

THE PASSIONS OF MANKIND

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Introduction

Human emotions: An evolutionary paradox?

This book consists mainly of book chapters and articles that I have previously published, although some new material has been added. The book deals with human emotions, seen from an evolutionary perspective.

Today, our emotions seem to be driving us towards disaster. At first this seems to be a paradox. Our emotions have been produced by evolution, and Darwinian natural selection is supposed to produce traits that lead to survival, rather than to destruction. Examining the question more closely, we can notice that in our species, evolution is divided into two parts, genetic evolution, which proceeds very slowly, and cultural evolution, which moves with lightning-like speed, and is constantly-accelerating.

On the time-scale of genetic evolution, it only took a moment for our ancestors to move from making cave-paintings to speculating on the existence of atoms in ancient Greece. In another moment, we had unleashed the terrible power of the atom. During this time our emotions did not change. We face the global problems created by today's science and technology, and by the exponential growth of population and industry, with our poor cave-man's brains and our anachronistic stone-age emotions.

Condorcet, Godwin and Malthus

The Enlightenment in Europe was a period of tremendous optimism. Summarizing the ideas of human progress that were current at the time, the Marquis de Condorcet (1743-1794) wrote an enormously optimistic book entitled *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain*, or in English, *Sketch for a Historical Picture of the Progress of the Human Mind*.

In England, William Godwin (1756-1836) wrote an equally optimistic book, *Political Justice*, in which he maintained that progress would soon produce a world with mechanized agriculture and material plenty in which humans would only need to work very few hours each day to gain their daily bread, the rest of their time being devoted to culture and mental improvement. The savage system of laws of Godwin's time, in which stealing a handkerchief was punishable by hanging, would not be needed in the future, because in the midst of plenty, no one would be motivated to steal.

An argument between father and son

Thomas Robert Malthus (1755-1834) was introduced to these books by his father, Daniel Malthus, an intellectual English country gentleman and an enthusiastic supporter of the ideas of Condorcet and Godwin. Listening to his father, the thoughts of Thomas Robert Malthus turned to the rapid population growth which, as a clergyman, he had noticed in the records of births and deaths in his congregation. He told his father that all the benefits of progress would be eaten up by growing populations. Impressed by these arguments, Daniel Malthus urged his son to write them out and to publish them. The result was T.R. Malthus' famous book on population, which he continued to revise and republish until the end of his life. Malthus' refutation of Godwin's utopia is particularly interesting.

The laws of nature and the passions of mankind

Malthus discussed William Godwin's egalitarian utopia, which, he said, would be extremely attractive if only it could be achieved: "The system of equality which Mr. Godwin proposes", Malthus wrote, "is, on the first view of it, the most beautiful and engaging which has yet appeared. A melioration of society to be produced merely by reason and conviction gives more promise of permanence than any change effected and maintained by force. The unlimited exercise of private judgement is a doctrine grand and captivating, and has a vast superiority over those systems where every individual is in a manner the slave of the public."

"The substitution of benevolence, as a master-spring and moving principle of society, instead of self-love, appears at first sight to be a consummation devoutly to be wished. In short, it is impossible to contemplate the whole of this fair picture without emotions of delight and admiration, accompanied with an ardent longing for the period of its accomplishment."

"But alas!" Malthus continued, "That moment can never arrive.... The great error under which Mr. Godwin labours throughout his whole work is the attributing of almost all the vices and misery that prevail in civil society to human institutions. Political regulations and the established administration of property are, with him, the fruitful sources of all evil, the hotbeds of all the crimes that degrade mankind. Were this really a true state of the case, it would not seem a completely hopeless task to remove evil completely from the world; and reason seems to be the proper and adequate instrument

for effecting so great a purpose.

“But the truth is, that though human institutions appear to be, and indeed often are, the obvious and obtrusive causes of much misery in society, they are, in reality, light and superficial in comparison with those deeper-seated causes of evil which result from the laws of nature and the passions of mankind.”

The passions of mankind drive humans to reproduce, while the laws of nature set limits to the carrying capacity of the environment. Godwin’s utopia, if established, would be very favorable to the growth of population; and very soon the shortage of food would lead to its downfall, because of the overpowering force of population growth.

In this book, I have tried to discuss the impact of human emotions on today’s world.

The climate emergency

Chapter 6 of this book discusses the climate emergency that we face today. Quick action is needed to save the long-term future. According to a recent report by the Intergovernmental Panel on Climate Change, we have only a little more than a decade left in which to take drastic action to reduce greenhouse gas emissions. We must act rapidly to avoid feedback loops which will otherwise lead to catastrophic climate change despite human mitigation efforts.

Anachronistic emotions can be overwritten by ethics

Chapter 8 deals with the way in which our stone-age emotions can be overwritten by education and ethics. It is not just a coincidence that the greatest ethical teachers in human history lived at a time when the tribal way of life was being supplanted by life in larger and more heterogeneous groups. The great human ability to learn, adapt and cooperate, can give us hope for the future.

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Chapter 1

GODWIN, CONDORCET AND MALTHUS

1.1 William Godwin's *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 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

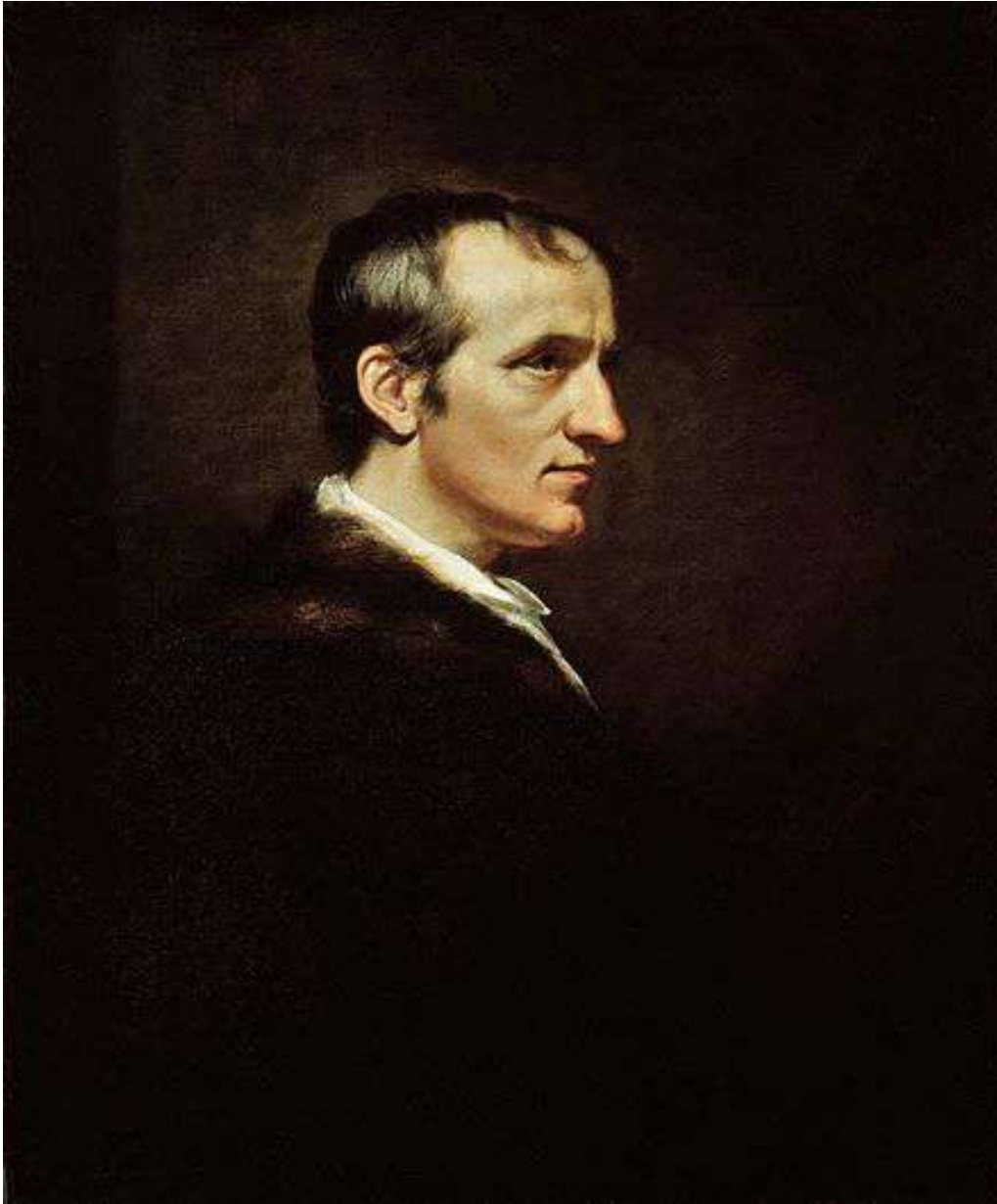


Figure 1.1: William Godwin in a painting by James Northcote (Wikipedia).

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 individual 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.

1.2 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



Figure 1.2: **The Marquis de Condorcet (public domain).**

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 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*.

1.3 Malthus: "The passions of mankind"

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 Botero 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 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



Figure 1.3: Thomas Robert Malthus (Wikipedia)!.

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 remediless, 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.

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Chapter 2

WHY WAR?

2.1 Ethology

In the long run, because of the terrible weapons that have already been produced through the misuse of science, and because of the even more terrible weapons that are likely to be invented in the future, the only way in which we can ensure the survival of civilization is to abolish the institution of war. But is this possible? Or are the emotions that make war possible so much a part of human nature that we cannot stop humans from fighting any more than we can stop cats and dogs from fighting? Can biological science throw any light on the problem of why our supposedly rational species seems intent on choosing war, pain and death instead of peace, happiness and life? To answer this question, we need to turn to the science of ethology - the study of inherited emotional tendencies and behavior patterns in animals and humans.

In *The Origin of Species*, Charles Darwin devoted a chapter to the evolution of instincts, and he later published a separate book on *The Expression of the Emotions in Man and Animals*. Because of these pioneering studies, Darwin is considered to be the founder of ethology.

The study of inherited behavior patterns in animals (and humans) was continued in the 20th century by such researchers as Karl von Frisch (1886-1982), Nikolaas Tinbergen (1907-1988), and Konrad Lorenz (1903-1989), three scientists who shared a Nobel Prize in Medicine and Physiology in 1973.

The third of the 1973 prizewinners, Konrad Lorenz, is controversial, but at the same time very interesting in the context of studies of the causes of war and discussions of how war may be avoided. As a young boy, he was very fond of animals, and his tolerant parents allowed him to build up a large menagerie in their house in Altenberg, Austria. Even as a child, he became an expert on waterfowl behavior, and he discovered the phenomenon of imprinting. He was given a one day old duckling, and found, to his intense joy, that it transferred its following response to his person. As Lorenz discovered, young waterfowl have a short period immediately after being hatched, when they identify as their “mother” whomever they see first. In later life, Lorenz continued his studies of imprinting, and there

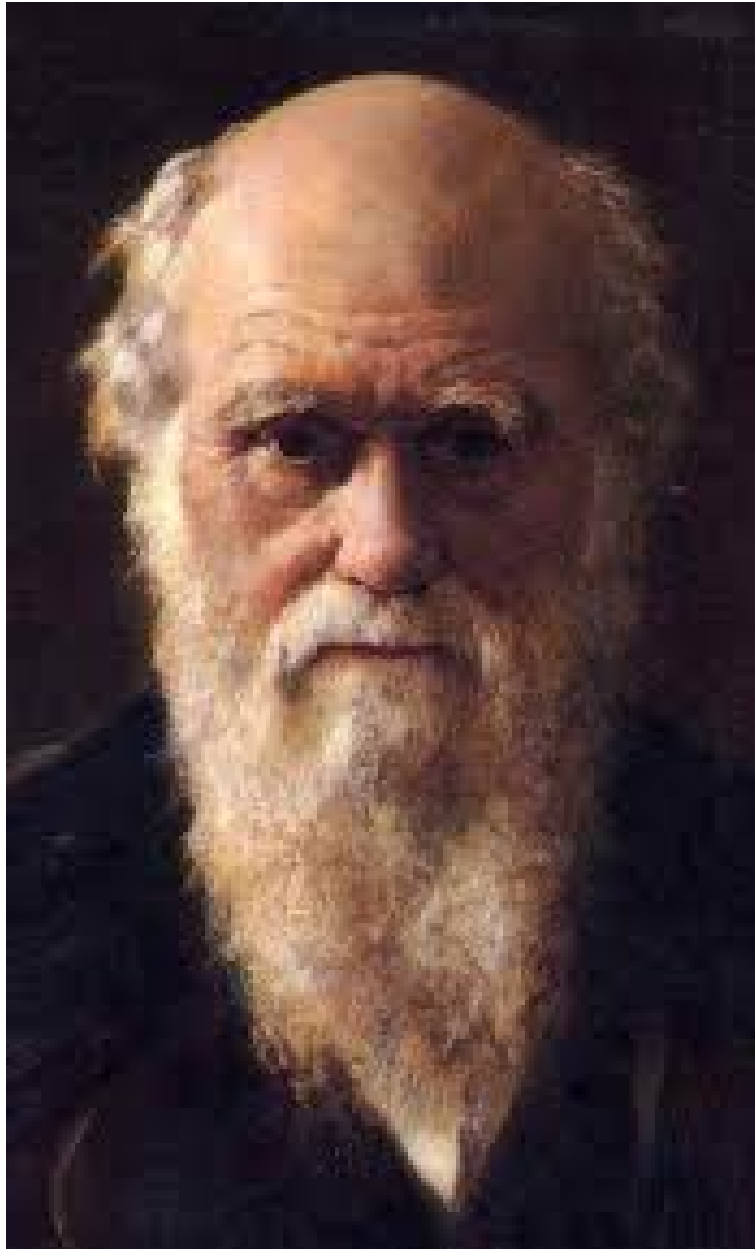


Figure 2.1: Because of Charles Darwin's book "The Expression of Emotions in Man and Animals", he is considered to be the founder of the field of Ethology, the study of inherited behavior patterns.



Figure 2.2: Nikolaas Tinbergen (1907-1988) on the left, with Konrad Lorenz (1903-1989). Together with Karl von Frisch (1886-1982) they shared the 1973 Nobel Prize in Physiology and Medicine for their pioneering work in Ethology.



Figure 2.3: Konrad Lorenz with geese who consider him to be their mother.

exists a touching photograph of him, with his white beard, standing waist-deep in a pond, surrounded by an adoring group of goslings who believe him to be their mother. Lorenz also studied bonding behavior in waterfowl.

It is, however, for his controversial book *On Aggression* that Konrad Lorenz is best known. In this book, Lorenz makes a distinction between intergroup aggression and intragroup aggression. Among animals, he points out, rank-determining fights are seldom fatal. Thus, for example, the fights that determine leadership within a wolf pack end when the loser makes a gesture of submission. By contrast, fights between groups of animals are often fights to the death, examples being wars between ant colonies, or of bees against intruders, or the defense of a rat pack against strange rats.

Many animals, humans included, seem willing to kill or be killed in defense of the communities to which they belong. Lorenz calls this behavioral tendency a “communal defense response”. He points out that the “holy shiver” - the tingling of the spine that humans experience when performing a heroic act in defense of their communities - is related to the prehuman reflex for raising the hair on the back of an animal as it confronts an enemy - a reflex that makes the animal seem larger than it really is.

In his book *On Aggression*, Konrad Lorenz gives the following description of the emotions of a hero preparing to risk his life for the sake of the group:

“In reality, militant enthusiasm is a specialized form of communal aggression, clearly distinct from and yet functionally related to the more primitive forms of individual aggression. Every man of normally strong emotions knows, from his own experience, the subjective phenomena that go hand in hand with the response of militant enthusiasm. A shiver runs down the back and, as more exact observation shows, along the outside of both arms. One soars elated, above all the ties of everyday life, one is ready to abandon all for the call of what, in the moment of this specific emotion, seems to be a sacred duty. All obstacles in its path become unimportant; the instinctive inhibitions against hurting or killing one’s fellows lose, unfortunately, much of their power. Rational considerations, criticisms, and all reasonable arguments against the behavior dictated by militant enthusiasm are silenced by an amazing reversal of all values, making them appear not only untenable, but base and dishonorable.

Men may enjoy the feeling of absolute righteousness even while they commit atrocities. Conceptual thought and moral responsibility are at their lowest ebb. As the Ukrainian proverb says: ‘When the banner is unfurled, all reason is in the trumpet’.”

“The subjective experiences just described are correlated with the following objectively demonstrable phenomena. The tone of the striated musculature is raised, the carriage is stiffened, the arms are raised from the sides and slightly rotated inward, so that the elbows point outward. The head is proudly raised, the chin stuck out, and the facial muscles mime the ‘hero face’ familiar from the films. On the back and along the outer surface of the arms, the hair stands on end. This is the objectively observed aspect of the shiver!”

“Anybody who has ever seen the corresponding behavior of the male chimpanzee defending his band or family with self-sacrificing courage will doubt the purely spiritual character of human enthusiasm. The chimp, too, sticks out his chin, stiffens his body, and raises his elbows; his hair stands on end, producing a terrifying magnification of his body

contours as seen from the front. The inward rotation of the arms obviously has the purpose of turning the longest-haired side outward to enhance the effect. The whole combination of body attitude and hair-raising constitutes a bluff. This is also seen when a cat humps its back, and is calculated to make the animal appear bigger and more dangerous than it really is. Our shiver, which in German poetry is called a 'heiliger Schauer', a 'holy' shiver, turns out to be the vestige of a prehuman vegetative response for making a fur bristle which we no longer have. To the humble seeker for biological truth, there cannot be the slightest doubt that human militant enthusiasm evolved out of a communal defense response of our prehuman ancestor."

Lorenz goes on to say, "An impartial visitor from another planet, looking at man as he is today - in his hand the atom bomb, the product of his intelligence - in his heart the aggression drive, inherited from his anthropoid ancestors, which the same intelligence cannot control - such a visitor would not give mankind much chance of survival."

In an essay entitled *The Urge to Self-Destruction*¹, Arthur Koestler says:

"Even a cursory glance at history should convince one that individual crimes, committed for selfish motives, play a quite insignificant role in the human tragedy compared with the numbers massacred in unselfish love of one's tribe, nation, dynasty, church or ideology... Wars are not fought for personal gain, but out of loyalty and devotion to king, country or cause..."

"We have seen on the screen the radiant love of the Führer on the faces of the Hitler Youth... They are transfixed with love, like monks in ecstasy on religious paintings. The sound of the nation's anthem, the sight of its proud flag, makes you feel part of a wonderfully loving community. The fanatic is prepared to lay down his life for the object of his worship, as the lover is prepared to die for his idol. He is, alas, also prepared to kill anybody who represents a supposed threat to the idol." The emotion described here by Koestler is the same as the communal defense mechanism ("militant enthusiasm") described in biological terms by Lorenz.

Generations of schoolboys have learned the Latin motto: "Dulce et decorum est pro patria mori" - it is both sweet and noble to die for one's country. Even in today's world, death in battle in defense of country and religion is still praised by nationalists. However, because of the development of weapons of mass destruction, both nationalism and narrow patriotism have become dangerous anachronisms.

In thinking of violence and war, we must be extremely careful not to confuse the behavioral patterns that lead to wife-beating or bar-room brawls with those that lead to episodes like the trench warfare of the First World War, or to the nuclear bombing of Hiroshima and Nagasaki. The first type of aggression is similar to the rank-determining fights of animals, while the second is more akin to the team-spirit exhibited by a football side. Heroic behavior in defense of one's community has been praised throughout the ages, but the tendency to such behavior has now become a threat to the survival of civilization, since tribalism makes war possible, and war with thermonuclear weapons threatens civilization

¹in *The Place of Value in a World of Facts*, A. Tiselius and S. Nielsson editors, Wiley, New York, (1970)

with catastrophe.

Warfare involves not only a high degree of aggression, but also an extremely high degree of altruism. Soldiers kill, but they also sacrifice their own lives. Thus patriotism and duty are as essential to war as the willingness to kill. As Arthur Koestler points out, "Wars are not fought for personal gain, but out of loyalty and devotion to king, country or cause..."

Tribalism involves passionate attachment to one's own group, self-sacrifice for the sake of the group, willingness both to die and to kill if necessary to defend the group from its enemies, and belief that in case of a conflict, one's own group is always in the right.

2.2 Population genetics

If we examine altruism and aggression in humans, we notice that members of our species exhibit great altruism towards their own children. Kindness towards close relatives is also characteristic of human behavior, and the closer the biological relationship is between two humans, the greater is the altruism they tend to show towards each other. This profile of altruism is easy to explain on the basis of Darwinian natural selection since two closely related individuals share many genes and, if they cooperate, the genes will be more effectively propagated.

To explain from an evolutionary point of view the communal defense mechanism discussed by Lorenz - the willingness of humans to kill and be killed in defense of their communities - we have only to imagine that our ancestors lived in small tribes and that marriage was likely to take place within a tribe rather than across tribal boundaries. Under these circumstances, each tribe would tend to consist of genetically similar individuals. The tribe itself, rather than the individual, would be the unit on which the evolutionary forces of natural selection would act. The idea of group selection in evolution was proposed in the 1930's by J.B.S. Haldane and R.A. Fisher, and more recently it has been discussed by W.D. Hamilton and E.O. Wilson.

According to the group selection model, a tribe whose members showed altruism towards each other would be more likely to survive than a tribe whose members cooperated less effectively. Since several tribes might be in competition for the same territory, intertribal aggression might, under some circumstances, increase the chances for survival of one's own tribe. Thus, on the basis of the group selection model, one would expect humans to be kind and cooperative towards members of their own group, but at the same time to sometimes exhibit aggression towards members of other groups, especially in conflicts over territory. One would also expect intergroup conflicts to be most severe in cases where the boundaries between groups are sharpest - where marriage is forbidden across the boundaries.



Figure 2.4: **Sir Ronald Aylmer Fisher (1890-1962).** Together with J.B.S Haldane he pioneered the theory of population genetics. Recent contributions to this theory have been made by W.D. Hamilton and E.O. Wilson.

2.3 Hope for the future

Although humans originally lived in small, genetically homogeneous tribes, the social and political groups of the modern world are much larger, and are often multiracial and multiethnic.

There are a number of large countries that are remarkable for their diversity, for example Brazil, Argentina and the United States. Nevertheless it has been possible to establish social cohesion and group identity within each of these enormous nations. India and China too, are mosaics of diverse peoples, but nevertheless, they function as coherent societies. Thus we see that group identity is a social construction, in which artificial “tribal markings” define the boundaries of the group. These tribal markings will be discussed in more detail below.

One gains hope for the future by observing how it has been possible to produce both internal peace and social cohesion over very large areas of the globe - areas that contain extremely diverse populations. The difference between making large, ethnically diverse countries function as coherent sociopolitical units and making the entire world function as a unit is not very great.

Since group identity is a social construction, it is not an impossible goal to think of enlarging the already-large groups of the modern world to include all of humanity.

On our small but beautiful earth, made small by technology, made beautiful by nature, there is room for one group only: the all-inclusive family of humankind.

2.4 Religion and ethnic identity

An acceleration of human cultural development seems to have begun approximately 70,000 years ago. The first art objects date from that period, as do migrations that ultimately took modern man across the Bering Strait to the western hemisphere. A land bridge extending from Siberia to Alaska is thought to have been formed approximately 70,000 years ago, disappearing again roughly 10,000 years before the present. Cultural and genetic studies indicate that migrations from Asia to North America took place during this period. Shamanism,² which is found both in Asia and the new world, as well as among the Sami (Lapps) of northern Scandinavia, is an example of the cultural links between the hunting societies of these regions.

Before the acceleration of human cultural development just mentioned, genetic change and cultural change went hand in hand, but during the last 70,000 years, the constantly accelerating rate of information-accumulation and cultural evolution has increasingly out-distanced the rate of genetic change in humans. Genetically we are almost identical with our hunter-gatherer ancestors of 70,000 years ago, but cultural evolution has changed our way of life beyond recognition.

²A shaman is a special member of a hunting society who, while in a trance, is thought to be able pass between the upper world, the present world, and the lower world, to cure illnesses, and to insure the success of a hunt.

Humans are capable of cultural evolution because it is so easy to overwrite and modify our instinctive behavior patterns with learned behavior. Within the animal kingdom, humans are undoubtedly the champions in this respect. No other species is so good at learning as we are. During the early stages of cultural evolution, the tendency of humans to be religious may have facilitated the overwriting of instinctive behavior with the culture of the tribe. Since religions, like languages, are closely associated with particular cultures, they serve as marks of ethnic identity.

2.5 Tribal markings; ethnicity; pseudospeciation

In biology, a species is defined to be a group of mutually fertile organisms. Thus all humans form a single species, since mixed marriages between all known races will produce children, and subsequent generations in mixed marriages are also fertile. However, although there is never a biological barrier to marriages across ethnic and racial boundaries, there are often very severe cultural barriers.

Irenäus Eibl-Eibesfeldt, a student of Konrad Lorenz, introduced the word *pseudospeciation* to denote cases where cultural barriers between two groups of humans are so strongly marked that marriages across the boundary are difficult and infrequent. In such cases, he pointed out, the two groups function as though they were separate species, although from a biological standpoint this is nonsense. When two such groups are competing for the same land, the same water, the same resources, and the same jobs, the conflicts between them can become very bitter indeed. Each group regards the other as being “not truly human”.

In his book *The Biology of War and Peace*, Eibl-Eibesfeldt discusses the “tribal markings” used by groups of humans to underline their own identity and to clearly mark the boundary between themselves and other groups. One of the illustrations in the book shows the marks left by ritual scarification on the faces of the members of certain African tribes. These scars would be hard to counterfeit, and they help to establish and strengthen tribal identity. Seeing a photograph of the marks left by ritual scarification on the faces of African tribesmen, it is impossible not to be reminded of the dueling scars that Prussian army officers once used to distinguish their caste from outsiders.

Surveying the human scene, one can find endless examples of signs that mark the bearer as a member of a particular group - signs that can be thought of as “tribal markings”: tattoos; piercing; bones through the nose or ears; elongated necks or ears; filed teeth; Chinese binding of feet; circumcision, both male and female; unique hair styles; decorations of the tongue, nose, or naval; peculiarities of dress, fashions, veils, chadors, and headdresses; caste markings in India; use or nonuse of perfumes; codes of honor and value systems; traditions of hospitality and manners; peculiarities of diet (certain foods forbidden, others preferred); giving traditional names to children; knowledge of dances and songs; knowledge of recipes; knowledge of common stories, literature, myths, poetry or common history; festivals, ceremonies, and rituals; burial customs, treatment of the dead and ancestor worship; methods of building and decorating homes; games and sports peculiar to a culture;



Figure 2.5: A tattooed face can help to establish tribal identity



Figure 2.6: An example of the dueling scars that Prussian army officers once used to distinguish their caste from outsiders.

relationship to animals, knowledge of horses and ability to ride; nonrational systems of belief. Even a baseball hat worn backwards or the professed ability to enjoy atonal music can mark a person as a member of a special “tribe”. Undoubtedly there many people in New York who would never think of marrying someone who could not appreciate the the paintings of Jasper Johns, and many in London who would consider anyone had not read all the books of Virginia Wolfe to be entirely outside the bounds of civilization.

By far the most important mark of ethnic identity is language, and within a particular language, dialect and accent. If the only purpose of language were communication, it would be logical for the people of a small country like Denmark to stop speaking Danish and go over to a more universally-understood international language such as English. However, language has another function in addition to communication: It is also a mark of identity. It establishes the boundary of the group.

Within a particular language, dialects and accents mark the boundaries of subgroups. For example, in England, great social significance is attached to accents and diction, a tendency that George Bernard Shaw satirized in his play, *Pygmalion*, which later gained greater fame as the musical comedy, *My Fair Lady*. This being the case, we can ask why all citizens of England do not follow the example of Eliza Doolittle in Shaw’s play, and improve their social positions by acquiring Oxford accents. However, to do so would be to run the risk of being laughed at by one’s peers and regarded as a traitor to one’s own local community and friends. School children everywhere can be very cruel to any child who does not fit into the local pattern. At Eton, an Oxford accent is compulsory; but in a Yorkshire school, a child with an Oxford accent would suffer for it.

Next after language, the most important “tribal marking” is religion. As mentioned above, it seems probable that in the early history of our hunter-gatherer ancestors, religion evolved as a mechanism for perpetuating tribal traditions and culture. Like language, and like the innate facial expressions studied by Darwin, religion is a universal characteristic of all human societies. All known races and cultures practice some sort of religion. Thus a tendency to be religious seems to be built into human nature, or at any rate, the needs that religion satisfies seem to be a part of our inherited makeup. Otherwise, religion would not be so universal as it is.

Religion is often strongly associated with ethnicity and nationalism, that is to say, it is associated with the demarcation of a particular group of people by its culture or race. For example, the Jewish religion is associated with Zionism and with Jewish nationalism. Similarly Islam is strongly associated with Arab nationalism. Christianity too has played an important role in in many aggressive wars, for example in the Crusades, in the European conquest of the New World, in European colonial conquests in Africa and Asia, and in the wars between Catholics and Protestants within Europe. We shall see in a later chapter how the originators of the German nationalist movement (the precursors of the Nazis), used quasi-religious psychological methods.

Human history seems to be saturated with blood. It would be impossible to enumerate the conflicts with which the story of humankind is stained. Many of the atrocities of history have involved what Irenäus Eibl-Eibesfeldt called “pseudospeciation”, that is to say, they were committed in conflicts involving groups between which sharply marked

cultural barriers have made intermarriage difficult and infrequent. Examples include the present conflict between Israelis and Palestinians; “racial cleansing” in Kosovo; the devastating wars between Catholics and Protestants in Europe; the Lebanese civil war; genocide committed against Jews and Gypsies during World War II; recent genocide in Rwanda; current intertribal massacres in the Ituri Province of Congo; use of poison gas against Kurdish civilians by Saddam Hussein’s regime in Iraq; the massacre of Armenians by Turks; massacres of Hindus by Muslims and of Muslims by Hindus in post-independence India; massacres of Native Americans by white conquerors and settlers in all parts of the New World; and massacres committed during the Crusades. The list seems almost endless.

