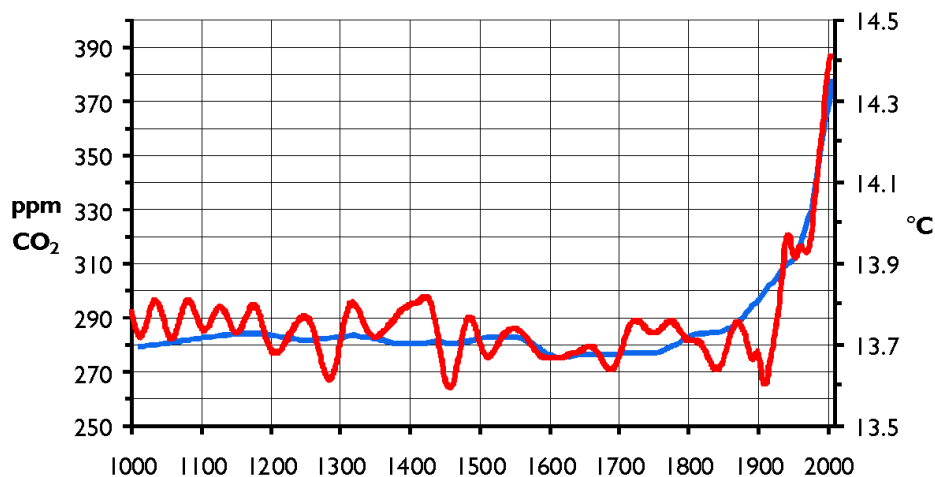


Figure 7.4: The Haino graph used by the United Nations Climate Change Compendium 2009. Source: wattsupwiththat.com

catastrophe.

At present a child dies from starvation every six seconds. Five million children die from hunger every year. Over a billion people in today's world are chronically undernourished. There is a threat that unless prompt and well-informed action is taken by the international community, the tragic loss of life that is already being experienced will increase to unimaginable proportions.

As glaciers melt in the Himalayas, threatening the summer water supplies of India and China; as ocean levels rise, drowning the fertile rice-growing river deltas of Asia; as aridity begins to decrease the harvests of Africa, North America and Europe; as populations grow; as aquifers are overdrawn; as cropland is lost to desertification and urban growth; and as energy prices increase, the billion people who now are undernourished but still survive, might not survive. They might become the victims of a famine whose proportions could exceed anything that the world has previously experienced.

It is vital for the world to stabilize its population, not only because of the threat of a catastrophic future famine, but also because rapid population growth is closely linked with poverty. Today, a large fraction of the world's people live in near-poverty or absolute poverty, lacking safe water, sanitation, elementary education, primary health care and proper nutrition. Governments struggling to solve these problems, and to provide roads, schools, jobs and medical help for all their citizens, find themselves defeated by the rapid doubling times of populations. For example, in Liberia, the rate of population growth is 4% per year, which means that the population of Liberia doubles in size every eighteen years.

Under such circumstances, despite the most ambitious development programs, the infrastructure per capita decreases. Also, since new jobs must be found for the new millions added to the population, the introduction of efficient modern methods in industry and

agriculture aggravates the already-serious problem of unemployment.

Education of women and higher status for women are vitally important measures, not only for their own sake, but also because in many countries these social reforms have proved to be strongly correlated with lower birth rates. Religious leaders who oppose programs for the education of women and for family planning on “ethical” grounds should think carefully about the scope and consequences of the catastrophic global famine which will undoubtedly occur within the next 50 years if population is allowed to increase unchecked.

One of the most important keys to controlling the global population explosion is giving women better education and equal rights. These goals are desirable for the sake of increased human happiness, and for the sake of the uniquely life-oriented point of view which women can give us; but in addition, education and improved status for women have shown themselves to be closely connected with lowered birth rates.

When women lack education and independent careers outside the home, they can be forced into the role of baby-producing machines by men who do not share in the drudgery of cooking, washing and cleaning; but when women have educational, legal, economic, social and political equality with men, experience has shown that they choose to limit their families to a moderate size.

Sir Partha Dasgupta of Cambridge University has pointed out that the changes needed to break the cycle of overpopulation and poverty are all desirable in themselves. Besides education and higher status for women, they include state-provided social security for old people, provision of water supplies near to dwellings, provision of health services to all, abolition of child labor and general economic development.³

Social Values and Levels of Consumption

Let us next turn to the problem of reducing the per-capita consumption in the industrialized countries. The whole structure of western society seems designed to push its citizens in the opposite direction, towards ever-increasing levels of consumption. The mass media hold before us continually the ideal of a personal utopia filled with material goods. Every young man in a modern industrial society feels that he is a failure unless he fights his way to the “top”; and in recent years, women too have been drawn into this competition.

Of course not everyone can reach the top; there would not be room for everyone; but society urges all us to try, and we feel a sense of failure if we do not reach the goal. Thus, modern life has become a struggle of all against all for power and possessions.

One of the central problems in reducing consumption is that in our present economic and social theory, consumption has no upper bound; there is no definition of what is enough; there is no concept of a state where all of the real needs of a person have been satisfied. In our growth-oriented present-day economics, it is assumed that, no matter how much a person earns, he or she is always driven by a desire for more.

The phrase “conspicuous consumption” was invented by the Norwegian-American economist Thorstein Veblen (1857-1929) in order to describe the way in which our society uses eco-

³<http://www.poverties.org/famine-in-africa.html>

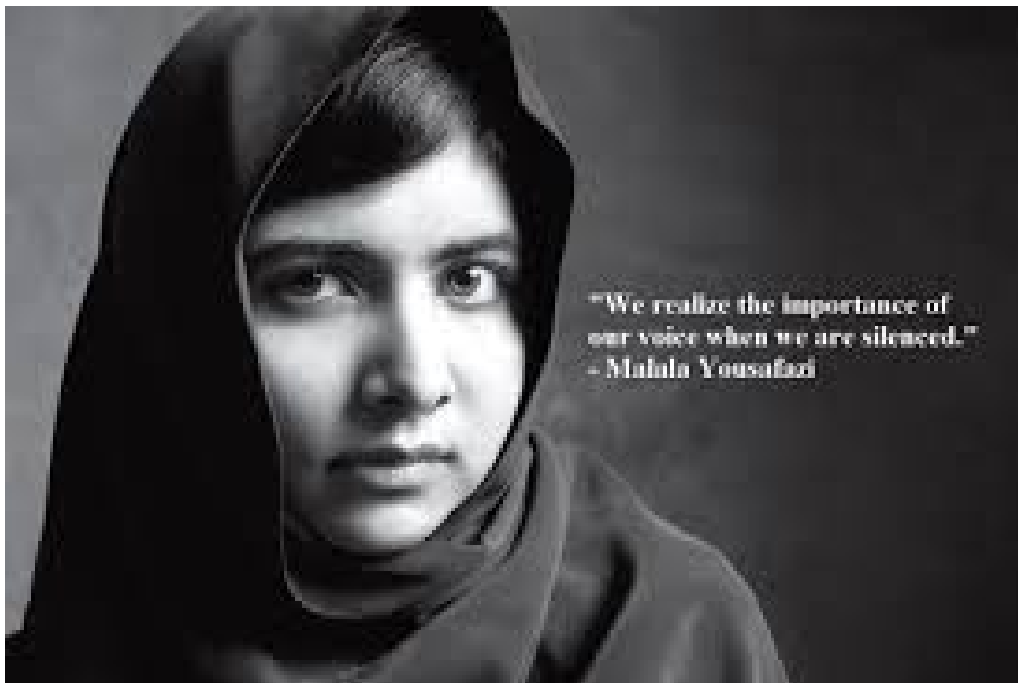


Figure 7.5: The changes needed to break the cycle of overpopulation and poverty are all desirable in themselves. Besides education and higher status for women, they include state-provided social security for old people, provision of water supplies near to dwellings, provision of health services to all, abolition of child labor, and general economic development. Source: unesco.usmission.gov



Figure 7.6: **FAO, IFAD and WFP joint project “Mainstreaming food loss reduction initiatives for smallholders in food deficit areas” aims to improve food security and income generation through reduction of food losses in food grains and pulses value chains. Photo: FAO/Alessandra Benedetti**

conomic waste as a symbol of social status. In “The Theory of the Leisure Class”, first published in 1899, Veblen pointed out that it was wrong to believe that human economic behavior is rational, or that it can be understood in terms of classical economic theory. To understand it, Veblen maintained, one might better make use of insights gained from anthropology, psychology, sociology, and history.

The sensation caused by the publication of Veblen’s book, and the fact that his phrase, “conspicuous consumption”, has become part of our language, indicate that his theory did not completely miss its mark. In fact, modern advertisers seem to be following Veblen’s advice: Realizing that much of the output of our economy will be used for the purpose of establishing the social status of consumers, advertising agencies hire psychologists to appeal to the consumer’s longing for a higher social position.

When possessions are used for the purpose of social competition, demand has no natural upper limit; it is then limited only by the size of the human ego, which, as we know, is boundless. This would be all to the good if unlimited economic growth were desirable. But today, when further industrial growth implies future collapse, western society urgently needs to find new values to replace our worship of power, our restless chase after excitement, and our admiration of excessive consumption.

The values which we need, both to protect nature from civilization and to protect civilization from itself, are perhaps not new: Perhaps it would be more correct to say that we need to rediscover ethical values which once were part of human culture, but which were lost during the process of industrialization, when technology allowed us to break traditional environmental constraints.

Our ancestors were hunter-gatherers, living in close contact with nature, and respecting the laws and limitations of nature. There are many hunter-gatherer cultures existing today, from whose values and outlook we could learn much. Unfortunately, instead of learning

from them, we often move in with our bulldozers and make it impossible for their way of life to continue. During the past several decades, for example, approximately one tribe of South American forest Indians has died out every year. Of the 6000 human languages now spoken, it is estimated that half will vanish during the next 50 years.

In some parts of Africa, before cutting down a tree, a man will offer a prayer of apology to the spirit of the tree, explaining why necessity has driven him to such an act. The attitude involved in this ritual is something which industrialized society needs to learn, or relearn. Older cultures have much to teach industrial society because they already have experience with full-world situation which we are fast approaching.

In a traditional culture, where change is extremely slow, population has an opportunity to expand to the limits which the traditional way of life allows, so that it reaches an equilibrium with the environment. For example, in a hunter-gatherer culture, population has expanded to the limits which can be supported without the introduction of agriculture. The density of population is, of course, extremely low, but nevertheless it is pressing against the limits of sustainability. Overhunting or overfishing would endanger the future. Respect for the environment is thus necessary for the survival of such a culture.

Similarly, in a stable, traditional agricultural society which has reached an equilibrium with its environment, population is pressing against the limits of sustainability. In such a culture, one can usually find expressed as a strong ethical principle the rule that the land must not be degraded, but must be left fertile for the use of future generations.

Today, the whole world seems to be adopting values, fashions, and standards of behavior presented in the mass media of western society. The unsustainable, power-worshipping, consumption-oriented values of western society are so strongly propagandized by television, films and advertising, that they overpower and sweep aside the wisdom of older societies. This is unfortunate, since besides showing us unsustainable levels of affluence and economic waste, the western mass media depict values and behavior patterns which are hardly worthy of imitation. We need to reverse this trend. The industrialized countries must learn from the values of older traditional cultures. The wisdom of our ancestors, their respect for nature and their hospitable traditions of sharing, can help us to create a new economic system founded on social and environmental ethics.⁴

7.2 Entropy and economics

We urgently need to shift quickly from fossil fuels to renewable energy if we are to avoid a tipping point after which human efforts to avoid catastrophic climate change will be futile because feedback loops will have taken over. The dangerous methane hydrate feedback loop is discussed in an excellent short video made by Thom Hartmann and the Leonardo

⁴<http://www.learndev.org/dl/harmony8.pdf>
<http://dissidentvoice.org/2015/05/gandhi-as-an-economist/>
<http://www.encyclopedia.com/doc/1G2-3401804813.html>

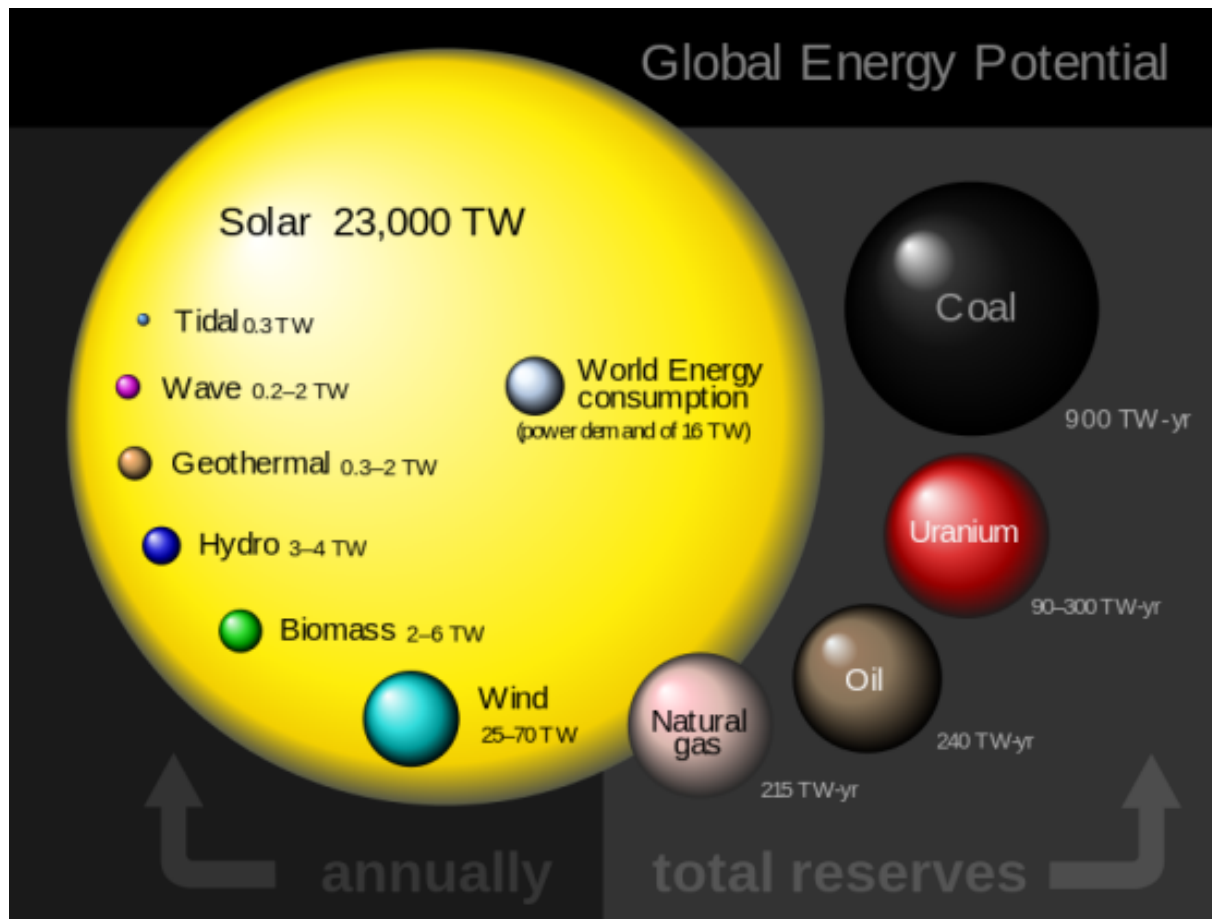


Figure 7.7: Global energy potential. Comparison of renewable and conventional planetary energy reserves and sources. While renewables display their power potential in terawatts (TW) with the corresponding annual amount of energy, conventional sources display their total recoverable energy reserves in terawatt-years (TW-yr). Author: Rfassbind, Wikimedia Commons

DiCaprio Foundation.⁵

Celebrated author and activist Naomi Klein has emphasized the link between need for economic reform and our urgent duty to address climate change.⁶

Rebel economist Prof. Tim Jackson discusses the ways in which our present economic system has failed us, and the specific reforms that are needed. In one of his publications, he says: “The myth of growth has failed us. It has failed the two billion people who still live on 2 dollars a day. It has failed the fragile ecological systems on which we depend for survival. It has failed, spectacularly, in its own terms, to provide economic stability and secure people’s livelihood.”⁷

What is entropy?

Entropy is a quantity, originally defined in statistical mechanics and thermodynamics. It is a measure of the statistical probability of any state of a system: The greater the entropy, the greater the probability. The second law of thermodynamics asserts that entropy of the universe always increases with time. In other words, the universe as a whole is constantly moving towards states of greater and greater probability.

For any closed system, the same is true. Such systems move in time towards states of greater and greater probability. However, the earth, with its biosphere, is not a closed system. The earth constantly receives an enormous stream of light from the sun. The radiation which we receive from the sun brings us energy that can be used to perform work, and in physics this is called “free energy”. Because of this flood of incoming sunlight, plants, animals and humans are able to create structures which from a statistical point of view are highly unlikely.