Religion often contributes to conflicts by sharpening the boundaries between ethnic groups and by making marriage across those boundaries difficult and infrequent. However, this negative role is balanced by a positive one, whenever religion is the source of ethical principles, especially the principle of universal human brotherhood.

The religious leaders of today’s world have the opportunity to contribute importantly to the solution of the problem of war. They have the opportunity to powerfully support the concept of universal human brotherhood, to build bridges between religious groups, to make intermarriage across ethnic boundaries easier, and to soften the distinctions between communities. Our political leaders have the duty to move away from nationalism and militarism. If they fail to do this, they will have failed humankind at a time of great danger and crisis.



Figure 2.7: An illustration from Darwin's book, "The Expression of Emotions in Man and Animals". Here a cat raises its back and fur when confronting an enemy to make itself seem larger and more dangerous. This reflex was later discussed by the ethologist Konrad Lorenz.

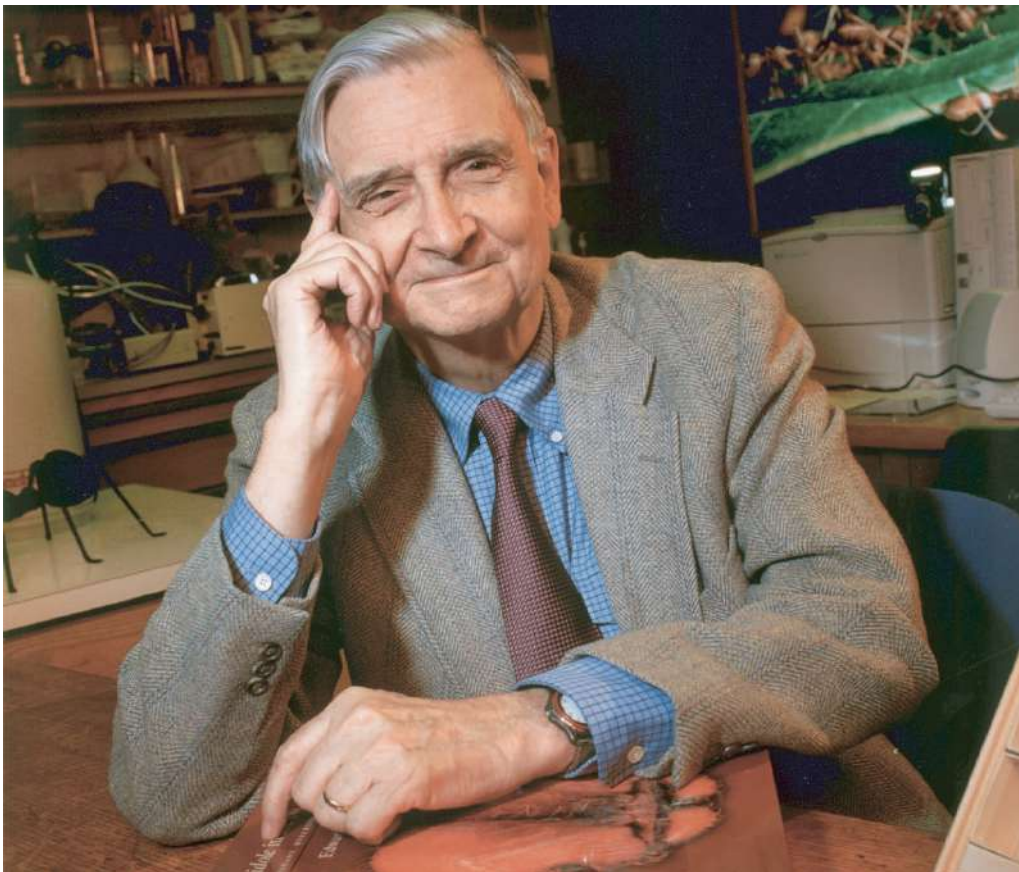


Figure 2.8: **Professor E.O. Wilson of Harvard is famous for his books on Sociobiology.**



Figure 2.9: **Professor Richard Dawkins** of Oxford, controversial author of “**The Selfish Gene**” and many other books. He has contributed much to the debate on relationships between science, religion, aggression and altruism.

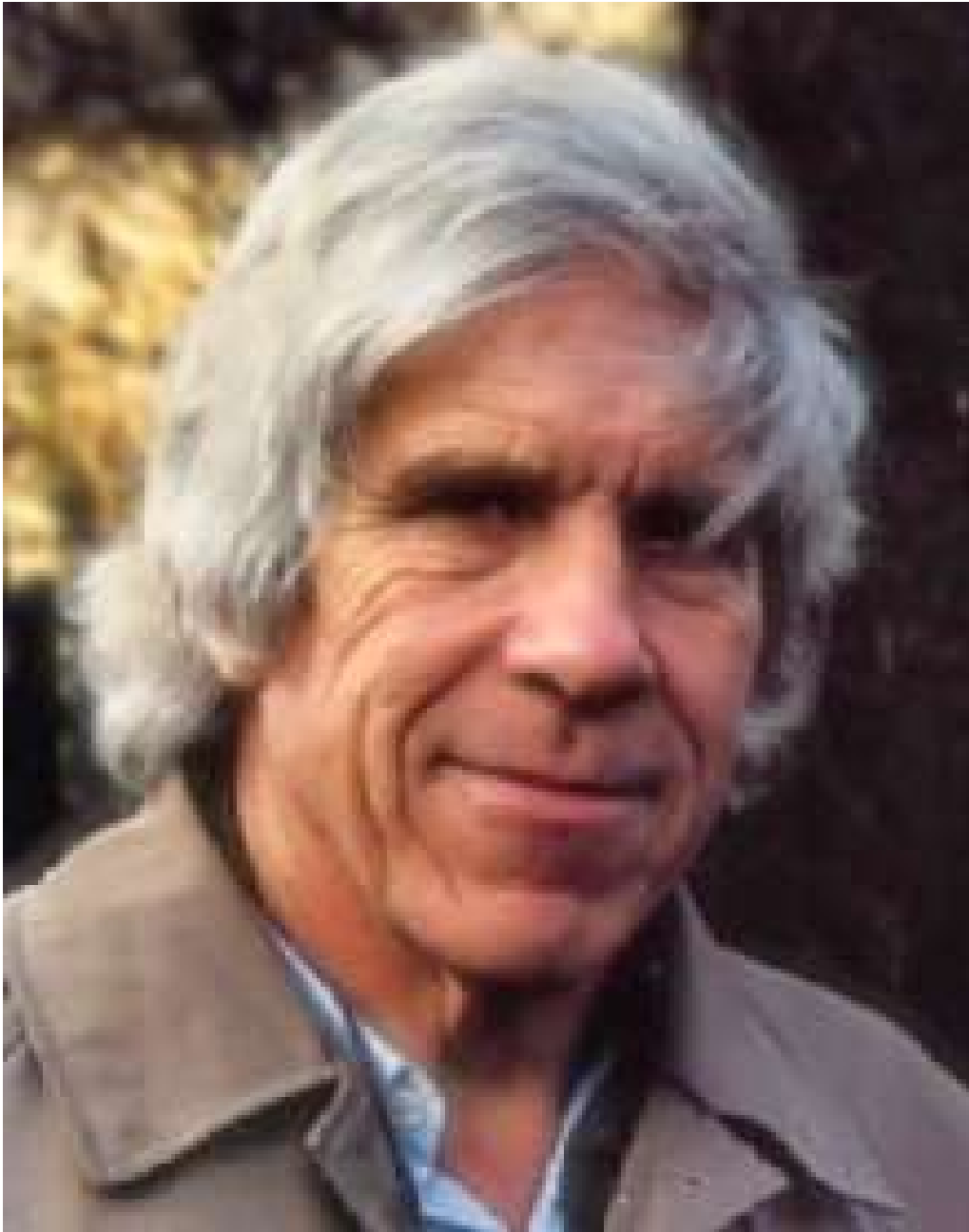


Figure 2.10: William Donald Hamilton was a Royal Society Research Professor at Oxford University until his death in 2000. He contributed importantly to our understanding of altruism from the standpoint of genetics.

2.6 The arms race prior to World War 1

The inherited tendency towards tribalism in human nature makes war possible. Humans are willing to kill and to be killed to defend their own group against perceived enemies. However, there is another element that drives and perpetuates the institution of war - the enormous amounts of money earned by arms manufacturers - the military-industrial complex against which Dwight D. Eisenhower warned in his famous farewell address.

In an article entitled *Arms Race Prior to 1914, Armament Policy*³, Eric Brose writes: “New weapons produced during the Industrial Revolution in the late 1800s heightened existing tensions among European nations as countries strove to outpace their enemies technologically. This armaments race accelerated in the decade before 1914 as the Triple Alliance of Germany, Austria-Hungary, and Italy squared off against the Triple Entente of France, Russia, and Britain. Germany’s fears of increases in Russian armaments, and British fears of the German naval buildup, contributed heavily to the outbreak and spread of the First World War in 1914.”

The Wikipedia article on *Arms race* states that “From 1897 to 1914, a naval arms race between the United Kingdom and Germany took place. British concern about rapid increase in German naval power resulted in a costly building competition of Dreadnought-class ships. This tense arms race lasted until 1914, when the war broke out. After the war, a new arms race developed among the victorious Allies, which was temporarily ended by the Washington Naval Treaty.

“In addition to the British and Germans, contemporaneous but smaller naval arms races also broke out between Russia and the Ottoman Empire; the Ottomans and Greece; France and Italy; the United States and Japan; and Brazil, Argentina, and Chile.

“The United Kingdom had the largest navy in the world. In accord with Wilhelm II’s enthusiasm for an expanded German navy and the strong desires of Grand Admiral Alfred von Tirpitz, Secretary of State of the German Imperial Naval Office, four Fleet Acts from 1898 and 1912 greatly expanded the German High Seas Fleet. The German aim was to build a fleet that would be two thirds the size of the British navy. The plan was sparked by the threat of the British Foreign Office in March 1897, after the British invasion of Transvaal that started the Boer War, of blockading the German coast and thereby crippling the German economy if Germany intervened in the conflict in Transvaal. From 1905 onward, the British navy developed plans for such a blockade, which was a central part of British strategy.

“In reaction to the challenge to its naval supremacy, from 1902 to 1910, the British Royal Navy embarked on a massive expansion to keep ahead of the Germans. The competition came to focus on the revolutionary new ships based on HMS Dreadnought, which was launched in 1906.”

³International Encyclopedia of the First World War

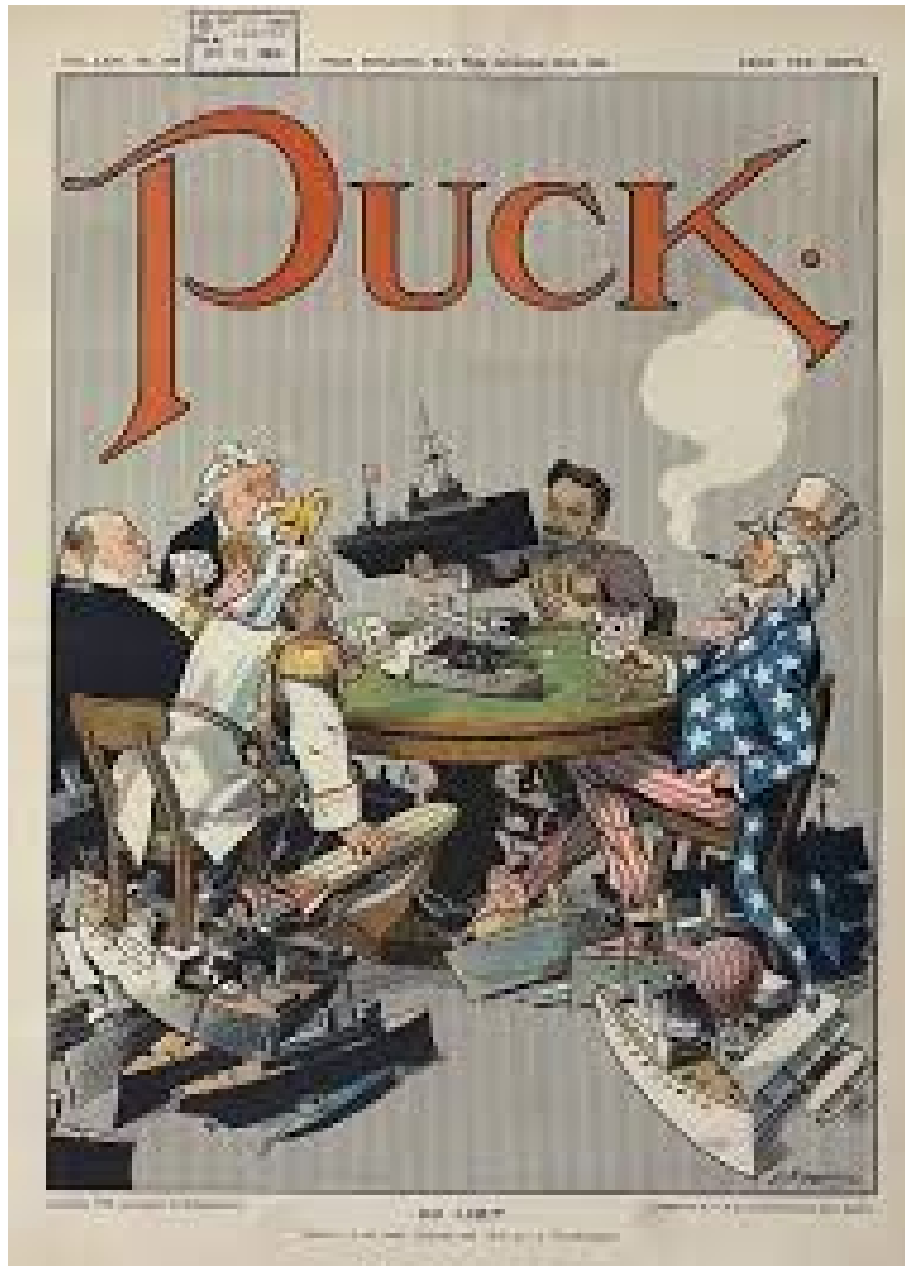


Figure 2.11: Left to right, US, Britain, Germany, France and Japan, engage in a “no limits” game for naval supremacy.

2.7 Krupp, Thyssen and Germany's steel industry

The Krupp family business, known as Friedrich Krupp AG, was the largest company in Europe at the beginning of the 20th century. It was important to weapons development and production in both world wars. One of the most powerful dynasties in European history, for 400 years Krupp flourished as the premier weapons manufacturer for Germany. From the Thirty Years' War until the end of the Second World War, they produced everything from battleships, U-boats, tanks, howitzers, guns, utilities, and hundreds of other commodities.

The Thyssen family similarly profited from the arms races prior to World War I and World War II. August Thyssen (1842-1925) founded a large iron and steel company in the Ruhr district of Germany, and was succeeded by his son Fritz Thyssen, who greatly aided Hitler's rise to power.

2.8 Colonialism and the outbreak of the First World War

The First World War broke out approximately 100 years ago, and much thought has been given to the causes of this tragic event, whose consequences continue to cast a dark shadow over the human future. When the war ended four years later, ten million young men had been killed and twenty million wounded, of whom six million were crippled for life. The war had cost 350,000,000,000 1919 dollars. This was a calculable cost; but the cost in human suffering and brutalization of values was incalculable.

It hardly mattered whose fault the catastrophe had been. Perhaps the Austrian government had been more to blame than any other. But blame for the war certainly did not rest with the Austrian people nor with the young Austrians who had been forced to fight. However, the tragedy of the First World War was that it created long-lasting hatred between the nations involved; and in this way it led, only twenty years later, to an even more catastrophic global war, during the course of which nuclear weapons were developed.

Most scholars believe that competing colonial ambitions played an important role in setting the stage for the First World War. A second factor was an armaments race between European countries, and the huge profits gained by arms manufacturers. Even at that time, the Military-industrial complex was firmly established; and today it continues to be the greatest source of war, together with neocolonialism.⁴

⁴<http://alphahistory.com/worldwar1/imperialism/>
<http://www.flowofhistory.com/units/etc/19/26>
<http://alphahistory.com/worldwar1/militarism/>



Figure 2.12: Map of European colonies in Africa in 1914, just before the First World War. Source: www.createdebate.com

2.9 Prescott Bush and Hitler

Prescott Sheldon Bush (1895-1972), the father of George H.W. Bush and grandfather of George W. Bush, actively supported the revival of Germany's armament's industry in the 1930's, as well as supplying large amounts of money to Adolf Hitler's Nazi Party.⁵

An article in *The Guardian*⁶, Ben Aris and Dubcab Campbell write that "George Bush's grandfather, the late US senator Prescott Bush, was a director and shareholder of companies that profited from their involvement with the financial backers of Nazi Germany.

"The Guardian has obtained confirmation from newly discovered files in the US National Archives that a firm of which Prescott Bush was a director was involved with the financial architects of Nazism.

"His business dealings, which continued until his company's assets were seized in 1942 under the Trading with the Enemy Act, has led more than 60 years later to a civil action for damages being brought in Germany against the Bush family by two former slave laborers at Auschwitz and to a hum of pre-election controversy.

"The debate over Prescott Bush's behavior has been bubbling under the surface for some time. There has been a steady Internet chatter about the "Bush/Nazi" connection,

⁵<https://www.youtube.com/watch?v=TnHnjmCYjy4>
<https://www.youtube.com/watch?v=7BZCfbrXKs4>
<https://www.youtube.com/watch?v=7BZCfbrXKs4>
<http://www.georgewalkerbush.net/bushfamilyfundedhitler.htm>
<http://www.theguardian.com/world/2004/sep/25/usa.secondworldwar>

⁶September 25, 2004



Figure 2.13: Prescott Bush, the father of George H.W. Bush and grandfather of George W. Bush, supported Hitler's rise to power with large financial contributions to the Nazi Party. The photo shows them together. Source: topinfo-post.com

much of it inaccurate and unfair. But the new documents, many of which were only declassified last year, show that even after America had entered the war and when there was already significant information about the Nazis' plans and policies, he worked for and profited from companies closely involved with the very German businesses that financed Hitler's rise to power. It has also been suggested that the money he made from these dealings helped to establish the Bush family fortune and set up its political dynasty.

"Bush was also on the board of at least one of the companies that formed part of a multinational network of front companies to allow [Fritz] Thyssen to move assets around the world.

"Thyssen owned the largest steel and coal company in Germany and grew rich from Hitler's efforts to re-arm between the two world wars. One of the pillars in Thyssen's international corporate web, UBC, worked exclusively for, and was owned by, a Thyssen-controlled bank in the Netherlands. More tantalizing are Bush's links to the Consolidated Silesian Steel Company (CSSC), based in mineral rich Silesia on the German-Polish border. During the war, the company made use of Nazi slave labor from the concentration camps, including Auschwitz. The ownership of CSSC changed hands several times in the 1930s, but documents from the US National Archive declassified last year link Bush to CSSC, although it is not clear if he and UBC were still involved in the company when Thyssen's American assets were seized in 1942."

2.10 Fritz Thyssen supports Hitler's rise to power

"In 1923, Thyssen met former General Erich Ludendorff, who advised him to attend a speech given by Adolf Hitler, leader of the Nazi Party. Thyssen was impressed by Hitler and his bitter opposition to the Treaty of Versailles, and began to make large donations to the party, including 100,000 gold marks in 1923 to Ludendorff. In this he was unusual among German business leaders, as most were traditional conservatives who regarded the Nazis with suspicion. Thyssen's principal motive in supporting the National Socialists was his great fear of communism; he had little confidence that the various German anticommunist factions would prevent a Soviet-style revolution in Germany unless the popular appeal of communism among the lower classes was co-opted by an anticommunist alternative. Postwar investigators found that he had donated 650,000 Reichsmarks to right-wing parties, mostly to the Nazis, although Thyssen himself claimed to have donated 1 million marks to the Nazi Party. Thyssen remained a member of the German National People's Party until 1932, and did not join the Nazi Party (National Socialist German Workers' Party) until 1933.

"In November, 1932, Thyssen and Hjalmar Schacht were the main organizers of a letter to President Paul von Hindenburg urging him to appoint Hitler as Chancellor. Thyssen also persuaded the Association of German Industrialists to donate 3 million Reichsmarks to the Nazi Party (National Socialist German Workers' Party) for the March, 1933 Reichstag election. As a reward, he was elected a Nazi member of the Reichstag and appointed to the Council of State of Prussia, the largest German state (both purely honorary positions).

"Thyssen welcomed the suppression of the Communist Party, the Social Democrats and the trade unions. In 1934 he was one of the business leaders who persuaded Hitler to suppress the SA, leading to the "Night of the Long Knives". Thyssen accepted the exclusion of Jews from German business and professional life by the Nazis, and dismissed his own Jewish employees. But as a Catholic, he objected to the increasing repression of the Roman Catholic Church, which gathered pace after 1935: in 1937 he sent a letter to Hitler, protesting the persecution of Christians in Germany.[4] The breaking point for Thyssen was the violent pogrom against the Jews in November 1938, known as Kristallnacht, which caused him to resign from the Council of State. By 1939 he was also bitterly criticizing the regime's economic policies, which were subordinating everything to rearmament in preparation for war."



Figure 2.14: An arms race between the major European powers contributed to the start of World War I.



Figure 2.15: World War I was called “The War to End All Wars”. Today it seems more like The War that Began All Wars.

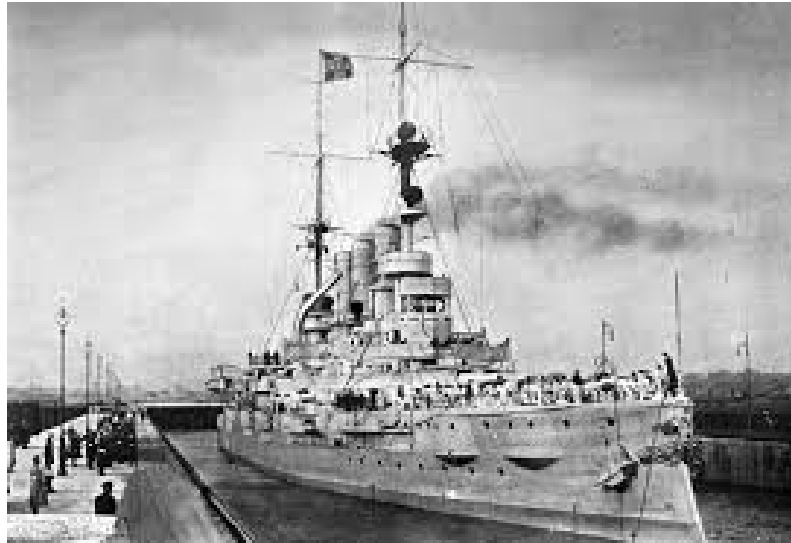


Figure 2.16: The naval arms race, which contributed to the start of World War I, enriched steel manufacturers and military shipbuilders.



Figure 2.17: Who is the leader, and who the follower?

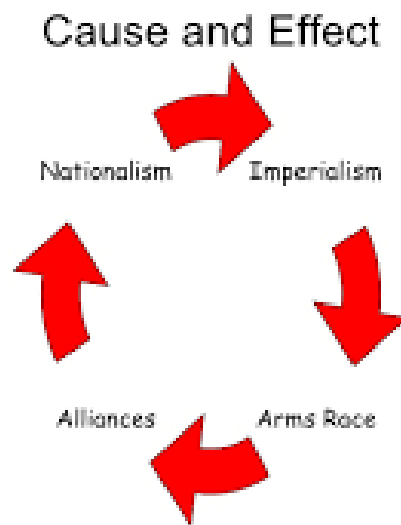


Figure 2.18: A vicious circle.



Figure 2.19: Ready, set, go!

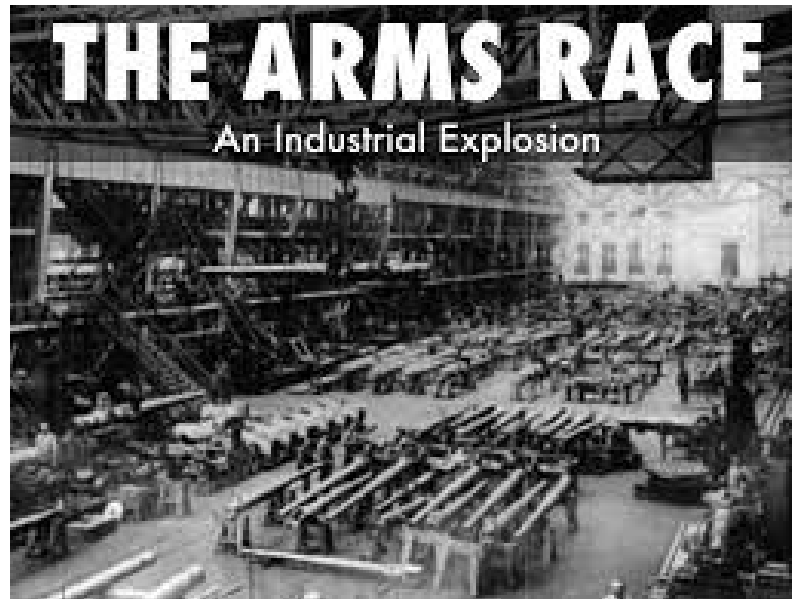


Figure 2.20: If our economies depend on armaments industries, it is an unhealthy dependence, analogous to drug addiction.



Figure 2.21: The nuclear arms race casts a dark shadow over the future of human civilization and the biosphere.



Figure 2.22: During the Cuban Missile Crisis, the world came close to a catastrophic thermonuclear war.

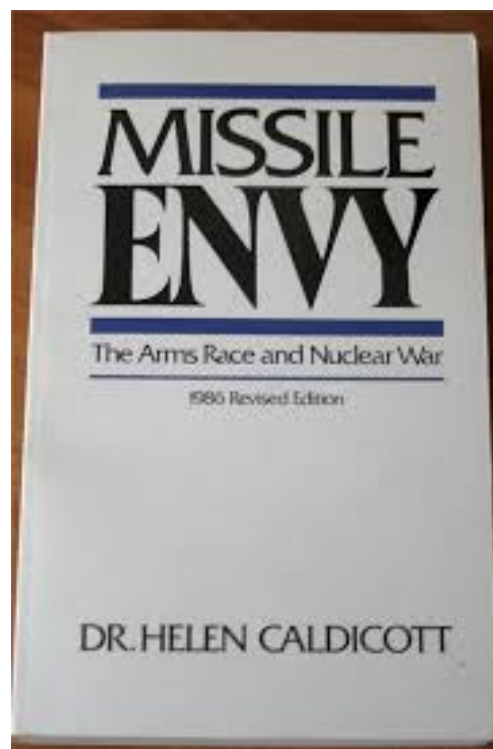


Figure 2.23: Dr. Helen Caldecott has worked to document the dangers of both nuclear weapons and nuclear power generation.



Figure 2.24: We must listen to the wise words of Dr. Martin Luther King, Jr.

2.11 Eisenhower's farewell address

In his famous farewell address, US President Dwight Eisenhower eloquently described the terrible effects of an overgrown Military-industrial complex. Here are his words:

"We have been compelled to create a permanent armaments industry of vast proportions.... This conjunction of an immense military establishment and a large arms industry is new in the American experience. The total influence, economic, political, even spiritual, is felt in every city, every State house, every office of the Federal government...[and] we must not fail to comprehend its grave implications. Our toil, resources and livelihood are all involved; so is the very structure of our society.

"In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the Military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist."

In another speech, he said: "Every gun that is made, every warship launched, every rocket fired signifies, in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed. This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children."

Today the world spends more than 1.7 trillion dollars (\$ 1,700,000,000,000) every year on armaments. This vast river of money, almost too large to be imagined, is the "devil's dynamo" driving the institution of war. Politicians notoriously can be bought with a tiny fraction of this enormous amount; hence the decay of democracy. It is also plain that if the almost unbelievable sums now wasted on armaments were used constructively, most of the pressing problems now facing humanity could be solved.

Because the world spends almost two thousand billion dollars each year on armaments, it follows that very many people make their living from war. This is the reason why it is correct to speak of war as an institution, and why it persists, although we know that it is the cause of much of the suffering that inflicts humanity.