The disorder and statistical probability of the universe is constantly increasing, but because the earth is not a closed system, we are able to create local order, and complex, statistically improbable structures, like the works of Shakespeare, the Mona Lisa and the Internet. The human economy is driven by the free energy which we receive as income from the sun. Money is, in fact, a symbol for free energy, and free energy might be thought of as “negative entropy”. There is also a link between free energy and information.⁸

⁵<https://www.youtube.com/watch?v=sRGVTK-AAvw>
<http://lasthours.org/>

⁶<http://thischangeseverything.org/naomi-klein/>
<http://www.theguardian.com/profile/naomiklein>

⁷<http://www.theguardian.com/sustainable-business/rio-20-tim-jackson-leaders-green-economy?newsfeed=true>

⁸<http://www.theguardian.com/sustainable-business/consumerism-sustainability-short-termism>
<http://www.amazon.com/Information-Theory-And-Evolution-Edition/dp/9814401234>

Human society as a superorganism, with the global economy as its digestive system

A completely isolated human being would find it as difficult to survive for a long period of time as would an isolated ant or bee or termite. Therefore it seems correct to regard human society as a superorganism. In the case of humans, the analog of the social insects' nest is the enormous and complex material structure of civilization. It is, in fact, what we call the human economy. It consists of functioning factories, farms, homes, transportation links, water supplies, electrical networks, computer networks and much more.

Almost all of the activities of modern humans take place through the medium of these external "exosomatic" parts of our social superorganism. The terms "exosomatic" and "endosomatic" were coined by the American scientist Alfred Lotka (1880-1949). A lobster's claw is endosomatic; it is part of the lobster's body. The hammer used by a human is exosomatic, like a detachable claw. Lotka spoke of "exosomatic evolution", including in this term not only cultural evolution but also the building up of the material structures of civilization.

The economy associated with the human superorganism "eats" resources and free energy. It uses these inputs to produce local order, and finally excretes them as heat and waste. The process is closely analogous to food passing through the alimentary canal of an individual organism. The free energy and resources that are the inputs of our economy drive it just as food drives the processes of our body, but in both cases, waste products are finally excreted in a degraded form.

Almost all of the free energy that drives the human economy came originally from the sun's radiation, the exceptions being geothermal energy which originates in the decay of radioactive substances inside the earth, and tidal energy, which has its origin in the slowing of the motions of the earth-moon system. However, since the start of the Industrial Revolution, our economy has been using the solar energy stored in of fossil fuels. These fossil fuels were formed over a period of several hundred million years. We are using them during a few hundred years, i.e., at a rate approximately a million times the rate at which they were formed.

The present rate of consumption of fossil fuels is more than 13 terawatts and, if used at the present rate, fossil fuels would last less than a century. However, because of the very serious threats posed by climate change, human society would be well advised to stop the consumption of coal, oil and natural gas well before that time.

The rate of growth of of new renewable energy sources is increasing rapidly. These sources include small hydro, modern biomass, solar, wind, geothermal, wave and tidal energy. There is an urgent need for governments to set high taxes on fossil fuel consumption and to shift subsidies from the petroleum and nuclear industries to renewables. These changes in economic policy are needed to make the prices of renewables more competitive.

The shock to the global economy that will be caused by the end of the fossil fuel era will be compounded by the scarcity of other non-renewable resources, such as metals. While it is true (as neoclassical economists emphasize) that "matter and energy can neither be created nor destroyed", free energy can be degraded into heat, and concentrated deposits of

minerals can be dispersed. Both the degradation of free energy into heat and the dispersal of minerals involve increases of entropy.

Frederick Soddy

One of the first people to call attention to the relationship between entropy and economics was the English radiochemist Frederick Soddy (1877-1956). Soddy won the Nobel Prize for Chemistry in 1921 for his work with Ernest Rutherford demonstrating the transmutation of elements in radioactive decay processes. His concern for social problems then led him to a critical study of the assumptions of classical economics. Soddy believed that there is a close connection between free energy and wealth, but only a very tenuous connection between wealth and money.

Soddy was extremely critical of the system of “fractional reserve banking” whereby private banks keep only a small fraction of the money that is entrusted to them by their depositors and lend out the remaining amount. He pointed out that this system means that the money supply is controlled by the private banks rather than by the government, and also that profits made from any expansion of the money supply go to private corporations instead of being used to provide social services. Fractional reserve banking exists today, not only in England but also in many other countries. Soddy’s criticisms of this practice cast light on the subprime mortgage crisis of 2008 and the debt crisis of 2011.

As Soddy pointed out, real wealth is subject to the second law of thermodynamics. As entropy increases, real wealth decays. Soddy contrasted this with the behavior of debt at compound interest, which increases exponentially without any limit, and he remarked:

“You cannot permanently pit an absurd human convention, such as the spontaneous increment of debt [compound interest] against the natural law of the spontaneous decrement of wealth [entropy]”. Thus, in Soddy’s view, it is a fiction to maintain that being owed a large amount of money is a form of real wealth.

Frederick Soddy’s book, “Wealth, virtual wealth and debt: The solution of the economic paradox”, published in 1926 by Allen and Unwin, was received by the professional economists of the time as the quixotic work of an outsider. Today, however, Soddy’s common-sense economic analysis is increasingly valued for the light that it throws on the problems of our fractional reserve banking system, which becomes more and more vulnerable to failure as economic growth falters.⁹

Currency reform, and nationalization of banks

Frederick Soddy was writing at a time when England’s currency was leaving the gold standard, and in order to replace this basis for the currency, he proposed an index system. Soddy’s index was to be based on a standard shopping basket containing household items, such as bread, milk, potatoes and so on. If the price of the items in the basket rose, more

⁹www.fadedpage.com/link.php?file=20140873-a5.pdf
<http://human-wrongs-watch.net/2015/07/08/debt-slavery/>

currency would be issued by the nationalized central bank. If the price fell, currency would be withdrawn.

Nationalization of banks was proposed by Soddy as a means of avoiding the evils of the fractional reserve banking system. Today we see a revival of the idea of nationalized banks, or local user-owned cooperative banks. The Grameen Bank, founded by Prof. Muhammad Yunus, pioneered the idea of socially-motivated banks for the benefit poor people who would ordinarily be unable to obtain loans. The bank and its founder won a Nobel Peace Prize in 2006.¹⁰

Nicholas Georgescu-Roegen

The incorporation of the idea of entropy into economic thought also owes much to the mathematician and economist Nicholas Georgescu-Roegen (1906-1994), the son a Romanian army officer. Georgescu-Roegen's talents were soon recognized by the Romanian school system, and he was given an outstanding education in mathematics, which later contributed to his success and originality as an economist.

Between 1927 and 1930 the young Georgescu studied at the Institute de Statistique in Paris, where he completed an award-winning thesis: "On the problem of finding out the cyclical components of phenomena". He then worked in England with Karl Pearson from 1930 to 1932, and during this period his work attracted the attention of a group of economists who were working on a project called the Harvard Economic Barometer. He received a Rockefeller Fellowship to join this group, but when he arrived at Harvard, he found that the project had been disbanded.

In desperation, Georgescu-Roegen asked the economist Joseph Schumpeter for an appointment to his group. Schumpeter's group was in fact a remarkably active and interesting one, which included the future Nobel laureate Wassely Leontief; and there followed a period of intense intellectual activity during which Georgescu-Roegen became an economist.

Despite offers of a permanent position at Harvard, Georgescu-Roegen returned to his native Romania in the late 1930's and early 1940's in order to help his country. He served as a member of the Central Committee of the Romanian National Peasant Party. His experiences at this time led to his insight that economic activity involves entropy. He was also helped to this insight by Borel's monograph on Statistical Mechanics, which he had read during his Paris period.

¹⁰<http://www.grameen-info.org/history/>
<http://www.ibtimes.com/greece-drawing-contingency-plans-nationalize-banks-bring-parallel-currency-report-1868830>
<http://www.quora.com/Why-were-banks-nationalized-in-India>
<http://www.bloomberg.com/news/articles/2015-01-28/greek-bank-investors-hammered-as-3-day-slump-wipes-12-billion>
<http://www.armstrongeconomics.com/archives/30531>
<https://en.wikipedia.org/wiki/Nationalization>
<http://www.theguardian.com/world/2015/jul/23/beppe-grillo-calls-for-nationalisation-of-italian-banks-and-exit-from-euro>
<http://dissidentvoice.org/2015/07/whats-wrong-with-our-monetary-system-and-how-to-fix-it/>

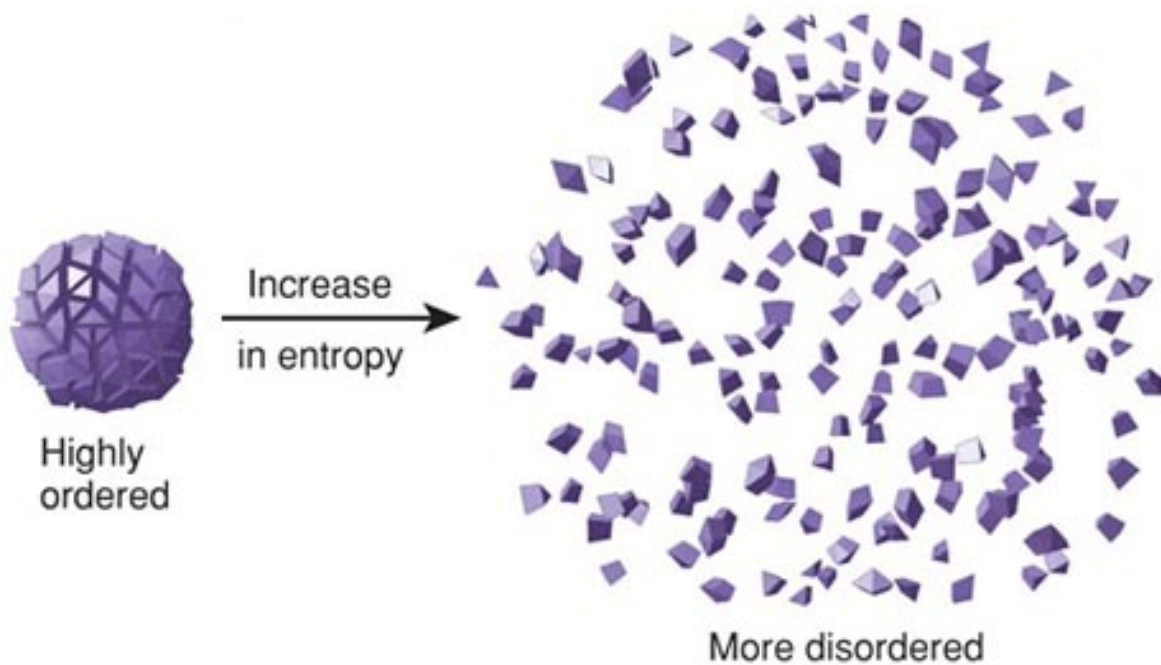


Figure 7.8: According to the second law of thermodynamics, the entropy of the universe constantly increases. Increase of entropy corresponds to increase of disorder, and also to increase of statistical probability. Living organisms on the earth are able to achieve a high degree of order and highly improbable structures because the earth is not a closed system. It constantly receives free energy (i.e. energy capable of doing work) from the sun, and this free energy can be thought of as carrying thermodynamic information, or “negative entropy”. Source: flowchainsensel.wordpress.co,

Georgescu-Roegen later wrote: “The idea that the economic process is not a mechanical analogue, but an entropic, unidirectional transformation began to turn over in my mind long ago, as I witnessed the oil wells of the Ploesti field of both World Wars’ fame becoming dry one by one, and as I grew aware of the Romanian peasants’ struggle against the deterioration of their farming soil by continuous use and by rains as well. However it was the new representation of a process that enabled me to crystallize my thoughts in describing the economic process as the entropic transformation of valuable natural resources (low entropy) into valueless waste (high entropy).”

After making many technical contributions to economic theory, Georgescu-Roegen returned to this insight in his important 1971 book, “The Entropy Law and the Economic Process” (Harvard University Press), where he outlines his concept of bioeconomics. In a later book, “Energy and Economic Myths” (Pergamon Press, New York, 1976), he offered the following recommendations for moving towards a bioeconomic society:

1. The complete prohibition of weapons production, thereby releasing productive forces for more constructive purposes;



Figure 7.9: **Wind, solar, and biomass are three emerging renewable sources of energy. Wind turbines in a rapeseed field in Sandesneben, Germany. Author: Jürgen from Sandesneben, Germany, Wikimedia Commons**

2. Immediate aid to underdeveloped countries;
3. Gradual decrease in population to a level that could be maintained only by organic agriculture;
4. Avoidance, and strict regulation if necessary, of wasteful energy use;
5. Abandon our attachment to “extravagant gadgetry”;
6. “Get rid of fashion”;
7. Make goods more durable and repairable; and
8. Cure ourselves of workaholic habits by re-balancing the time spent on work and leisure, a shift that will become incumbent as the effects of the other changes make themselves felt.

Georgescu-Roegen did not believe that his idealistic recommendations would be adopted, and he feared that human society is headed for a crash.

Limits to Growth: A steady-state economy

Nicholas Georgescu-Roegen’s influence continues to be felt today, not only through his own books and papers but also through those of his students, the distinguished economists Herman E. Daly and Kozo Mayumi, who for many years have been advocating a steady-state economy. As they point out in their books and papers, it is becoming increasingly apparent that unlimited economic growth on a finite planet is a logical impossibility. However, it is important to distinguish between knowledge, wisdom and culture, which can and should

continue to grow, and growth in the sense of an increase in the volume of material goods produced. It is growth in the latter sense that is reaching its limits.

Daly describes our current situation as follows: “The most important change in recent times has been the growth of one subsystem of the Earth, namely the economy, relative to the total system, the ecosphere. This huge shift from an ‘empty’ to a ‘full’ world is truly ‘something new under the sun’... The closer the economy approaches the scale of the whole Earth, the more it will have to conform to the physical behavior mode of the Earth... The remaining natural world is no longer able to provide the sources and sinks for the metabolic throughput necessary to sustain the existing oversized economy, much less a growing one. Economists have focused too much on the economy’s circulatory system and have neglected to study its digestive tract.”¹¹

In the future, the only way that we can avoid economic collapse is to build a steady-state economy. There exists much literature on how this can be achieved, and these writings ought to become a part of the education of all economists and politicians.

7.3 The global food crisis

Optimum population in the long-term future

What is the optimum population of the world? It is certainly not the maximum number that can be squeezed onto the globe by eradicating every species of plant and animal that cannot be eaten. The optimum global population is one that can be supported in comfort, equality and dignity, and with respect for the environment.

In 1848 (when there were just over one billion people in the world), John Stuart Mill described the optimal global population in the following words: “The density of population necessary to enable mankind to obtain, in the greatest degree, all the advantages of cooperation and social intercourse, has, in the most populous countries, been attained. A population may be too crowded, although all be amply supplied with food and raiment.”

“... Nor is there much satisfaction in contemplating the world with nothing left to the spontaneous activity of nature; with every rood of land brought into cultivation, which is capable of growing food for human beings; every flowery waste or natural pasture plowed up, all quadrupeds or birds which are not domesticated for man’s use exterminated as his rivals for food, every hedgerow or superfluous tree rooted out, and scarcely a place left where a wild shrub or flower could grow without being eradicated as a weed in the name of improved agriculture. If the earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase of wealth and population would extirpate

¹¹<http://dalynews.org/learn/blog/>
<http://steadystate.org/category/herman-daly/>
<https://www.youtube.com/watch?v=EN5esbvAt-w>
<https://www.youtube.com/watch?v=wIR-VsXtM4Y>
<http://www.imf.org/external/pubs/ft/survey/so/2015/car031315a.htm>

John Stuart Mill (1806-1873, England)



Mill “had a lifelong goal of reforming the world in the interest of human well-being”

<http://plato.stanford.edu/entries/mill/>

Figure 7.10: Mill wrote: **“I sincerely hope, for the sake of posterity, that they will be content to be stationary, long before necessity compels them to it.”**
Source: www.slideshare.net

from it, for the mere purpose of enabling it to support a larger, but not better or happier population, I sincerely hope, for the sake of posterity, that they will be content to be stationary, long before necessity compels them to it.” (From John Stuart Mill, “Principles of Political Economy, With Some of Their Applications to Social Philosophy”, 1848.)

Has the number of humans in the world already exceeded the earth’s sustainable limits? Will the global population of humans crash catastrophically after having exceeded the carrying capacity of the environment? There is certainly a danger that this will happen - a danger that the 21st century will bring very large scale famines to vulnerable parts of the world, because modern energy-intensive agriculture will be dealt a severe blow by the end of the fossil fuel era, and because climate change will reduce the world’s agricultural output.