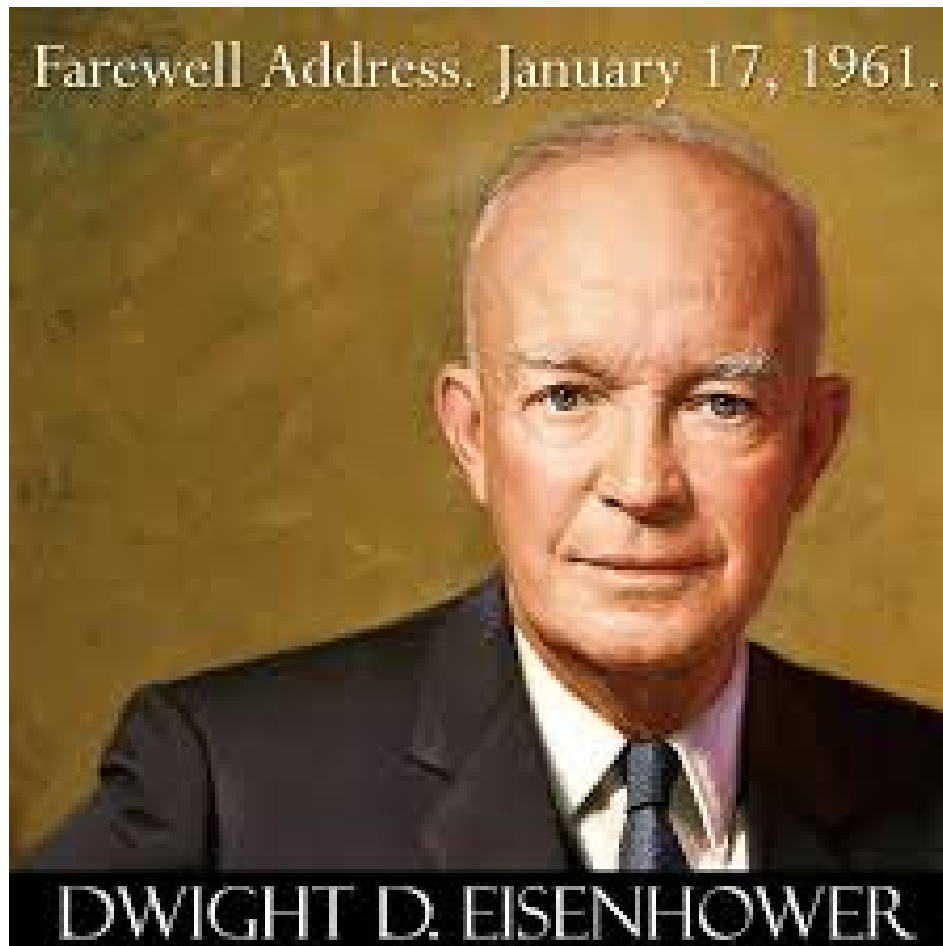


Figure 2.25: “In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the Military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist.”

2.12 The nuclear arms race

Flaws in the concept of nuclear deterrence

Before discussing other defects in the concept of deterrence, it must be said very clearly that the idea of “massive nuclear retaliation” is completely unacceptable from an ethical point of view. The doctrine of retaliation, performed on a massive scale, violates not only the principles of common human decency and common sense, but also the ethical principles of every major religion. Retaliation is especially contrary to the central commandment of Christianity which tells us to love our neighbor, even if he or she is far away from us, belonging to a different ethnic or political group, and even if our distant neighbor has seriously injured us. This principle has a fundamental place not only in Christianity but also in all other major religions. “Massive retaliation” completely violates these very central ethical principles, which are not only clearly stated and fundamental but also very practical, since they prevent escalatory cycles of revenge and counter-revenge.

Contrast Christian ethics with estimates of the number of deaths that would follow a US nuclear strike against Russia: Several hundred million deaths. These horrifying estimates shock us not only because of the enormous magnitude of the expected mortality, but also because the victims would include people of every kind: women, men, old people, children and infants, completely irrespective of any degree of guilt that they might have. As a result of such an attack, many millions of people in neutral countries would also die. This type of killing has to be classified as genocide.

When a suspected criminal is tried for a wrongdoing, great efforts are devoted to clarifying the question of guilt or innocence. Punishment only follows if guilt can be proved beyond any reasonable doubt. Contrast this with the totally indiscriminate mass slaughter that results from a nuclear attack!

It might be objected that disregard for the guilt or innocence of victims is a universal characteristic of modern war, since statistics show that, with time, a larger and larger percentage of the victims have been civilians, and especially children. For example, the air attacks on Coventry during World War II, or the fire bombings of Dresden and Tokyo, produced massive casualties which involved all segments of the population with complete disregard for the question of guilt or innocence. The answer, I think, is that modern war has become generally unacceptable from an ethical point of view, and this unacceptability is epitomized in nuclear weapons.

The enormous and indiscriminate destruction produced by nuclear weapons formed the background for an historic 1996 decision by the International Court of Justice in the Hague. In response to questions put to it by WHO and the UN General Assembly, the Court ruled 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 World Court added unanimously that “there exists an obligation to pursue in good faith *and bring to a conclusion* negotiations leading to nuclear disarmament in all its aspects under strict international control.”

This landmark decision has been criticized by the nuclear weapon states as being decided “by a narrow margin”, but the structuring of the vote made the margin seem more narrow than it actually was. Seven judges voted against Paragraph 2E of the decision (the paragraph which states that the threat or use of nuclear weapons would be generally illegal, but which mentions as a possible exception the case where a nation might be defending itself from an attack that threatened its very existence.) Seven judges voted for the paragraph, with the President of the Court, Muhammad Bedjaoui of Algeria casting the deciding vote. Thus the Court adopted it, seemingly by a narrow margin. But three of the judges who voted against 2E did so because they believed that no possible exception should be mentioned! Thus, if the vote had been slightly differently structured, the result would have been ten to four.

Of the remaining four judges who cast dissenting votes, three represented nuclear weapons states, while the fourth thought that the Court ought not to have accepted the questions from WHO and the UN. However Judge Schwebel from the United States, who voted against Paragraph 2E, nevertheless added, in a separate opinion, “It cannot be accepted that the use of nuclear weapons on a scale which would - or could - result in the deaths of many millions in indiscriminate inferno and by far-reaching fallout, have pernicious effects in space and time, and render uninhabitable much of the earth, could be lawful.” Judge Higgins from the UK, the first woman judge in the history of the Court, had problems with the word “generally” in Paragraph 2E and therefore voted against it, but she thought that a more profound analysis might have led the Court to conclude in favor of illegality in all circumstances. Judge Fleischhauer of Germany said in his separate

opinion, “The nuclear weapon is, in many ways, the negation of the humanitarian considerations underlying the law applicable in armed conflict and the principle of neutrality. The nuclear weapon cannot distinguish between civilian and military targets. It causes immeasurable suffering. The radiation released by it is unable to respect the territorial integrity of neutral States.”

President Bedjaoui, summarizing the majority opinion, called nuclear weapons “the ultimate evil”, and said “By its nature, the nuclear weapon, this blind weapon, destabilizes Humanitarian law, the law of discrimination in the use of weapons... The ultimate aim of every action in the field of nuclear arms will always be nuclear disarmament, an aim which is no longer utopian and which all have a duty to pursue more actively than ever.”

Thus the concept of nuclear deterrence is not only unacceptable from the standpoint of ethics; it is also contrary to international law. The World Court’s 1996 advisory Opinion unquestionably also represents the opinion of the majority of the world’s peoples. Although no formal plebiscite has been taken, the votes in numerous resolutions of the UN General Assembly speak very clearly on this question. For example the New Agenda Resolution (53/77Y) was adopted by the General Assembly on 4 December 1998 by a massively affirmative vote, in which only 18 out of the 170 member states voted against the resolution.⁷ The New Agenda Resolution proposes numerous practical steps towards complete nuclear disarmament, and it calls on the Nuclear-Weapon States “to demonstrate an unequivocal commitment to the speedy and total elimination of their nuclear weapons and without delay to pursue in good faith and bring to a conclusion negotiations leading to the elimination of these weapons, thereby fulfilling their obligations under Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)”. Thus, in addition to being ethically unacceptable and contrary to international law, nuclear weapons also contrary to the principles of democracy.

Having said these important things, we can now turn to some of the other defects in the concept of nuclear deterrence. One important defect is that nuclear war may occur through accident or miscalculation - through technical defects or human failings. This possibility is made greater by the fact that despite the end of the Cold War, thousands of missiles carrying nuclear warheads are still kept on a “hair-trigger” state of alert with a quasi-automatic reaction time measured in minutes. There is a constant danger that a nuclear war will be triggered by error in evaluating the signal on a radar screen. For example, the BBC reported recently that a group of scientists and military leaders are worried that a small asteroid entering the earths atmosphere and exploding could trigger a nuclear war if mistaken for a missile strike.

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. Grey⁸ expressed this concern as follows: “The problem, indeed the enduring problem, is that we are resting our future upon a nuclear

⁷Of the 18 countries that voted against the New Agenda resolution, 10 were Eastern European countries hoping for acceptance into NATO, whose votes seem to have been traded for increased probability of acceptance.

⁸Chairman, National Institute for Public Policy

deterrence system concerning which we cannot tolerate even a single malfunction.” General Curtis E. LeMay⁹ 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. Blair¹⁰ 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.”

“But nobody can predict that the fatal accident or unauthorized act will never happen”, Fred Ikle of the Rand Corporation has written, “Given the huge and far-flung missile forces, ready to be launched from land and sea on 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.”

Another serious failure of the concept of nuclear deterrence is that it does not take into account the possibility that atomic bombs may be used by terrorists. Indeed, the threat of nuclear terrorism has today become one of the most pressing dangers that the world faces, a danger that is particularly acute in the United States.

Since 1945, more than 3,000 metric tons (3,000,000 kilograms) of highly enriched uranium and plutonium have been produced - enough for several hundred thousand nuclear weapons. Of this, roughly a million kilograms are in Russia, inadequately guarded, in establishments where the technicians are poorly paid and vulnerable to the temptations of bribery. There is a continuing danger that these fissile materials will fall into the hands of terrorists, or organized criminals, or irresponsible governments. Also, an extensive black market for fissile materials, nuclear weapons components etc. has recently been revealed in connection with the confessions of Pakistan’s bomb-maker, Dr. A.Q. Khan. Furthermore, if Pakistan’s less-than-stable government should be overthrown, complete nuclear weapons could fall into the hands of terrorists.

On November 3, 2003, Mohamed ElBaradei, Director General of the International Atomic Energy Agency, made a speech to the United Nations in which he called for “limiting the processing of weapons-usable material (separated plutonium and high enriched uranium) in civilian nuclear programmes - as well as the production of new material through reprocessing and enrichment - by agreeing to restrict these operations to facilities exclusively under international control.” It is almost incredible, considering the dangers of nuclear proliferation and nuclear terrorism, that such restrictions were not imposed long ago. Nuclear reactors used for “peaceful” purposes unfortunately also generate fissionable isotopes of plutonium, neptunium and americium. Thus all nuclear reactors must be regarded as ambiguous in function, and all must be put under strict international control. One might ask, in fact, whether globally widespread use of nuclear energy is worth the danger that it entails.

The Italian nuclear physicist Francesco Calogero, who has studied the matter closely, believes that terrorists could easily construct a simple gun-type nuclear bomb if they were in possession of a critical mass of highly enriched uranium. In such a simple atomic bomb,

⁹Founder and former Commander in Chief of the United States Strategic Air Command

¹⁰Brookings Institute

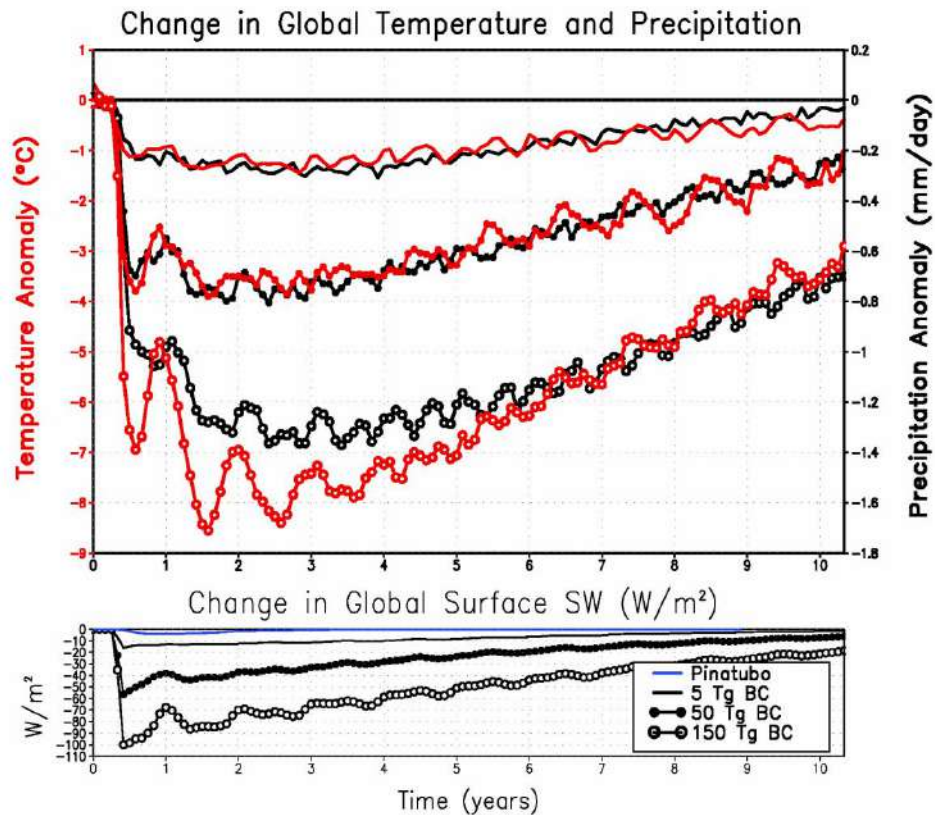


Figure 2.26: Recent studies by atmospheric scientists have shown that the smoke from burning cities produced by even a limited nuclear war would have a devastating effect on global agriculture. The studies show that the smoke would rise to the stratosphere, where it would spread globally and remain for a decade, blocking sunlight and destroying the ozone layer. Because of the devastating effect on global agriculture, darkness from even a small nuclear war (e.g. between India and Pakistan) would result in an estimated billion deaths from famine. Nuclear darkness resulting from a large-scale war involving all of the nuclear weapons that are now on high alert status would destroy all agriculture on earth for a period of ten years, and almost all humans would die of starvation. (See O. Toon, A. Robock, and R. Turco, “The Environmental Consequences of Nuclear War”, *Physics Today*, vol. 61, No. 12, 2008, p. 37-42).

two grapefruit-sized subcritical portions of HEU are placed at opposite ends of the barrel of an artillery piece and are driven together by means of a conventional explosive. Prof. Calogero estimates that the fatalities produced by the explosion of such a device in the center of a large city could exceed 100,000.

We must remember the remark of U.N. Secretary General Kofi Annan after the 9/11/2001 attacks on the World Trade Center. He said, “*This time* it was not a nuclear explosion”. The meaning of his remark is clear: If the world does not take strong steps to eliminate fissionable materials and nuclear weapons, it will only be a matter of time before they will be used in terrorist attacks on major cities. Neither terrorists nor organized criminals can be deterred by the threat of nuclear retaliation, since they have no territory against which such retaliation could be directed. They blend invisibly into the general population. Nor can a “missile defense system” prevent terrorists from using nuclear weapons, since the weapons can be brought into a port in any one of the hundreds of thousands of containers that enter on ships each year, a number far too large to be checked exhaustively.

Today we must give special weight to the danger that a catastrophic nuclear war may occur through the mental instability of a political leader or an error of judgement, since we now are living with Donald Trump and Kim Jong-un. In the words of ICAN’s Executive Director Beatrice Finn, the end of human civilization and much of the biosphere is “only a tantrum away”. Donald Trump has repeatedly expressed his desire for more “usable” nuclear weapons. and if nuclear weapons are ever used, there is a strong danger of escalation to a full-scale thermonuclear war.

Another problem with the concept of nuclear deterrence is that even if the danger that a catastrophic nuclear war will occur in any given year is small, over a long period of time the danger builds up into a certainty. If the dangers for any given year are 1%, 2% or 3%, the probabilities of are survival until 2100 are respectively 43%, 18% and 8%. If the period for which we must survive is extended to the year 2200, the chances of survival in the three cases are respectively .16%, .025%, and .0039%.

In this perilous situation, the only logical thing for the world to do is to get rid of both fissile materials and nuclear weapons as rapidly as possible. We must acknowledge that the idea of nuclear deterrence is a dangerous fallacy, and acknowledge that the development of military systems based on nuclear weapons has been a terrible mistake, a false step that needs to be reversed. If the most prestigious of the nuclear weapons states can sincerely acknowledge their mistakes and begin to reverse them, nuclear weapons will seem less glamorous to countries like India, Pakistan, North Korea and Iran, where they now are symbols of national pride and modernism.

Civilians have for too long played the role of passive targets, hostages in the power struggles of politicians. It is time for civil society to make its will felt. If our leaders continue to enthusiastically support the institution of war, if they will not abolish nuclear weapons, then let us have new leaders.

2.13 Global famine produced by nuclear war

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 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.

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."¹¹

¹¹<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>
<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>

A 2012 report published by International Physicians for the Prevention of Nuclear War states that even a small local nuclear war between India and Pakistan would put two billion people at risk of starvation.

2.14 Dangers of nuclear power generation

The Chernobyl disaster

The dangers of nuclear power generation are exemplified by the Chernobyl disaster: On the 26th of April, 1986, during the small hours of the morning, the staff of the Chernobyl nuclear reactor in Ukraine turned off several safety systems in order to perform a test. The result was a core meltdown in Reactor 4, causing a chemical explosion that blew off the reactor's 1,000-ton steel and concrete lid. 190 tons of highly radioactive uranium and graphite were hurled into the atmosphere. The resulting radioactive fallout was 200 times greater than that caused by the nuclear bombs that destroyed Hiroshima and Nagasaki. The radioactive cloud spread over Belarus, Ukraine, Russia, Finland, Sweden and Eastern Europe, exposing the populations of these regions to levels of radiation 100 times the normal background. Ultimately, the radioactive cloud reached as far as Greenland and parts of Asia.

The exact number of casualties resulting from the Chernobyl meltdown is a matter of controversy, but according to a United Nations report, as many as 9 million people have been adversely affected by the disaster. Since 1986, the rate of thyroid cancer in affected areas has increased ten-fold. An area of 155,000 square kilometers (almost half the size of Italy) in Belarus, Ukraine and Russia is still severely contaminated. Even as far away as Wales, hundreds of farms are still under restrictions because of sheep eating radioactive grass.

Public opinion turned against nuclear power generation as a result of the Chernobyl disaster. Had the disaster taken place in Western Europe or North America, its effect on public opinion would have been still greater. Nevertheless, because of the current energy crisis, and because of worries about global warming, a number of people are arguing that nuclear energy should be given a second chance. The counter-argument is that a large

<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/>

increase in the share of nuclear power in the total spectrum of energy production would have little effect on climate change but it would involve unacceptable dangers, not only dangers of accidents and dangers associated with radioactive waste disposal, but above all, dangers of proliferation of nuclear weapons.

Of the two bombs that destroyed Hiroshima and Nagasaki, one made use of the rare isotope of uranium, U-235, while the other used plutonium. Both of these materials can be made by a nation with a nuclear power generation program.

Reactors and nuclear weapons

Uranium has atomic number 92, i.e., a neutral uranium atom has a nucleus containing 92 positively-charged protons, around which 92 negatively-charged electrons circle. All of the isotopes of uranium have the same number of protons and electrons, and hence the same chemical properties, but they differ in the number of neutrons in their nuclei. For example, the nucleus of U-235 has 143 neutrons, while that of U-238 has 146. Notice that $92+143=235$, while $92+146=238$. The number written after the name of an element to specify a particular isotope is the number of neutrons plus the number of protons. This is called the "nucleon number", and the weight of an isotope is roughly proportional to it. This means that U-238 is slightly heavier than U-235. If the two isotopes are to be separated, difficult physical methods dependent on mass must be used, since their chemical properties are identical. In natural uranium, the amount of the rare isotope U-235 is only 0.7 percent.

A paper published in 1939 by Niels Bohr and John A. Wheeler indicated that it was the rare isotope of uranium, U-235, that undergoes fission. A bomb could be constructed, they pointed out, if enough highly enriched U-235 could be isolated from the more common isotope, U-238. Calculations later performed in England by Otto Frisch and Rudolf Peierls showed that the "critical mass" of highly enriched uranium needed is quite small: only a few kilograms.

The Bohr-Wheeler theory also predicted that an isotope of plutonium, Pu-239, should be just as fissionable as U-235¹². Instead of trying to separate the rare isotope, U-235, from the common isotope, U-238, physicists could just operate a nuclear reactor until a sufficient amount of Pu-239 accumulated, and then separate it out by ordinary chemical means.

Thus in 1942, when Enrico Fermi and his coworkers at the University of Chicago produced the world's first controlled chain reaction within a pile of cans containing ordinary (nonenriched) uranium powder, separated by blocks of very pure graphite, the chain-reacting pile had a double significance: It represented a new source of energy for mankind,

¹²Both U-235 and Pu-239 have odd nucleon numbers. When U-235 absorbs a neutron, it becomes U-236, while when Pu-239 absorbs a neutron it becomes Pu-240. In other words, absorption of a neutron converts both these species to nuclei with even nucleon numbers. According to the Bohr-Wheeler theory, nuclei with even nucleon numbers are especially tightly-bound. Thus absorption of a neutron converts U-235 to a highly-excited state of U-236, while Pu-239 is similarly converted to a highly excited state of Pu-240. The excitation energy distorts the nuclei to such an extent that fission becomes possible.

but it also had a sinister meaning. It represented an easy path to nuclear weapons, since one of the by-products of the reaction was a fissionable isotope of plutonium, Pu-239. The bomb dropped on Hiroshima in 1945 used U-235, while the Nagasaki bomb used Pu-239.

By reprocessing spent nuclear fuel rods, using ordinary chemical means, a nation with a power reactor can obtain weapons-usable Pu-239. Even when such reprocessing is performed under international control, the uncertainty as to the amount of Pu-239 obtained is large enough so that the operation might superficially seem to conform to regulations while still supplying enough Pu-239 to make many bombs.

The enrichment of uranium¹³ is also linked to reactor use. Many reactors of modern design make use of low enriched uranium (LEU) as a fuel. Nations operating such a reactor may claim that they need a program for uranium enrichment in order to produce LEU for fuel rods. However, by operating their ultracentrifuges a little longer, they can easily produce highly enriched uranium (HEU), i.e., uranium containing a high percentage of the rare isotope U-235, and therefore usable in weapons.

Known reserves of uranium are only sufficient for the generation of 8×10^{20} joules of electrical energy¹⁴, i.e., about 25 TWy. It is sometimes argued that a larger amount of electricity could be obtained from the same amount of uranium through the use of fast breeder reactors, but this would involve totally unacceptable proliferation risks. In fast breeder reactors, the fuel rods consist of highly enriched uranium. Around the core, is an envelope of natural uranium. The flux of fast neutrons from the core is sufficient to convert a part of the U-238 in the envelope into Pu-239, a fissionable isotope of plutonium.

Fast breeder reactors are prohibitively dangerous from the standpoint of nuclear proliferation because both the highly enriched uranium from the fuel rods and the Pu-239 from the envelope are directly weapons-usable. It would be impossible, from the standpoint of equity, to maintain that some nations have the right to use fast breeder reactors, while others do not. If all nations used fast breeder reactors, the number of nuclear weapons states would increase drastically.

It is interesting to review the way in which Israel, South Africa, Pakistan, India and North Korea¹⁵ obtained their nuclear weapons, since in all these cases the weapons were constructed under the guise of “atoms for peace”, a phrase that future generations may someday regard as being tragically self-contradictory.

Israel began producing nuclear weapons in the late 1960's (with the help of a “peaceful” nuclear reactor provided by France, and with the tacit approval of the United States) and the country is now believed to possess 100-150 of them, including neutron bombs. Israel's policy is one of visibly possessing nuclear weapons while denying their existence.

South Africa, with the help of Israel and France, also weaponized its civil nuclear program, and it tested nuclear weapons in the Indian Ocean in 1979. In 1991 however, South Africa destroyed its nuclear weapons and signed the NPT.

¹³i.e. production of uranium with a higher percentage of U-235 than is found in natural uranium

¹⁴Craig, J.R., Vagn, D.J. and Skinner, B.J., *Resources of the Earth: Origin, Use and Environmental Impact, Third Edition*, page 210.

¹⁵Israel, India and Pakistan have refused to sign the Nuclear Non-Proliferation Treaty, and North Korea, after signing the NPT, withdrew from it in 2003.

India produced what it described as a “peaceful nuclear explosion” in 1974. By 1989 Indian scientists were making efforts to purify the lithium-6 isotope, a key component of the much more powerful thermonuclear bombs. In 1998, India conducted underground tests of nuclear weapons, and is now believed to have roughly 60 warheads, constructed from Pu-239 produced in “peaceful” reactors.

Pakistan’s efforts to obtain nuclear weapons were spurred by India’s 1974 “peaceful nuclear explosion”. As early as 1970, the laboratory of Dr. Abdul Qadeer Khan, (a metallurgist who was to become Pakistan’s leading nuclear bomb maker) had been able to obtain from a Dutch firm the high-speed ultracentrifuges needed for uranium enrichment. With unlimited financial support and freedom from auditing requirements, Dr. Khan purchased restricted items needed for nuclear weapon construction from companies in Europe and the United States. In the process, Dr. Khan became an extremely wealthy man. With additional help from China, Pakistan was ready to test five nuclear weapons in 1998. The Indian and Pakistani nuclear bomb tests, conducted in rapid succession, presented the world with the danger that these devastating weapons would be used in the conflict over Kashmir. Indeed, Pakistan announced that if a war broke out using conventional weapons, Pakistan’s nuclear weapons would be used “at an early stage”.

In Pakistan, Dr. A.Q. Khan became a great national hero. He was presented as the person who had saved Pakistan from attack by India by creating Pakistan’s own nuclear weapons. In a Washington Post article¹⁶ Pervez Hoodbhoy wrote: “Nuclear nationalism was the order of the day as governments vigorously promoted the bomb as the symbol of Pakistan’s high scientific achievement and self-respect...” Similar manifestations of nuclear nationalism could also be seen in India after India’s 1998 bomb tests.

Early in 2004, it was revealed that Dr. Khan had for years been selling nuclear secrets and equipment to Libya, Iran and North Korea, and that he had contacts with Al-Qaeda. However, observers considered that it was unlikely that Khan would be tried, since a trial might implicate Pakistan’s army as well as two of its former prime ministers.

Recent assassination attempts directed at Pakistan’s President, Pervez Musharraf, emphasize the precariousness of Pakistan’s government. There a danger that it may be overthrown, and that the revolutionists would give Pakistan’s nuclear weapons to a subnational organization. This type of danger is a general one associated with nuclear proliferation. As more and more countries obtain nuclear weapons, it becomes increasingly likely that one of them will undergo a revolution, during the course of which nuclear weapons will fall into the hands of criminals or terrorists.

If nuclear reactors become the standard means for electricity generation as the result of a future energy crisis, the number of nations possessing nuclear weapons might ultimately be as high as 40. If this should happen, then over a long period of time the chance that one or another of these nations would undergo a revolution during which the weapons would fall into the hands of a subnational group would gradually grow into a certainty.

There is also a possibility that poorly-guarded fissionable material could fall into the hands of subnational groups, who would then succeed in constructing their own nuclear

¹⁶1 February, 2004

weapons. Given a critical mass of highly-enriched uranium, a terrorist group, or an organized criminal (Mafia) group, could easily construct a crude gun-type nuclear explosive device. Pu-239 is more difficult to use since it is highly radioactive, but the physicist Frank Barnaby believes that a subnational group could nevertheless construct a crude nuclear bomb (of the Nagasaki type) from this material.

We must remember the remark of U.N. Secretary General Kofi Annan after the 9/11/2001 attacks on the World Trade Center. He said, "*This time* it was not a nuclear explosion". The meaning of his remark is clear: If the world does not take strong steps to eliminate fissionable materials and nuclear weapons, it will only be a matter of time before they will be used in terrorist attacks on major cities, or by organized criminals for the purpose of extortion. Neither terrorists nor organized criminals can be deterred by the threat of nuclear retaliation, since they have no territory against which such retaliation could be directed. They blend invisibly into the general population. Nor can a "missile defense system" prevent criminals or terrorists from using nuclear weapons, since the weapons can be brought into a port in any one of the hundreds of thousands of containers that enter on ships each year, a number far too large to be checked exhaustively.

Finally we must remember that if the number of nations possessing nuclear weapons becomes very large, there will be a greatly increased chance that these weapons will be used in conflicts between nations, either by accident or through irresponsible political decisions.

On November 3, 2003, Mohamed ElBaradei, Director General of the International Atomic Energy Agency, made a speech to the United Nations in which he called for "limiting the processing of weapons-usable material (separated plutonium and high enriched uranium) in civilian nuclear programs - as well as the production of new material through reprocessing and enrichment - by agreeing to restrict these operations to facilities exclusively under international control." It is almost incredible, considering the dangers of nuclear proliferation and nuclear terrorism, that such restrictions were not imposed long ago.

From the facts that we have been reviewing, we can conclude that if nuclear power generation becomes widespread during a future energy crisis, and if equally widespread proliferation of nuclear weapons is to be avoided, the powers and budget of the IAEA will have to be greatly increased. All enrichment of uranium and Reprocessing fuel rods throughout the world will have to be placed under direct international control, as has been emphasized by Mohamed ElBaradei. Because this will need to be done with fairness, such regulations will have to hold both in countries that at present have nuclear weapons and in countries that do not. It has been proposed that there should be an international fuel rod bank, to supply new fuel rods and reprocess spent ones. In addition to this excellent proposal, one might also consider a system where all power generation reactors and all research reactors would be staffed by the IAEA.

Nuclear reactors used for "peaceful" purposes unfortunately also generate fissionable isotopes of not only of plutonium, but also of neptunium and americium. Thus all nuclear reactors must be regarded as ambiguous in function, and all must be put under strict international control. One must ask whether globally widespread use of nuclear energy is worth the danger that it entails.

Let us now examine the question of whether nuclear power generation would appreciably help to prevent global warming. The fraction of nuclear power in the present energy generation spectrum is at present approximately 1/16. Nuclear energy is used primarily for electricity generation. Thus increasing the nuclear fraction would not affect the consumption of fossil fuels used directly in industry, transportation, in commerce, and in the residential sector. Coal is still a very inexpensive fuel, and an increase in nuclear power generation would do little to prevent it from being burned. Thus besides being prohibitively dangerous, and besides being unsustainable in the long run (because of finite stocks of uranium and thorium), the large-scale use of nuclear power cannot be considered to be a solution to the problem of anthropogenic climate change.

Optimists point to the possibility of using fusion of light elements, such as hydrogen, to generate power. However, although this can be done on a very small scale (and at great expense) in laboratory experiments, the practical generation of energy by means of thermonuclear reactions remains a mirage rather than a realistic prospect on which planners can rely. The reason for this is the enormous temperature required to produce thermonuclear reactions. This temperature is comparable to that existing in the interior of the sun, and it is sufficient to melt any ordinary container. Elaborate “magnetic bottles” have been constructed to contain thermonuclear reactions, and these have been used in successful very small scale experiments. However, despite 50 years of heavily-financed research, there has been absolutely no success in producing thermonuclear energy on a large scale, or at anything remotely approaching commercially competitive prices.

2.15 Military-industrial complexes today

“We’re going to take out seven countries in five years”

In an interview with Amy Goodman¹⁷, retired 4-star General Wesley Clark said: “About ten days after 9/11, I went through the Pentagon and I saw Secretary Rumsfeld and Deputy Secretary Wolfowitz. I went downstairs just to say hello to some of the people on the Joint Staff who used to work for me, any one of the generals called me in. He said, “Sir, you’ve got to come in and talk to me a second.” I said, “Well, you’re too busy.” He said, “No, no.” He says, “We’ve made the decision we’re going to war with Iraq.” This was on or about the 20th of September. I said, “We’re going to war with Iraq? Why?” He said, “I don’t know.” He said, “I guess they don’t know what else to do.” So I said, “Well, did they find some information connecting Saddam to al-Qaeda?” He said, “No, no.” He says, “There’s nothing new that way. They just made the decision to go to war with Iraq.” He said, “I guess it’s like we don’t know what to do about terrorists, but we’ve got a good military and we can take down governments.” And he said, “I guess if the only tool you have is a hammer, every problem has to look like a nail.

So I came back to see him a few weeks later, and by that time we were bombing in Afghanistan. I said, “Are we still going to war with Iraq?” And he said, “Oh, it’s worse

¹⁷<https://genius.com/General-wesley-clark-seven-countries-in-five-years-annotated>



Figure 2.27: General Wesley Clark

than that.” He reached over on his desk. He picked up a piece of paper. And he said, “I just got this down from upstairs” - meaning the Secretary of Defense’s office - “today.” And he said, “This is a memo that describes how we’re going to take out seven countries in five years, starting with Iraq, and then Syria, Lebanon, Libya, Somalia, Sudan and, finishing off, Iran.” I said, “Is it classified?” He said, “Yes, sir.” I said, “Well, don’t show it to me.” And I saw him a year or so ago, and I said, “You remember that?” He said, “Sir, I didn’t show you that memo! I didn’t show it to you!”

The global trade in light arms

An important poverty-generating factor in the developing countries is war - often civil war. The five permanent members of the U.N. Security Council are, ironically, the five largest exporters of small arms. Small arms have a long life. The weapons poured into Africa by both sides during the Cold War are still there, and they contribute to political chaos and civil wars that block development and cause enormous human suffering.

The United Nations website on Peace and Security through Disarmament states that “Small arms and light weapons destabilize regions; spark, fuel and prolong conflicts; obstruct relief programmes; undermine peace initiatives; exacerbate human rights abuses; hamper development; and foster a ‘culture of violence’.”

An estimated 639 million small arms and light weapons are in circulation worldwide,

one for every ten people. Approximately 300,000 people are killed every year by these weapons, many of them women and children.

Examples of endemic conflict

In several regions of Africa, long-lasting conflicts have prevented development and caused enormous human misery. These regions include Ethiopia, Eritiria, Somalia (Darfur), Chad, Zimbabwe and the Democratic Republic of Congo. In the Congo, the death toll reached 5.4 million in 2008, with most of the victims dying of disease and starvation, but with war as the root cause. In view of these statistics, the international community can be seen to have a strong responsibility to stop supplying small arms and ammunition to regions of conflict. There is absolutely no excuse for the large-scale manufacture and international sale of small arms that exists today.

The Wolfowitz Doctrine

The Wolfowitz Doctrine is the unofficial name given to the early version of the Defense Strategy for the 1990s: The Regional Defense Strategy report for the 1994-99 fiscal years. It was later released by then Secretary of Defense Dick Cheney in 1993. It brazenly advocates that America do everything in its power to retain its global hegemony and superpower status, including ensuring that Russia, China, Iran and other regional powers - but especially Russia - be prevented from attaining enough power to seriously challenge the US. In short, it's another US blueprint for total global supremacy.

There are many quotable passages from the Wolfowitz Doctrine. Here's one which sums up its aims:

"Our first objective is to prevent the re-emergence of a new rival, either on the territory of the former Soviet Union or elsewhere that poses a threat on the order of that posed formerly by the Soviet Union. This is a dominant consideration underlying the new regional defense strategy and requires that we endeavor to prevent any hostile power from dominating a region whose resources would, under consolidated control, be sufficient to generate global power. These regions include Western Europe, East Asia, the territory of the former Soviet Union, and Southwest Asia."

Similar motives guide US policy today. In February, 2018, US Secretary of Defense James Mattis said: "We will continue to prosecute the campaign against terrorists, but great-power competition - not terrorism - is now the primary focus of US national security."

Militarism in North Korea

The following states are now believed to currently possess nuclear weapons: The United states, Russia, The United Kingdom, France, China, India, Pakistan, North Korea and Israel. The way in which North Korea obtained its nuclear weapons is described by Wikipedia in the following paragraphs:

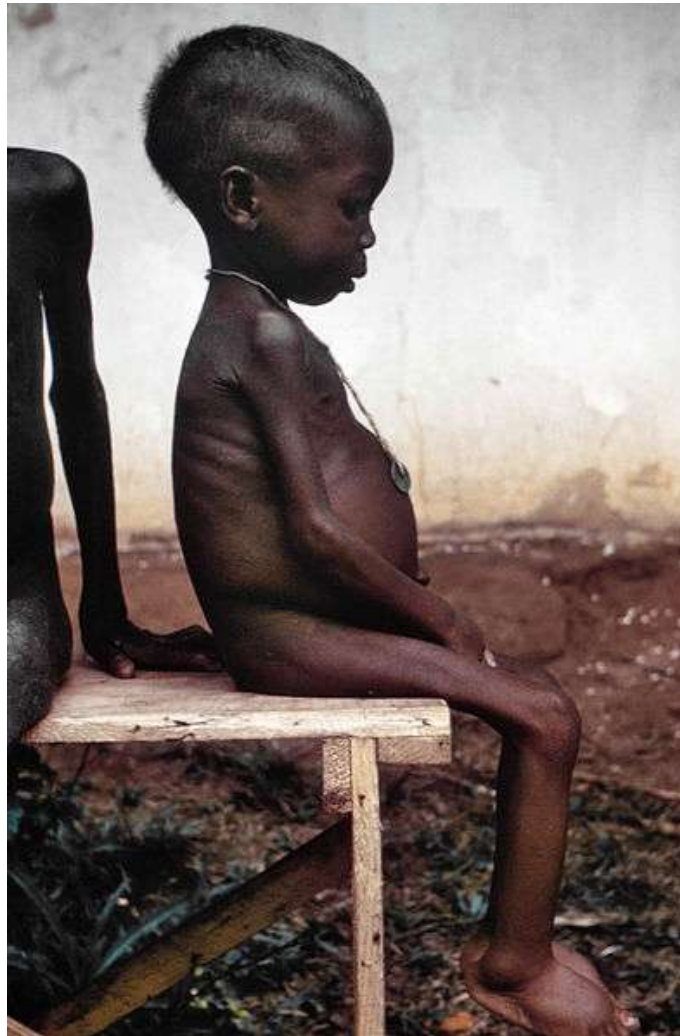


Figure 2.28: 40,000 children die each day from starvation or from poverty-related diseases. Meanwhile, the world spends more than \$1,700,000,000,000 each year on armaments.

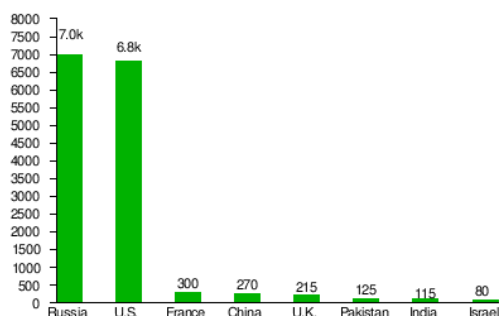


Figure 2.29: **Countries by estimated nuclear warhead stockpiles according to the Federation of American scientists.**

“The nuclear program can be traced back to about 1962, when North Korea committed itself to what it called ‘all-fortressization’, which was the beginning of the hyper-militarized North Korea of today. In 1963, North Korea asked the Soviet Union for help in developing nuclear weapons, but was refused. The Soviet Union agreed to help North Korea develop a peaceful nuclear energy program, including the training of nuclear scientists. Later, China, after its nuclear tests, similarly rejected North Korean requests for help with developing nuclear weapons.

“Soviet engineers took part in the construction of the Yongbyon Nuclear Scientific Research Center and began construction of an IRT-2000 research reactor in 1963, which became operational in 1965 and was upgraded to 8 MW in 1974. In 1979 North Korea indigenously began to build in Yongbyon a second research reactor, an ore processing plant and a fuel rod fabrication plant. Soviet engineers took part in the construction of the Yongbyon Nuclear Scientific Research Center, and began construction of an IRT-2000 research reactor in 1963, which became operational in 1965 and was upgraded to 8 MW in 1974. In 1979 North Korea indigenously began to build in Yongbyon a second research reactor, an ore processing plant and a fuel rod fabrication plant. ”

Thus like other new nuclear weapons states, North Korea obtained nuclear weapons by misuse of nuclear power generation facilities donated by other countries. In addition, North Korea spend a large fraction of its GDP on conventional armaments. Under the Songun policy, the Korean Peoples Army is the central institution of North Korean society. As of 2016, the Korean Peoples Army had 5,889,000 paramilitary personelle (25% of the population of North Korea) making it the largest paramilitary organization on earth.

Table 2.1: **SIPRI Military Expenditure Database, 2016**

Rank	Country	Annual Spending \$ Bn.	% of GDP
1	United State	611.2	3.3
2	China	215.7	1.9
3	Russia	69.2	5.3
4	Saudi Arabia	63.7	10
5	India	55.9	2.5
6	France	55.7	2.3
7	United Kingdom	48.3	1.9
8	Japan	46.1	1.0
9	Germany	41.1	1.2
10	South Korea	36.8	2.7
11	Italy	27.9	1.5
12	Australia	24.3	2.0

Table 2.2: **SIPRI List of arms manufacturers, 2016**

Rank	Company	Country	Annual Arms Sales \$ Mn.
1	Lockheed Martin	United States	40,830
2	Boeing	United States	29,510
3	Raytheon	United States	22,910
4	BAE Systems	United Kingdom	22,700
5	Northrop Grumman	United States	21,400
6	General Dynamics	United States	19,230
7	Airbus	European Union	12,520
8	L-3 Communications	United States	8,890
9	Leonardo-Finmeccanica	Italy	8,500
10	Thales Group	France	8,170
11	United Technologies Corporation	United States	6,870
12	Huntington Ingalls Industries	United States	6,720



Figure 2.30: North Korea's dictator, Kim Jong-un. The doctrine of nuclear deterrence rests on the assumption that political leaders will always act rationally, an assumption that seems very uncertain in the case of the U.S.-North Korean conflict.

The SIPRI Yearbook, 2017

Dan Smith of the Stockholm International Peace Research Institute (SIPRI) wrote the following Introduction to the organization's yearbook for 2017:

"An overall perspective on 2016 finds a balance between negative developments and the continued functioning of the international system. However, the year ended with clear grounds for concern that the balance sheet seemed to be tipping towards the negative amid growing unease about the durability of key parts of the international security architecture.

"Conflicts in the Middle East continued to generate humanitarian tragedies and large-scale movement of refugees, and violent conflict continued in several other parts of the world, most notably Africa, Asia and to a lesser extent Eastern Europe. Developments in North Korea's nuclear programme contributed to international political instability with potentially serious knock-on effects. On the positive side, the 2015 Paris Climate Agreement entered into force in November 2016, the 2015 Iran nuclear deal began implementation on time in early 2016 and the United Nations General Assembly adopted a resolution to start negotiations in 2017 on eliminating nuclear weapons. Progress was also made on work to monitor the unfolding implementation of the UN's Agenda 2030 for international social and economic development. A major contribution to the positive side of the balance sheet in 2016 was the peace agreement in Colombia.

"Nonetheless, virtually all the major global indicators for peace and security have moved in a negative direction: more military spending, increased arms trading, more violent conflicts and the continuing forward march of military technology.

"Existing multilateral and bilateral arms control agreements and processes are also under challenge-not least due to the deteriorating relationship between Russia and the United States-raising questions of global concern and potentially epochal scope. Were the great gains in peaceful relations since the end of the cold war now being reversed? Would the return of strategic competition between the major powers have negative implications for managing increased conflict risk? These uncertainties, combined with political developments in Europe and the USA- especially the vote by the United Kingdom to leave the European Union and the election of Donald J. Trump as US President-seemed to reveal

a much decreased commitment to international institutions and a renewed emphasis in several key states on a narrowly defined national interest.

“The scale of the challenges facing humanity has been summed up in the proposal to adopt the label of ‘the Anthropocene’ for the current era, thus designating it as one in which human activity is the dominant influence on climate and the environment. It is disconcerting to note that such cooperation risks becoming more elusive than it has seemed for most of the time since the end of the cold war, at a time when it is more needed than ever. Experience has shown that international cooperation can work. But is the international cooperative urge as persistent as the problems it needs to address?”

2.16 A culture of violence

Links with the entertainment industry

Here are a few films that glorify war:

- Black Hawk Down
- Top Gun
- Behind Enemy Lines
- Red Dawn (1984)
- American Sniper
- Iron Eagle
- Pearl Harbor
- Act of Valor
- We Were Soldiers
- The Green Berets

Making a game of killing

The mass media are an important part of our educational system. Perhaps it is time to look more closely at the values that they are transmitting. In particular, we should perhaps look at computer games designed for young boys. They often give the strongest imaginable support to a culture of violence.

For example, a game entitled “Full Spectrum Warrior” was recently reviewed in a Danish newspaper. According to the reviewer, “...An almost perfect combination of graphics, sound, band design, and gameplay makes it seem exactly like the film Black Hawk Down - with the player as the main character. This is not just a coincidence, because the game is based on an army training program... Full Spectrum Warrior is an extremely intense experience, and despite the advanced possibilities, the controls are simple enough so that young children can play it... The player is completely drawn into the screen, and remains there until the end of the mission.” The reviewer gave the game six stars (the maximum).



Figure 2.31: Tom Cruise in “Top Gun”.



Figure 2.32: A culture of violence supports the Devil’s Dynamo.

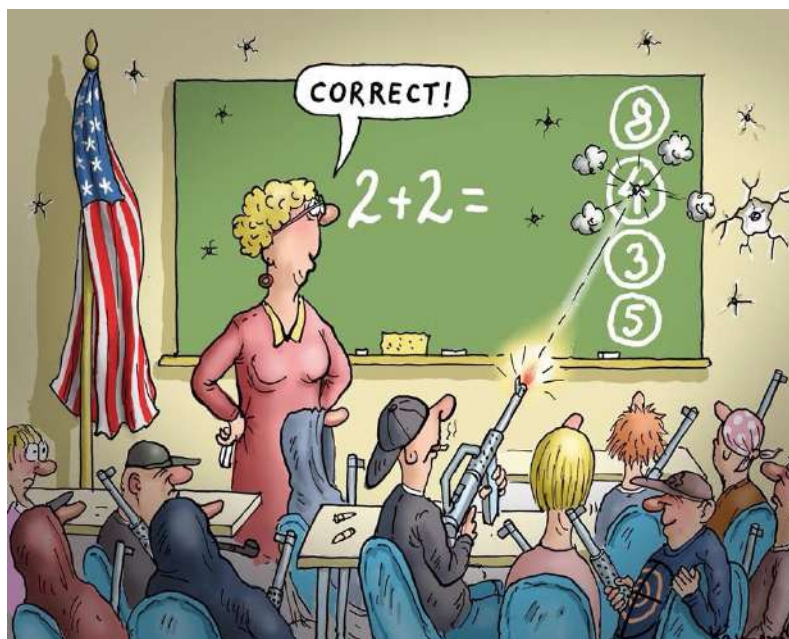


Figure 2.33: **A culture of violence:** In the United States the National Rifle Association has proposed guns in schools as the answer to the epidemic of school shootings.

Another genre of computer games has to do with building empires, ignoring the fact that imperialism is morally indefensible. For example, “Forge of Empires” is a browser-based strategy game. It is described as follows: “The game offers a single-player campaign for players to explore and conquer several provinces, gaining resources and new technology as they progress.” Conquering countries for the sake of gaining their resources is an all-too-familiar feature of the modern world. In the game “Forge of Empires”, our young people are indoctrinated with the ethos of resource wars.

During his trial, the Norwegian mass-murderer Anders Behring Breivik described how he trained for his attack on young people on the Island of Utøya using the computer game “Call of Duty: Modern Warfare”. The court also heard how he took what he called a “sabbatical” for a year between the summers of 2006 and 2007. During this year, he played a game called “World of Warcraft” full-time, in the bedroom of his mother’s Oslo flat, spending up to 16 hours a day using the game to distance himself from the human and moral significance of killing.

Is this not similar to the frame of mind of drone operators, sitting in comfort in their Nevada bunkers, distanced from the reality of killing? They are playing a computer game that kills targeted individuals and their families, in remote countries, by remote control. There is no need to look into the eyes of the victims. They are just abstract symbols in a computer game.

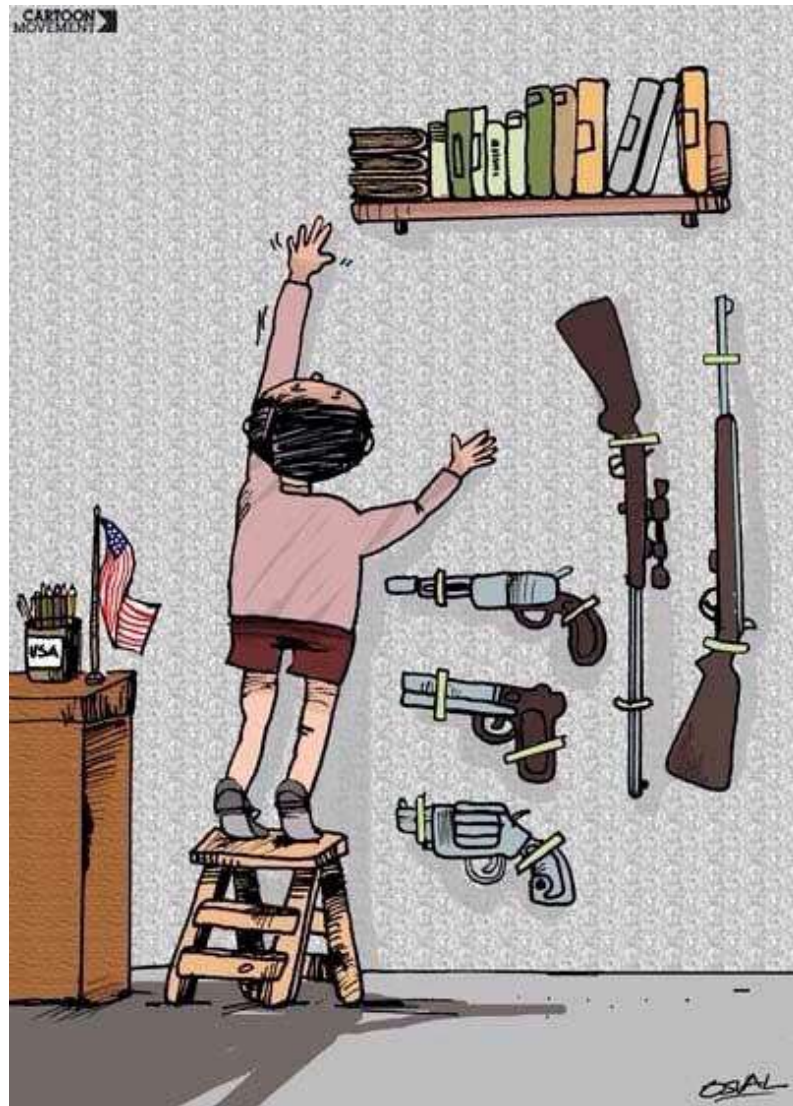


Figure 2.34: A culture of violence. Guns in schools?

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Chapter 3

THE CHEMISTRY OF EMOTIONS

3.1 Darwin's book on emotions

In *The Origin of Species*, Charles Darwin devoted a chapter to the evolution of instincts, and he later published a separate book on *The Expression of the Emotions in Man and Animals*. Because of these pioneering studies, Darwin is considered to be the founder of ethology.

Behind Darwin's work in this field is the observation that instinctive behavior patterns are just as reliably inherited as morphological characteristics. Darwin was also impressed by the fact that within a given species, behavior patterns have some degree of uniformity, and the fact that the different species within a family are related by similarities of instinctive behavior, just as they are related by similarities of bodily form. For example, certain elements of cat-like behavior can be found among all members of the cat family; and certain elements of dog-like or wolf-like behavior can be found among all members of the dog family. On the other hand, there are small variations in instinct among the members of a given species. For example, not all domestic dogs behave in the same way.

"Let us look at the familiar case of breeds of dogs", Darwin wrote in *The Origin of Species*, "It cannot be doubted that young pointers will sometimes point and even back other dogs the very first time they are taken out; retrieving is certainly in some degree inherited by retrievers; and a tendency to run round, instead of at, a flock of sheep by shepherd dogs. I cannot see that these actions, performed without experience by the young, and in nearly the same manner by each individual, and without the end being known - for the young pointer can no more know that he points to aid his master than the white butterfly knows why she lays her eggs on the leaf of the cabbage - I cannot see that these actions differ essentially from true instincts..."

"How strongly these domestic instincts habits and dispositions are inherited, and how curiously they become mingled, is well shown when different breeds of dogs are crossed. Thus it is known that a cross with a bulldog has affected for many generations the courage and obstinacy of greyhounds; and a cross with a greyhound has given to a whole family of shepherd dogs a tendency to hunt hares..."

Darwin believed that in nature, desirable variations of instinct are propagated by natural selection, just as in the domestication of animals, favorable variations of instinct are selected and propagated by kennelmen and stock breeders. In this way, according to Darwin, complex and highly developed instincts, such as the comb-making instinct of honey-bees, have evolved by natural selection from simpler instincts, such as the instinct by which bumble bees use their old cocoons to hold honey and sometimes add a short wax tube.

In the introduction of his book, *The Expression of the Emotions in Man and Animals*, Darwin says "I thought it very important to ascertain whether the same expressions and gestures prevail, as has often been asserted without much evidence, with all the races of mankind, especially with those who have associated but little with Europeans. Whenever the same movements of the features or body express the same emotions in several distinct races of man, we may infer with much probability, that such expressions are true ones, - that is, are innate or instinctive."

To gather evidence on this point, Darwin sent a printed questionnaire on the expression of human emotions and sent it to missionaries and colonial administrators in many parts of the world. There were 16 questions to be answered:

1. *Is astonishment expressed by the eyes and mouth being opened wide, and by the eyebrows being raised?*
2. *Does shame excite a blush when the colour of the skin allows it to be visible? and especially how low down on the body does the blush extend?*
3. *When a man is indignant or defiant does he frown, hold his body and head erect, square his shoulders and clench his fists?*
4. *When considering deeply on any subject, or trying to understand any puzzle, does he frown, or wrinkle the skin beneath the lower eyelids?*

and so on.

Darwin received 36 replies to his questionnaire, many coming from people who were in contact with extremely distinct and isolated groups of humans. The results convinced him that our emotions and the means by which they are expressed are to a very large extent innate, rather than culturally determined, since the answers to his questionnaire were so uniform and so independent of both culture and race. In preparation for his book, he also closely observed the emotions and their expression in very young babies and children, hoping to see inherited characteristics in subjects too young to have been greatly influenced by culture. Darwin's observations convinced him that in humans, just as in other mammals, the emotions and their expression are to a very large extent inherited universal characteristics of the species.

The study of inherited behavior patterns in animals (and humans) was continued in the 20th century by such researchers as Karl von Frisch (1886-1982), Nikolaas Tinbergen (1907-1988), and Konrad Lorenz (1903-1989), three scientists who shared a Nobel Prize in Medicine and Physiology in 1973.

Karl von Frisch, the first of the three ethologists who shared the 1973 prize, is famous for his studies of the waggle-dance of honeybees. Bees guide each other to sources of food by a genetically programmed signaling method - the famous waggle dance, deciphered in 1945 by von Frisch. When a worker bee has found a promising food source, she returns to the hive and performs a complex dance, the pattern of which indicates both the direction and distance of the food. The dancer moves repeatedly in a pattern resembling the Greek letter Θ . If the food-discoverer is able to perform her dance on a horizontal flat surface in view of the sun, the line in the center of the pattern points in the direction of the food. However, if the dance is performed in the interior of the hive on a vertical surface, gravity takes the place of the sun, and the angle between the central line and the vertical represents the angle between the food source and the sun.

The central part of the dance is, in a way, a re-enactment of the excited forager's flight to the food. As she traverses the central portion of the pattern, she buzzes her wings and waggles her abdomen rapidly, the number of waggles indicating the approximate distance to the food ¹. After this central portion of the dance, she turns alternately to the left or to the right, following one or the other of the semicircles, and repeats the performance. Studies of the accuracy with which her hive-mates follow these instructions show that the waggle dance is able to convey approximately 7 bits of information - 3 bits concerning distance and 4 bits concerning direction. After making his initial discovery of the meaning of the dance, von Frisch studied the waggle dance in many species of bees. He was able to distinguish species-specific dialects, and to establish a plausible explanation for the evolution of the dance.

Among the achievements for which Tinbergen is famous are his classic studies of instinct in herring gulls. He noticed that the newly-hatched chick of a herring gull pecks at the beak of its parent, and this signal causes the parent gull to regurgitate food into the gaping beak of the chick. Tinbergen wondered what signal causes the chick to initiate this response by pecking at the beak of the parent gull. Therefore he constructed a series of models of the parent in which certain features of the adult gull were realistically represented while other features were crudely represented or left out entirely. He found by trial and error that the essential signal to which the chick responds is the red spot on the tip of its parent's beak. Models which lacked the red spot produced almost no response from the young chick, although in other respects they were realistic models; and the red spot on an otherwise crude model would make the chick peck with great regularity.

In other experiments, Tinbergen explored the response of newly-hatched chicks of the common domestic hen to models representing a hawk. Since the chicks were able to recognize a hawk immediately after hatching, he knew that the response must be genetically programmed. Just as he had done in his experiments with herring gulls, Tinbergen experimented with various models, trying to determine the crucial characteristic that was recognized by the chicks, causing them to run for cover. He discovered that a crude model in the shape of the letter T invariable caused the response if pulled across the sky with the

¹The number of waggles is largest when the source of food is near, and for extremely nearby food, the bees use another dance, the "round dance".

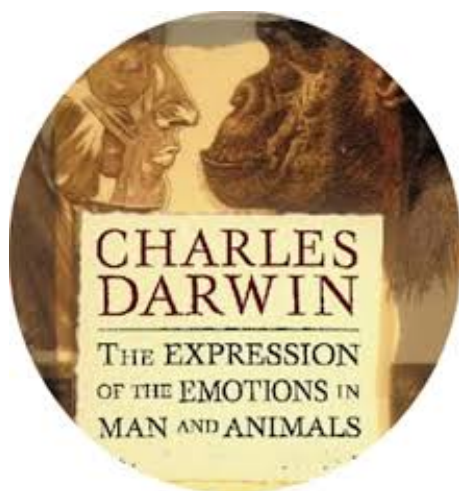


Figure 3.1: Charles Darwin discussed inherited behaviour patterns in *The Origin of Species*. He later published a separate book on this subject entitled *The Expression of Emotions in Man and Animals*.

wings first and tail last. (Pulled backwards, the T shape caused no response.)

In the case of a newly-hatched herring gull chick pecking at the red spot on the beak of its parent, the program in the chick's brain must be entirely genetically determined, without any environmental component at all. Learning cannot play a part in this behavioral pattern, since the pattern is present in the young chick from the very moment when it breaks out of the egg. On the other hand (Tinbergen pointed out) many behavioral patterns in animals and in man have both an hereditary component and an environmental component. Learning is often very important, but learning seems to be built on a foundation of genetic predisposition.

To illustrate this point, Tinbergen called attention to the case of sheep-dogs, whose remote ancestors were wolves. These dogs, Tinbergen tells us, can easily be trained to drive a flock of sheep towards the shepherd. However, it is difficult to train them to drive the sheep away from their master. Tinbergen explained this by saying that the sheep-dogs regard the shepherd as their "pack leader"; and since driving the prey towards the pack leader is part of the hunting instinct of wolves, it is easy to teach the dogs this maneuver. However, driving the prey away from the pack leader would not make sense for wolves hunting in a pack; it is not part of the instinctive makeup of wolves, nor is it a natural pattern of behavior for their remote descendants, the sheep-dogs.

As a further example of the fact that learning is usually built on a foundation of genetic predisposition, Tinbergen mentions the ease with which human babies learn languages. The language learned is determined by the baby's environment; but the astonishing ease with which a human baby learns to speak and understand implies a large degree of genetic predisposition.



Figure 3.2: A baby crying, one of the illustrations in *The Expression of Emotions in Man and Animals*.