When the major glaciers in the Himalayas have melted, they will no longer be able to give India and China summer water supplies; rising oceans will drown much agricultural land; and aridity will reduce the output of many regions that now produce much of the world’s grain. Falling water tables in overdrawn aquifers, and loss of topsoil will add to the problem. We should be aware of the threat of a serious global food crisis in the 21st century if we are to have a chance of avoiding it.

The term *ecological footprint* was introduced by William Rees and Mathis Wackernagel in the early 1990’s to compare demands on the environment with the earth’s capacity to regenerate. In 2015, humanity used environmental resources at such a rate that it would take 1.6 earths to renew them. In other words, we have already exceeded the earth’s carrying capacity. Since eliminating the poverty that characterizes much of the world

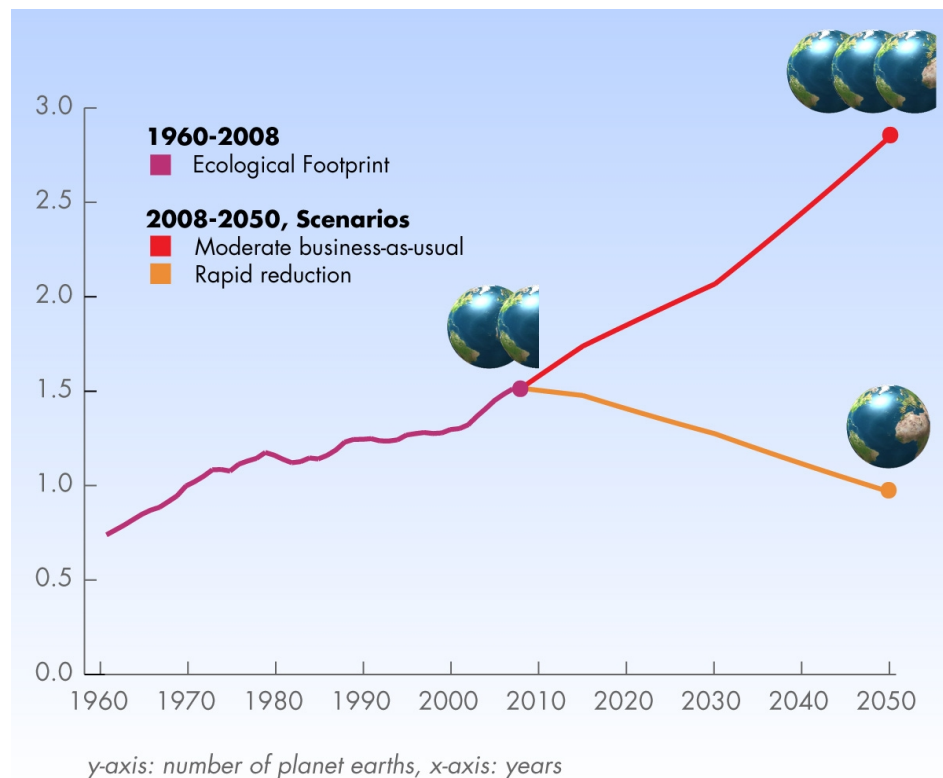


Figure 7.11: **Our present trajectory is completely unsustainable. If we follow it, then by 2050 it would take almost three earths to regenerate our demands on resources.** Source: footprintnetwork.org

today will require more resources per capita, rather than less. it seems likely that in the era beyond fossil fuels, the optimum global population will be considerably less than the present population of the world.

Limitations on cropland

In 1944 the Norwegian-American plant geneticist Norman Borlaug was sent to Mexico by the Rockefeller Foundation to try to produce new wheat varieties that might increase Mexico's agricultural output. Borlaug's dedicated work on this project was spectacularly successful. He remained with the project for 16 years, and his group made 6,000 individual crossings of wheat varieties to produce high-yield disease-resistant strains.

In 1963, Borlaug visited India, bringing with him 100 kg. of seeds from each of his most promising wheat strains. After testing these strains in Asia, he imported 450 tons of the Lerma Rojo and Sonora 64 varieties: 250 tons for Pakistan and 200 for India. By 1968, the success of these varieties was so great that school buildings had to be commandeered to store the output. Borlaug's work began to be called a "Green Revolution". In India, the research on high-yield crops was continued and expanded by Prof. M.S. Swaminathan



Figure 7.12: Norman Borlaug and agronomist George Harrer in 1943. Source: beforeitsnews.com

and his co-workers. The work of Green Revolution scientists, such Norman Borlaug and M.S. Swaminathan, has been credited with saving the lives of as many as a billion people.

Despite these successes, Borlaug believes that the problem of population growth is still a serious one. “Africa and the former Soviet republics”, Borlaug states, “and the Cerrado, are the last frontiers. After they are in use, the world will have no additional sizable blocks of arable land left to put into production, unless you are willing to level whole forests, which you should not do. So, future food-production increases will have to come from higher yields. And though I have no doubt that yields will keep going up, whether they can go up enough to feed the population monster is another matter. Unless progress with agricultural yields remains very strong, the next century will experience human misery that, on a sheer numerical scale, will exceed the worst of everything that has come before.”

With regard to the prospect of increasing the area of cropland, a report by the United Nations Food and Agricultural Organization (Provisional Indicative World Plan for Agricultural Development, FAO, Rome, 1970) states that “In Southern Asia,... in some countries of Eastern Asia, in the Near East and North Africa... there is almost no scope for expanding agricultural area... In the drier regions, it will even be necessary to return to permanent pasture the land that is marginal and submarginal for cultivation. In most of Latin America and Africa south of the Sahara, there are still considerable possibilities for expanding cultivated areas; but the costs of development are high, and it will often be more economical to intensify the utilization of areas already settled.” Thus there is a possibility of increasing the area of cropland in Africa south of the Sahara and in Latin America, but only at the cost of heavy investment and at the additional cost of destruction of tropical

rain forests.

Rather than an increase in the global area of cropland, we may encounter a future loss of cropland through soil erosion, salination, desertification, loss of topsoil, depletion of minerals in topsoil, urbanization and failure of water supplies. In China and in the Southwestern part of the United States, water tables are falling at an alarming rate. The Ogallala aquifer (which supplies water to many of the plains states in the central and southern parts of the United States) has a yearly overdraft of 160%.

In the 1950's, both the U.S.S.R and Turkey attempted to convert arid grasslands into wheat farms. In both cases, the attempts were defeated by drought and wind erosion, just as the wheat farms of Oklahoma were overcome by drought and dust in the 1930's. If irrigation of arid lands is not performed with care, salt may be deposited, so that the land is ruined for agriculture. This type of desertification can be seen, for example, in some parts of Pakistan. Another type of desertification can be seen in the Sahel region of Africa, south of the Sahara. Rapid population growth in the Sahel has led to overgrazing, destruction of trees, and wind erosion, so that the land has become unable to support even its original population.

Especially worrying is a prediction of the International Panel on Climate Change concerning the effect of global warming on the availability of water: According to Model A1 of the IPCC, global warming may, by the 2050's, have reduced by as much as 30% the water available in large areas of world that now are large producers of grain.

Added to the agricultural and environmental problems, are problems of finance and distribution. Famines can occur even when grain is available somewhere in the world, because those who are threatened with starvation may not be able to pay for the grain, or for its transportation. The economic laws of supply and demand are not able to solve this type of problem. One says that there is no "demand" for the food (meaning demand in the economic sense), even though people are in fact starving.¹²

Energy-dependence of modern agriculture

A very serious problem with Green Revolution plant varieties is that they require heavy inputs of pesticides, fertilizers and irrigation. Because of this, the use of high-yield varieties contributes to social inequality, since only rich farmers can afford the necessary inputs. Monocultures, such as the Green Revolution varieties may also prove to be vulnerable to future epidemics of plant diseases, such as the epidemic that caused the Irish Potato Famine in 1845. Even more importantly, pesticides, fertilizers and irrigation all depend on the use of fossil fuels. One must therefore ask whether high agricultural yields can be maintained in the future, when fossil fuels are expected to become prohibitively scarce and

¹²<http://www.independent.co.uk/environment/climate-change/society-will-collapse-by-2040-due-to-catastrophic-food-shortages-says-study-10336406.html>
<http://www.truth-out.org/news/item/32131-the-new-climate-normal-abrupt-sea-level-rise-and-predictions-of-civilization-collapse>
<http://www.commondreams.org/views/2015/08/13/dignity-democracy-and-food-interview-frances-moore-lappe>

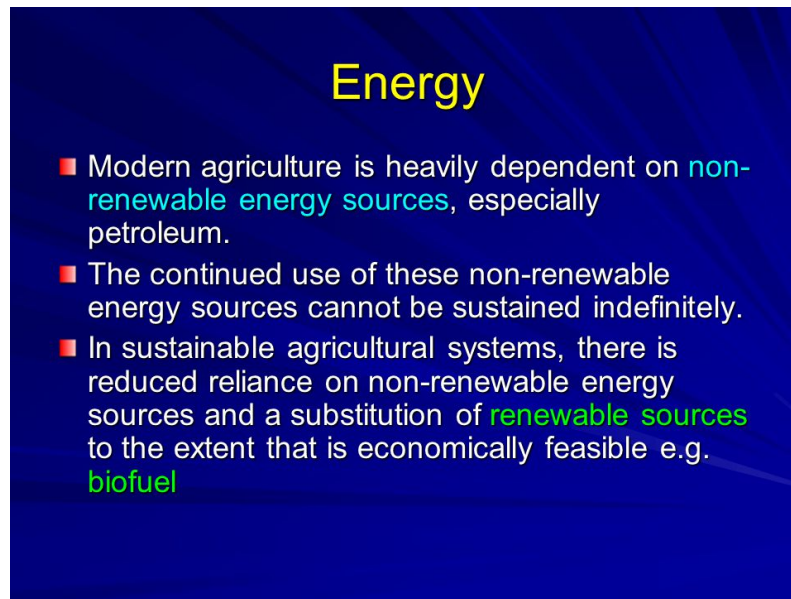


Figure 7.13: **Source: slideplayer.com**

expensive.

Modern agriculture has become highly dependent on fossil fuels, especially on petroleum and natural gas. This is especially true of production of the high-yield grain varieties introduced in the Green Revolution, since these require especially large inputs of fertilizers, pesticides and irrigation. Today, fertilizers are produced using oil and natural gas, while pesticides are synthesized from petroleum feedstocks, and irrigation is driven by fossil fuel energy. Thus agriculture in the developed countries has become a process where inputs of fossil fuel energy are converted into food calories.

The ratio of the fossil fuel energy inputs to the food calorie outputs depends on how many energy-using elements of food production are included in the accounting. David Pimental and Mario Giampietro of Cornell University estimated in 1994 that U.S. agriculture required 0.7 kcal of fossil fuel energy inputs to produce 1.0 kcal of food energy. However, this figure was based on U.N. statistics that did not include fertilizer feedstocks, pesticide feedstocks, energy and machinery for drying crops, or electricity, construction and maintenance of farm buildings. A more accurate calculation, including these inputs, gives an input/output ratio of approximately 1.0. Finally, if the energy expended on transportation, packaging and retailing of food is included, Pimental and Giampietro found that the input/output ratio for the U.S. food system was approximately 10, and this figure did not include energy used for cooking.

The Brundtland Report's estimate of the global potential for food production assumes "that the area under food production can be around 1.5 billion hectares (3.7 billion acres - close to the present level), and that the average yields could go up to 5 tons of grain equivalent per hectare (as against the present average of 2 tons of grain equivalent)." In other words, the Brundtland Report assumes an increase in yields by a factor of 2.5.

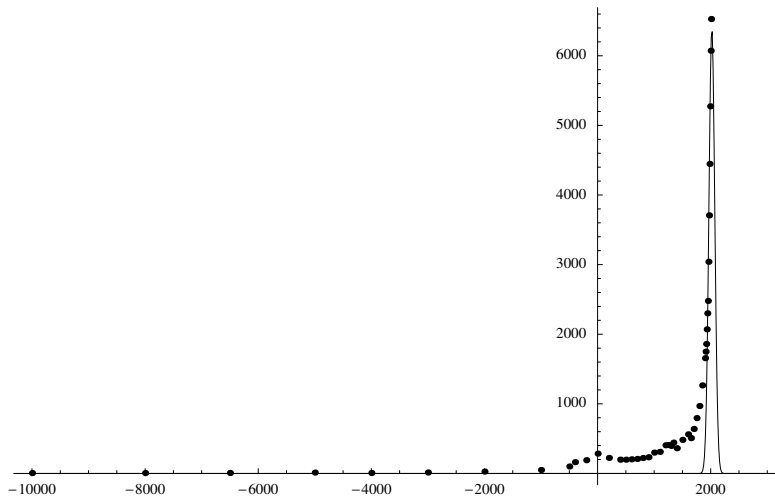


Figure 7.14: **Population growth and fossil fuel use, seen on a time-scale of several thousand years. The dots are population estimates in millions from the US Census Bureau. Fossil fuel use appears as a spike-like curve, rising from almost nothing to a high value, and then falling again to almost nothing in the space of a few centuries. When the two curves are plotted together, the explosive rise of global population is seen to be simultaneous with, and perhaps partially driven by, the rise of fossil fuel use. This raises the question of whether the world's population is headed for a crash when the fossil fuel era has ended. (Author's own graph)**

This would perhaps be possible if traditional agriculture could everywhere be replaced by energy-intensive modern agriculture using Green Revolution plant varieties. However, Pimental and Giampietro's studies show that modern energy-intensive agricultural techniques cannot be maintained after fossil fuels have been exhausted or after their use has been discontinued to avoid catastrophic climate change.

At the time when the Brundtland Report was written (1987), the global average of 2 tons of grain equivalent per hectare included much higher yields from the sector using modern agricultural methods. Since energy-intensive petroleum-based agriculture cannot be continued in the post-fossil-fuel era, future average crop yields will probably be much less than 2 tons of grain equivalent per hectare.

The 1987 global population was approximately 5 billion. This population was supported by 3 billion tons of grain equivalent per year. After fossil fuels have been exhausted, the total world agricultural output is likely to be considerably less than that, and therefore the population that it will be possible to support sustainably will probably be considerably less than 5 billion, assuming that our average daily per capita use of food calories remains the same, and assuming that the amount of cropland and pasturage remains the same (1.5 billion hectares cropland, 3.0 billion hectares pasturage).

The Brundtland Report points out that “The present (1987) global average consumption of plant energy for food, seed and animal feed amounts to 6,000 calories daily, with a range among countries of 3,000-15,000 calories, depending on the level of meat consumption.” Thus there is a certain flexibility in the global population that can survive on a given total agricultural output. If the rich countries were willing to eat less meat, more people could be supported.¹³

Effects of climate change on agriculture

a) The effect of temperature increase

There is a danger that when climate change causes both temperature increases and increased aridity in regions like the US grain belt, yields will be very much lowered. Of the three main grain types (corn, wheat and rice) corn is the most vulnerable to the direct effect of increases in temperature. One reason for this is the mechanism of pollination of corn: A pollen grain lands on one end of a corn-silk strand, and the germ cell must travel the length of the strand in order to fertilize the kernel. At high temperatures, the corn silk becomes dried out and withered, and is unable to fulfill its biological function. Furthermore, heat can cause the pores on the underside of the corn leaf to close, so that photosynthesis stops.

According to a study made by Mohan Wali and coworkers at Ohio State University, the photosynthetic activity of corn increases until the temperature reaches 20°C. It then remains constant until the temperature reaches 35°C, after which it declines. At 40°C and above, photosynthesis stops altogether.

Scientists in the Phillipines report that the pollination of rice fails entirely at 40°C, leading to crop failures. Wheat yields are also markedly reduced by temperatures in this range.¹⁴

b) The effect of decreased rainfall

According to the Stern Report, some of the major grain-producing areas of the world might loose up to 30% of their rainfall by 2050. These regions include much of the United States, Brazil, the Mediterranean region, Eastern Russia and Belarus, the Middle East, Southern Africa and Australia. Of course possibilities for agriculture may simultaneously increase in other regions, but the net effect of climate change on the world's food supply is predicted to be markedly negative.

c) Unsustainable use of groundwater

¹³<http://www.truth-out.org/news/item/32354-environmentalists-sue-epa-over-dead-zone-in-gulf-of-mexico>

¹⁴<http://ecowatch.com/2015/08/03/heat-wave-iran/>



Figure 7.15: Lester R. Brown has been a pioneer in the study of the future global food crisis. Source: www.azquotes.com

It may seem surprising that fresh water can be regarded as a non-renewable resource. However, groundwater in deep aquifers is often renewed very slowly. Sometimes renewal requires several thousand years. When the rate of withdrawal of groundwater exceeds the rate of renewal, the carrying capacity of the resource has been exceeded, and withdrawal of water becomes analogous to mining a mineral. However, it is more serious than ordinary mining because water is such a necessary support for life.