Figure 3.3: Another illustration in Darwin's book, *The Expression of Emotions in Man and Animals* shows an expression of horror on the face of a man. This expression was induced by an electrical shock, showing the human facial musculature is capable of forming the expression of horror automatically, if properly induced.



Figure 3.4: Another illustration in Darwin's book shows a dog's face expressing threat when confronting an enemy.

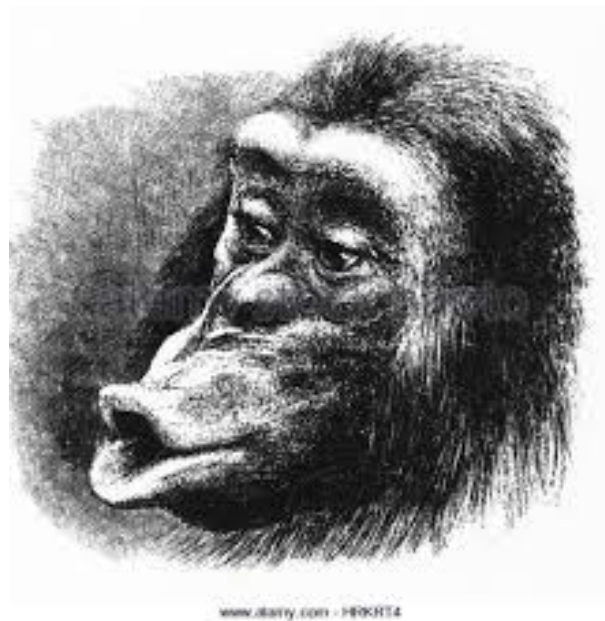


Figure 3.5: An ape expressing affection.

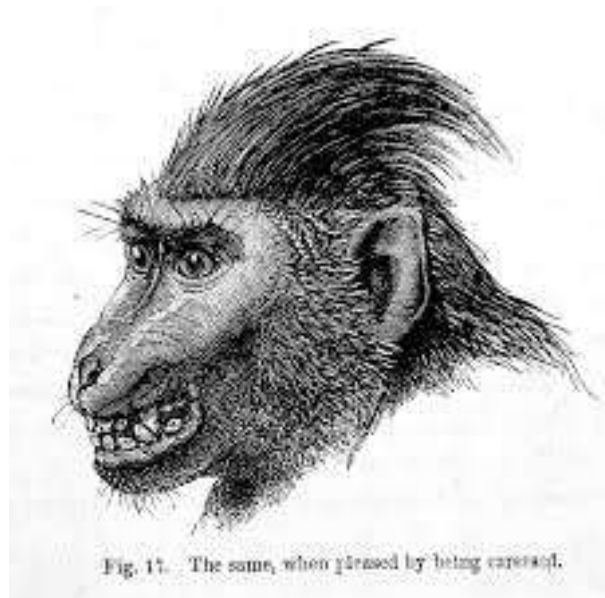


Figure 3.6: The same animal expressing threat. Both drawings are illustrations from Darwin's book.

3.2 Brain chemistry

Emotions in humans and in animals have an extremely long evolutionary history. Chemicals that affect behaviour are present in even the most primitive forms of multicellular organisms, even in slime molds, which are at the exact borderline between single-celled multicellular organisms. Cyclic AMP has been shown to be the molecule that expresses slime mold unhappiness!

Not only do cells communicate by touching each other and recognizing each other's cell surface antigens - they also communicate by secreting and absorbing transmitter molecules. For example, the group behavior of slime mold cells is coordinated by the cyclic adenosine monophosphate molecules, which the cells secrete when distressed.

Within most multicellular organisms, cooperative behavior of cells is coordinated by molecules such as hormones - chemical messengers. These are recognized by "receptors", the mechanism of recognition once again depending on complementarity of charge distributions and shape. Receptors on the surfaces of cells are often membrane-bound proteins which reach from the exterior of the membrane to the interior. When an external transmitter molecule is bound to a receptor site on the outside part of the protein, it causes a conformational change which releases a bound molecule of a different type from a site on the inside part of the protein, thus carrying the signal to the cell's interior. In other cases the messenger molecule passes through the cell membrane.

In this way the individual cell in a society of cells (a multicellular organism) is told when to divide and when to stop dividing, and what its special role will be in the economy of the cell society (differentiation). For example, in humans, follicle-stimulating hormone, luteinizing hormone, prolactin, estrogen and progesterone are among the chemical messengers which cause the cell differentiation needed to create the secondary sexual characteristics of females.

Another role of chemical messengers in multicellular organisms is to maintain a reasonably constant internal environment in spite of drastic changes in the external environment of individual cells or of the organism as a whole (homeostasis). An example of such a homeostatic chemical messenger is the hormone insulin, which is found in humans and other mammals. The rate of its release by secretory cells in the pancreas is increased by high concentrations of glucose in the blood. Insulin carries the news of high glucose levels to target cells in the liver, where the glucose is converted to glycogen, and to other target cells in the muscles, where the glucose is burned.

3.3 Nervous systems

Hormones require a considerable amount of time to diffuse from the cells where they originate to their target cells; but animals often need to act very quickly, in fractions of seconds, to avoid danger or to obtain food. Because of the need for quick responses, a second system of communication has evolved - the system of neurons.

Neurons have a cell bodies, nuclei, mitochondria and other usual features of eukaryotic

cells, but in addition they possess extremely long and thin tubelike extensions called axons and dendrites. The axons function as informational output channels, while the dendrites are inputs. These very long extensions of neurons connect them with other neurons which can be at distant sites, to which they are able to transmit electrical signals. The complex network of neurons within a multicellular organism, its nervous system, is divided into three parts. A sensory or input part brings in signals from the organism's interior or from its external environment. An effector or output part produces a response to the input signal, for example by initiating muscular contraction.

Between the sensory and effector parts of the nervous system is a message-processing (internuncial) part, whose complexity is not great in the jellyfish or the leech. However, the complexity of the internuncial part of the nervous system increases dramatically as one goes upward in the evolutionary order of animals, and in humans it is truly astonishing.

3.4 Chemical synapses

The small button-like connections between neurons are called synapses. When an electrical signal propagating along an axon reaches a synapse, it releases a chemical transmitter substance into the tiny volume between the synapse and the next neuron (the post-synaptic cleft). Depending on the nature of the synapse, this chemical messenger may either cause the next neuron to “fire” (i.e., to produce an electrical pulse along its axon) or it may inhibit the firing of the neuron. Furthermore, the question of whether a neuron will or will not fire depends on the past history of its synapses. Because of this feature, the internuncial part of an animal's nervous system is able to learn. There are many kinds of synapses and many kinds of neurotransmitters, and the response of synapses is sensitive to the concentration of various molecules in the blood, a fact which helps to give the nervous systems of higher animals extraordinary subtlety and complexity.

3.5 Neurotransmitters

The first known neurotransmitter molecule, acetylcholine, was discovered jointly by Sir Henry Dale in England and by Otto Loewi in Germany. In 1921 Loewi was able to show that nerve endings transmit information to muscles by means of this substance.

The idea for the critical experiment occurred to him in a dream at 3 am. Otto Loewi woke up and wrote down the idea; but in the morning he could not read what he had written. Luckily he had the same dream the following night. This time he took no chances. He got up, drank some coffee, and spent the whole night working in his laboratory. By morning he had shown that nerve cells separated from the muscle of a frog's heart secrete a chemical substance when stimulated, and that this substance is able to cause contractions of the heart of another frog.

Sir Henry Dale later showed that Otto Loewi's transmitter molecule was identical to acetylcholine, which Dale had isolated from the ergot fungus in 1910. The two men shared

a Nobel Prize in 1936. Since that time, a large variety of neurotransmitter molecules have been isolated. Among the excitatory neurotransmitters (in addition to acetylcholine) are noradrenalin, norepinephrine, serotonin, dopamine, and glutamate, while gamma-aminobutyric acid is an example of an inhibitory neurotransmitter.

Some important neurotransmitters

- **Glutamate:** This is the most abundant neurotransmitter in humans, used by about half of the neurons in the human brain. It is the primary excitatory transmitter in the central nervous system. One of its functions is to help form memories.
- **GABA:** The name GABA is an acronym for Gamma-aminobutyric acid. GABA is the primary inhibitory transmitter in the vertebrate brain. It helps to control anxiety, and it is sometimes used medically to treat anxiety and the associated sleeplessness.
- **Glycine:** This neurotransmitter is a single amino acid. It is the main inhibitory neurotransmitter in the vertebrate spinal cord. Glycine is important in the central nervous system, especially in the spinal cord, brainstem, and retina.
- **Acetylcholine:** An ester (the organic analogue of a salt) formed from the reaction between choline and acetic acid, acetylcholine stimulates muscles, functions in the autonomic nervous system and sensory neurons, and is associated with REM sleep. Alzheimer's disease is associated with a significant drop in acetylcholine levels.
- **Norepinephrine:** Also known as noradrenaline, norepinephrine increases heart rate and blood pressure. It is part of the body's "fight or flight" system. Norepinephrine is also needed to form memories. Stress depletes stores of this neurotransmitter.
- **Dopamine:** Dopamine is also synthesized in plants and most animals. It is an inhibitory transmitter associated with the reward center of the brain. Low dopamine levels are associated with social anxiety and Parkinson's disease, while excess dopamine is related to schizophrenia. The brain includes several distinct dopamine pathways, one of which plays a major role in reward-motivated behavior. Most types of rewards increase the level of dopamine in the brain, and many addictive drugs increase dopamine neuronal activity.
- **Serotonin:** Biochemically derived from the amino acid tryptophan, serotonin is an inhibitory neurotransmitter involved in mood, emotion, and perception. Low serotonin levels can lead to depression, suicidal tendencies, anger management issues, difficulty sleeping, migraines, and an increased craving for carbohydrates. Its functions include the regulation of mood, appetite, and sleep. Serotonin also has some cognitive functions, including memory and learning.

- **Endorphins:** The name of this class of neurotransmitters means “a class of a morphine-like substance originating from within the body”. are a class of molecules similar to opioids (e.g., morphine, heroin) in terms of structure and function. The word “endorphin” is short for “endogenous morphine.” Endorphins are inhibitory transmitters associated with pleasure and pain relief. In other animals, these chemicals slow metabolism and permit hibernation. The treatment of pain by means of acupuncture functions by releasing endorphines.

Pleasure versus happiness

Pleasure is fleeting. Happiness lasts. Pleasure is addictive, but happiness is not. Pleasure craves more and more of everything. Happiness can be content with very little. These characteristics make happiness a better goal than pleasure. Interestingly, the neurotransmitter dopamine is associated with pleasure, while serotonin is associated with happiness.²

3.6 Oxytocin, the “love hormone”

Besides discovering acetylcholine, Sir Henry Dale also discovered, in 1906, the peptide hormone Oxytocin, which has sometimes been called the “love hormone”. Oxytocin plays a role in social bonding and sexual reproduction in both sexes. During childbirth, Oxytocin is released into the bloodstream of women in response to stretching of the cervix and uterus during labour, and also in response to breastfeeding. The hormone then facilitates the bonding between mother and child. Oxytocin is also present in men and its concentration in their bloodstream increases in response to romantic attachments and social bonding.

A very similar hormone, with similar functions, is also present in other mammals besides humans.

²See, for example, <https://gobeyondlifestyle.com/happiness-vs-pleasure-root-addiction/>

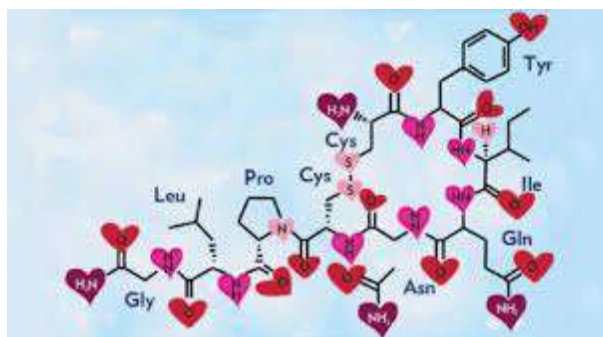


Figure 3.7: An artist’s impression of the structure of oxytocin

3.7 Mother love and rage

We can recognize many of our own emotions in other mammals. Among these are mother love and rage. Interestingly these two emotions are associated respectively with oxytocin and testosterone.

One of the most beautiful emotions is the love that women exhibit towards their children. We must all be grateful that women are willing to undergo the danger and pain of childbirth. We must be grateful for the devotion that they show to their children and families.

Both humans and most other animals compete for dominance and mating rights. In humans, mating displays and struggles for dominance lead to what the economist Thorstein Veblen called “conspicuous consumption”. Overconsumption in industrialized nations is one of the factors driving the world towards an ecological catastrophe.



Figure 3.8: Mother love: One of the most beautiful emotions.



Figure 3.9: Mother love.



Figure 3.10: **Mother love**



Figure 3.11: **Mother love:**



Figure 3.12: Mother love



Figure 3.13: Mother love



Figure 3.14: **Mother love**



Figure 3.15: Mother love: Although we recognize the emotions of mammals most clearly as being similar to our own, animals less closely related to ourselves also exhibit emotions that we can recognize. For example, birds are devoted to their young and make great sacrifices to help and protect them.



Figure 3.16: Male animals fighting for dominance and mating rights

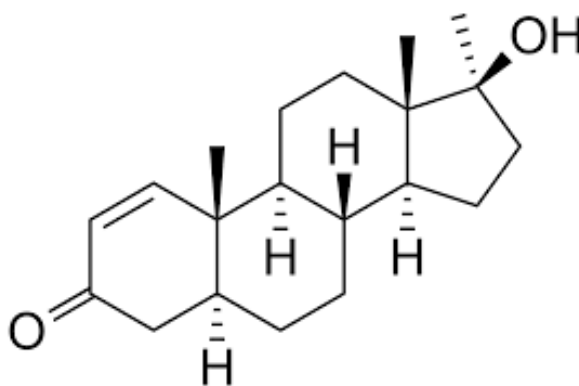


Figure 3.17: Testosterone is a hormone present in large quantities in males and much smaller amounts in females. It is involved in rank-determining fights and mating.



Figure 3.18: Male lions fighting for dominance and mating rights.



Figure 3.19: In Shakespeare's poetic tragedy, *Romeo and Juliet*, we see many human emotions on display: males fighting for dominance and mating rights (testosterone), romantic attachment (oxytocin), and tribalism (Montagues versus Capulets). The dangers of tribalism in an age of genocidal and potentially omniscient thermonuclear weapons will be discussed in another chapter.

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Chapter 4

SEX AND OVER-CONSUMPTION

4.1 Thoreau: a pioneer of simple living

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 pre-industrial 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.

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. "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 Nüremberg Principles.

Thoreau became the friend and companion of the transcendentalist writer Ralph Waldo Emerson (1803-1882), who introduced him to a circle of 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."

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*, which was published in 1854. The book is arranged according to seasons, so that the two-year sojourn appears compressed into a single year.

"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."

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.

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



Figure 4.1: Henry David Thoreau, 1817-1862.

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.”

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 before publication.

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.”

4.2 Veblen; economics as anthropology; conspicuous consumption

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 economic waste as a symbol of social status. In *The Theory of the Leisure Class*, first published in 1899, Veblen pointed out that it is 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 preferably make use of insights gained from anthropology, psychology, sociology, and history.

Thorstein Veblen was born into a large Norwegian immigrant family living on a farm in Wisconsin. His first language was Norwegian, and in fact he did not learn English well until he was in his teens. He was a strange boy, precociously addicted to reading, but negligent about doing his chores on the farm. His family recognized that he was unusually intelligent and decided to send him to Carlton College, where he obtained a B.A. in 1880. Later he did graduate work at Johns Hopkins University and finally obtained a Ph.D. from Yale in 1884.

Despite the Ph.D., he failed to obtain an academic position. His iconoclastic views and non-conformist attitudes undoubtedly contributed to this joblessness. Returning to the family farm, Thorstein Veblen continued his voracious reading and his neglect of farm duties for six years. As one of his brothers wrote, “He was lucky enough to come out of a race and family who made family loyalty a religion... He was the only loafer in a highly respectable community... He read and loafed, and the next day he loafed and read.”

An interesting fact about this strange man is that, for some reason, women found him very attractive. In 1888, Thorstein Veblen married Ellen Rolfe, the niece of the president of Carlton College. His wife was to leave him many times, partly because of his many

infidelities, and partly because of his aloofness and detachment. He was like a visitor from another planet.

In part, the marriage to Ellen was motivated by Veblen's search for a job. He hoped to obtain work as an economist for the Atchison, Topeka and Santa Fe Railway, of which her uncle was president. However, the railway was in financial difficulties, and it was taken over by bankers, after which the position disappeared.

Finally a family council was held on the Veblen farm, and it was decided that Thorstein should once again attempt to enter the academic world. In 1891, wearing corduroy trousers and a coonskin hat, he walked into the office of the conservative economist J.L. Laughlan and introduced himself. Although taken aback by Veblen's appearance, Laughlan began to talk with him, and he soon recognized Veblen's genius. A year later, when he moved to the University of Chicago, Laughlan brought Veblen with him at a salary of \$520 per year.

At the University of Chicago, Veblen soon established a reputation both for eccentricity and for enormous erudition. His socks were held up by safety pins, but he was reputed to be fluent in twenty-six languages. He gained attention also by publishing a series of brilliant essays.

In 1899, Veblen "fluttered the dovescotes of the East" by publishing a book entitled *The Theory of the Leisure Class*. It was part economics, part anthropology, and part social satire. Nothing of the kind had ever been seen in the field of economics. Until that moment it had been universally assumed that human economic behavior is rational. Veblen's detached and surgically sharp intelligence exposed it as being very largely irrational.

According to Thorstein Veblen, ancient tribal instincts and attitudes motivate us today, just as they motivated our primitive ancestors. Veblen speaks of a predatory phase of primitive society where the strongest fighters were able to subjugate others. This primitive class structure was based on violence, and, according to Veblen, the attitudes associated with it persist today.

For example, Veblen noted that male members of the leisure class liked to go about with walking sticks. Why? Because, answers Veblen, it is "an advertisement that the bearer's hands are employed otherwise than in useful effort." Also, a walking stick is a weapon: "The handling of so tangible and primitive a means of offense is very comforting to anyone who is gifted with even a moderate share of ferocity".

Even in modern society, Veblen says, we have an admiration for those who succeed in obtaining power and money through predatory means, and this admiration makes honest and useful work seem degraded. "During the predatory culture", Veblen wrote, "labour comes to be associated in men's habits of thought with weakness and subjugation to a master. It is therefore a mark of inferiority, and therefore comes to be accounted to be unworthy of man in his best estate. By virtue of this tradition, labour is felt to be debasing, and this tradition has never died out. On the contrary, with the advance of social differentiation it has acquired the axiomatic force of ancient and unquestioned prescription."

"In order to gain and hold the esteem of men it is not sufficient merely to possess wealth or power. The wealth or power must be put in evidence, for esteem is awarded only on evidence. It is felt by all persons of refined taste that a spiritual contamination is inseparable from certain offices that are conventionally required of servants. Vulgar surroundings,

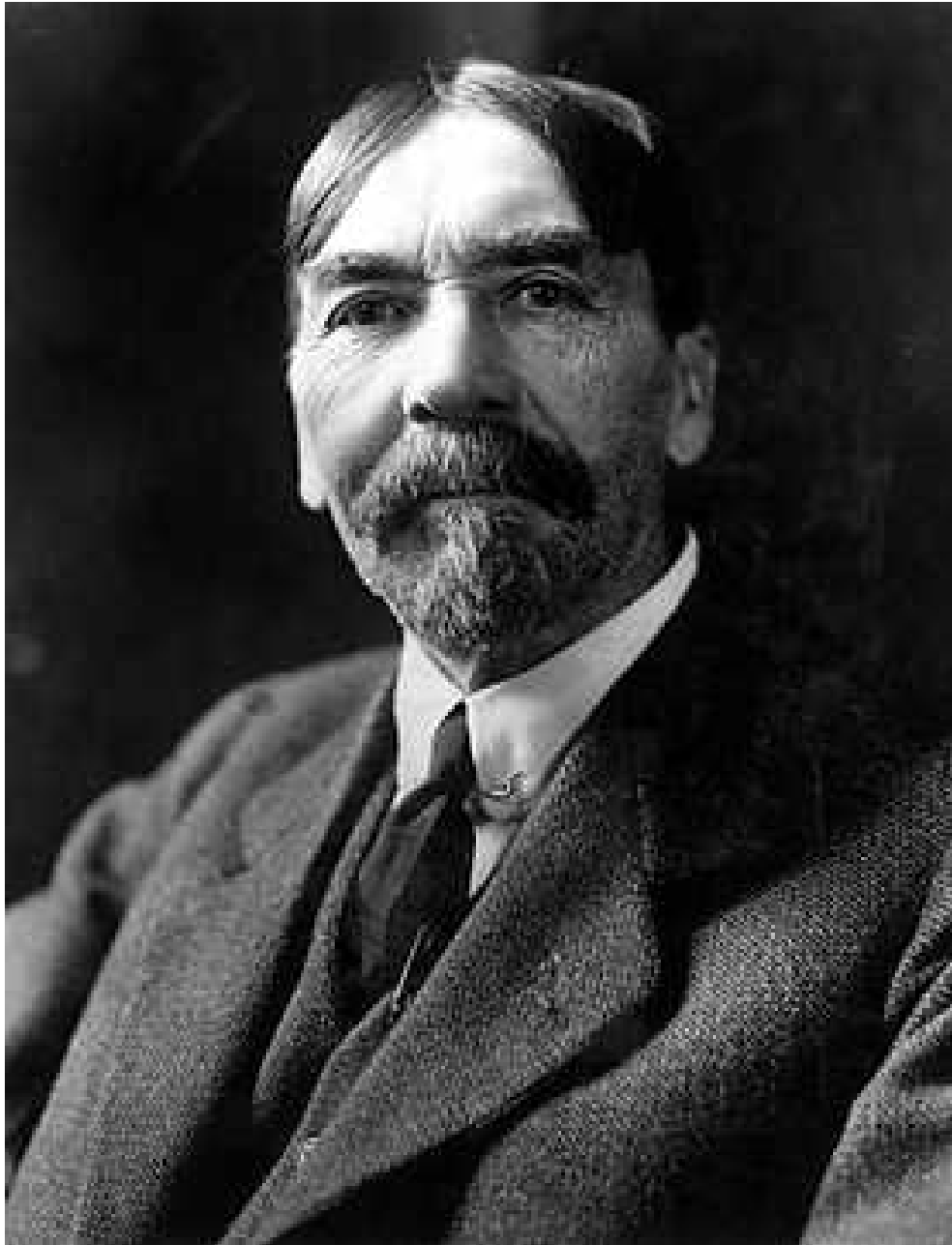


Figure 4.2: **Thorstein Veblen (1857-1929).**

mean (that is to say, inexpensive) habitations, and vulgarly productive occupations are unhesitatingly condemned and avoided. They are incompatible with life on a satisfactory spiritual plane - with 'high thinking'."

"...The performance of labour has been accepted as a conventional evidence of inferior force, therefore it comes by itself, by a mental shortcut, to be regarded as intrinsically base."

"The normal and characteristic occupations of the [leisure] class are... government, war, sports, and devout observances... At this as at any other cultural stage, government and war are, at least in part, carried out for the pecuniary gain of those who engage in them, but it is gain obtained by the honourable method of seizure and conversion."

Veblen also remarks that "It is true of dress even in a higher degree than of most items of consumption, that people will undergo a very considerable degree of privation in the comforts or the necessities of life in order to afford what is considered a decent amount of wasteful consumption; so that it is by no means an uncommon occurrence, in an inclement climate, for people to go ill clad in order to appear well dressed."

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.

4.3 Gandhi as an economist; merit and goods are not connected

If humans are to achieve a stable society in the distant future, it will be necessary for them to become modest in their economic behavior and peaceful in their politics. For both modesty and peace, Gandhi is useful as a source of ideas.

Mohandas Karamchand Gandhi was born in 1869 in Porbandar, India. His family belonged to the Hindu caste of shopkeepers. (In Gujarati "Gandhi" means "grocer".) However, the family had risen in status, and Gandhi's father, grandfather, and uncle had all served as prime ministers of small principalities in western India.

In 1888, Gandhi sailed for England, where he spent three years studying law at the Inner Temple in London. Before he left India, his mother had made him take a solemn oath not to touch women, wine, or meat. He thus came into contact with the English vegetarians, who included Sir Edward Arnold (translator of the Bhagavad Gita), the Theosophists Madame Blavatsky and Annie Besant, and the Fabians. Contact with this idealistic group of social critics and experimenters helped to cure Gandhi of his painful shyness, and it also developed his taste for social reform and experimentation.

Gandhi's exceptionally sweet and honest character won him many friends in England,

and he encountered no racial prejudice at all. However, when he traveled to Pretoria in South Africa a few years later, he experienced racism in its worst form. Although he was meticulously well dressed in an English frock coat, and in possession of a first-class ticket, Gandhi was given the choice between traveling third class or being thrown off the train. (He chose the second alternative.) Later in the journey he was beaten by a coach driver because he insisted on his right to sit as a passenger rather than taking a humiliating position on the footboard of the coach.

The legal case which had brought Gandhi to South Africa was a dispute between a wealthy Indian merchant, Dada Abdullah Seth, and his relative, Seth Tyeb (who had refused to pay a debt of 40,000 pounds, in those days a huge sum). Gandhi succeeded in reconciling these two relatives, and he persuaded them to settle their differences out of court. Later he wrote about this experience:

“Both were happy with this result, and both rose in public estimation. 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. The lesson was so indelibly burnt into me that a large part of my time during my twenty years of practice as a lawyer was occupied in bringing about compromises of hundreds of cases. I lost nothing thereby - not even money, certainly not my soul.”

Gandhi was about to return to India after the settlement of the case, but at a farewell party given by Abdullah Seth, he learned of a bill before the legislature which would deprive Indians in South Africa of their right to vote. He decided to stay and fight against the bill.

Gandhi spent the next twenty years in South Africa, becoming the leader of a struggle for the civil rights of the Indian community. In this struggle he tried “...to find the better side of human nature and to enter men’s hearts.” Gandhi’s stay in England had given him a glimpse of English liberalism and English faith in just laws. He felt confident that if the general public in England could be made aware of gross injustices in any part of the British Empire, reform would follow. He therefore organized non-violent protests in which the protesters sacrificed themselves so as to show as vividly as possible the injustice of an existing law. For example, when the government ruled that Hindu, Muslim and Parsi marriages had no legal standing, Gandhi and his followers voluntarily went to prison for ignoring the ruling.

Gandhi used two words to describe this form of protest: “satyagraha” (the force of truth) and “ahimsa” (non-violence). Of these he later wrote: “I have nothing new to teach the world. Truth and non-violence are as old as the hills. All that I have done is to try experiments in both on as vast a scale as I could. In so doing, I sometimes erred and learnt by my errors. Life and its problems have thus become to me so many experiments in the practice of truth and non-violence.”

In his autobiography, 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). At this time he also took an oath of chastity (“*bramacharya*”), partly because his wife was unwell and he wished to protect her from further pregnancies, and partly in order to devote himself more completely to the struggle for civil rights.

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 traveled 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,



Figure 4.3: Gandhi and his wife Kasturbhai in 1902.

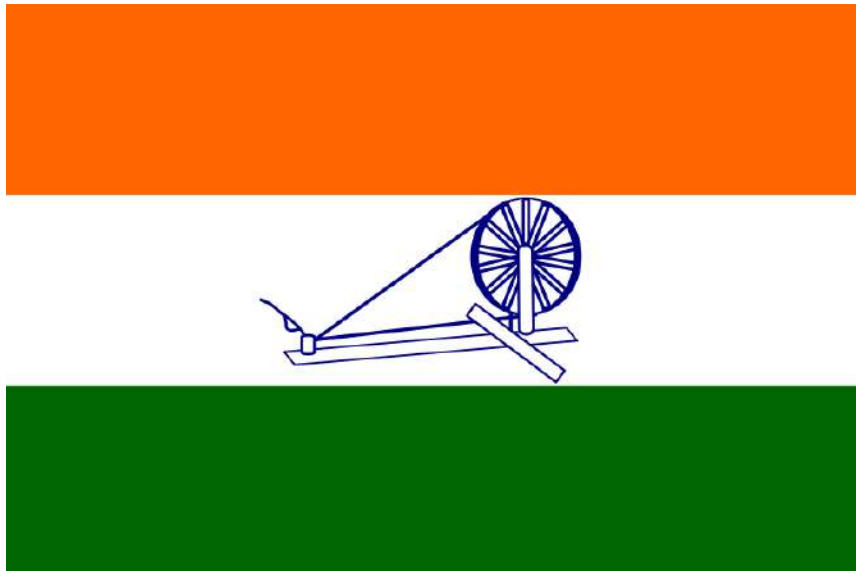


Figure 4.4: Gandhi's spinning wheel was incorporated into the flag of the Congress Party and later into the national flag of an independent India.

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.

Gandhi also organized many demonstrations whose purpose was to show the British public that although the British raj gave India many benefits, the toll exacted was too high, not only in terms of money, but also in terms of India's self-respect and self-sufficiency. All of Gandhi's demonstrations were designed to underline this fact. For example, in 1930 Gandhi organized a civil-disobedience campaign against the salt laws. The salt laws gave the Imperial government a monopoly and prevented Indians from making their own salt by evaporating sea water. The majority of Indians were poor farmers who worked long hours in extreme heat, and salt was as much a necessity to them as bread. The tax on salt was essentially a tax on the sweat of the farmers.