In many regions of the world today, groundwater is being withdrawn faster than it can be replenished, and important aquifers are being depleted. In China, for example, groundwater levels are falling at an alarming rate. Considerations of water supply in relation to population form the background for China's stringent population policy. At a recent lecture, Lester Brown of the Worldwatch Institute was asked by a member of the audience to name the resource for which shortages would most quickly become acute. Most of the audience expected him to name oil, but instead he replied "water".

Lester Brown then cited China's falling water table. He predicted that within decades, China would be unable to feed itself. He said that this would not cause hunger in China itself: Because of the strength of China's economy, the country would be able to purchase grain on the world market. However Chinese purchases of grain would raise the price, and put world grain out of reach of poor countries in Africa. Thus water shortages in China will produce famine in parts of Africa, Brown predicted.

Under many desert areas of the world are deeply buried water tables formed during glacial periods when the climate of these regions was wetter. These regions include the Middle East and large parts of Africa. Water can be withdrawn from such ancient reservoirs by deep wells and pumping, but only for a limited amount of time.

In oil-rich Saudi Arabia, petroenergy is used to drill wells for ancient water and to bring

it to the surface. Much of this water is used to irrigate wheat fields, and this is done to such an extent that Saudi Arabia exports wheat. The country is, in effect, exporting its ancient heritage of water, a policy that it may, in time, regret. A similarly short-sighted project is Muammar Qaddafi's enormous pipeline, which will bring water from ancient sub-desert reservoirs to coastal cities.

In the United States, the great Ogallala aquifer is being overdrawn. This aquifer is an enormous stratum of water-saturated sand and gravel under-lying parts of northern Texas, Oklahoma, New Mexico, Kansas, Colorado, Nebraska, Wyoming and South Dakota. The average thickness of the aquifer is about 70 meters. The rate of water withdrawal from the aquifer exceeds the rate of recharge by a factor of eight.

Thus we can see that in many regions, the earth's present population is living on its inheritance of water, rather than its income. This fact, coupled with rapidly increasing populations and climate change, may contribute to a very serious food crisis partway through the 21st century.

d) Glacial melting and summer water supplies

The summer water supplies of both China and India are threatened by the melting of glaciers. The Gangotri glacier, which is the principle glacier feeding India's great Ganges River, is reported to be melting at an accelerating rate, and it could disappear within a few decades. If this happens, the Ganges could become seasonal, flowing only during the monsoon season. Chinese agriculture is also threatened by disappearing Himalayan glaciers, in this case those on the Tibet-Quinghai Plateau. The respected Chinese glaciologist Yao Tandong estimates that the glaciers feeding the Yangtze and Yellow Rivers are disappearing at the rate of 7% per year.¹⁵

The Indus and Mekong Rivers will be similarly affected by the melting of glaciers. Lack of water during the summer season could have a serious impact on the irrigation.

Mature forests contain vast amounts of sequestered carbon, not only in their trees, but also in the carbon-rich soil of the forest floor. When a forest is logged or burned to make way for agriculture, this carbon is released into the atmosphere.

One fifth of the global carbon emissions are at present due to destruction of forests. This amount is greater than the CO₂ emissions for the world's transportation systems. An intact forest pumps water back into the atmosphere, increasing inland rainfall and benefiting agriculture. By contrast, deforestation, for example in the Amazonian rainforest, accelerates the flow of water back into the ocean, thus reducing inland rainfall. There is a danger that the Amazonian rainforest may be destroyed to such an extent that the region will become much more dry. If this happens, the forest may become vulnerable to fires produced by lightning strikes. This is one of the feedback loops against which the Stern Report warns: the drying and burning of the Amazonian rainforest may become irreversible, greatly accelerating climate change, if destruction of the forest proceeds beyond

¹⁵<http://www.commondreams.org/news/2015/08/04/global-glaciers-melting-three-times-rate-20th-century>



Figure 7.16: Whitechuck Glacier in the North Cascades National Park in 1973.
Source: www.nichols.edu



Figure 7.17: The same glacier in 2006. Source: www.nichols.edu

a certain point.

e) Erosion of topsoil.

Besides depending on an adequate supply of water, food production also depends on the condition of the thin layer of topsoil that covers the world's croplands. This topsoil is being degraded and eroded at an alarming rate: According to the World Resources Institute and the United Nations Environment Programme, "It is estimated that since World War II, 1.2 billion hectares... has suffered at least moderate degradation as a result of human activity. This is a vast area, roughly the size of China and India combined." This area is 27% of the total area currently devoted to agriculture. The report goes on to say that the degradation is greatest in Africa. The risk of topsoil erosion is greatest when marginal land is brought into cultivation, since marginal land is usually on steep hillsides which are vulnerable to water erosion when wild vegetation is removed.

David Pimental and his associates at Cornell University pointed out in 1995 that "Because of erosion-associated loss of productivity and population growth, the per capita food supply has been reduced over the past 10 years and continues to fall. The Food and Agricultural Organization reports that the per capita production of grains which make up 80% of the world's food supply, has been declining since 1984...During the past 40 years nearly one-third of the world's cropland (1.5 billion hectares) has been abandoned because of soil erosion and degradation. Most of the replacement has come from marginal land made available by removing forests. Agriculture accounts for 80% of the annual deforestation."

Topsoil can also be degraded by the accumulation of salt when irrigation water evaporates. The worldwide area of irrigated land has increased from 8 million hectares in 1800 to more than 100 million hectares today. This land is especially important to the world food supply because it is carefully tended and yields are large in proportion to the area. To protect this land from salination, it should be irrigated in such a way that evaporation is minimized.

Finally cropland with valuable topsoil is being lost to urban growth and highway development, a problem that is made more severe by growing populations and by economic growth.

Every year, more than 100,000 square kilometers of rain forest are cleared and burned, an area which corresponds to that of Switzerland and the Netherlands combined. Almost half of the world's tropical forests have already been destroyed. Ironically, the land thus cleared often becomes unsuitable for agriculture within a few years. Tropical soils may seem to be fertile when covered with luxuriant vegetation, but they are usually very poor in nutrients because of leeching by heavy rains. The nutrients which remain are contained in the vegetation itself; and when the forest cover is cut and burned, the nutrients are rapidly lost.

Often the remaining soil is rich in aluminum oxide and iron oxide. When such soils are exposed to oxygen and sun-baking, a rock-like substance called Laterite is formed.

Secret land purchases in Africa

According to a report released by the Oakland Institute, in 2009 alone, hedge funds bought or leased nearly 60 million hectares of land in Africa, an area the size of France.

As populations increase, and as water becomes scarce, China, and other countries, such as Saudi Arabia are also buying enormous tracts of agricultural land, not only in Africa, but also in other countries.

These land purchases are very often kept secret from the local populations by corrupt governments.¹⁶

Some conclusions

There is a danger that just as global population reaches the unprecedented level of 9 billion or more, the agricultural base for supporting it may suddenly collapse. Ecological catastrophe, possibly compounded by war and other disorders, could produce famine and death on a scale unprecedented in history, a disaster of unimaginable proportions, involving billions rather than millions of people.

The resources of the earth and the techniques of modern science can support a global population of moderate size in comfort and security; but the optimum size is undoubtedly smaller than the world's present population. Given a sufficiently small global population, renewable sources of energy can be found to replace disappearing fossil fuels. Technology may also be able to find renewable substitutes for many disappearing mineral resources for a global population of moderate size. What technology cannot do, however, is to give a global population of 9 billion people the standard of living which the industrialized countries enjoy today.

7.4 The threats and costs of war

The direct and indirect costs of war

The costs of war, both direct and indirect, are so enormous that they are almost beyond comprehension. We face a direct threat because a thermonuclear war may destroy human civilization and much of the biosphere, and an indirect threat because the institution of war interferes seriously with the use of tax money for constructive and peaceful purposes.

Today, despite the end of the Cold War, the world spends roughly 1.7 trillion (i.e. 1.7 million million) US dollars each year on armaments. This colossal flood of money could have been used instead for education, famine relief, development of infrastructure, or on urgently needed public health measures.

The World Health Organization lacks funds to carry through an antimalarial program on as large a scale as would be desirable, but the entire program could be financed for

¹⁶<http://www.latimes.com/world/asia/la-fg-china-foreign-farmland-20140329-story.html>
<http://www.bbc.com/news/world-africa-13688683>



Figure 7.18: **Children born with birth defects due to the US use of Agent Orange during the Vietnam War. Source: stopwarcoalition.org**

less than our military establishments spend in a single day. Five hours of world arms spending is equivalent to the total cost of the 20-year WHO campaign that resulted in the eradication of smallpox. For every 100,000 people in the world, there are 556 soldiers, but only 85 doctors. Every soldier costs an average of \$20,000 per year, while the average spent on education is only \$380 per school-aged child. With a diversion of funds consumed by three weeks of military spending, the world could create a sanitary water supply for all its people, thus eliminating the cause of almost half of all human illness.

A new drug-resistant form of tuberculosis has recently become widespread in Asia and in the former Soviet Union. In order to combat this new and highly dangerous form of tuberculosis and to prevent its spread, WHO needs \$500 million, an amount equivalent to 1.2 hours of world arms spending.

Today's world is one in which roughly ten million children die every year from starvation or from diseases related to poverty. Besides this enormous waste of young lives through malnutrition and preventable disease, there is a huge waste of opportunities through inadequate education. The rate of illiteracy in the 25 least developed countries is 80%, and the total number of illiterates in the world is estimated to be 800 million. Meanwhile every 60 seconds the world spends \$6.5 million on armaments.

It is plain that if the almost unbelievable sums now wasted on the institution of war were used constructively, most of the pressing problems of humanity could be solved, but today the world spends more than 20 times as much on war as it does on development.

Medical and psychological consequences; loss of life

While in earlier epochs it may have been possible to confine the effects of war mainly to combatants, in the 20th century the victims of war were increasingly civilians, and especially children. For example, according to Quincy Wright's statistics, the First and Second World Wars cost the lives of 26 million soldiers, but the toll in civilian lives was much larger: 64 million.

Since the Second World War, despite the best efforts of the UN, there have been over 150 armed conflicts; and, if civil wars are included, there are on any given day an average of 12 wars somewhere in the world. In the conflicts in Indo-China, the proportion of civilian



Figure 7.19: A little girl cries as medics attend to her injuries at al-Shifa hospital in Gaza in 2014, during the conflict. Photo: UNICEF/Eyad El Baba

victims was between 80% and 90%, while in the Lebanese civil war some sources state that the proportion of civilian casualties was as high as 97%.

Civilian casualties often occur through malnutrition and through diseases that would be preventable in normal circumstances. Because of the social disruption caused by war, normal supplies of food, safe water and medicine are interrupted, so that populations become vulnerable to famine and epidemics.¹⁷

Effects of war on children

According to UNICEF figures, 90% of the casualties of recent wars have been civilians, and 50% children. The organization estimates that in recent years, violent conflicts have driven 20 million children from their homes. They have become refugees or internally displaced persons within their own countries.

During the last decade 2 million children have been killed and 6 million seriously injured or permanently disabled as the result of armed conflicts, while 1 million children have been orphaned or separated from their families. Of the ten countries with the highest rates of death of children under five years of age, seven are affected by armed conflicts. UNICEF estimates that 300,000 child soldiers are currently forced to fight in 30 armed conflicts throughout the world. Many of these have been forcibly recruited or abducted.

Even when they are not killed or wounded by conflicts, children often experience painful psychological traumas: the violent death of parents or close relatives, separation from their families, seeing family members tortured, displacement from home, disruption of ordinary life, exposure to shelling and other forms of combat, starvation and anxiety about the

¹⁷<http://www.cadmusjournal.org/article/volume-2/issue-2-part-3/lessons-world-war-i>
<http://www.truth-out.org/opinion/item/27201-the-leading-terrorist-state>



Figure 7.20: The first victim of a child soldier is childhood. Authors; Rafaela Tasca and Carlos Latuff. Source: <http://www.indymedia.org.uk>, Free Art License, Wikimedia Commons



Figure 7.21: Asylum-seekers in a holding centre on Greece's Samos Island. Photo: UNHCR/A. D'Amato

future.¹⁸

Refugees

Human Rights Watch estimates that in 2001 there were 15 million refugees in the world, forced from their countries by war, civil and political conflict, or by gross violations of human rights. In addition, there were an estimated 22 million internally displaced persons, violently forced from their homes but still within the borders of their countries.

In 2001, 78% of all refugees came from ten areas: Afghanistan, Angola, Burma, Burundi, Congo-Kinshasa, Eritria, Iraq, the Palestinian territories, Somalia and Sudan. A quarter of all refugees are Palestinians, who make up the world's oldest and largest refugee population. 45% of the world's refugees have found sanctuaries in Asia, 30% in Africa, 19% in Europe and 5% in North America.

Refugees who have crossed an international border are in principle protected by Article 14 of the Universal Declaration of Human Rights, which affirms their right "to seek and to enjoy in other countries asylum from persecution". In 1950 the Office of the High Commissioner for Refugees was created to implement Article 14, and in 1951 the Convention Relating to the Status of Refugees was adopted by the UN. By 2002 this legally binding treaty had been signed by 140 nations. However the industrialized countries have recently adopted a very hostile and restrictive attitude towards refugees, subjecting them to arbitrary arrests, denial of social and economic rights, and even forcible return to countries in which they face persecution.

The status of internally displaced persons is even worse than that of refugees who have crossed international borders. In many cases the international community simply ignores

¹⁸<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2080482/>

their suffering, reluctant to interfere in the internal affairs of sovereign states. In fact, the United Nations Charter is self-contradictory in this respect, since on the one hand it calls for non-interference in the internal affairs of sovereign states, but on the other hand, people everywhere are guaranteed freedom from persecution by the Charter's Universal Declaration of Human Rights.¹⁹

Damage to infrastructure

Most insurance policies have clauses written in fine print exempting companies from payment of damage caused by war. The reason for this is simple. The damage caused by war is so enormous that insurance companies could never come near to paying for it without going bankrupt.

We mentioned above that the world spends 1.7 trillion dollars each year on preparations for war. A similarly colossal amount is needed to repair the damage to infrastructure caused by war. Sometimes this damage is unintended, but sometimes it is intentional.

During World War II, one of the main aims of air attacks by both sides was to destroy the industrial infrastructure of the opponent. This made some sense in a war expected to last several years, because the aim was to prevent the enemy from producing more munitions. However, during the Gulf War of 1990, the infrastructure of Iraq was attacked, even though the war was expected to be short. Electrical generating plants and water purification facilities were deliberately destroyed with the apparent aim of obtaining leverage over Iraq after the war.

In general, because war has such a catastrophic effect on infrastructure, it can be thought of as the opposite of development. War is the greatest generator of poverty.²⁰

Ecological damage

Warfare during the 20th century has not only caused the loss of 175 million lives (primarily civilians) - it has also caused the greatest ecological catastrophes in human history. The damage takes place even in times of peace. Studies by Joni Seager, a geographer at the University of Vermont, conclude that "a military presence anywhere in the world is the single most reliable predictor of ecological damage".

Modern warfare destroys environments to such a degree that it has been described as an "environmental holocaust." For example, herbicides use in the Vietnam War killed an estimated 6.2 billion board-feet of hardwood trees in the forests north and west of Saigon, according to the American Association for the Advancement of Science. Herbicides such as Agent Orange also made enormous areas of previously fertile land unsuitable for agriculture for many years to come. In Vietnam and elsewhere in the world, valuable agricultural land

¹⁹<https://www.hrw.org/topic/refugees>

²⁰<https://www.wsws.org/en/articles/2002/11/iraq-n04.html>

<http://www.globalresearch.ca/crimes-against-humanity-the-destruction-of-iraqs-electricity-infrastructure-the-social-economic-and-environmental-impacts/5355665>

<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/00157630-EN-ERP-48.PDF>



Figure 7.22: Image source: Greenpeace

has also been lost because land mines or the remains of cluster bombs make it too dangerous for farming.

During the Gulf War of 1990, the oil spills amounted to 150 million barrels, 650 times the amount released into the environment by the notorious Exxon Valdez disaster. During the Gulf War an enormous number of shells made of depleted uranium were fired. When the dust produced by exploded shells is inhaled it often produces cancer, and it will remain in the environment of Iraq for decades.

Radioactive fallout from nuclear tests pollutes the global environment and causes many thousands of cases of cancer, as well as birth abnormalities. Most nuclear tests have been carried out on lands belonging to indigenous peoples. Agent Orange also produced cancer, birth abnormalities and other serious forms of illness both in the Vietnamese population and among the foreign soldiers fighting in Vietnam²¹

The threat of nuclear war

As bad as conventional arms and conventional weapons may be, it is the possibility of a catastrophic nuclear war that poses the greatest threat to humanity. There are today roughly 16,000 nuclear warheads in the world. The total explosive power of the warheads that exist or that could be made on short notice is approximately equal to 500,000 Hiroshima bombs.