Before launching his campaign, Gandhi sent a polite letter to the Viceroy, Lord Irwin, explaining his reasons for believing that the salt laws were unjust, and announcing his intention of disregarding them unless they were repealed. Then, on March 12 1930, Gandhi and many of his followers, accompanied by several press correspondents, started on a march to the sea to carry out their intention of turning themselves into criminals by making salt. Every day, Gandhi led the procession about 12 miles, stopping at villages in the evenings to hold prayer meetings. Many of the villagers joined the march, while others cast flower petals in Gandhi's path or sprinkled water on his path to settle the dust.

On April 5 the marchers arrived at the sea, where they spent the night in prayer on the beach. In the morning they began to make salt by wading into the sea, filling pans with water, and letting it evaporate in the sun. Not much salt was made in this way, but Gandhi's action had a strong symbolic power. A wave of non-violent civil disobedience demonstrations swept over India, so extensive and widespread that the Imperial government, in danger of losing control of the country, decided to arrest as many of the demonstrators as possible. By midsummer, Gandhi and a hundred thousand of his followers were in prison, but nevertheless the civil disobedience demonstrations continued.

In January, 1931, Gandhi was released from prison and invited to the Viceroy's palace to talk with Lord Irwin. They reached a compromise agreement: Gandhi was to call off the demonstrations and would attend a Round Table Conference in London to discuss Indian

home rule, while Lord Irwin agreed to release the prisoners and would change the salt laws so that Indians living near to the coast could make their own salt.

The salt march was typical of Gandhi's non-violent methods. Throughout the demonstrations he tried to maintain a friendly attitude towards his opponents, avoiding escalation of the conflict. Thus at the end of the demonstrations, the atmosphere was one in which a fair compromise solution could be reached. Whenever he was in prison, Gandhi regarded his jailers as his hosts. Once, when he was imprisoned in South Africa, he used the time to make a pair of sandals, which he sent to General Smuts, the leader of the South African government. Thus Gandhi put into practice the Christian principle, "Love your enemies; do good to them that hate you."

Gandhi's importance lies in the fact that he was a major political leader who sincerely tried to put into practice the ethical principles of religion. In his autobiography Gandhi says: "I can say without the slightest hesitation, and yet with all humility, that those who say that religion has nothing to do with politics do not know what religion means."

Gandhi believed that human nature is essentially good, and that it is our task to find and encourage whatever is good in the character of others. During the period when he practiced as a lawyer, Gandhi's aim was "to unite parties riven asunder," and this was also his aim as a politician. In order for reconciliation to be possible in politics, it is necessary to avoid escalation of conflicts. Therefore Gandhi used non-violent methods, relying only on the force of truth. "It is my firm conviction," he wrote, "that nothing can be built on violence."

To the insidious argument that "the end justifies the means," Gandhi answered firmly: "They say 'means are after all means'. I would say 'means are after all everything'. As the means, so the end. Indeed the Creator has given us control (and that very limited) 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." In other words, a dirty method produces a dirty result; killing produces more killing; hate leads to more hate. But there are positive feedback loops as well as negative ones. A kind act produces a kind response; a generous gesture is returned; hospitality results in reflected hospitality. Hindus and Buddhists call this principle "the law of karma".

Gandhi believed that the use of violent means must inevitably contaminate the end achieved. Because Gandhi's methods were based on love, understanding, forgiveness and reconciliation, the non-violent revolution which he led left very little enmity in its wake. When India finally achieved its independence from England, the two countries parted company without excessive bitterness. India retained many of the good ideas which the English had brought - for example the tradition of parliamentary democracy - and the two countries continued to have close cultural and economic ties.

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 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.

4.4 The counter-culture; stepping off the treadmill

Say's Law ("Supply creates its own demand"), was proposed by the French economist Jean-Baptiste Say (1767-1832). Say's basis for this proposition was the assumption that a consumer's desire for goods is infinite. He combined this assumption with the observation that the wages paid for the production of goods will provide money enough to buy back the goods, even if the amount involved increases without limit. Comforted by Say's "law", and by the observation that people in industrial societies do indeed consume far more than they actually need, economists continue to pursue economic growth as though it were the Holy Grail. We do indeed devote much of our efforts to "making the earth bald before her time".

As things are today, the advertising industry, which is part of the mainstream culture, whips demand towards ever higher levels by exploiting our tendency to use material goods for the purpose of social competition. Meanwhile, a small but significant counter-culture has realized that unlimited economic growth will lead to ecological disaster unless we stop in time.

In the 1960's, a counter-culture developed in the United States, partly as a reaction against the Vietnam War and partly as a reaction against consumerism. It seemed to young people that they were being offered a possession-centered way of life that they did not want, and that they were being asked to participate in a war that they thought was immoral.

In 1964, a free speech movement began on the campus of the University of California in Berkeley. Students demanded that the university administration should lift a ban that it had imposed on on-campus political activities. Student movements elsewhere in the United States and in Europe echoed the Berkeley protests throughout the late 1960's and early 1970's.

Mario Savo, one of the leaders of the Berkeley free speech movement, compared the Establishment to an enormous anti-human machine: "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."

The Greening of America, by Charles Reich, describes the youth-centered counter-culture: "Industrialism produced a new man...", Reich wrote, "one adapted to the demands of the machine. In contrast, today's emerging consciousness seeks a new knowledge of what it means to be human, in order that the machine, having been built, may now be turned

to human ends; in order that man once more can become a creative force, renewing and creating his own life and thus giving life back to society.”

4.5 Charles Darwin’s theory of sexual selection

Darwin’s sequel to *The Origin of Species*

In 1871, Charles Darwin published a book entitled *The Descent of Man and Selection in Relation to Sex*. It was a sequel to his 1859 book *On the Origin of Species*, from which he had intentionally omitted any discussion of human ancestry. In 1871, however, hoenty compelled him to discuss this highly controversial topic. In his 1871 book, Darwin also discusses a question that had long bothered him. Why do the males of some bird species have extravagantly ornimental plumages, which are so elleborate that they may even hinder the birds’ escape from predators? Darwin had often remarked that the sight of a peacock’s beautiful feathers made him ill because it seemed to contradict his theory of natural selection. By 1871, however, he had found the answer: sexual selection.

Male-male competition and female choice

In discussing sexual selection, Darwin divided the subject into two headings - male-male competition and female choice.

Regarding male-male competition, Darwin wrote that survival “...depends, not on a struggle for existence, but on a struggle between the males for possession of the females; the result is not death to the unsuccessful competitor, but few or no offspring.”

In discussing female selection, he wrote “...when the males and females of any animal have the same general habits ... but differ in structure, colour, or ornament, such differences have been mainly caused by sexual selection.”

The statician and evolutionary biologist Sir Ronald Aylmer Fischer (1890-1962) later wrote that “...plumage development in the male, and sexual preference for such developments in the female, must thus advance together, and so long as the process is unchecked by severe counterselection, will advance with ever-increasing speed. In the total absence of such checks, it is easy to see that the speed of development will be proportional to the development already attained, which will therefore increase with time exponentially, or in geometric progression... In most existing species the runaway process must have been already checked, and we should expect that the more extraordinary developments of sexual plumage are not due like most characters to a long and even course of evolutionary progress, but to sudden spurts of change.”



Figure 4.5: A male peacock.



Figure 4.6: Display by a male bird of paradise.



Figure 4.7: **Red bird of paradise male in display.**



Figure 4.8: **The King-of-Saxony bird of paradise.**



Figure 4.9: Mating display of a seabird on the Galapagos Islands. The females find this very attractive.



Figure 4.10: Female bowerbirds judge males according to their building skills and aesthetic taste.

4.6 We must stop using material goods as a means of social competition

Shooting Santa Claus

No one wants to shoot Santa Claus. That goes without saying! Who would want to harm that jolly old man, with his reindeer and sleigh, and his workshop at the North Pole? Who would want to prevent him from bringing happiness to everyone? Who would want to stop him from making the children's eyes light up like stars? Surely no one!

But the sad truth today is that we have to get rid of Santa somehow, before he kills us, and before he kills most of the plants and animals with which we share our world. Perhaps shooting is too harsh. Perhaps we should just forget Santa and all that he stands for, with his red suit, invented by the advertising department of Coca Cola.

This is what Santa stands for: The customer is always right. Your wish is our command. You have a right to whatever you desire. If you feel like taking a vacation on the other side of the world, don't hesitate, just do it. If you feel like buying a SUV, just do it. Self-fulfillment is your birthright. Spending makes the economy grow, and growth is good. Isn't that right?

But sadly that isn't right. 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



Figure 4.11: An expensive automobile can be thought of as a mating display used by human males to impress females.

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.



Figure 4.12: A very large house can also be thought of as a human mating display.



Figure 4.13: **Size matters!**



Figure 4.14: Males fighting for dominance and mating rights.

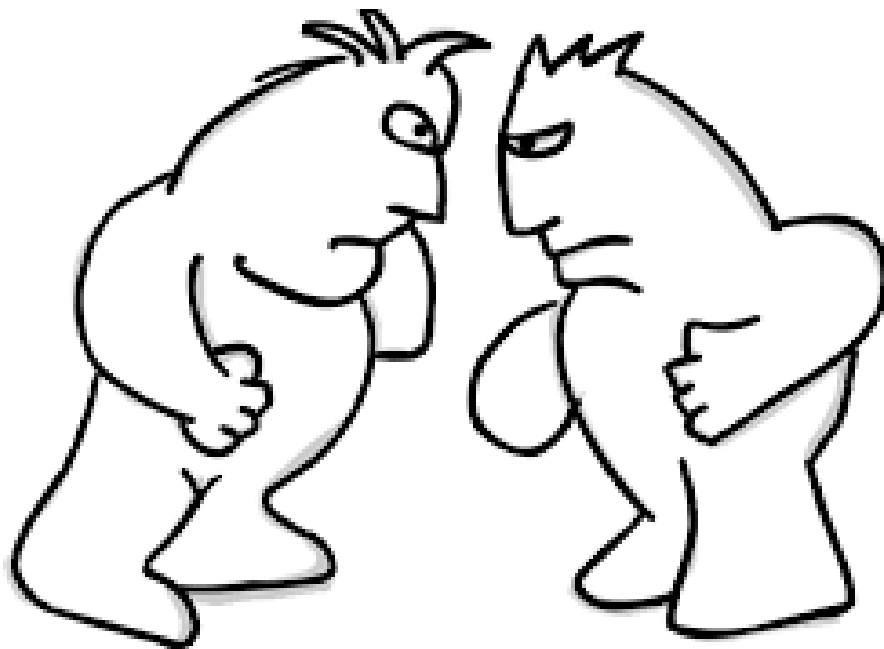


Figure 4.15: Males fighting for dominance and mating rights.

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Chapter 5

ARE WE BEING DRIVEN LIKE CATTLE?

5.1 Terrorism is actually a trivial threat

As we stand in line for security checks at airports, we may have the distinct feeling that we are being herded like cattle. Air travel has changed, and has become much less pleasant, since the fear of terrorism replaced the fear of communism as the excuse that governments give for diverting colossal sums of money from desperately needed social goals to the bottomless pit of war. Innocent grandmothers, and their grandchildren, are required to remove their shoes and belts. Everyone is treated like a criminal. It is a humiliating experience. We may well feel like dumb driven cattle; and the purpose of the charade is not so much to prevent airliners from being sabotaged as it is to keep the idea of terrorism fresh in our minds.

Is the threat of terrorism real? Or is it like the barking of a dog driving a herd? The threat of climate change is very real indeed. The threat to future global food security is real too. Already 11 million children die every year from malnutrition and poverty-related causes. The threat to human civilization and the biosphere posed by a possible Third World War is real. The threat of exhaustion of non-renewable resources and economic collapse is real. The dangers associated with our unstable fractional reserve banking system are also real. Beside these all too real threats to our future, the threat of terrorism is vanishingly small.

Millions starve. Millions die yearly from preventable diseases. Millions die as a consequence of wars. Compared with these numbers, the total count of terrorist victims is vanishingly small. It is even invisible compared with the number of people killed yearly in automobile accidents.

Terrorism is an invented threat. Our military industrial complexes invented it to take the place of the threat of communism after the end of the Cold War. They invented it so that they would be able to continue spending 1,700,000,000,000 dollars each year on armaments, an amount almost too large to be imagined.

So the people, the driven cattle, have been made to fear terrorism. How was this done? It was easy after 9/11. Could it be that the purpose of the 9/11 disaster was to make people fear terrorism, so that they could be more easily manipulated, more easily deprived of their civil rights, more easily driven into a war against Iraq? There is strong evidence that many highly placed governmental figures knew well in advanced that the World Trade Center would be attacked, and that they made the disaster much worse than it otherwise would have been. This evidence is available on the Internet.

Are we being driven like cattle into another war, by another fake threat? Is Iran really a threat? It is a country which has not attacked any of its neighbors for a century, although it has frequently itself been attacked. Israel has 300 nuclear weapons, and the US has many thousand, yet they claim that Iran's civilian nuclear program is a threat. Is it a real threat, or are we being driven, like cattle, by a false threat.

The precipice towards which we are being driven is very dangerous indeed. There is a real danger that a military attack on Iran could escalate uncontrollably into World War III. We have just passed the 100th anniversary of the start of World War I, and we should remember that this catastrophic conflagration was started as a limited operation by Austria to punish the Serbian nationalists, but it escalated uncontrollably

The Middle East is already a deeply troubled region, and it is a region in which the US and Israel cannot be said to be universally popular. Might not an attack on Iran initiate a revolution in Pakistan, thus throwing Pakistan's nuclear weapons into the conflict on the side of Iran? Furthermore, both China and Russia are staunch allies of Iran. Perhaps they would be drawn into the war.

Let us stop being driven like cattle by invented threats. Let us instead look at the very real dangers that threaten human civilization, and do our utmost to avoid them.

5.2 9/11 truth: Is it a question of truth, or of identity?

"What need we fear who knows it, when none can call our power to account?" Shakespeare's Lady Macbeth

"The human brain was not designed by evolution for finding truth. It was designed for finding advantage." Albert Szent-Györgyi

"History is a set of agreed-upon lies", Napoleon, quoting Fontanelle

When two people tell each other that they believe the same nonsense, a bond is formed between them; and the worse the nonsense, the stronger the bond. This is an aspect of tribalism. The bonding through shared beliefs is, like ritual scarification in African tribes, a mark of identity. This aspect of human nature makes it difficult to find out the truth. For example, any American who casts doubt on the official government-endorsed narrative

of the the events of September 11, 2001 becomes a “conspiracy theorist”, or a “terrorist sympathiser” - in any case certainly not a loyal, upstanding, patriotic citizen. As George W. Bush said shortly after the events, “You are either with us or against us.” It is not a queestion of truth. It is a question of identity.

But what is the truth? According to testimony given by CIA insider Susan Lindauer, the CIA knew about the planned attack on the World Trade Center as early as April, 2001. According to Lindauer, it was realized that airplanes striking the buildings would not cause their collapse, and so the disaster was deliberately made worse than it otherwise would have been by US government agents, who planted charges of explosives.

Other evidence supports Lindauer’s testimony. Numerous people in New York saved samples of the dust produced by the collapse of the WTC buildings, and chemical analysis of the dust shows the presence of nanothermite, a powerful heat-producing compound which seems to have been used to melt the steel framework of the strongly-constructed sky scrapers. Videos the collapse of the buildings, especially Building 7, show them falling freely in the manner of structures brought down in a controlled demolition. The videos also show molten steel pouring out of the buildings. Furthermore, pools of recently-melted steel were found in the ruins before these were sealed off from the public. An ordinary fire does not produce temperatures high enough to melt steel. New York Fire Department workers report hearing numerous explosions in the WTC buildings before they collapsed.

Thus there is strong evidence, available to everyone who is willing to look at it on the Internet, which shows that the official version of 9/11 is untrue, and that the US government made the disaster worse than it otherwise would have been in order to justify not only an unending “War on Terror”, but also the abridgement of civil liberties within the United States. But very few people wish to challenge the official version of the attack on the World Trade Center. Those who accept the official version are. by definition, respectable citizens, while those who challenge it are “leftists” and “probably terrorist sympathizers”. As George W. Bush said, “You are either for us, or you are against us”.



Figure 5.1: Molten steel pouring from the burning World Trade Center. An ordinary fire is not hot enough to melt steel.



Figure 5.2: Molten steel in the ruins of the World Trade Center.



Figure 5.3: Photo of the World Trade Center shortly before its collapse. Thermite, used for cutting steel in the demolition of buildings, produces white smoke when it burns

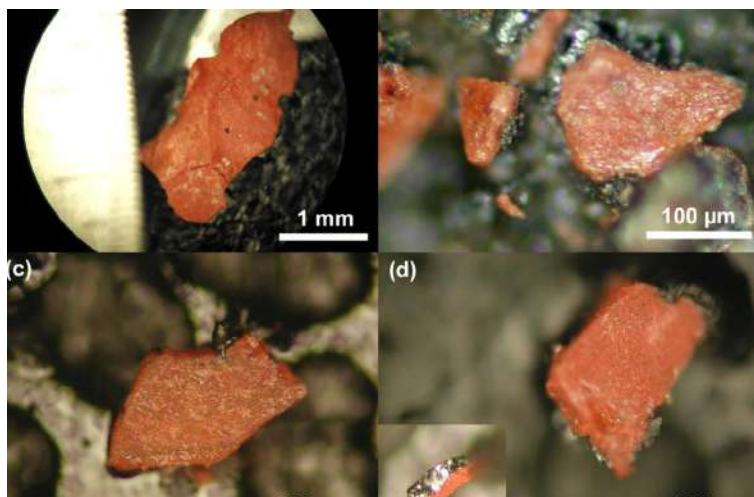


Figure 5.4: The type of thermite that seems to have been used for the destruction of WTC 1 and WTC 2 was military-grade nano-thermite, which cannot be purchased by private persons.



Figure 5.5: Building 7 was not hit by any aircraft, and yet it collapsed many hours later, during the afternoon, in a manner that looked exactly like a controlled demolition.



Figure 5.6: Reports of observers who heard explosions are corroborated by MSNBC video footage of reporter Ashleigh Banfield several blocks north of WTC 7. In the video, she hears a loud sound, turns her attention to WTC 7, and says, “Oh my god.... This is it.” About seven seconds after she hears the loud sound, WTC 7 collapses. As David Chandler observes in the video *Sound Evidence for Explosions*: There were two blasts, followed by seven more regularly spaced all in two and a half seconds. Craig Bartmer’s testimony may come to mind: “The whole time you’re hearing ‘thume, thume, thume, thume, thume.’ ”....



Figure 5.7: This picture shows materials of WTC 1, including multi-ton beams, being explosively ejected several hundred feet in all directions. Physics teacher David Chandler states that “[U]nder the canopy of falling debris, do you see the rapid sequence of explosive ejections of material? Some of the jets have been clocked at over 100 mph.... They’re continuous and widespread. They move progressively down the faces of the building, keeping pace with the falling debris.... The building is being progressively destroyed from the top down by waves of explosions creating a huge debris field.”

5.3 *Beyond Misinformation*

In 2015, Architects and Engineers for 9/11 Truth Inc. published a 52-page report entitled **Beyond Misinformation**. It can be downloaded from their website at <https://www.ae911truth.org/>. Here are a few quotations from the report.

The history of steel-framed high-rise buildings spans about 100 years. Setting aside the events of September 11, 2001, every total collapse of a steel- framed high-rise building during that period of time has been caused by controlled demolition. In comparison, fires have never caused the total collapse of high-rise buildings, though high-rise building fires occur frequently...

If the destruction of WTC 1, WTC 2, and WTC 7 were caused by fire, this would make them the first steel- framed high-rise buildings in history to suffer total fire-induced collapse (combined with structural damage from the airplane impacts in the case of WTC 1 and WTC 2). They would also be the first fire-induced collapses to exhibit nearly all of the features of controlled demolition and none of the features of fire-induced collapse. Edward Munyak, a fire protection engineer, puts it this way: “Even one progressive global collapse would have been extraordinary. But to have three occur in one day was just beyond comprehension.”...

According to NIST¹, once collapse initiated, WTC 1 and WTC 2 fell in approximately 11 seconds and 9 seconds, respectively, each coming down “essentially in free fall.” To many observers, the speed of collapse was the most striking feature of their destruction. Yet, NIST’s explanation for why WTC 1 and WTC 2 collapsed “essentially in free fall” was limited to a half-page section of its 10,000-page report titled “Events Following Collapse Initiation.” In this section, NIST attempted to explain the speed and completeness of the collapses simply by saying: “It was not stopped by the floors below. So there was no calculation that we did to determine what is clear from the videos.”...

Not only was molten metal seen pouring out of WTC 2, dozens of eyewitnesses observed it in the debris of all three buildings. A small selection is presented below:

- *Leslie Robertson, a lead engineer in the design of WTC 1 and WTC 2, told an audience: “We were down at the B-1 level and one of the firefighters said, ‘I think you’d be interested in this.’ And they pulled up a big block of concrete, and there was like a little river of steel flowing.”*
- *FDNY Captain Philip Ruvolo recalled with other firefighters seated next to him: “You’d get down below and you’d see molten steel, molten steel, running down the channel rails, like you’re in a foundry, like lava”. Other firefighters chimed in, “Like lava”, “Like lava from a volcano”.*
- *Ken Holden, the Commissioner of the NYC Department of Design and Construction, testified before the 9/11 Commission: “Underground it was still so hot that molten metal dripped down the sides of the wall from building 6”.*

¹NIST, the National Institute of Standards and Technology, produced a report on 9/11 which many regard as a cover-up.

Three scientific studies have documented evidence in the WTC dust that indicates extremely high temperatures during the destruction of WTC 1 and WTC 2 - and possibly WTC 7.

Released in May 2004, the RJ Lee report titled WTC Dust Signature identified “[s]pherical iron and spherical or vesicular silicate particles that result from exposure to high temperature” in the dust.

An earlier 2003 version of RJ Lee’s report observed: “Various metals (most notably iron and lead) were melted during the WTC event, producing spherical metallic particles. Exposure of phases to high heat results in the formation of spherical particles due to surface tension.... Particles of materials that had been modified by exposure to high temperature, such as spherical particles of iron and silicates, are common in the WTC dust...but are not common in normal office dust.” The 2003 version also reported that while iron particles make up only 0.04 percent of normal building dust, they constituted 5.87 percent of the WTC dust.

Iron does not melt until 1,538 °C (2,800 °F), which, as discussed above, cannot be reached by diffuse hydrocarbon fires. Still, even higher temperatures than 1,538 °C were indicated by another discovery documented in RJ Lee’s report...

In April 2009 a group of scientists led by Dr. Niels Harrit, an expert in nano-chemistry who taught chemistry at the University of Copenhagen for over 40 years, published a paper in the Open Chemical Physics Journal titled “Active Thermite Materials Discovered in Dust from the 9/11 World Trade Center Catastrophe”. This paper, which reported the results of experiments conducted on small red-gray, bi-layered chips found in multiple independent WTC dust samples, concluded that the chips were unreacted nano-thermite, a form of thermite with explosive properties engineered at the nano-level.

5.4 9/11 Unmasked

“9/11 Unmasked” is a very recent book by David Ray Griffin and Elizabeth Woodworth. A review of the book in “The Guardian” by Piers Robinson can be found on the following link: <https://off-guardian.org/2018/09/10/9-11-unmasked-by-david-ray-griffin-and-elizabeth-woodworth-a-review/> Here are a few quotations from the review:

Although not a topic for polite conversation, nor a widely recognized ‘acceptable’ issue for mainstream academics and journalists, the issue of 9/11 and the multiple questions that persist with respect to this transformative event continue to bubble under the surface. 9/11 ushered in the global ‘war on terror’, shaping the geo-political agenda of Western governments for almost two decades now and having a deleterious impact on civil liberties across Western liberal democratic states. Torture has been used as part of official policy and there is bulk data collection and surveillance of entire populations.

In recent years, further information has come into the public domain, via the UK Chilcot report regarding the formative stages of the post 9/11 ‘war on terror’: Within days of 9/11 having occurred a British embassy cable reported that ‘the “regime-change hawks” in

Washington are arguing that a coalition put together for one purpose (against international terrorism) could be used to clear up other problems in the region'; Chilcot also published a Bush-Blair communication from the aftermath of 9/11 which discussed phase two of the 'war on terror' and indicated debate over when to 'hit' countries unconnected with Al Qaeda, such as Iraq, Syria and Iran.

Broadly speaking, Chilcot corroborated former Supreme Allied Commander Wesley Clark's claim that he was informed, immediately after 9/11, that seven countries, including Syria, were to be 'taken out' in five years.

It is against this backdrop that "9/11 Unmasked" by David Ray Griffin and Elizabeth Woodworth now emerges. The book is the culmination of seven years work by the 9/11 Consensus Panel which includes 23 experts from fields including physics, chemistry, structural engineering, aeronautical engineering, piloting, airplane crash investigation, medicine, journalism, psychology, and religion.

Another review of the book, by Edward Curtin, has recently been published by TMS Media Service Weekly Digest. It can be reached on the following link: <https://www.transcend.org/tms/2018-fakest-fake-news-the-u-s-governments-9-11-conspiracy-theory/> . Here are some excerpts from the review:

For seventeen years we have been subjected to an onslaught of U.S. government and corporate media propaganda about 9/11 that has been used to support the "war on terror" that has resulted in millions of deaths around the world. It has been used as a pretext to attack nations throughout the Middle East, South Asia, and Africa. It has led to a great increase in Islamophobia since Muslims were accused of being responsible for the attacks. It has led to a crackdown on civil liberties in the United States, the exponential growth of a vast and costly national security apparatus, the spreading of fear and anxiety on a great scale, and a state of permanent war that is pushing the world toward a nuclear confrontation. And much, much more.

The authors of this essential book, David Ray Griffin and Elizabeth Woodworth, and all their colleagues who have contributed to this volume, have long been at the front lines trying to wake people up to the real news about 9/11. They have battled against three U.S. presidents, a vast propaganda machine "strangely" allied with well-known leftists, and a corporate mass media intent on serving deep-state interests, all of whom have used illogic, lies, and pseudo-science to conceal the terrible truth. Yet despite the establishment's disinformation and deceptions, very many people have come to suspect that the official story of the September 11, 2001 attacks is not true.

With the publication of "9/11Unmasked: An International Review Panel Investigation", they now have a brilliant source book to use to turn their suspicions into certitudes. And for those who have never doubted the official account (or accounts would be more accurate), reading this book should shock them into reality, because it is not based on speculation, but on carefully documented and corroborated facts, exacting logic, and the scientific method...

This research process went on for many years, with the findings reported in this book. The Consensus 9/11 Panel provides evidence against the official claims in nine categories:

1. *The Destruction of the Twin Towers*
2. *The Destruction of WTC 7*
3. *The Attack on the Pentagon*
4. *The 9/11 Flights*
5. *US Military Exercises on and before 9/11*
6. *Claims about Military and Political Leaders*
7. *Osama bin Laden and the Hijackers*
8. *Phone Calls from the 9/11 Flights*
9. *Insider Trading*

Each category is introduced and then broken down into sub-sections called points, which are examined in turn. For example, the destruction of the Twin Towers has points that include, "The Claim That No One Reported Explosions in the Twin Towers," "The Claim That the Twin Towers Were Destroyed by Airplane Impacts, Jet Fuel, and Fire," "The Claim That There Were Widespread Infernos in the South Tower," etc. Each point is introduced with background, the official account is presented, then the best evidence, followed by a conclusion. Within the nine categories there are 51 points examined, each meticulously documented through quotations, references, etc., all connected to 875 endnotes that the reader can follow. It is scrupulously laid out and logical, and the reader can follow it sequentially or pick out an aspect that particularly interests them...

As a grandson of a Deputy Chief of the New York Fire Department (343 firefighters died on 9/11), I find it particularly despicable that the government agency, the National Institute of Standards and Technology (NIST), that was charged with investigating the collapse of the Towers and Building 7, would claim that no one gave evidence of explosions in the Twin Towers, when it is documented by the fastidious researcher Graeme MacQueen, a member of The 9/11 Consensus Panel, that over 100 firefighters who were at the scene reported hearing explosions in the towers. One may follow endnote 22 to MacQueen's research and his sources that are indisputable. There are recordings.

5.5 The arrogance of power

9/11 is an example of the arrogance of power. There is strong evidence of a governmental lie, but very few dare to point to it. Like Lady Macbeth, the US government is saying, "What need we fear who knows it, when none can call our power to account?" However, we should remember that things ended badly for Macbeth and his wife.

The fear-enforced conformity of Nazi Germany is also an example of the arrogance of power. There are strong parallels between 9/11 and the way in which the Nazi's used the Reichstag Fire as an excuse both for attacking civil liberties within Germany, and for invading Poland. All of us remember seeing in films the quasi-religious expressions of ecstasy on the faces of enormous crowds of Germans as they listened to Hitler's speeches. Fanatical nationalism appeals to primitive emotions of tribalism which all of us have inherited from our remote ancestors; but in the faces of the crowds listening to Hitler's hypnotic speeches

we can see something more: conformity enforced by fear. But what about ourselves? Are we really fearless? If so, why don't we speak truth to power? Why don't we challenge governmental lies?

Attempts to rule the world through military power were tyrannical and undemocratic under the Roman Empire, tyrannical under the British Empire, and tyrannical under Napoleon. The ambition of military world dominance was evil when it was the aim of Hitler; and it is evil today when practiced by any country, much more so now than in earlier times because of the invention of nuclear weapons.

5.6 Terrorism: a pseudothreat

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. For example, CIA insider Susan Lindauer has testified that the US government knew about the planned attacks as early as April, 2001. Other experts have testified that explosives must have been used to bring the buildings down.

Numerous samples of the dust from the disaster were collected by people in New York City, and chemical analysis of the dust has shown the presence of nanothermite, a compound that produces intense heat. Pools of recently-melted steel were found in the ruins of the buildings before these were sealed off from the public. An ordinary fire does not produce temperatures high enough to melt steel.