To multiply the tragedy of Hiroshima by a factor of half a million makes an enormous difference, not only quantitatively, but also qualitatively. Those who have studied the question believe that a nuclear catastrophe today would inflict irreversible damage on our civilization, genetic pool and environment.

²¹<http://www.dailymail.co.uk/news/article-2401378/Agent-Orange-Vietnamese-children-suffering-effects-herbicide-sprayed-US-Army-40-years-ago.html>



Figure 7.23: The 15 megaton explosion detonated by the United States at Bikini Atoll in 1954 produced lasting biological damage to humans and animals living on the distant Marshall Islands. Today, half a century later, the islanders still experience radiation sickness in the form of leukemia and birth defects. Source: www.theguardian.com

Thermonuclear weapons consist of an inner core where the fission of uranium-235 or plutonium takes place. The fission reaction in the core is able to start a fusion reaction in the next layer, which contains isotopes of hydrogen. It is possible to add a casing of ordinary uranium outside the hydrogen layer, and under the extreme conditions produced by the fusion reaction, this ordinary uranium can undergo fission. In this way, a fission-fusion-fission bomb of almost limitless power can be produced.

For a victim of severe radiation exposure, the symptoms during the first week are nausea, vomiting, fever, apathy, delirium, diarrhoea, oropharyngeal lesions and leukopenia. Death occurs during the first or second week.

We can perhaps be helped to imagine what a nuclear catastrophe means in human terms by reading the words of a young university professor, who was 2,500 meters from the hypocenter at the time of the bombing of Hiroshima: “Everything I saw made a deep impression: a park nearby covered with dead bodies... very badly injured people evacuated in my direction... Perhaps most impressive were girls, very young girls, not only with their clothes torn off, but their skin peeled off as well. ... My immediate thought was that this was like the hell I had always read about. ... I had never seen anything which resembled it before, but I thought that should there be a hell, this was it.”

One argument that has been used in favor of nuclear weapons is that no sane political leader would employ them. However, the concept of deterrence ignores the possibility of war by accident or miscalculation, a danger that has been increased by nuclear proliferation and by the use of computers with very quick reaction times to control weapons systems.

Recent nuclear power plant accidents remind us that accidents frequently happen through human and technical failure, even for systems which are considered to be very “safe.” We must also remember the time scale of the problem. To assure the future of humanity,



Figure 7.24: A nuclear war would be an ecological disaster, making large portions of the world permanently uninhabitable because of long-lasting radioactivity. Chernobyl radiation map 1996 30km zone by CIA Factbook. Licensed under CC BY-SA 2.5 via Wikimedia Commons.



Figure 7.25: Sculpture depicting Saint George slaying the dragon. The dragon is created from fragments of Soviet SS-20 and United States Pershing nuclear missiles. UN Photo/Milton Grant

nuclear catastrophe must be avoided year after year and decade after decade. In the long run, the safety of civilization cannot be achieved except by the abolition of nuclear weapons, and ultimately the abolition of the institution of war.

In 1985, International Physicians for the Prevention of Nuclear War received the Nobel Peace Prize. IPPNW had been founded in 1980 by six physicians, three from the Soviet Union and three from the United States. Today, the organization has wide membership among the world's physicians. Professor Bernard Lowen of the Harvard School of Public Health, one of the founders of IPPNW, said in a recent speech:

"...No public health hazard ever faced by humankind equals the threat of nuclear war. Never before has man possessed the destructive resources to make this planet uninhabitable... Modern medicine has nothing to offer, not even a token benefit, in the event of nuclear war..."

"We are but transient passengers on this planet Earth. It does not belong to us. We are not free to doom generations yet unborn. We are not at liberty to erase humanity's past or dim its future. Social systems do not endure for eternity. Only life can lay claim to uninterrupted continuity. This continuity is sacred."

The danger of a catastrophic nuclear war casts a dark shadow over the future of our species. It also casts a very black shadow over the future of the global environment. The environmental consequences of a massive exchange of nuclear weapons have been treated in a number of studies by meteorologists and other experts from both East and West. They predict that a large-scale use of nuclear weapons would result in fire storms with very high winds and high temperatures, which would burn a large proportion of the wild land fuels in the affected nations. The resulting smoke and dust would block out sunlight for a period of many months, at first only in the northern hemisphere but later also in the southern hemisphere.

Temperatures in many places would fall far below freezing, and much of the earth's plant life would be killed. Animals and humans would then die of starvation. The nuclear winter

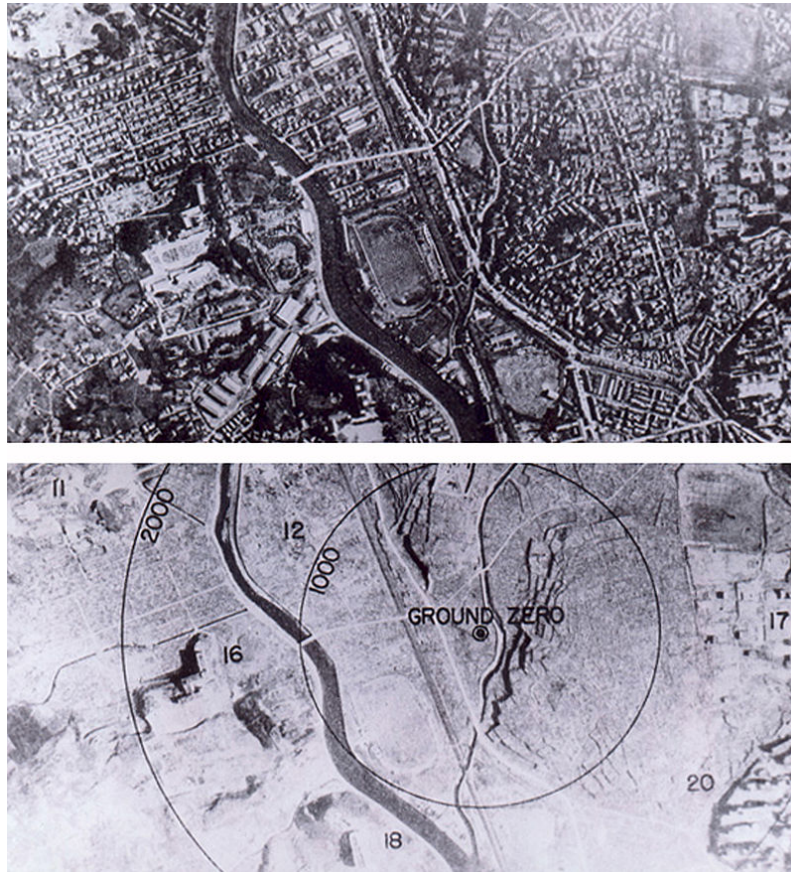


Figure 7.26: Nagasaki before and after the nuclear bombing, Public domain

effect was first discovered as a result of the Mariner 9 spacecraft exploration of Mars in 1971. The spacecraft arrived in the middle of an enormous dust-storm on Mars, and measured a large temperature drop at the surface of the planet, accompanied by a heating of the upper atmosphere. These measurements allowed scientists to check their theoretical models for predicting the effect of dust and other pollutants distributed in planetary atmospheres.

Using experience gained from the studies of Mars, R.P. Turco, O.B. Toon, T. Ackerman, J.B. Pollack and C. Sagan made a computer study of the climatic effects of the smoke and dust that would result from a large-scale nuclear war. This early research project is sometimes called the TTAPS Study, after the initials of the authors.

In April 1983, a special meeting was held in Cambridge, Massachusetts, where the results of the TTAPS Study and other independent studies of the nuclear winter effect were discussed by more than 100 experts. Their conclusions were presented at a forum in Washington, D.C., the following December, under the chairmanship of U.S. Senators Kennedy and Hatfield. The numerous independent studies of the nuclear winter effect all agreed of the following main predictions:

High-yield nuclear weapons exploded near the earth's surface would put large amounts of dust into the upper atmosphere. Nuclear weapons exploded over cities, forests, oilfields and refineries would produce fire storms of the type experienced in Dresden and Hamburg after incendiary bombings during the Second World War. The combination of high-altitude dust and lower altitude soot would prevent sunlight from reaching the earth's surface, and the degree of obscuration would be extremely high for a wide range of scenarios.

A baseline scenario used by the TTAPS study assumes a 5,000-megaton nuclear exchange, but the threshold for triggering the nuclear winter effect is believed to be much lower than that. After such an exchange, the screening effect of pollutants in the atmosphere might be so great that, in the northern and middle latitudes, the sunlight reaching the earth would be only 1% of ordinary sunlight on a clear day, and this effect would persist for many months. As a result, the upper layers in the atmosphere might rise in temperature by as much as 100 °C, while the surface temperatures would fall, perhaps by as much as 50 °C.

The temperature inversion produced in this way would lead to superstability, a condition in which the normal mixing of atmospheric layers is suppressed. The hydrological cycle (which normally takes moist air from the oceans to a higher and cooler level, where the moisture condenses as rain) would be strongly suppressed. Severe droughts would thus take place over continental land masses. The normal cleansing action of rain would be absent in the atmosphere, an effect which would prolong the nuclear winter.

In the northern hemisphere, forests would die because of lack of sunlight, extreme cold, and drought. Although the temperature drop in the southern hemisphere would be less severe, it might still be sufficient to kill a large portion of the tropical forests, which normally help to renew the earth's oxygen.

The oxygen content of the atmosphere would then fall dangerously, while the concentration of carbon dioxide and oxides of nitrogen produced by firestorms would remain high. The oxides of nitrogen would ultimately diffuse to the upper atmosphere, where they would destroy the ozone layer.

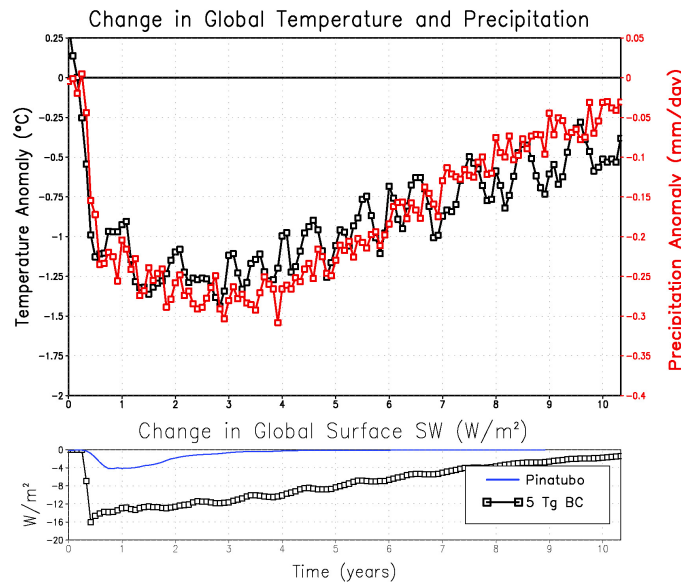


Figure 7.27: **Predicted changes in global temperature, precipitation and surface illumination over a ten-year period after a nuclear war. (Standard 5Tg case)**
Source: Alan Robock, Rutgers University

Thus, even when the sunlight returned after an absence of many months, it would be sunlight containing a large proportion of the ultraviolet frequencies which are normally absorbed by the ozone in the stratosphere, and therefore a type of light dangerous to life. Finally, after being so severely disturbed, there is no guarantee that the global climate would return to its normal equilibrium.

Even a nuclear war below the threshold of nuclear winter might have climatic effects very damaging to human life. Professor Paul Ehrlich, of Stanford University, has expressed this in the following words:

“...A smaller war, which set off fewer fires and put less dust into the atmosphere, could easily depress temperatures enough to essentially cancel grain production in the northern hemisphere. That in itself would be the greatest catastrophe ever delivered upon Homo Sapiens, just that one thing, not worrying about prompt effects. Thus even below the threshold, one cannot think of survival of a nuclear war as just being able to stand up after the bomb has gone off.”²²

²²<http://www.voanews.com/content/pope-francis-calls-for-nuclear-weapons-ban/2909357.html>
<http://www.cadmusjournal.org/article/issue-4/flaws-concept-nuclear-deterrence>
<http://www.countercurrents.org/avery300713.htm>
<https://www.wagingpeace.org/author/john-avery/>
<http://www.commondreams.org/news/2015/08/06/70-years-after-bombing-hiroshima-calls-abolish-nuclear-weapons>



Figure 7.28: Source: War Resisters international

Nuclear weapons are criminal! Every war is a crime!

War was always madness, always immoral, always the cause of unspeakable suffering, economic waste and widespread destruction, and always a source of poverty, hate, barbarism and endless cycles of revenge and counter-revenge. It has always been a crime for soldiers to kill people, just as it is a crime for murderers in civil society to kill people. No flag has ever been wide enough to cover up atrocities.

But today, the development of all-destroying modern weapons has put war completely beyond the bounds of sanity and elementary humanity.

Today, war is not only insane, but also a violation of international law. Both the United Nations Charter and the Nuremberg Principles make it a crime to launch an aggressive war. According to the Nuremberg Principles, every soldier is responsible for the crimes that he or she commits, even while acting under the orders of a superior officer.

Nuclear weapons are not only insane, immoral and potentially omnicidal, but also criminal under international law. In response to questions put to it by WHO and the UN General Assembly, the International Court of Justice ruled in 1996 that “the threat and use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and particularly the principles and rules of humanitarian law.” The only possible exception to this general rule might be “an extreme circumstance of self-defense, in which the very survival of a state would be at stake”. But the Court refused to say that even in this extreme circumstance the threat or use of nuclear weapons would be legal. It left the exceptional case undecided. In addition, the Court added unanimously that “there

<http://www.informationclearinghouse.info/article42488.htm>

<http://www.informationclearinghouse.info/article42492.htm>

<http://www.commondreams.org/views/2015/08/06/hiroshima-and-nagasaki-remembering-power>

<http://human-wrongs-watch.net/2015/07/22/israel-iran-and-the-nuclear-non-proliferation-treaty/>

<http://human-wrongs-watch.net/2015/06/25/militarisms-hostages/>

<http://human-wrongs-watch.net/2015/05/24/the-path-to-zero-dialogues-on-nuclear-dangers-by-richard-falk-and-david-krieger/>

<http://human-wrongs-watch.net/2015/03/30/europe-must-not-be-forced-into-a-nuclear-war-with-russia/>

<http://www.truth-out.org/opinion/item/32073-the-us-should-eliminate-its-nuclear-arsenal-not-modernize-it>

<http://www.cadmusjournal.org/article/issue-4/flaws-concept-nuclear-deterrence>

<http://www.cadmusjournal.org/article/issue-6/arms-trade-treaty-opens-new-possibilities-u>

<http://eruditio.worldacademy.org/issue-6/article/remember-your-humanity>

<http://www.informationclearinghouse.info/article42568.htm>

<https://firstlook.org/theintercept/2014/09/23/nobel-peace-prize-fact-day-syria-7th-country-bombed-obama/>

<http://www.informationclearinghouse.info/article42577.htm>

<http://www.informationclearinghouse.info/article42580.htm>

<http://human-wrongs-watch.net/2015/08/06/us-unleashing-of-atomic-weapons-against-civilian-populations-was-a-criminal-act-of-the-first-order/>

<http://human-wrongs-watch.net/2015/08/06/hiroshima-and-nagasaki-remembering-the-power-of-peace/>

<http://human-wrongs-watch.net/2015/08/04/atomic-bombing-hear-the-story-setsuko-thurlow/>

<http://human-wrongs-watch.net/2015/08/04/atomic-bombing-hear-the-story-yasuaki-yamashita/>

<http://human-wrongs-watch.net/2015/08/03/why-nuclear-weapons/>

exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control.”

Can we not rid ourselves of both nuclear weapons and the institution of war itself? We must act quickly and resolutely before our beautiful world and everything that we love are reduced to radioactive ashes.

7.5 Threats from right-wing extremism and racism

On Friday, 15 March, 2019, a white racist and extremist killed 49 people who were praying at two mosques in New Zealand, severely injuring many others. Brenton Tarrant, a 28-year-old Australian citizen, was arrested and charged with the attacks. He openly declared himself to be a fascist, avowing white supremacist ideology. In a so-called manifesto, the suspect refers to Trump as a “symbol of renewed white identity”.

In a recent Breitbart News interview, Donald Trump boasted about the toughness of his supporters, saying “I can tell you I have the support of the police, the support of the military, the support of the Bikers for Trump - I have the tough people, but they don’t play it tough - until they go to a certain point, and then it would be very bad, very bad.” Trump’s critics accused him of fomenting violence and promoting racist and extremist groups such as the Alt Right movement.

White neo-Nazi groups like Proud Boys and Alt Right have been hosted at Trump rallies. Alt Right leader Richard Spencer often gives Nazi salutes at conferences, shouting “Heil Trump!”

Speaking about a neo-Nazi rally in Charlottesville Virginia, former Klu Klux Klan Grand Wizard David Duke said: “We are determined to take our country back. We are going to fulfill the promises of Donald Trump. That’s what we believed in. That’s why we voted for Donald Trump, because he said he’s going to take our country back.” The Klu Klux Klan has a long history of murdering black people in America’s southern states.

Political reaction to migration

Brexit

Across the developed world, the reaction to threatened migration of refugees from climate change has been less than generous, to say the least. The recent decision of Britain to leave the European Union was motivated largely by the fear of British workers that EU laws would force their country to accept large numbers of refugees.

Swings to the right in Europe

In Germany, Angela Merkel’s generous policies towards refugees have cost her votes, while an openly racist party, the Alternative for Germany (AfD) party, has gained in strength. Frauke Petry, 40, the party’s leader, has said border guards might need to turn guns on

anyone crossing a frontier illegally. The party's policy platform says "Islam does not belong in Germany" and calls for a ban on the construction of mosques.

In September, 2017, eight people from the neo-Nazi Freital Group were put on trial in Dresden for bomb attacks on homes for asylum applicants. Hundreds of similar assaults occur in Germany every year, but they had never before been tried as terrorism in a federal court.

In the German election, which took place on Sunday, October 1, 2017, Angela Merkel won a fourth term as Chancellor, but her party won only 33% of the votes, a percentage much reduced from the 41% won in the election of 2013. Angela Merkel was paying a high price for her refugee-friendly policies.

Meanwhile the far right anti-immigration AfD party made a historic breakthrough, winning 13.5% of the vote, thus becoming the first overtly nationalist party to sit in the Bundestag in 60 years. The Greens have already complained that "Nazis have returned to parliament". In fact, members of the AfD party have begun to say that Germans should stop being ashamed of their country's Nazi past.

In France, the National Front is a nationalist party that uses populist rhetoric to promote its anti-immigration and anti-European Union positions. The party favors protectionist economic policies and would clamp down on government benefits for immigrants.

Similarly, in the Netherlands, the anti-European Union, anti-Islam Party for Freedom has called for closing all Islamic schools and recording the ethnicity of all Dutch citizens. In early November, the party was leading in polls ahead of next year's parliamentary elections.

Other far-right anti-immigrant parties in Europe include Golden Dawn (Greece), Jobbik (Hungary), Sweden Democrats (Sweden), Freedom Party (Austria), and People's Party - Our Slovakia (Slovakia). All of these parties have gained in strength because of the widespread fear of immigration.

Populism in the United States

The election of Donald Trump, who ran for President in 2016 on an openly racist and anti-immigrant platform, can also be seen as the result of fear of immigration, especially on the part of industrial workers.

Evangelicals and the end of the world

Evangelicals form the largest single religious group in the United States, with roughly a quarter of the US population. 81 percent of them voted for Donald Trump in the 2016 election, and they remain his ardent supporters. A recent article²³ about the Evangelicals states that "They have proven to be loyal foot soldiers in the battle against undocumented immigrants and Muslims. The triumph of gay rights, the persistence of legal abortion, and the election of Barack Obama signaled to them a need to fight for the America they once

²³<https://www.christiancentury.org/article/critical-essay/american-evangelicalism-and-politics-whiteness>

knew. The history of American evangelicalism shows us a group of believers who find the most in common when it comes to race and politics.”

The great danger from the Evangelicals comes from their attitude towards the threat of catastrophic climate change. They welcome the catastrophe! They welcome the end of the world! The sooner it comes, the sooner all good white Evangelicals will go to paradise and the sooner everyone else will go to eternal torment in hell!

Personally, I consider the beliefs of the Evangelicals to be insane - and not only insane, but also extremely dangerous. My own belief is that some degree of suffering due to climate change is inevitable, but that it is our duty to work with dedication to minimize that suffering, and to give our children and grandchildren a future in which they will have a chance to survive.

7.6 A new social contract

Our present situation is this:

The future looks extremely dark because of human folly, especially the long-term future. The greatest threats are catastrophic climate change and thermonuclear war, but a large-scale global famine also has to be considered.

We give our children loving care, but it makes no sense to do so and at the same time to neglect to do all that is within our power to ensure that they and their descendants will inherit an earth in which they can survive. We also have a responsibility to all the other living organisms with which we share the gift of life.

Inaction is not an option. We have to act with courage and dedication, even if the odds are against success, because the stakes are so high. The mass media could mobilize us to action, but they have failed in their duty. Our educational system could also wake us up and make us act, but it too has failed us. The battle to save the earth from human greed and folly has to be fought in the alternative media.

We need a new economic system, a new society, a new social contract, a new way of life. Here are the great tasks that history has given to our generation: We must achieve a steady-state economic system. We must restore democracy. We must decrease economic inequality. We must break the power of corporate greed. We must leave fossil fuels in the ground. We must stabilize and ultimately reduce the global population. We must eliminate the institution of war. And finally, we must develop a more mature ethical system to match our new technology.

We must achieve a steady-state economic system

A steady-state economic system is necessary because neither population growth nor economic growth can continue indefinitely on a finite earth. No one can maintain that exponential industrial growth is sustainable in the long run except by refusing to look more than a short distance into the future.



Figure 7.29: *Otro mundo es posible. Another world is possible.* Source: <http://dailytheology.org>

Of course, it is necessary to distinguish between industrial growth, and growth of culture and knowledge, which can and should continue to grow. Qualitative improvements in human society are possible and desirable, but resource-using and pollution-producing industrial growth is reaching its limits, both because of ecological constraints and because of the exhaustion of petroleum, natural gas and other non-renewable resources, such as metals. The threat of catastrophic climate change makes it imperative for us to stop using fossil fuels within very few decades.

We discussed Nicholas Georgescu-Roegen's reasons for viewing our present economic system as unidirectional and entropic: Low-entropy resources are converted into high-entropy waste, a unidirectional process. By contrast, to be sustainable in the long run, a process must be cyclic, like the growth and regeneration of a forest.

Georgescu-Roegen's list of desiderata remains valid today: We need drastic cuts in weapons production, thereby releasing productive forces for more constructive purposes. We need immediate aid to underdeveloped countries and gradual decrease in population to a level that can be maintained by organic agriculture. We also need avoidance, and strict regulation if necessary, of wasteful energy use. Finally, we need to abandon our attachment to extravagant gadgetry and fashion, and we must cure ourselves of workaholic habits by re-balancing the time spent on work and leisure.

Today, the distinguished economist Herman Daly (a student of Georgescu-Roegen) continues to write perceptive articles and books documenting the need for a steady-state economy. Among his books, the following are noteworthy: "Steady-State Economics" (1977); "For the Common Good" (1989, with John B. Cobb, Jr.); "Valuing the Earth" (1993, with Kenneth Townsend); "Beyond Growth" (1996); "Ecological Economics and the Ecology of Economics" (1999); "Local Politics of Global Sustainability" (2000, with Thomas Prugh and Robert Costanza), and "Ecological Economics: Principles and Applications" (2003, with Joshua Farley. Prof. Daly is a recipient of the Right Livelihood Award, which is



Figure 7.30: Nicholas Georgescu-Roegen, a great pioneer of Ecological Economics. His writings cast much light on our present situation. Source: elcomercio.ep

sometimes called the Alternative Nobel Prize.²⁴

We must restore democracy

It is obvious, almost by definition, that excessive governmental secrecy and true democracy are incompatible. If the people of a country have no idea what their government is doing, they cannot possibly have the influence on decisions that the word “democracy” implies.

Governmental secrecy is not something new. Secret diplomacy contributed to the outbreak of World War I, and the secret Sykes-Picot Agreement later contributed to the bitterness of conflicts in the Middle East. However, in recent years, governmental secrecy has grown enormously.

The revelations of Edward Snowden have shown that the number of people involved in secret operations of the United States government is now as large as the entire population of Norway: roughly 5 million. The influence of this dark side of government has become so great that no president is able to resist it.

Many modern governments have become very expert in manipulating public opinion through mass media. They only allow the public to hear a version of the “news” that has been handed down by powerholders. Of course, people can turn to the alternative media that are available on the Internet. But on the whole, the vision of the world presented on television screens and in major newspapers is the “truth” that is accepted by the majority of the public, and it is this picture of events that influences political decisions. Censorship

²⁴<http://steadystate.org/category/herman-daly/>
https://en.wikipedia.org/wiki/Herman_Daly
<http://grist.org/article/bank/>
<http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf>
<http://www.clubofrome.org/?p=326>



Figure 7.31: **Edward Snowden**, Author: **Laura Poitras / Praxis Films**, Creative Commons Attribution 3.0 Unported license. **Wikimedia Commons**

of the news by the power elite is a form of secrecy, since it withholds information that is needed for a democracy to function properly.

Snowden has already said most of what he has to say. Nevertheless, Washington was willing to break international law and the rules of diplomatic immunity by forcing its European allies to ground the plane of Bolivian President Evo Morales following a rumor that Snowden was on board. This was not done to prevent Snowden from saying more, but with the intention of making a gruesome example of him, as a warning to other whistleblowers.

In a democracy, the power of judging and controlling governmental policy is supposed to be in the hands of the people. It is completely clear that if the people do not know what their government is doing, then they cannot judge or control governmental policy, and democracy has been abolished. There has always been a glaring contradiction between democracy and secret branches of the government, such as the CIA, which conducts its assassinations and its dirty wars in South America and elsewhere without any public



Figure 7.32: Hong Kong rally to support Snowden, June 15, 2013, Author: See-ming Lee, Creative Commons Attribution 2.0 Generic license, Wikimedia Commons



Figure 7.33: Demonstration in support of Assange in front of Sydney Town Hall, 10 December 2010, Author: Elekh, Creative Commons Attribution-Share Alike 3.0 Unported license. Wikimedia Commons

knowledge or control.

The gross, wholesale electronic spying on citizens revealed by Snowden seems to be specifically aimed at eliminating democracy. It is aimed at instilling universal fear and conformity, fear of blackmail and fear of being out of step, so that the public will not dare to oppose whatever the government does, no matter how criminal or unconstitutional.

We must restore democracy wherever it has been replaced by oligarchy. When we do so, we will free ourselves from many evils, including excessive economic inequality, violation of civil rights, and the suffering produced by perpetual wars.

We must decrease economic inequality

In his Apostolic Exhortation, “*Evangelii Gaudium*”, Pope Francis said:

“In our time humanity is experiencing a turning-point in its history, as we can see from the advances being made in so many fields. We can only praise the steps being taken to improve people’s welfare in areas such as health care, education and communications. At the same time we have to remember that the majority of our contemporaries are barely living from day to day, with dire consequences. A number of diseases are spreading. The hearts of many people are gripped by fear and desperation, even in the so-called rich countries. The joy of living frequently fades, lack of respect for others and violence are on the rise, and inequality is increasingly evident. It is a struggle to live and, often, to live with precious little dignity.”

“This epochal change has been set in motion by the enormous qualitative, quantitative, rapid and cumulative advances occurring in the sciences and in technology, and by their instant application in different areas of nature and of life. We are in an age of knowledge and information, which has led to new and often anonymous kinds of power.”

“Just as the commandment ‘Thou shalt not kill’ sets a clear limit in order to safeguard the value of human life, today we also have to say ‘thou shalt not’ to an economy of exclusion and inequality. Such an economy kills. How can it be that it is not a news item when an elderly homeless person dies of exposure, but it is news when the stock market loses two points? This is a case of exclusion. Can we continue to stand by when food is thrown away while people are starving? This is a case of inequality. Today everything comes under the laws of competition and the survival of the fittest, where the powerful feed upon the powerless. As a consequence, masses of people find themselves excluded and marginalized: without work, without possibilities, without any means of escape.”

“In this context, some people continue to defend trickle-down theories which assume that economic growth, encouraged by a free market, will inevitably succeed in bringing about greater justice and inclusiveness in the world. This opinion, which has never been confirmed by the facts, expresses a crude and naive trust in the goodness of those wielding economic power and in the sacralized workings of the prevailing economic system. Meanwhile, the excluded are still waiting.”

In a recent speech, Senator Bernie Sanders quoted Pope Francis extensively and added: “We have a situation today, Mr. President, incredible as it may sound, where the wealthiest

85 people in the world own more wealth than the bottom half of the world's population.”²⁵

The social epidemiologist Prof. Richard Wilkinson, has documented the ways in which societies with less economic inequality do better than more unequal societies in a number of areas, including increased rates of life expectancy, mathematical performance, literacy, trust, social mobility, together with decreased rates of infant mortality, homicides, imprisonment, teenage births, obesity and mental illness, including drug and alcohol addiction.²⁶ We must also remember that according to the economist John A. Hobson, the basic problem that led to imperialism was an excessively unequal distribution of incomes in the industrialized countries. The result of this unequal distribution was that neither the rich nor the poor could buy back the total output of their society. The incomes of the poor were insufficient, and rich were too few in number.

We must break the power of corporate greed

When the United Nations was established in 1945, the purpose of the organization was to abolish the institution of war. This goal was built into many of the articles of the UN Charter. Accordingly, throughout the world, many War Departments were renamed and became Departments of Defense. But the very name is a lie. In an age of nuclear threats and counter-threats, populations are by no means protected. Ordinary citizens are just hostages in a game for power and money. It is all about greed.

Why is war continually threatened? Why is Russia threatened? Why is war with Iran threatened? Why fan the flames of conflict with China? Is it to “protect” civilians? Absolutely not! In a thermonuclear war, hundreds of millions of civilians would die horribly everywhere in the world, also in neutral countries. What is really being protected are the profits of arms manufacturers. As long as there are tensions; as long as there is a threat of war, military budgets are safe; and the profits of arms makers are safe. The people in several “democracies”, for example the United States, do not rule at the moment. Greed rules.

As Institute Professor Noam Chomsky of MIT has pointed out, greed and lack of ethics are built into the structure of corporations. By law, the Chief Executive Officer of a corporation must be entirely motivated by the collective greed of the stockholders. He must maximize profits. If the CEO abandons this single-minded chase after corporate profits for ethical reasons, or for the sake of humanity or the biosphere or the future, he (or she) must, by law, be fired and replaced.

Occasionally, for the sake of their public image, corporations seem to do something for other motives than their own bottom line, but it is usually window dressing. For example, Shell claims to be supporting research on renewable energy. Perhaps there is indeed a small

²⁵https://www.youtube.com/watch?v=9_LJpN893Vg
<https://www.oxfam.org/en/tags/inequality>
https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/cr-even-it-up-extreme-inequality-291014-en.pdf

²⁶<https://www.youtube.com/watch?v=cZ7LzE3u7Bw>
https://en.wikipedia.org/wiki/Richard_G._Wilkinson



Figure 7.34: Greed: one of the seven deadly sins. Pecados Capitaes. Avaricia.
Author: Jesus Solana from Madrid, Spain, Wikimedia Commons



Figure 7.35: “Pope Francis among the people at St. Peter’s Square - 12 May 2013” by Edgar Jiménez from Porto, Portugal - Papa rock star. [CC BY-SA 2.0], Wikimedia Commons

renewable energy laboratory somewhere in that vast corporation; but the real interest of the organization is somewhere else. Shell is sending equipment on a large scale to drill for more and more environment-destroying oil in the Arctic.²⁷

We must leave fossil fuels in the ground

The threat of catastrophic climate change requires prompt and dedicated action by the global community. Unless we very quickly make the transition from fossil fuels to 100% renewable energy, we will reach a tipping point after which uncontrollable feedback loops could take over, leading to a human-caused 6th geological extinction event. This might even be comparable to the Permian-Triassic event, during which 96% of all marine species and 70% of terrestrial vertebrates became extinct.

New hope that such a catastrophe for human civilization and the biosphere can be avoided comes from two recently-released documents: The Encyclical “*Laudato Si’*” by Pope Francis, and the statistics on the rate of growth of renewable energy newly released by the Earth Policy Institute.

Arctic sea-ice is melting at an increasingly rapid rate, because of several feedback loops. One of these feedback loops, called the albedo effect, is due to the fact that white snow-covered sea-ice in the Arctic reflects sunlight, while dark water absorbs it, raising the

²⁷<http://www.countercurrents.org/avery170715.htm>
<http://human-wrongs-watch.net/2015/06/25/militarisms-hostages/>
<https://www.youtube.com/watch?v=FJUA4cm0Rck>

temperature and leading to more melting.

Another feedback loop is due to the fact that rising temperatures mean that more water is evaporated. The water vapor in the atmosphere acts like a greenhouse gas, and raises the temperature still further.