Thus it seems probable that the US government participated in the 9/11 attacks, and used them in much the same way that the Nazis used the Reichstag fire, to abridge civil liberties and to justify a foreign invasion. Soon afterward, the Patriot Act was passed. It's Orwellian name is easily understood by anyone who has read "1984".

But in Shelley's words, "We 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.

Some Suggestions for further reading

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19. National Fire Protection Association (NFPA), *NFPA 921 Guide for Fire and Explosion Investigations* (Current edition: 2014)
20. NFPA Report, *High-Rise Building Fires* by John R. Hall, Jr. (September 2013)
21. National Institute of Standards and Technology (NIST), *National Institute of Standards and Technology Final Plan: National Building Fire Safety Investment of the World Trade Center* by Sivaraj Shyam-Sunder (August 2002)
22. NIST, *June 2004 Progress Report on the Federal Building and Fire Safety Investigation of the World Trade Center Disaster (WTC 1 & WTC 2)*
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25. NIST: To NIST, *Request for Correction* from Bob McIlvaine, Bill Doyle, Steven Jones, Kevin Ryan, Richard Gage, Frank Legge (April 2007)
26. NIST: From NIST, *Response to the Request for Correction* (September 2007)
27. NIST: To NIST, *Appeal from James R. Gourley, Bob McIlvaine, Steven Jones to NIST's Response to the Request for Correction* (October 2007)
28. NIST, *Questions and Answers about the NIST WTC Towers Investigation (NIST FAQs for WTC 1 & WTC 2* updated September 19, 2011)
29. NIST, *Questions and Answers about the NIST WTC 7 Investigation (NIST FAQs for WTC 7*, updated June 27, 2012)
30. NIST, *WTC 7 Technical Briefing* (August 26, 2008)
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Chapter 6

THE CLIMATE EMERGENCY

6.1 Quick action is needed to save the long-term future

The worst effects of catastrophic climate change lie in the distant future, a century or even many centuries from the present; but disaster can only be avoided if quick action is taken. The nations of the world must act immediately to reduce and eventually stop the use of fossil fuels and the destruction of forests. If decisive action is not taken within the next few decades, feedback loops will make human intervention useless. These feedback loops include the albedo effect, the methane hydrate feedback loop, and the fact as tropical forests become drier, they become vulnerable to fires ignited by lightning. These fires accelerate the drying, and thus a feed-back loop is formed.

As time passes, and as the disastrous consequences of climate change become more apparent, the political will required for action will increase; but by that time it may be too late. We are rapidly approaching several crucial tipping points.

At present, the average global rate of use of primary energy is roughly 2 kW_t per person. In North America, the rate is 12 kW_t per capita, while in Europe, the figure is 6 kW_t . In Bangladesh, it is only 0.2 kW_t . This wide variation implies that considerable energy savings are possible, through changes in lifestyle, and through energy efficiency.

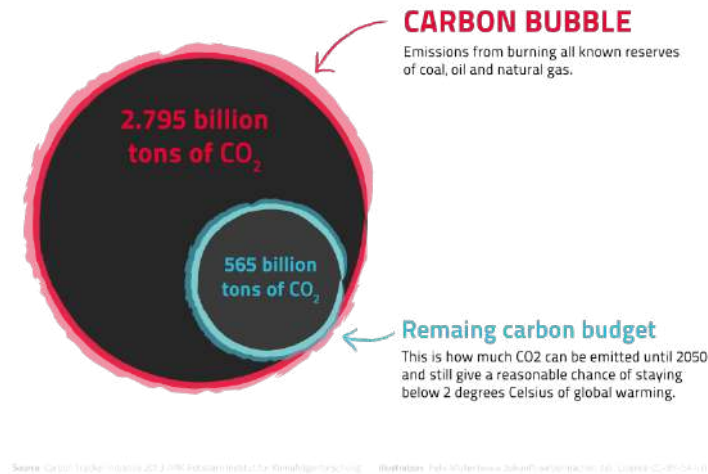


Figure 6.1: The Carbon Bubble according to data by the Carbon Tracker Initiative 2013. In order to avoid tipping points that will make human attempts to avoid catastrophic climate change useless, we must leave most of the known fossil fuel reserves in the ground!

6.2 Is the transition to 100% renewable energy possible?

Remaining reserves and rates of use of fossil fuels

	Reserves	2005 rate of use	Years remaining
Coal	780 TWy	3.5 TW	217 years
Oil	250 TWy	6.0 TW	42 years
Natural gas	250 TWy	3.7 TW	68 years
Total	1260 TWy	13.2 TW	(95 years)

Year	Demand	Population	Per Capita
1980	9.48 TW	4.45 bil.	2.13 kW
1985	10.3 TW	4.84 bil.	2.11 kW
1990	11.6 TW	5.99 bil.	2.20 kW
1995	12.3 TW	5.68 bil.	2.16 kW
2003	14.1 TW	6.30 bil.	2.23 kW
2010	17.1 TW	6.84 bil.	2.50 kW
2015	18.9 TW	7.23 bil.	2.58 kW
2020	20.5 TW	7.61 bil.	2.70 kW
2025	22.3 TW	7.91 bil.	2.82 kW
2030	24.2 TW	8.30 bil.	2.93 kW

If we ask whether the transition to 100% renewable energy is possible, the answer is very simple: It is not only possible; it is inevitable! This is because the supply of fossil fuels is finite, and at the present rate of use they will be exhausted in less than a century. While the transition to 100% renewables is inevitable, the vitally important point to remember is that if we are to avoid disaster, the transition must come quickly.

In this book, we will use kilowatts (kW), megawatts (MW) and terawatts (TW) as the units in which we discuss the rate of use of energy. A megawatt is equal to a thousand kilowatts or a million watts. A terawatt is equal to a thousand megawatts, or a million kilowatts or a billion (1,000,000,000) watts. A citizen of the European Union uses energy

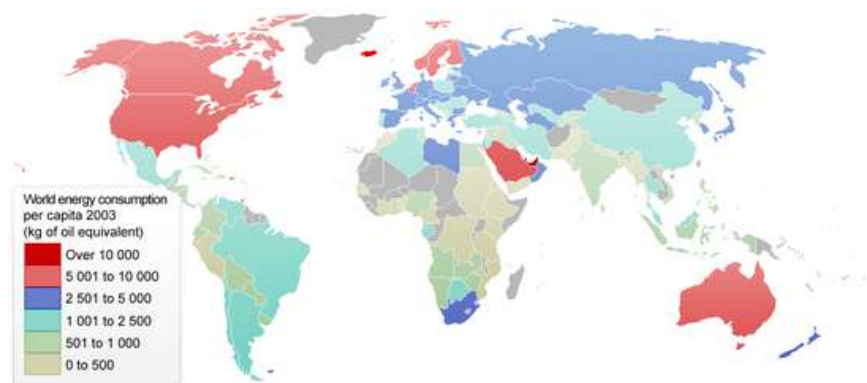


Figure 6.2: A map of the world showing per capita rates of energy use.

at the rate of about 6 kilowatts, while in North America, the rate of energy use is double that amount. The global average rate of energy use is a little over 2 kilowatts. Since there are now 7.5 billion people in the world, our present rate of energy use is roughly 15 terawatts,

The total available energy from fossil fuels can be measured in terawatt.years (TWy). Rough estimates of global coal reserves of coal, oil and natural gas are given by the table shown above.

The present rate of use of fossil fuels is greater than the 2005 rate shown in the table, and the remaining reserves are smaller than those shown. It is assumed that as oil becomes exhausted, coal will be converted into liquid fuels, as was done in Germany during World War II.

A second table, shown below, illustrates the historical and projected total global energy demand as a function of time between 1980 and 2030. In this slightly out-of-date table, the last year using historical data is 2003, later years being estimates based on projections.

Notice that the per capita energy use is almost constant. Our rapidly growing demand for energy is primarily the result of the world's rapidly growing population of humans. It would be wise to stabilize human populations because of the threat of human-caused ecological catastrophes and the danger of an extremely large-scale famine, involving billions of people rather than millions. Such a famine is threatened because growing populations require a growing food supply, climate changes threaten agriculture through droughts, melting glaciers and loss of agricultural land. The end of the fossil fuel era will also mean the end of high-yield petroleum-based agriculture.

The rate of growth of renewable energy

There is reason for hope that even the high energy demands show in the second table can be met by renewables. The basis of this hope can be found in the extremely high present rate of growth of renewable energy, and in the remarkable properties of exponential growth.

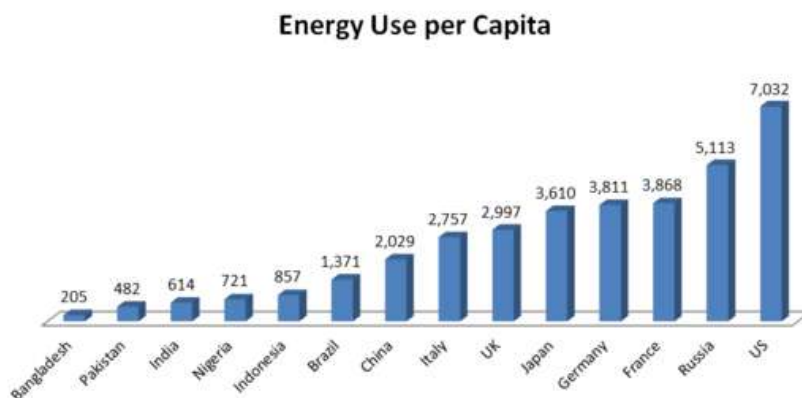


Figure 6.3: **Energy use per capita by country (World Bank data)**

According to figures recently released by the Earth Policy Institute, 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.

6.3 Renewables are now much cheaper than fossil fuels!

According to an article written by Megan Darby and published in *The Guardian* on 26 January, 2016, "Solar power costs are tumbling so fast the technology is likely to fast outstrip mainstream energy forecasts.

"That is the conclusion of Oxford University researchers, based on a new forecasting model published in *Research Policy*¹.

"Commercial prices have fallen by 58% since 2012 and by 16

"Since the 1980s, panels to generate electricity from sunshine have got 10% cheaper each year. That is likely to continue, the study said, putting solar on course to meet 20% of global energy needs by 2027.' "

Solar energy

Unlike the burning of fossil fuels, renewables like solar energy do not release pollutants into the atmosphere. In China, public opinion has shifted in favor of renewables because of air pollution in cities.

¹<http://www.sciencedirect.com/science/article/pii/S0048733315001699>

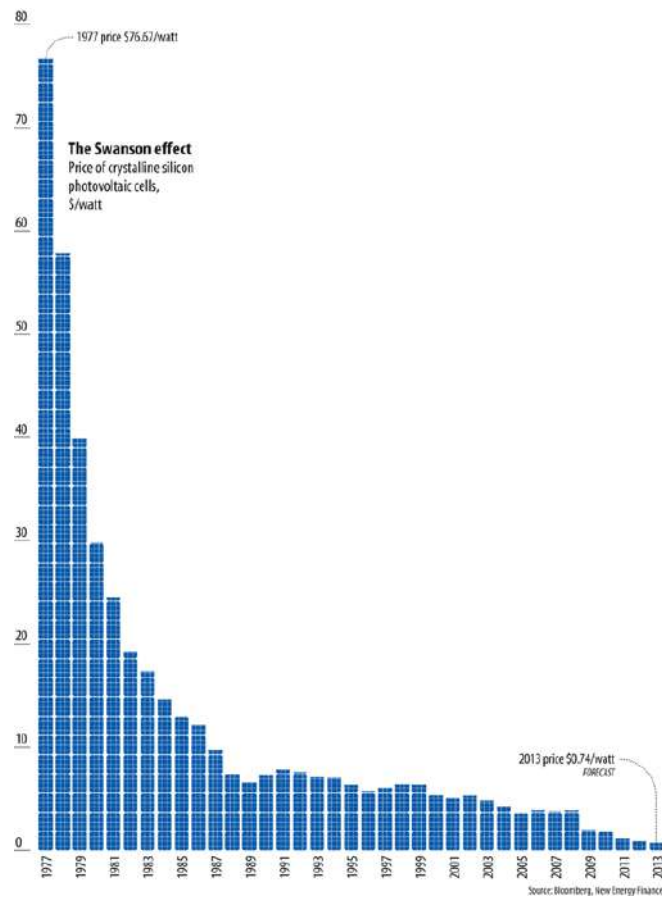


Figure 6.4: The cost of photovoltaic cell panels is falling rapidly

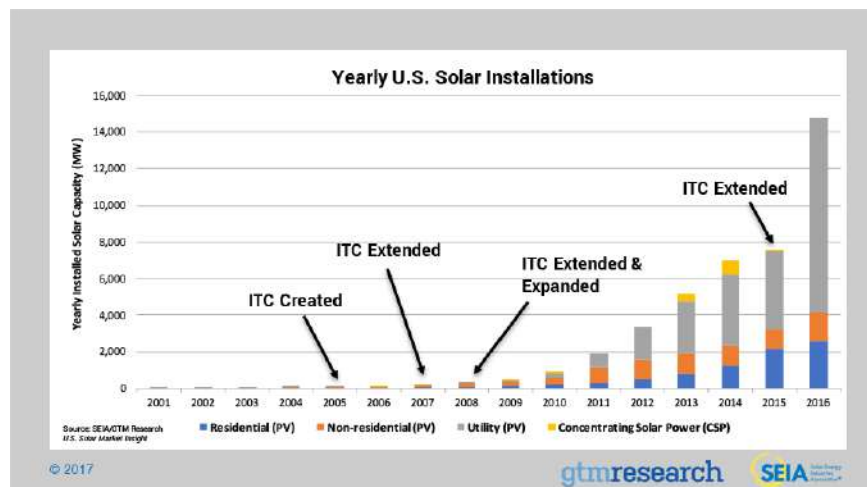


Figure 6.5: Driven by falling prices, new solar installations in the United States are increasing rapidly. The acronym ITC stands for Solar Investment Tax Credit. Commercial prices have fallen by 58% since 2012 and by 16% in the last year



Figure 6.6: Air pollution from the burning of coal has become a serious problem in China. This problem has helped to shift Chinese public opinion away from the burning of coal and towards renewables. China has now become a major manufacturer of photovoltaic cells.

Photovoltaic cells

The price of solar photovoltaic panels has declined 99 percent over the last four decades, from \$74 a watt in 1972 to less than 70 cents a watt in 2014.

Between 2009 and 2014, solar panel prices dropped by three fourths, helping global PV installations grow 50 percent per year.

Deutsche Bank notes that as of early 2014, solar PV was already competitive with average residential, commercial or industrial electricity rates in 14 countries, and in California - even without subsidies. By late 2014 there were nearly 600,000 individual PV systems in the United States, almost twice as many as in 2012. This number may well pass 1 million in 2016.

In 2013, just 12 percent of U.S. homebuilders offered solar panels as an option for new single-family homes. More than half of them anticipate doing so by 2016. Four of the top five U.S. home construction firms - DR Horton, Lennar Corp, PulteGroup and KB Home - now automatically include solar panels on every new house in certain markets.

In 2007 there were only 8,000 rooftop solar installations in coal-heavy Australia; now there are over a million.

Saudi Arabia has 41,000 megawatts of solar PV operating, under construction and planned - enough to generate up to two thirds of the country's electricity.

For the roughly 1.3 billion people without access to electricity, it is now often cheaper and more efficient simply to install solar panels rooftop-by-rooftop than to build a central power plant and transmission infrastructure.

Wind energy

Over the past decade, world wind power capacity grew more than 20 percent a year, its increase driven by its many attractive features, by public policies supporting its expansion, and by falling costs.

By the end of 2014, global wind generating capacity totaled 369,000 megawatts, enough to power more than 90 million U.S. homes. Wind currently has a big lead on solar PV, which has enough worldwide capacity to power roughly 30 million U.S. homes.

China is now generating more electricity from wind farms than from nuclear plants, and should have little trouble meeting its official 2020 wind power goal of 200,000 megawatts. For perspective, that would be enough to satisfy the annual electricity needs of Brazil.

In nine U.S. states, wind provides at least 12 percent of electricity. Iowa and South Dakota are each generating more than one quarter of their electricity from wind.

In the Midwestern United States, contracts for wind power are being signed at a price of 2.5 cents per kilowatt-hour (kWh), which compares with the nationwide average grid price of 10-12 cents per kWh.

Although a wind farm can cover many square miles, turbines occupy little land. Coupled with access roads and other permanent features, a wind farm's footprint typically comes to just over 1 percent of the total land area covered by the project.

Wind energy yield per acre is off the charts. For example, a farmer in northern Iowa could plant an acre in corn that would yield enough grain to produce roughly \$1,000 worth of fuel-grade ethanol per year, or the farmer could put on that same acre a turbine that generates \$300,000 worth of electricity per year. Farmers typically receive \$3,000 to \$10,000 per turbine each year in royalties. As wind farms spread across the U.S. Great Plains, wind royalties for many ranchers will exceed their earnings from cattle sales.

The problem of intermittency

Many forms of renewable energy encounter the problem of intermittency. For example, on windy days, Denmark's windmills generate more than enough electricity to meet the needs of the country, but on days when the wind is less strong, the electrical energy generated is insufficient. Denmark solves this problem by selling surplus electrical power to Germany on windy days, and buying power from hydroelectric-rich Norway on less windy days.

The problem of intermittency can alternatively be solved by pumping water to uphill reservoirs when the wind is strong, and letting the stored water drive turbines when the wind is weak. The problem of intermittency can also be solved with lithium ion storage batteries, by splitting water into hydrogen and oxygen, or by using other types of fuel cells.

Developing countries: No need for grids

When cell phones came into general use, developing countries with no telephone networks were able to use the new technology through satellites, thus jumping over the need for country-wide telephone lines. Similarly, village solar or wind installations in the developing countries can supply power locally, bypassing the need for a grid.

6.4 An economic tipping point

Renewables are now cheaper than fossil fuels

Solar energy and wind energy have recently become cheaper than fossil fuels. Thus a tipping point has been passed. From now on, despite frantic efforts of giant fossil fuel corporations to prevent it from happening, the transition to 100% renewable energy will be driven by economic forces alone.

Subsidies to the fossil fuel industry

<http://www.imf.org/en/News/Articles/2015/09/28/04/53/sonew070215a>

<http://priceofoil.org/fossil-fuel-subsidies/>

6.5 An unprecedented investment opportunity

Investment in electric vehicles

On July 5, 2017, the Volvo Car Group made the following announcement: ²

“Volvo Cars, the premium car maker, has announced that every Volvo it launches from 2019 will have an electric motor, marking the historic end of cars that only have an internal combustion engine (ICE) and placing electrification at the core of its future business.

“The announcement represents one of the most significant moves by any car maker to embrace electrification and highlights how over a century after the invention of the internal combustion engine electrification is paving the way for a new chapter in automotive history.

“‘This is about the customer,’ said Håkan Samuelsson, president and chief executive. ‘People increasingly demand electrified cars and we want to respond to our customers’ current and future needs. You can now pick and choose whichever electrified Volvo you wish.’

“Volvo Cars will introduce a portfolio of electrified cars across its model range, embracing fully electric cars, plug in hybrid cars and mild hybrid cars.

“It will launch five fully electric cars between 2019 and 2021, three of which will be Volvo models and two of which will be high performance electrified cars from Polestar, Volvo Cars’ performance car arm. Full details of these models will be announced at a later date.”

The electric vehicle investment opportunity was also illustrated by the 2017 vote of Germany’s Bundesrat to ban the manufacture of internal combustion engines after 2030 ³.

The article announcing the vote adds that “It’s a strong statement in a nation where the auto industry is one of the largest sectors of the economy; Germany produces more automobiles than any other country in Europe and is the third largest in the world. The resolution passed by the Bundesrat calls on the European Commission (the executive arm of the European Union) to ‘evaluate the recent tax and contribution practices of Member States on their effectiveness in promoting zero-emission mobility,’ which many are taking to mean an end to the lower levels of tax currently levied on diesel fuel across Europe.”

France plans to end the sale of vehicles powered by gasoline and diesel by 2040, environment minister Nicolas Hulot announced recently.

Hulot made the announcement on Thursday, June 13, 2017, in Paris as he launched the country’s new Climate Plan to accelerate the transition to clean energy and to meet its targets under the Paris climate agreement.

To ease the transition, Hulot said the French government will offer tax incentives to replace fossil-fuel burning cars with clean alternatives.

Furthermore, the government of India has recently announced its intention to only

²<https://www.media.volvocars.com/global/en-gb/media/pressreleases/210058/volvo-cars-to-go-all-electric>

³<https://arstechnica.com/cars/2016/10/germanys-bundesrat-votes-to-ban-the-internal-combustion-engine-by-2030/>

nave electric vehicles by 2030⁴. This hugely ambitious plan was announced during the 2017 Confederation of Indian Industry Annual Session. Besides the avoidance of climate change, which might make many regions of India uninhabitable, the motive for replacing 28 million combustion engine vehicles by electric ones was the severe air pollution from which India suffers. Severe air pollution also motivates efforts by the government of China to promote the transition to electric vehicles.

The governments of Norway and the Netherlands have taken steps towards banning the internal combustion engine⁵. Both the upper and lower houses of the Netherlands' government voted to ban cars driven by internal combustion engines by 2025, the same year in which Norway plans to sell nothing but zero-emission vehicles.

In a report commissioned by the investment bankers Cowan & Co, managing director and senior research analyst Jeffrey Osborne, predicted that electric vehicles will cost less than gasoline-powered cars by the early- to mid-2020s due to falling battery prices as well as the costs that traditional carmakers will incur as they comply to new fuel-efficiency standards. Osbourne pointed out that a number of major car brands are hopping onto the electric bandwagon to compete in a space carved out by industry disrupter, Tesla.

"We see the competitive tides shifting in 2019 and beyond as European [car makers] roiled by the diesel scandal and loss of share to Tesla in the high margin luxury segment step on the gas and accelerate the pace of EV introductions", he wrote.

Bloomberg New Energy Finance reported similar predictions: "Falling battery costs will mean electric vehicles will also be cheaper to buy in the U.S. and Europe as soon as 2025," the report said. "Batteries currently account for about half the cost of EVs, and their prices will fall by about 77 percent between 2016 and 2030."

In October, 2017, General Motors unveiled plans to roll out 20 new entirely electric car models by 2023, with two of the new EVs coming out in the next 18 months. Meanwhile, Ford announced the creation of "Team Edison," intended to accelerate the company's EV development and partnership work. The name, is "seemingly in direct response to Elon Musk's Tesla, which recently surpassed Ford's market capitalization."

Tesla's Chairman, highly successful inventor and entrepreneur Elon Musk, has made massive investments in factories manufacturing electric vehicles, improved lithium ion storage cells, and photovoltaic panels, as will be discussed in Chapter 2.

Investment in wind turbine energy

In Denmark, the wind turbine industry contributes substantially to the country's positive balance of payments. According to Wikipedia, "The Danish wind turbine industry is the world's largest. Around 90% of the national output is exported, and Danish companies accounted for 38% of the world turbine market in 2003, when the industry employed some 20,000 people and had a turnover of around 3 billion euro."

⁴<https://www.greentechmedia.com/articles/read/what-country-will-become-the-first-to-ban-internal-combustion-cars>

⁵<http://www.prnewswire.com/news-releases/the-dutch-revolution-in-smart-charging-of-electric-vehicles-597268791.html>

Denmark's two largest wind turbine manufacturers are Vestas and Siemens Wind Power. Vestas employs more than 21,000 people globally. In February 2016, Vestas got its largest order of 1,000 MW (278 x 3.6 MW) for the Fosen project near Trondheim in Norway. It costs DKK 11 billion, and should deliver 3.4 TWh per year.

In 2015 Siemens Wind had a combined market share of 63% of European offshore wind turbines (nearly 75% in 2009 by capacity and number). In 2011, Siemens Wind Power had 6.3% share of the world wind turbine market, and was the second largest in 2014.

In many countries, including Australia, Canada, Denmark, Germany, India, The Netherlands, United Kingdom, and United States, wind turbine cooperatives have sprung up. In these cooperatives, communities share the costs and profits of wind turbine projects. For example, the Hepburn Wind Project in Victoria, Australia, owns two 2MW wind turbines which produce enough power for 2,300 households.

Investment in solar energy

Global revenues from solar photovoltaic installations are expected to reach \$1.2 trillion between the present and 2024 according to a recent article⁶

Another article⁷ states that "The global electric power industry is evolving into a model that offers more diversity, both in terms of generation and in the ownership of generation assets, and solar PV is one technology at the head of this change. Following years of unsustainable pricing and oversupply, demand for solar PV systems has finally caught up, with 2015 expected to be the year when the global solar PV market shifts and starts to compete with other technologies. According to a recent report from Navigant Research, global revenue from solar PV installations is expected to total more than \$1.2 trillion from 2015 to 2024."

6.6 For creating jobs, renewables beat fossil fuels

Here are some excerpts from a 2016 report issued by the Solar Foundation:

- One out of every 50 new jobs added in the United States in 2016 was created by the solar industry, representing 2 percent of all new jobs.
- Solar jobs in the United States have increased at least 20 percent per year for the past four years, and jobs have nearly tripled since the first Solar Jobs Census was released in 2010.
- Over the next 12 months, employers surveyed expect one out of every 50 new jobs added in the United States in 2016 was created by the solar industry, representing 2 percent of all new jobs.

⁶<https://cleantechnica.com/2016/01/25/global-revenue-solar-pv-installations-expected-reach-1-2-trillion/>

⁷<http://www.navigantresearch.com/newsroom/global-revenue-from-solar-pv-installations-is-expected-to-total-more-than-1-2-trillion-from-2015-to-2024>

- In 2016, the five states with the most solar jobs were California, Massachusetts, Texas, Nevada, and Florida.
- The solar industry added \$84 billion to the US GDP in 2016 to see total solar industry employment increase by 10 percent to 286,335 solar workers.
- The solar industry added \$84 billion to the US GDP in 2016.

6.7 The Stern Review

Background of the Stern Review

The Stern Review on the Economics of Climate Change is a 700 page document commissioned by the government of the United Kingdom and released on 30 October, 2006. The research behind this report was conducted by a team led by Nicolas Stern (Baron Stern of Brentford), chair of the Grantham Research Institute on Climate Change and the Environment.

The Stern Review discusses the catastrophic climate change which will result if prompt action is not taken, and it proposes that 1% of global GDP be used annually to prevent such disasters. In 2014, the global GDP was estimated to be 77.9 trillion dollars, so that the 1% investment in renewable energy recommended by Lord Stern and his research team would have amounted to nearly a trillion dollars.

The Middle East

According to current estimates, 81.5% of the world's proven crude oil reserves are located in OPEC Member Countries, with the bulk of OPEC oil reserves in the Middle East, amounting to 65.5% of the OPEC total.

China

China's large reserves of coal lie near to the surface, and are thus very easily accessible. Mining of coal has driven the country's rapid industrial growth, but it has also produced a severe public health problem because of air pollution.

In April, 2017, China's rate of economic growth was 6.9%⁸. This rate of growth, if continued, would mean that China's economy would double every ten years. and increase by a factor of 1024 every century. Obviously this is impossible. Never-ending economic growth on a finite planet is a logical absurdity. China's high economic growth rate, is driven by its use of coal, and this must quickly stop if ecological disaster is to be avoided.



Figure 6.7: Protesters at the 2017 G20 meeting in Hamburg Germany.

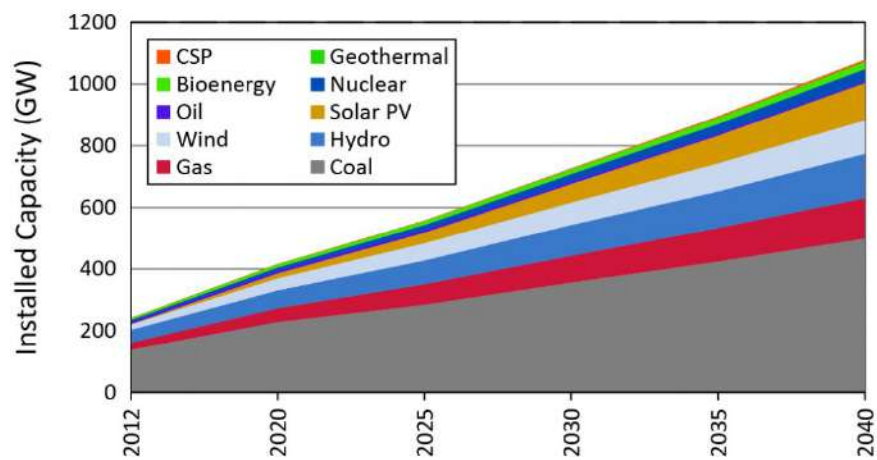


Figure 6.8: India's installed and future energy mix, as visualized by the World Coal Association

India

The MIT Technology Review recently published an important article entitled *India's Energy Crisis*⁹.

The article makes alarming reading in view of the world's urgent need to make a very rapid transition from fossil fuels to 100% renewable energy. We must make this change quickly in order to avoid a tipping point beyond which catastrophic climate change will be unavoidable.

The MIT article states that "Since he took power in May, 2014, Prime Minister Narendra Modi has made universal access to electricity a key part of his administration's ambitions. At the same time, he has pledged to help lead international efforts to limit climate change. Among other plans, he has promised to increase India's total power generating capacity to 175 gigawatts, including 100 gigawatts of solar, by 2022. (That's about the total power generation of Germany.)"