If we consider long-term effects, by far the most dangerous of the feedback loops is the melting of methane hydrate crystals and the release of methane into the atmosphere, where its effects as a greenhouse gas are roughly twenty times great as those of CO₂.

When organic matter is carried into the oceans by rivers, it decays to form methane. The methane then combines with water to form hydrate crystals, which are stable at the temperatures which currently exist on ocean floors. However, if the temperature rises, the crystals become unstable, and methane gas bubbles up to the surface.

The worrying thing about methane hydrate deposits on ocean floors is the enormous amount of carbon involved: roughly 10,000 gigatons. To put this huge amount into perspective, we can remember that the total amount in world CO₂ emissions since 1751 has been only 337 gigatons.

Despite the worrying nature of the threats that we are facing, there are reasons for hope. One of the greatest of these is the beautiful, profound and powerful encyclical that has just been released by Pope Francis.²⁸

Pope Francis tells us that the dictates of today's economists are not sacred: In the future, if we are to survive, economics must be given both a social conscience and an ecological conscience. Nor are private property and profits sacred. They must be subordinated to the common good, and the preservation of our global commons. Less focus on material goods need not make us less happy. The quality of our lives can be increased, not decreased, if we give up our restless chase after power and wealth, and derive more of our pleasures from art, music and literature, and from conversations with our families and friends.

Another reason for hope can be found in the extremely high present rate of growth of renewable energy, and in the remarkable properties of exponential growth. According to figures recently released by the Earth Policy Institute,²⁹ the global installed photovoltaic capacity is currently able to deliver 242,000 megawatts, and it is increasing at the rate of 27.8% per year. Wind energy can now deliver 370,000 megawatts, and it is increasing at the rate of roughly 20% per year.

Because of the astonishing properties of exponential growth, we can calculate that if these growth rates are maintained, renewable energy can give us 24.8 terawatts within only 15 years! This is far more than the world's present use of all forms of energy.

All of us must still work with dedication to provide the political will needed to avoid catastrophic climate change. However, the strong and friendly voice of Pope Francis, and the remarkable rate of growth of renewable energy can guide our work, and can give us hope and courage.

The award-winning author and activist Naomi Klein has emphasized that the climate

²⁸http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524-enciclica-laudato-si.html

²⁹<http://www.earth-policy.org/books/tgt>



Figure 7.36: The award-winning author and activist Naomi Klein has emphasized that the climate crisis changes everything. Environmentalists and antiwar activists must unite! We need a new economic system! The people of the world don't want climate change; they want system change! The photo shows Naomi Klein in Warsaw Nov.20 2008, by Mariusz Kubik, (own work). [CC BY 3.0], Wikimedia Commons

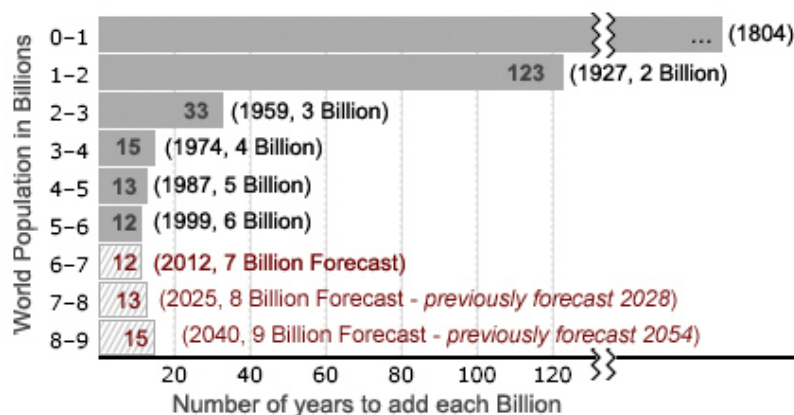


Figure 7.37: The years taken for every billion people to be added to the world's population, and the years that population was reached. (with future estimates). Updated from original version with improved annotation and all data (years) revised in light of currently known information published on World Population Milestones. Fully revised by BS based on original by User:ELT

crisis changes everything. Environmentalists and antiwar activists must unite! We need a new economic system! The people of the world don't want climate change; they want system change!³⁰

We must stabilize and ultimately reduce the global population

According to the World Resources Institute and the United Nations Environment Programme, "It is estimated that since World War II, 1.2 billion hectares...[of agricultural land] has suffered at least moderate degradation as a result of human activity. This is a vast area, roughly the size of China and India combined." This area is 27% of the total area currently devoted to agriculture 5 . The report goes on to say that the degradation is greatest in Africa.

David Pimental and his associates at Cornell University pointed out in 1995 that "Because of erosion-associated loss of productivity and population growth, the per capita food

³⁰<https://www.transcend.org/tms/2015/03/naomi-klein-the-economic-system-we-have-created-global-warming/>
<http://thischangeseverything.org/naomi-klein/>
<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>
<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>
<https://www.youtube.com/watch?v=sRGVTK-AAvw>
<https://www.youtube.com/watch?v=MVwmi7HCmSI>
<https://www.youtube.com/watch?v=AjZaFjXfLec>
<https://www.youtube.com/watch?v=m6pFDu7ILV4>
<https://www.youtube.com/watch?v=MVwmi7HCmSI>
<http://therightsofnature.org/universal-declaration/>

supply has been reduced over the past 10 years and continues to fall. The Food and Agricultural Organization reports that the per capita production of grains which make up 80% of the world's food supply, has been declining since 1984."

Pimental et al. add that "Not only is the availability of cropland per capita decreasing as the world population grows, but arable land is being lost due to excessive pressure on the environment. For instance, during the past 40 years nearly one-third of the world's cropland (1.5 billion hectares) has been abandoned because of soil erosion and degradation. Most of the replacement has come from marginal land made available by removing forests. Agriculture accounts for 80% of the annual deforestation."

The phrase "developing countries" is more than a euphemism; it expresses the hope that with the help of a transfer of technology from the industrialized nations, all parts of the world can achieve prosperity. An important factor that prevents the achievement of worldwide prosperity is population growth.

In the words of Dr. Halfdan Mahler, former Director General of the World Health Organization, "Country after country has seen painfully achieved increases in total output, food production, health and educational facilities and employment opportunities reduced or nullified by excessive population growth."

The growth of population is linked to excessive urbanization, infrastructure failures and unemployment. In rural districts in the developing countries, family farms are often divided among a growing number of heirs until they can no longer be subdivided. Those family members who are no longer needed on the land have no alternative except migration to overcrowded cities, where the infrastructure is unable to cope so many new arrivals. Often the new migrants are forced to live in excrement-filled makeshift slums, where dysentery, hepatitis and typhoid are endemic, and where the conditions for human life sink to the lowest imaginable level. In Brazil, such shanty towns are called "favelas".

If modern farming methods are introduced in rural areas while population growth continues, the exodus to cities is aggravated, since modern techniques are less labor-intensive and favor large farms. In cities, the development of adequate infrastructure requires time, and it becomes a hopeless task if populations are growing rapidly. Thus, population stabilization is a necessary first step for development.

It can be observed that birth rates fall as countries develop. However, development is sometimes blocked by the same high birth rates that economic progress might have prevented. In this situation (known as the "demographic trap"), economic gains disappear immediately because of the demands of an exploding population.

For countries caught in the demographic trap, government birth control programs are especially important, because one cannot rely on improved social conditions to slow birth rates. Since health and lowered birth rates should be linked, it is appropriate that family-planning should be an important part of programs for public health and economic development.

A recent study conducted by Robert F. Lapham of Demographic Health Surveys and W. Parker Maudlin of the Rockefeller Foundation has shown that the use of birth control is correlated both with socio-economic setting and with the existence of strong family-planning programs. The implication of this study is that even in the absence of increased

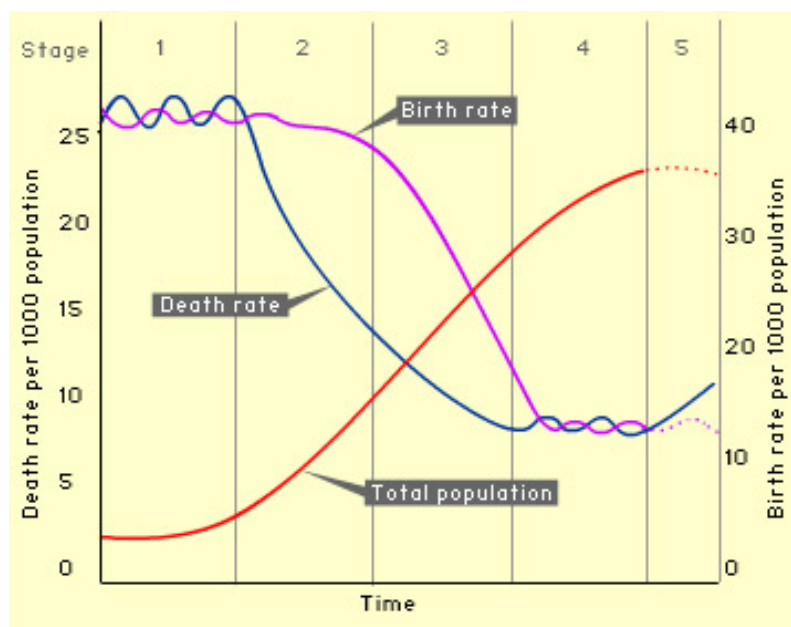


Figure 7.38: **The demographic transition, from an equilibrium with high birth rates and high death rates to a new equilibrium where both birth and death rates are low.** Author: en>User:Charmed88. Public domain, Wikimedia Commons

living standards, family planning programs can be successful, provided they have strong government support.

Education of women and higher status for women are vitally important measures, not only for their own sake, but also because in many countries these social reforms have proved to be the key to lower birth rates. As Sir Partha Dasgupta of Cambridge University has pointed out, the changes needed to break the cycle of overpopulation and poverty are all desirable in themselves. Besides education and higher status for women, they include state-provided social security for old people, provision of water supplies near to dwellings, provision of health services to all, abolition of child labor and general economic development. The money required to make these desirable changes is a tiny fraction of the amount that is currently wasted on war.

In order to avoid a catastrophic future famine, it is vitally important that all of the countries of the world should quickly pass through a demographic transition from a situation characterized by high birth rates and high death rates to a new equilibrium, where low death rates are balanced by low birth rates.

We must eliminate the institution of war

The problem of achieving internal peace over a large geographical area is not insoluble. It has already been solved. There exist today many nations or regions within each of



Figure 7.39: An etching by Francisco Goya (1791-1818) from the series “The Disasters of War”. Public Domain, Wikimedia Commons

which there is internal peace, and some of these are so large that they are almost worlds in themselves. One thinks of China, India, Brazil, Australia, the Russian Federation, the United States, and the European Union. Many of these enormous societies contain a variety of ethnic groups, a variety of religions and a variety of languages, as well as striking contrasts between wealth and poverty. If these great land areas have been forged into peaceful and cooperative societies, cannot the same methods of government be applied globally?

But what are the methods that nations use to achieve internal peace? Firstly, every true government needs to have the power to make and enforce laws that are binding on individual citizens. Secondly the power of taxation is a necessity. Thirdly, within their own territories, almost all nations have more military power than any of their subunits. For example, the US Army is more powerful than the State Militia of Illinois.

This unbalance of power contributes to the stability of the Federal Government of the United States. When the FBI wanted to arrest Al Capone, it did not have to bomb Chicago. Agents just went into the city and arrested the gangster. Even if Capone had been enormously popular in Illinois, the the government of the state would have realized in advance that it had no chance of resisting the US Federal Government, and it still would have allowed the “Feds” to make their arrest. Similar considerations hold for almost all nations within which there is internal peace. It is true that there are some nations within which subnational groups have more power than the national government, but these are frequently characterized by civil wars.

Of the large land areas within which internal peace has been achieved, the European Union differs from the others because its member states still maintain powerful armies.

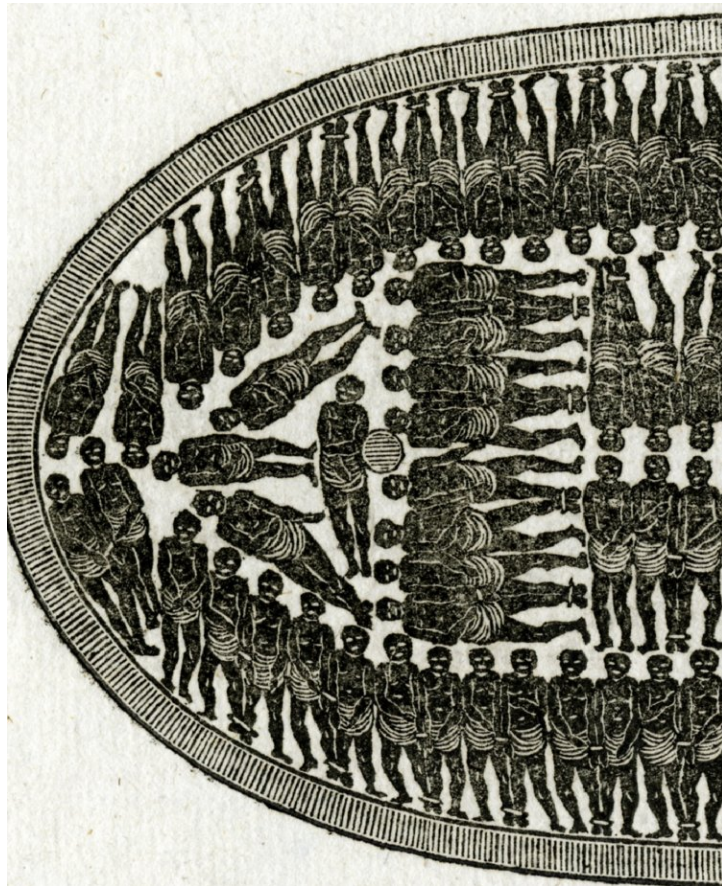


Figure 7.41: “Description of a slave ship”, by an anonymous artist, wood engraving. A model of the ship was used by William Wilberforce in the House of Commons. The example of the men and women who worked to rid the world of slavery can give us courage as we strive for a time when war will exist only as a dark memory fading into the past. Public domain, Wikimedia Commons

era of happiness and prosperity for the family of man. It is within our power to let this happen. The example of the men and women who worked to rid the world of slavery can give us courage as we strive for a time when war will exist only as a dark memory fading into the past.

New ethics to match new technology

Modern science has, for the first time in history, offered humankind the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of death through infectious disease. At the same time, science has given humans the power to obliterate their civilization with nuclear weapons, or to make the earth uninhabitable through overpopulation and pollution.

The question of which of these paths we choose is literally a matter of life or death for ourselves and our children. Will we use the discoveries of modern science constructively, and thus choose the path leading towards life? Or will we use science to produce more and more lethal weapons, which sooner or later, through a technical or human failure, may result in a catastrophic nuclear war? Will we thoughtlessly destroy our beautiful planet through unlimited growth of population and industry? The choice among these alternatives is ours to make. We live at a critical moment of history, a moment of crisis for civilization.

No one living today asked to be born at such a moment, but by an accident of birth, history has given us an enormous responsibility, and two daunting tasks: If civilization is to survive, we must not only stabilize the global population but also, even more importantly, we must eliminate the institution of war. We face these difficult tasks with an inherited emotional nature that has not changed much during the last 40,000 years. Furthermore, we face the challenges of the 21st century with an international political system based on the anachronistic concept of the absolutely sovereign nation-state. However, the human brain has shown itself to be capable of solving even the most profound and complex problems. The mind that has seen into the heart of the atom must not fail when confronted with paradoxes of the human heart.

We must replace the old world of international anarchy, chronic war and institutionalized injustice, by a new world of law. The United Nations Charter, the Universal Declaration of Human Rights and the International Criminal Court are steps in the right direction, but these institutions need to be greatly strengthened and reformed.³¹

³¹<http://www.countercurrents.org/zuesse050815.htm>
<https://www.youtube.com/watch?t=16&v=hDsPWmioSHg>
<http://www.commondreams.org/views/2014/04/14/us-oligarchy-not-democracy-says-scientific-study>
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We also need a new global ethic, where loyalty to one's family and nation is supplemented by a higher loyalty to humanity as a whole. The Nobel laureate biochemist Albert Szent-Györgyi once wrote:

"The story of man consists of two parts, divided by the appearance of modern science.... In the first period, man lived in the world in which his species was born and to which his senses were adapted. In the second, man stepped into a new, cosmic world to which he was a complete stranger.... The forces at man's disposal were no longer terrestrial forces, of human dimension, but were cosmic forces, the forces which shaped the universe. The few hundred Fahrenheit degrees of our flimsy terrestrial fires were exchanged for the ten million degrees of the atomic reactions which heat the sun."

"This is but a beginning, with endless possibilities in both directions; a building of a human life of undreamt of wealth and dignity, or a sudden end in utmost misery. Man lives in a new cosmic world for which he was not made. His survival depends on how well and how fast he can adapt himself to it, rebuilding all his ideas, all his social and political institutions."

"...Modern science has abolished time and distance as factors separating nations. On our shrunken globe today, there is room for one group only: the family of man."

7.7 We need system change

WE NEED SYSTEM CHANGE, NOT CLIMATE CHANGE! Civil society, excluded from the COP21 conference by the French government, carried banners with this slogan on the streets of Paris. They did so in defiance of tear-gas-using black-clad police. System change has been the motto for climate marches throughout the world. Our entire system is leading us towards disaster, and this includes both economic and governmental establishments. To save human civilization, the biosphere and the future, the people of the world must take matters into their own hands and change the system. ³²

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Figure 7.42: Calling for system change, civil society members hold a sit-in at the Paris climate talks.



Figure 7.43: Officials of the Trump administration freely admit that their interference in the internal politics of Venezuela is motivated by US desire to control the vast Venezuelan oil reserves. They seem unconcerned by the fact that the extraction and use of oil must quickly stop if the planet is to be saved.

We need a new economic system, a new society, a new social contract, a new way of life. Here are the great tasks that history has given to our generation: We must achieve a steady-state economic system. We must restore democracy. We must decrease economic inequality. We must break the power of corporate greed. We must leave fossil fuels in the ground. We must stabilize and ultimately reduce the global population. We must eliminate the institution of war. And finally, we must develop a more mature ethical system to match our new technology.

There are reasons for hope. Both solar energy and wind energy are growing at a phenomenal rate, and the transition to 100% renewable energy could be achieved within a very few decades if this growth is maintained. But a level playing field is needed. At present fossil fuel corporations receive half a trillion dollars each year in subsidies. Nuclear power generation is also highly subsidized (and also closely linked to the danger of nuclear war). If these subsidies were abolished, or better yet, used to encourage renewable energy development, the renewables could win simply by being cheaper ³³

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Chapter 8

A NONVIOLENT ECOLOGICAL REVOLUTION

8.1 The invention of printing and the modern world

Although paper, printing and ink were Chinese inventions, the Chinese system of writing was not easily adapted to printing with movable type, and thus the revolutionary impact of printing was first felt by Europe. An “information explosion” occurred in Europe, produced by printing, inexpensive books and pamphlets, and widespread literacy. The result was the Scientific Revolution, the Enlightenment and the Industrial Revolution.

The universal genius of Leonardo da Vinci failed to revolutionize the ideas of his time because his many notebooks were never printed. By contrast, the work of his near contemporary, Nicolaus Copernicus had a revolutionary impact because his great book on the heliocentric model of the solar system was one of the first scientific books to be printed.



Figure 8.1: Movable metal type and the composing stick were first used in Gutenberg’s press.



Figure 8.2: Studies of embryos by Leonardo da Vinci (1452-1519). Leonardo's many notebooks were never printed, and therefore his unparalleled genius and diligence had a smaller impact on the history of science than did the work of his near-contemporary Copernicus.

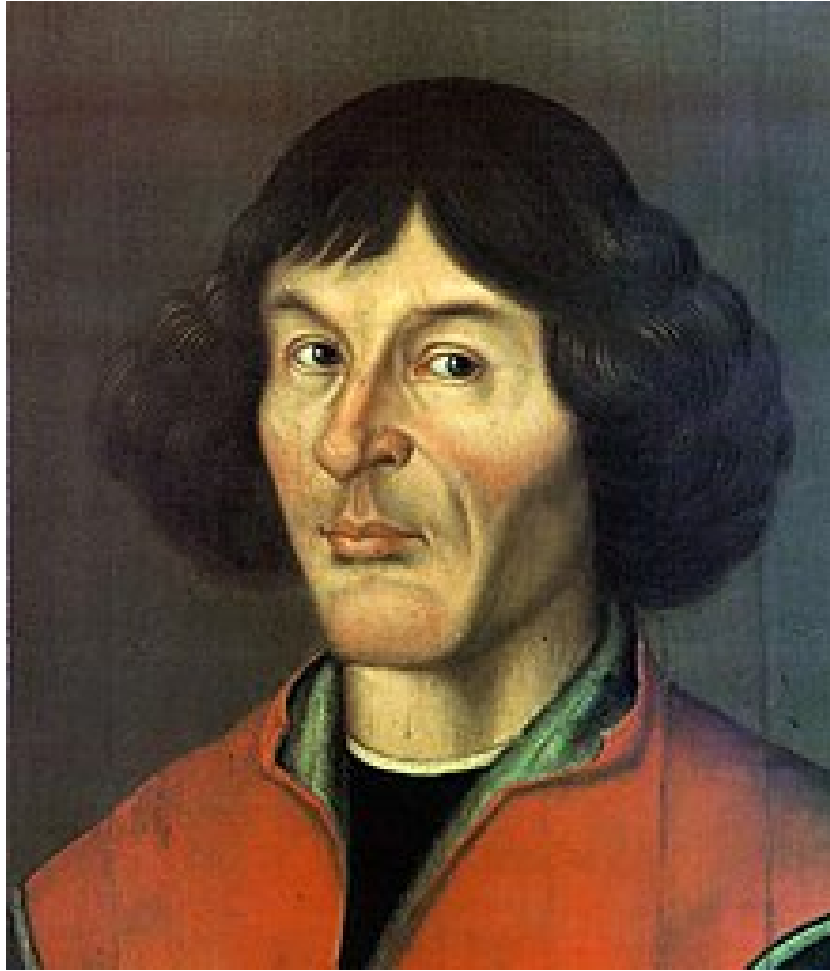


Figure 8.3: Nicolaus Copernicus (1473-1543). The publication of his great book, *De revolutionibus orbium coelestium* (On the Revolutions of the Celestial Spheres) just before his death was a major event in the history of science. It ushered in the Scientific Revolution. Printing allowed the widespread sharing of scientific knowledge, and it allowed Isaac Newton to achieve his synthesis by building on the ideas of his predecessors, Copernicus, Galileo, Tycho Brahe, and Kepler. Newton became the symbol for rational thought in the Age of Reason.

8.2 Ideals of the Enlightenment

Excerpts from John Locke's *Second Treatise on Government*

Men living together according to reason," he wrote, "without a common superior on earth with authority to judge between them, is properly the state of nature... A state also of equality, wherein all the power and jurisdiction is reciprocal, no one having more than another; there being nothing more evident than that creatures of the same species, promiscuously born to all the same advantages of nature and the use of the same facilities, should also be equal amongst one another without subordination or subjection...

But though this be a state of liberty, yet it is not a state of licence... The state of nature has a law to govern it, which obliges every one; and reason, which is that law, teaches all mankind who will but consult it, that being equal and independent, no one ought to harm another in his life, health, liberty or possessions...

Whenever the legislators endeavor to take away, and destroy the property of the people, or to reduce them to slavery under arbitrary power, they put themselves into a state of war with the people, who are thereupon absolved from any farther obedience, and are left to the common refuge, which God hath provided for all men, against force and violence. Whensoever therefore the legislative shall transgress this fundamental rule of society; and either by ambition, fear, folly or corruption, endeavor to grasp themselves, or put into the hands of any other an absolute power over the lives, liberties, and estates of the people; By this breach of trust they forfeit the power, the people had put into their hands, for quite contrary ends, and it devolves to the people, who have a right to resume their original liberty.

The final paragraph of Condorcet's *Esquisse*

How admirably calculated is this view of the human race, emancipated from its chains, released alike from the dominion of chance, as well as from that of the enemies of its progress, and advancing with a firm and indeviate step in the paths of truth, to console the philosopher lamenting the errors, the flagrant acts of injustice, the crimes with which the earth is still polluted? It is the contemplation of this prospect that rewards him for all his efforts to assist the progress of reason and the establishment of liberty. He dares to regard these efforts as a part of the eternal chain of the destiny of mankind; and in this persuasion he finds the true delight of virtue, the pleasure of having performed a durable service, which no vicissitude will ever destroy in a fatal operation calculated to restore the reign of prejudice and slavery. This sentiment is the asylum into which he retires, and to which the memory of his persecutors cannot follow him: he unites himself in imagination with man restored to his



Figure 8.4: The American Declaration of Independence expressed the ideals of the Enlightenment. It contains the words “We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness. That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed”. In these words, we see rejection of the “divine right of kings”, John Locke’s assertion of the equality of all humans, and Rousseau’s concept of a Social Contract.



Figure 8.5: Denis Diderot, editor of the *Encyclopédie*. This vast work, planned by Diderot and his co-workers, was intended to systematize and preserve all of human knowledge. It formed the ideological background for both the American Revolution and the French Revolution. The ideals of the Enlightenment are still valid, and they can inspire us today as we work to save the future of our planet.

rights, delivered from oppression, and proceeding with rapid strides in the path of happiness; he forgets his own misfortunes while his thoughts are thus employed; he lives no longer to adversity, calumny and malice, but becomes the associate of these wiser and more fortunate beings whose enviable condition he so earnestly contributed to produce.

An excerpt from Godwin's *Political Justice*

The spirit of oppression, the spirit of servility and the spirit of fraud - these are the immediate growth of the established administration of property. They are alike hostile to intellectual improvement. The other vices of envy, malice, and revenge are their inseparable companions. In a state of society where men lived in the midst of plenty, and where all shared alike the bounties of nature, these sentiments would inevitably expire. The narrow principle of selfishness would vanish. No man being obliged to guard his little store, or provide with anxiety and pain for his restless wants, each would lose his own individual existence in the thought of the general good. No man would be the enemy of his neighbor, for they would have nothing to contend; and of consequence philanthropy would resume the empire which reason assigns her. Mind would be delivered from her perpetual anxiety about corporal support, and free to expatiate in the field of thought which is congenial to her. Each man would assist the inquiries of all.

8.3 Industrialization upsets humans' relationship with nature

The Scientific Revolution led inevitably to the Industrial Revolution, during which fossil fuels began to be used at a rate which exceeded the rate at which they were formed by a factor of a million. This massive use of fossil fuels led to a frenzy of completely unsustainable growth of both industry and global population. Before the Industrial Revolution, humans lived in a more or less harmonious relationship with nature; but this harmony was destroyed by industrialization.

What is needed today is a nonviolent ecological revolution in which the harmony between human society and nature is restored by reforming our economic system. The natural world must be given a higher economic priority. At the same time we should notice that excessive economic inequality has led to corporate domination of our political systems and to the replacement of democracy by oligarchy. Therefore a nonviolent ecological revolution should aim at reducing economic inequality as well as at giving harmony with nature, rather than growth, the primary economic goal. Hopefully the Green New Deal concept for economic reform will be adopted not only in the United States but also elsewhere in the world, since it offers a way to achieve both ecological and social reform.



8.3. *INDUSTRIALIZATION UPSETS HUNANS' RELATIONSHIP WITH NATURE*385





Figure 8.6: The continued extraction and burning of fossil fuels threatens the earth with an ecological megacatastrophe.

8.4 Their lives can inspire us to save the future

Much of this book consists of short biographies of women and men whose lives and work changed the world. They were revolutionists, but none of them used violent methods. Their lives can inspire us as we work to save the future for our children and grandchildren, for all future generations of humans, and for the plants and animals with which we share the gift of life.

What are their names? Very many people could have been mentioned, but here are a few who hopefully can represent the many: Johannes Gutenberg, René Descartes, Isaac Newton, Christian Heugens, Gottfried Wilhelm Leibniz, the Bernoulli family, Leonhard Euler, Voltaire, Jean-Jacques Rousseau, Joseph Johnson, Mary Wollstonecraft, William Blake, William Godwin, the Marquis de Condorcet, Thomas Robert Malthus, Charles Darwin, Thomas Paine, Thomas Jefferson, Alexander Hamilton, Benjamin Franklin, Ludwig van Beethoven, Percy Bysshe Shelly, Henry David Thoreau, Leo Tolstoy, Mahatma Gandhi, Martin Luther King, Jr., Albert Einstein, Bertrand Russell, Joseph Rotblat, Margaret Sanger, Emmeline Pankhurst, Daniel Ellsberg, Mairead Corrigan Maguire, Julian Assange, Edward Snowden, Joan Baez, Bob Dylan, Pete Seeger, Al Gore, Leonardo DiCaprio, Bill McKibben, Noam Chomsky, Alexandria Ocasio-Cortez, Naomi Klein, and Greta Thunberg.

8.5 Avoiding an ecological megacatastrophe

Quick change is needed to save the long-term future.

The central problem which the world faces in its attempts to avoid catastrophic climate change is a contrast of time scales. In order to save human civilization and the biosphere from the most catastrophic effects of climate change we need to act immediately, Fossil fuels must be left in the ground. Forests must be saved from destruction by beef or palm oil production. These vitally necessary actions are opposed by powerful economic interests, by powerful fossil fuel corporations desperate to monetize their under- ground “assets”, and by corrupt politicians receiving money from the beef or palm oil industries.

However, although some disastrous effects climate change are already visible, the worst of these calamities lie in the distant future. Therefore it is difficult to mobilize the political will for quick action. We need to act immediately, because of the danger of passing tipping points beyond which climate change will become irreversible despite human efforts to control it. The recent IPCC report states that our window of opportunity for climate action to avoid an ecological megacatastrophe is very small indeed.

Our situation today is unique. Never before has the world had a population of more than 7 billion people, to which a billion are added every decade. Never before have we had the power to destroy human civilization and the biosphere with thermonuclear weapons or catastrophic anthropogenic climate change. Since the exploding global population of humans is one of the root causes of our present crisis, we must stabilize and ultimately reduce the earth’s population.

We must also reduce consumption in the industrialized countries, and take steps that will lead us towards a steady-state economic system. Unlimited growth of either population or industry on a finite planet is a logical impossibility, and we have reached or passed the limits.

The crisis of civilization, which we face today, has been produced, in part, by the rapidity with which science and technology have developed. Our institutions and ideas adjust too slowly to the change. The great challenge which history has given to our generation is the task of building new international political structures, which will be in harmony with modern technology. At the same time, we must develop a new global ethic, which will replace our narrow loyalties by loyalty to humanity as a whole.

In the long run, because of the enormously destructive weapons, which have been produced through the misuse of science, the survival of civilization can only be ensured if we are able to abolish the institution of war. The threats posed by war with all-destroying modern weapons and the threat of catastrophic climate change are linked. Military organizations throughout the world are the largest single users of fossil fuels. The desire of nations to control oil supplies motivates wars. And a thermonuclear war would be an ecological catastrophe. If human civilization is to survive in the long run, the institution of war must be abolished.

The issue of social justice and economic equality is also linked to the task of avoiding an ecological megacatastrophe. Because of excessive economic inequality, many nations which claim to be democracies are in fact oligarchies. The enormous wealth of corporate oligarchs, such as the Koch brothers in the United States, is sufficient to buy not only the votes of politicians, but also the propaganda of mainstream media. Hence the campaign of lies and climate change denial sponsored by huge fossil fuel corporations. Hence also the failure of UN conferences to produce adequate climate action. One of the great challenges that face us today is the task of reducing economic inequality, both within nations and between nations.

Finally, there is a link between the task of ending the institution of war and our goal of saving the future by avoiding an ecological megacatastrophe. Almost unimaginably enormous quantities of money are wasted each year on wars and on preparations for war - in recent years more than 1,7 trillion dollars globally. If all costs are included, including the damage to infrastructure caused by war, costs of care for wounded, costs of veterans' benefits, and so on, this figure would be very much larger. The Green New Deal, in which the urgent need to create renewable energy infrastructure and the problem of unemployment are addressed simultaneously, could easily be financed by making cuts in military budgets. Not only the United States, where Green New Deal proposals are currently favored by a large majority of voters, but also many other countries could simultaneously combat militarism, create renewable energy infrastructure, and solve unemployment problems in this way.



8.6 Saving the future for our children

On March 15, 2015, over 1.5 million schoolchildren in 2083 places on all continents participated in the biggest climate action in history. Swedish 7th grade schoolchild and climate activist Greta Thunberg, whose lone school strike outside the Swedish Parliament last summer grew into a worldwide movement, said “The governments failed to respond properly to the dramatic challenge of our climate crisis. Our generation, the least responsible for the acts of the polluters, will be the ones to see the most devastating impacts of climate change. World leaders are losing the window to act, but we are not going to stand still watching their inertia.”

Our children have appealed to adults to save their future. We who are adults must respond. We must show ourselves to be worthy parents and grandparents. We give our children loving care, but it makes no sense do so and at the same time to neglect to do all that is within our power to ensure that they and their descendants will inherit an earth in which they can survive. We also have a responsibility to all the other living organisms with which we share the gift of life.

Inaction is not an option. We have to act with courage and dedication, even if the odds are against success, because the stakes are so high. Some degree of suffering from climate change is probably inevitable, but it is our duty to work to minimize that suffering. We must endeavor to give our children a future world in which they will have a chance to survive.



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