However India plans to expand its industrial economy, and to do this, it is planning to very much increase its domestic production and use of coal. The MIT article continues, pointing out that

However India plans to expand its industrial economy, and to do this, it is planning to very much increase its domestic production and use of coal. The MIT article continues, pointing out that "Such growth would easily swamp efforts elsewhere in the world to curtail carbon emissions, dooming any chance to head off the dire effects of global climate change. (Overall, the world will need to reduce its current annual emissions of 40 billion tons by 40 to 70 percent between now and 2050.) By 2050, India will have roughly 20 percent of the world's population. If those people rely heavily on fossil fuels such as coal to expand the economy and raise their living standards to the level people in the rich world have enjoyed for the last 50 years, the result will be a climate catastrophe regardless of anything the United States or even China does to decrease its emissions. Reversing these trends will require radical transformations in two main areas: how India produces electricity, and how it distributes it."

The Indian Minister of Power, Piyush Goyal, is an enthusiastic supporter of renewable energy expansion, but he also supports, with equal enthusiasm, the large-scale expansion of domestic coal production in India.

Meanwhile, the consequences of global warming are being felt by the people of India. For example, last May, a heat wave killed over 1,400 people and melted asphalt streets.¹⁰

Have India's economic planners really thought about the long-term future? Have they considered the fact that drastic climate change could make India completely uninhabitable?

⁸<https://tradingeconomics.com/china/gdp-growth-annual>

⁹<http://www.technologyreview.com/featuredstory/542091/indias-energy-crisis/>

¹⁰<https://www.rt.com/news/262641-india-heat-wave-killed/>



Figure 6.9: Oil production on the shelf in the Russian Arctic.

Russia

According to Wikipedia, “The petroleum industry in Russia is one of the largest in the world. Russia has the largest reserves, and is the largest exporter, of natural gas. It has the second largest coal reserves, the eighth largest oil reserves, and is one of the largest producer of oil. It is the third largest energy user.”

One of the difficulties of reducing Russia’s fossil fuel production is that the Russian economy depends so heavily on its oil and gas industries. Many European countries also depend on natural gas from Russia for winter heating of homes and workplaces.

North America

Canadian oil sands

Canada’s oil-sands deposits contain an amount of carbon comparable to the world’s total reserves of conventional oil. Oil is currently being extracted by methods that release four times as much carbon into the atmosphere as is contained in the refined oil from the deposits. Nevertheless, the government of Canada wholeheartedly supports extraction of oil from the tar sands.

The position of the Canadian government has been strongly criticized by leading climate scientist Professor James Hansen. A recent article in *The Guardian*¹¹, reported him as saying; “To leave our children with a manageable situation, we need to leave the unconventional fuel in the ground. Canada’s ministers are acting as salesmen for those people

¹¹<https://www.theguardian.com/environment/2013/may/19/tar-sands-exploitation-climate-scientist>



Figure 6.10: **Get rich quick at the oil sands.**

who will gain from the profits of that industry. But I don't think they are looking after the rights and wellbeing of the population as a whole.

"The thing we are facing overall is that the fossil fuel industry has so much money that they are buying off governments. Our democracies are seriously handicapped by the money that is driving decisions in Washington and other capitals."

Fracking in the United States

According to the US Department of Energy (DOE), in 2013 at least two million oil and gas wells in the US have been hydraulically fractured, and that of new wells being drilled, up to 95% are hydraulically fractured. The output from these wells makes up 43% of the oil production and 67% of the natural gas production in the United States.

Because of earthquakes and poisoning of water supplies caused by fracking, this practice has been banned by several states in the US, and nine countries or regions in Europe: France, Bulgaria, Roumania, Germany, The Czech Republic, Luxembourg, Northern Ireland, Spain and Switzerland,

Latin America

Venezuela's Belt of Tar

The Orinoco River Basin in Venezuela contains the world's largest deposit of extra-heavy oil and tar. The amount of carbon contained in this deposit is comparable to the carbon content of all the world's known reserves of conventional oil, and also larger than the carbon contained in Canada's oil sands.

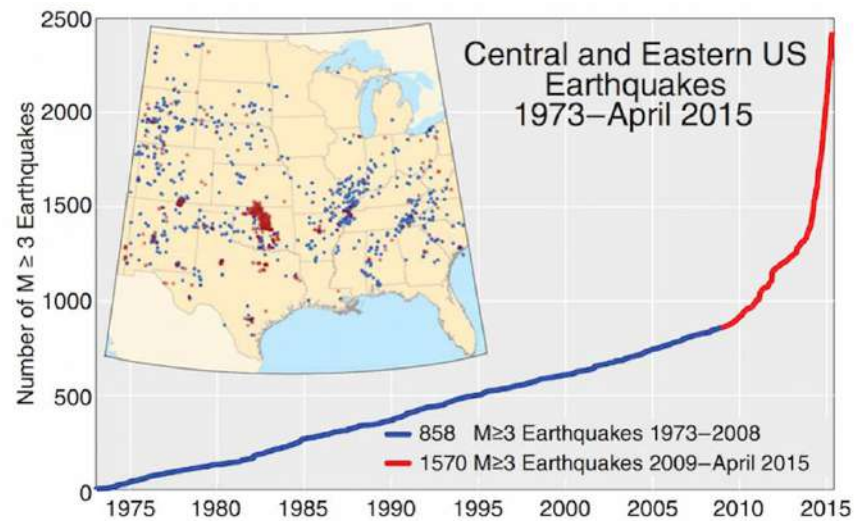


Figure 6.11: The sharply increased number of earthquakes in the United States has been linked to fracking. The use of fracking has also caused poisoning of water supplies.



Figure 6.12: Venezuela's Belt of Tar under the Orinoco River Basin is the world's largest deposit of extra-heavy oil and tar. Desire for control of Venezuela's huge oil reserves lies behind US interference in the internal politics of the country.

The Belt of Tar follows the line of the Orinoco river. It is approximately 600 kilometers (370 mi) from east to west, and 70 kilometers (43 mi) from north to south, with an area about 55,314 square kilometers (21,357 sq mi). The Orinoco deposit is estimated to contain 1.2 trillion barrels of extra-heavy oil.

The government of Venezuela has no plans for halting extraction from the Belt of Tar. On the contrary, detailed plans have been made for expanded exploitation of the deposit¹².

Extraction of oil in Brazil

According to a recent article in *The Guardian*¹³ “The discovery of tens of billions of barrels of oil in fields far off the coast of Rio de Janeiro was billed as one of the biggest finds of this century when it was announced in 2006.

“Many hoped it would deliver a bonanza for education and health and make Brazil one of world’s major economies.

“But with the country’s biggest energy company, Petrobras, mired in debt and scandal, the low price of oil and the dangers of a second Deepwater Horizon, the viability of this massive undertaking has never been under more scrutiny.”

The Brazilian offshore deposits are called “presalt oil”, since they lie under a thick layer of salt deposits.

According to the article in *The Guardian*, “Suggestions by climate campaigners that this reservoir of fossil fuel is a ‘carbon bomb’ that should be left in the ground, are dismissed as hypocrisy.”

The article quotes the geologist who discovered the off-shore fields as saying “The big countries of the world today developed without any concern for the environment. The base of US development was the oil in the Gulf of Mexico. The base of the UK’s industrial revolution was coal. How can they now say we can’t use our own pre-salt?”

The European Union

Coal in Germany and Poland

In 2016, Germany produced 176,100,000 tonnes of coal while Poland produced 131,100,000 tonnes. In the past, Poland experienced severe ecological effects from acid rain due to the burning of coal. Polish forests were destroyed by the effects of acid rain, and the facades of statues and buildings in Krakow and elsewhere were dissolved by the acid. Today the situation is improving, but the two countries are still heavily dependant on coal.

¹²<https://en.wikipedia.org/wiki/PDVSA>

¹³<https://www.theguardian.com/environment/ng-interactive/2015/jun/25/brazils-gamble-on-deep-water-oil-guanabara-bay>

North Sea oil

According to Wikipedia, “The British and Norwegian sections hold most of the remainder of the large oil reserves. It is estimated that the Norwegian section alone contains 54% of the sea’s oil reserves and 45% of its gas reserves- More than half of the North Sea oil reserves have been extracted, according to official sources in both Norway and the UK. For Norway, the Norwegian Petroleum Directorate [28] gives a figure of 4,601 million cubic meters of oil (corresponding to 29 billion barrels) for the Norwegian North Sea alone (excluding smaller reserves in Norwegian Sea and Barents Sea) of which 2,778 million cubic meters (60%) has already been produced prior to January 2007. UK sources give a range of estimates of reserves, but even using the most optimistic ‘maximum’ estimate of ultimate recovery, 76% had been recovered at end 2010.[citation needed] Note the UK figure includes fields which are not in the North Sea (onshore, West of Shetland).

6.8 Major producers of fossil fuels

The top 20 oil-producing nations in 2016

Wikipedia’s article entitles *List of countries by oil production* gives information shown in the table below. In the table, which is based on data from the International Energy Agency, production is measured in barrels of oil per day

1	Russia	10,551,497
2	Saudi Arabia	10,460,710
3	United States	8,875,817
4	Iraq	4,451,516
5	Iran	3,990,956
6	China	3,980,650
7	Canada	3,662,694
8	United Arab Emirates	3,106,077
9	Kuwait	2,923,825
10	Brazil	2,515,459
11	Venezuela	2,276,967
12	Mexico	2,186,877
13	Nigeria	1,999,885
14	Angola	1,769,615
15	Norway	1,647,975
16	Kazakhstan	1,595,199
17	Qatar	1,522,902
18	Algeria	1,348,361
19	Oman	1,006,841
20	United Kingdom	939,760

The top 10 coal producing nations in 2016

Wikipedia gives a similar list of coal producing nations. Only the top 10 are shown here, since these countries completely dominate global coal production. In the table, production is measured in millions of tonnes per year.

1	China	3411.0
2	India	692.4
3	United States	660.6
4	Australia	492.8
5	Indonesia	434.0
6	Russia	385.4
7	South Africa	251.3
8	Germany	176.1
9	Poland	131.1
10	Kazakhstan	102.4
	World	7,460.4

The world production of coal is falling. In 2014 it was 8,164.9 tonnes, in 2015, 7,861.1 tonnes, and in 2016 7,460.4 tonnes. Nevertheless, global production of coal remains worryingly high. If catastrophic climate change is to be avoided, it must stop altogether within one or two decades. At the moment the world is still producing roughly 1 tonne of coal per capita each year.

List of countries by natural gas production

Here is a similar table for natural gas. Production is measured in m³ per year. The final column indicates the date of the data.

1	United States	728,200,000,000	2014
2	Russia	578,700,000,000	2014
3	Iran	438,000,000,000	2017
4	Canada	143,100,000,000	2012
5	Qatar	133,200,000,000	2011
6	Norway	114,700,000,000	2012
7	China	107,200,000,000	2012
8	Saudi Arabia	103,200,000,000	2012
9	Algeria	82,760,000,000	2011
10	Netherlands	80,780,000,000	2012
	World	4,359,000,000,000	2010

6.9 Blood for oil

There is a close relationship between petroleum and war. James A. Paul, Executive Director of the Global Policy Forum, has described this relationship very clearly in the following words:

“Modern warfare particularly depends on oil, because virtually all weapons systems rely on oil-based fuel - tanks, trucks, armored vehicles, self-propelled artillery pieces, airplanes, and naval ships. For this reason, the governments and general staffs of powerful nations seek to ensure a steady supply of oil during wartime, to fuel oil-hungry military forces in far-flung operational theaters.”

“Just as governments like the US and UK need oil companies to secure fuel for their global war-making capacity, so the oil companies need their governments to secure control over global oilfields and transportation routes. It is no accident, then, that the world’s largest oil companies are located in the world’s most powerful countries.”

“Almost all of the world’s oil-producing countries have suffered abusive, corrupt and undemocratic governments and an absence of durable development. Indonesia, Saudi Arabia, Libya, Iraq, Iran, Angola, Colombia, Venezuela, Kuwait, Mexico, Algeria - these and many other oil producers have a sad record, which includes dictatorships installed from abroad, bloody coups engineered by foreign intelligence services, militarization of government and intolerant right-wing nationalism.”

The resource curse

The way in which the industrialized countries maintain their control over less developed nations can be illustrated by the “resource curse”, i.e. the fact that resource-rich developing countries are no better off economically than those that lack resources, but are cursed with corrupt and undemocratic governments. This is because foreign corporations extracting local resources under unfair agreements exist in a symbiotic relationship with corrupt local officials.

One might think that taxation of foreign resource-extracting firms would provide developing countries with large incomes. However, there is at present no international law governing multinational tax arrangements. These are usually agreed to on a bilateral basis, and the industrialized countries have stronger bargaining powers in arranging the bilateral agreements.

6.10 Fossil fuel extraction must stop!

“Leave the oil in the soil! Leave the coal in the hole! Leave the gas under the grass!” That was message of protesters at the 2017 G20 meeting. But from the facts shown in this chapter, we can see that on the whole, fossil fuels are not being left in the ground, where they have to remain if an ecological disaster is to be avoided. On the contrary, the extraction of coal, oil and gas continues almost as though the climate emergency did

not exist. Most politicians, with their eyes focused on the present, seem blind to future dangers. They think primarily about the jobs and living standards of their constituents, and about the next election. Meanwhile, the future of human civilization is neglected and remains in peril.¹⁴

The fact that historically, the highly industrialized nations were primarily responsible for atmospheric CO₂ increases does not excuse the developing countries from their responsibility for saving the future. Today China's coal, India's coal, Venezuela's tar sands and Brazil's pre-salt oil are among the greatest threats, and in these countries as elsewhere, extraction must stop.

We have to wake up! Business as usual cannot continue!

6.11 Extinction events and feedback loops

Scientists warn that if the transition to renewable energy does not happen within very few decades, there is a danger that we will reach a tipping point beyond which feedback loops, such as the albedo effect and the methane hydrate feedback loop, will take over and produce an out-of-control and fatal increase in global temperature.

In 2012, the World Bank issued a report warning that without quick action to curb CO₂ emissions, global warming is likely to reach 4 °C during the 21st century. This is dangerously close to the temperature which initiated the Permian-Triassic extinction event: 6 °C above normal. During the Permian-Triassic extinction event, which occurred 252 million years ago, 96% of all marine species were wiped out, as well as 70% of all terrestrial vertebrates.¹⁵

¹⁴See <https://www.theguardian.com/commentisfree/2017/sep/18/enough-tiptoeing-around-lets-make-this-clear-coal-kills-people>

¹⁵<http://science.nationalgeographic.com/science/prehistoric-world/permian-extinction/>
<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>

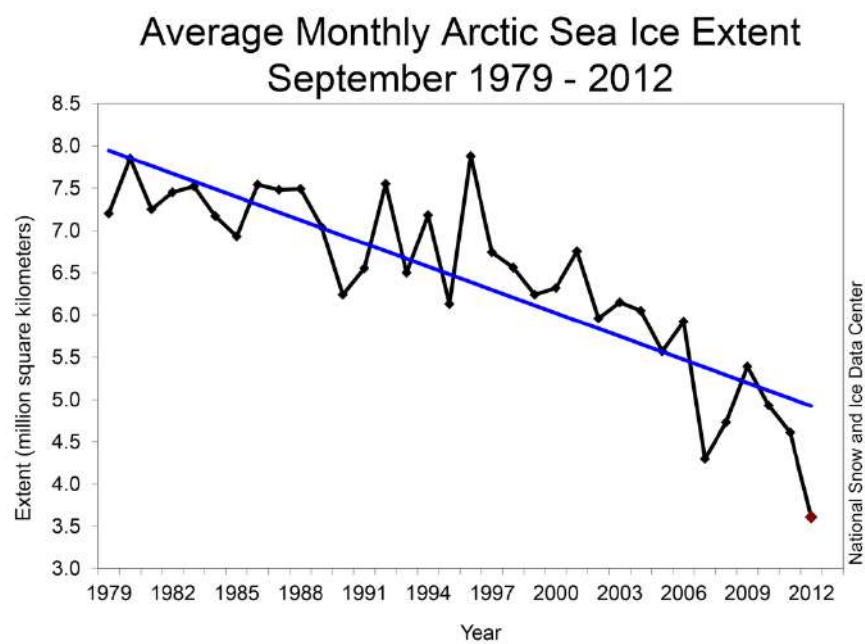


Figure 6.13: Monthly September ice extent for 1979 to 2012 shows a decline of 13.0% per decade. One can also see that the straight line does not really fit the data, which more nearly resemble a downward curve will that reach zero in the period 2016-2019. Source: National Snow and Ice Data Center. Wikimedia Commons

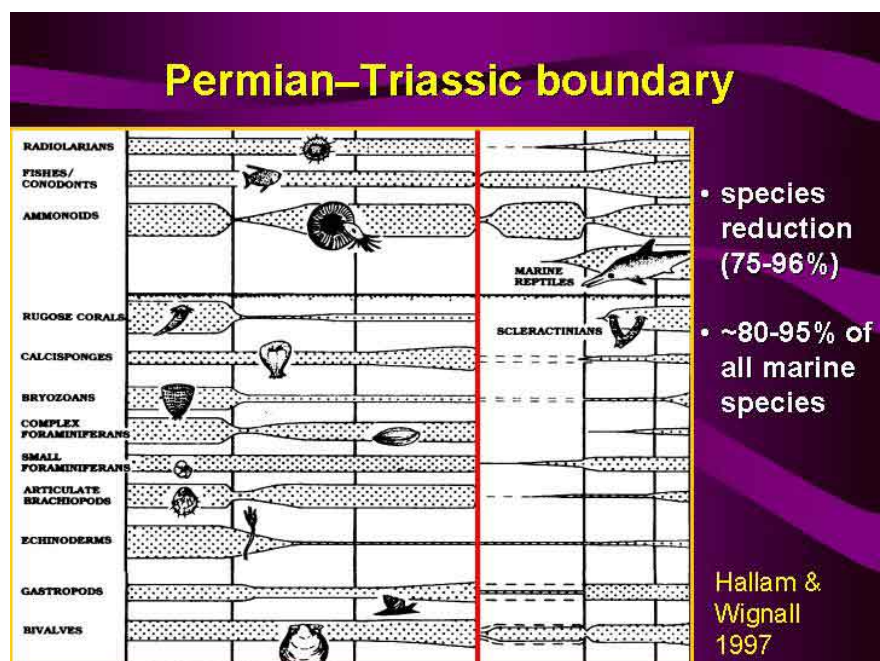


Figure 6.14: Loss of species caused by the Permian-Triassic extinction event. Unless quick steps are taken to lower our greenhouse gas emissions, we may cause a similar extinction event, which will threaten the survival of our own species. Source: Australian Frontiers of Science, www.sciencearchive.org.au

6.12 A warning from the World Bank

In 2012, the World Bank issued a report warning that without quick action to curb CO₂ emissions, global warming is likely to reach 4 °C during the 21st century. This is dangerously close to the temperature which initiated the Permian-Triassic extinction event: 6 °C above normal. During the Permian-Triassic extinction event, which occurred 252 million years ago, 96% of all marine species were wiped out, as well as 70% of all terrestrial vertebrates.¹⁶

The 4°C scenarios are devastating: the inundation of coastal cities; increasing risks for food production potentially leading to higher malnutrition rates; many dry regions becoming dryer, wet regions wetter; unprecedented heat waves in many regions, especially in the tropics; substantially exacerbated water scarcity in many regions; increased frequency of high-intensity tropical cyclones; and irreversible loss of biodiversity, including coral reef systems.

And most importantly, a 4°C world is so different from the current one that it comes with high uncertainty and new risks that threaten our ability to anticipate and plan for future adaptation needs. The lack of action on climate change not only risks putting prosperity out of reach of millions of people in the developing world, it threatens to roll back decades of sustainable development. It is clear that we already know a great deal about the threat before us. The science is unequivocal that humans are the cause of global warming, and major changes are already being observed: global mean warming is 0.8°C above pre industrial levels; oceans have warmed by 0.09°C since the 1950s and are acidifying; sea levels rose by about 20 cm since pre-industrial times and are now rising at 3.2 cm per decade; an exceptional number of extreme heat waves occurred in the last decade; major food crop growing areas are increasingly affected by drought.

Despite the global community's best intentions to keep global warming below a 2°C increase above pre-industrial climate, higher levels of warming are increasingly likely. Scientists agree that countries' current United Nations Framework Convention on Climate Change emission pledges and commitments would most likely result in 3.5 to 4°C warming. And the longer those pledges remain unmet, the more likely a 4°C world becomes.

Data and evidence drive the work of the World Bank Group. Science reports, including those produced by the Intergovernmental Panel on Climate Change, informed our decision to ramp up work on these issues, leading to, a World Development Report on climate change designed to improve our understanding of the implications of a warming planet; a Strategic Framework on Development and Climate Change, and a report on Inclusive Green Growth. The World Bank is a leading advocate for ambitious action on climate change, not only because it is a moral imperative, but because it makes good economic sense.

But what if we fail to ramp up efforts on mitigation? What are the implications of a 4°C world? We commissioned this report from the Potsdam Institute for Climate Impact

¹⁶<http://science.nationalgeographic.com/science/prehistoric-world/permian-extinction/>
<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>

Research and Climate Analytics to help us understand the state of the science and the potential impact on development in such a world.

It would be so dramatically different from today's world that it is hard to describe accurately; much relies on complex projections and interpretations. We are well aware of the uncertainty that surrounds these scenarios and we know that different scholars and studies sometimes disagree on the degree of risk. But the fact that such scenarios cannot be discarded is sufficient to justify strengthening current climate change policies. Finding ways to avoid that scenario is vital for the health and welfare of communities around the world. While every region of the world will be affected, the poor and most vulnerable would be hit hardest. A 4°C world can, and must, be avoided.

The World Bank Group will continue to be a strong advocate for international and regional agreements and increasing climate financing. We will redouble our efforts to support fast growing national initiatives to mitigate carbon emissions and build adaptive capacity as well as support inclusive green growth and climate smart development. Our work on inclusive green growth has shown that, through more efficiency and smarter use of energy and natural resources, many opportunities exist to drastically reduce the climate impact of development, without slowing down poverty alleviation and economic growth.

This report is a stark reminder that climate change affects everything. The solutions don't lie only in climate finance or climate projects. The solutions lie in effective risk management and ensuring all our work, all our thinking, is designed with the threat of a 4°C degree world in mind. The World Bank Group will step up to the challenge.

6.13 Permian-Triassic extinction event

The geological record shows five major extinction events.

- Ordovician-Silurian Extinction. around 439 million years ago.
- Late Devonian Extinction. 375-360 million years ago.
- Permian-Triassic extinction. 352 million years ago.
- Triassic-Jurassic extinction, 201 million years ago.
- Cretaceous-Paleogene extinction, 66 million years ago.

The most devastating of these was the Permian-Triassic extinction, which occurred 252 million years ago.¹⁷ In the Permian-Triassic extinction, 96% of all marine species and 76% of all terrestrial vertebrates disappeared forever. The cause of this extremely severe

¹⁷ <https://www.thomhartmann.com/bigpicture/last-hours-climate-change>
The Last Hours of Humanity: Warming the World To Extinction (book), by Thom Hartmann
<https://www.amazon.com/Last-Hours-Humanity-Warming-Extinction/dp/1629213640>
<http://www.mediaite.com/online/leonardo-dicaprio-boosts-thom-hartmann-apocalyptic-global-warming-film-last-hours/>

event is disputed, but according to one of the most plausible theories it was triggered by a massive volcanic eruption in Siberia, which released enormous amounts of CO₂ into the earth's atmosphere.

The region where massive volcanic eruptions are known to have occurred 252 million years ago called the "Siberian Traps". (The "Traps" part of the name comes from the fact that many of the volcanic rock formations in the region resemble staircases. The Swedish word for staircase is "trapped".) The eruptions continued for about a million years.

Today the area covered is about 2 million square kilometers, roughly equal to western Europe in land area. Estimates of the original coverage are as high as 7 million square kilometers. The original volume of lava is estimated to range from 1 to 4 million cubic kilometers.

The CO₂ released by the Siberian Traps eruption is believed to have caused a global temperature increase of 6°C, and this was enough to trigger the methane-hydrate feedback loop, which will be discussed below. The earth's temperature is thought to have continued to rise for 85,000 years, finally reaching 15° above normal.

6.14 The Holocene (Anthropocene) extinction

We are now living in the midst of a sixth, human-caused, mass extinction. How severe it becomes is up to us.

Recently a group of scientists stated that the scope of human impact on planet Earth is so great that the *Anthropocene* warrants a formal place in the Geological Time Scale.

In a statement issued by University of Leicester Press Office on 2 October 2017, professor Jan Zalasiewicz from the University of Leicester's School of Geography, Geology, and the Environment said: "Our findings suggest that the Anthropocene should follow on from the Holocene Epoch that has seen 11.7 thousand years of relative environmental stability, since the retreat of the last Ice Age, as we enter a more unstable and rapidly evolving phase of our planet's history,"¹⁸

"We conclude that human impact has now grown to the point that it has changed the course of Earth history by at least many millennia, in terms of the anticipated long-term climate effects (e.g. postponement of the next glacial maximum: see Ganopolski et al., 2016; Clark et al., 2016), and in terms of the extensive and ongoing transformation of the biota, including a geologically unprecedented phase of human-mediated species invasions, and by species extinctions which are accelerating (Williams et al., 2015, 2016)."

The report stated that defining characteristics of the period include "marked acceleration of rates of erosion and sedimentation; large-scale chemical perturbations to the cycles of carbon, nitrogen, phosphorus and other elements; the inception of significant change in global climate and sea level; and biotic changes including unprecedented levels of species invasions across the Earth. Many of these changes are geologically long-lasting, and some are effectively irreversible."

¹⁸<http://www2.le.ac.uk/offices/press/press-releases/2017/october/significant-scale-of-human-impact-on-planet-has-changed-course-of-earth2019s-history-scientists-suggest>

Loss of biodiversity

Tropical rain forests are the most biologically diverse places in the world. This is because they have not been affected by the periods of glaciation that have periodically destroyed the forests of temperate and boreal regions. The destruction of species-rich tropical rain forests is one of the mechanisms driving the present high rate of species loss.

According to a recent article published in *The Guardian*¹⁹ “Conservation experts have already signalled that the world is in the grip of the ”sixth great extinction” of species, driven by the destruction of natural habitats, hunting, the spread of alien predators and disease, and climate change.

“The IUCN²⁰ created shock waves with its major assessment of the world’s biodiversity in 2004, which calculated that the rate of extinction had reached 100-1,000 times that suggested by the fossil records before humans.

“No formal calculations have been published since, but conservationists agree the rate of loss has increased since then, and Stuart said it was possible that the dramatic predictions of experts like the renowned Harvard biologist E O Wilson, that the rate of loss could reach 10,000 times the background rate in two decades, could be correct.”

A recent article by Profs. Gerardo Ceballos, Paul R. Ehrlich and Rodolfo Dirzo in the *Proceedings of the National Academy of Sciences* was entitled “Biological Annihilation via the Ongoing Sixth Mass Extinction Signaled by Vertebrate Population Losses and Declines”.

The Abstract of the paper reads as follows: “The population extinction pulse we describe here shows, from a quantitative viewpoint, that Earth’s sixth mass extinction is more severe than perceived when looking exclusively at species extinctions. Therefore, humanity needs to address anthropogenic population extirpation and decimation immediately. That conclusion is based on analyses of the numbers and degrees of range contraction (indicative of population shrinkage and/or population extinctions according to the International Union for Conservation of Nature) using a sample of 27,600 vertebrate species, and on a more detailed analysis documenting the population extinctions between 1900 and 2015 in 177 mammal species. We find that the rate of population loss in terrestrial vertebrates is extremely high, even in ‘species of low concern.’ In our sample, comprising nearly half of known vertebrate species, 32% (8,851/27,600) are decreasing; that is, they have decreased in population size and range. In the 177 mammals for which we have detailed data, all have lost 30% or more of their geographic ranges and more than 40% of the species have experienced severe population declines (>80% range shrinkage). Our data indicate that beyond global species extinctions Earth is experiencing a huge episode of population declines and extirpations, which will have negative cascading consequences on ecosystem functioning and services vital to sustaining civilization. We describe this as a ‘biological annihilation’ to highlight the current magnitude of Earth’s ongoing sixth major extinction event.”

¹⁹<https://www.theguardian.com/environment/2010/mar/07/extinction-species-evolve>

²⁰International Union for the Conservation of Nature

6.15 Global warming and atmospheric water vapor

A feedback loop is a self-re-enforcing trend. One of the main positive feedback loops in global warming is the tendency of warming to increase the atmospheric saturation pressure for water vapor, and hence amount of water vapor in the atmosphere, which in turn leads to further warming, since water vapor is a greenhouse gas.

Wikipedia's article on greenhouse gases states that, "Water vapor accounts for the largest percentage of the greenhouse effect, between 36% and 66% for clear sky conditions and between 66% and 85% when including clouds."

6.16 The albedo effect

Albedo is defined to be the fraction of solar energy (shortwave radiation) reflected from the Earth back into space. It is a measure of the reflectivity of the earth's surface. Ice, especially with snow on top of it, has a high albedo: most sunlight hitting the surface bounces back towards space.

Loss of sea ice

Especially in the Arctic and Antarctic regions, there exists a dangerous feedback loop involving the albedo of ice and snow. As is shown in Figure 4.1, Arctic sea ice is rapidly disappearing. It is predicted that during the summers, the ice covering arctic seas may disappear entirely during the summers. As a consequence, incoming sunlight will encounter dark light-absorbing water surfaces rather than light-reflecting ice and snow.

This effect is self-re-enforcing. In other words, it is a feedback loop. The rising temperatures caused by the absorption of more solar radiation cause the melting of more ice, and hence even more absorption of radiation rather than reflection, still higher temperatures, more melting, and so on.

The feedback loop is further strengthened by the fact that water vapor acts like a greenhouse gas. As polar oceans become exposed, more water vapor enters the atmosphere, where it contributes to the greenhouse effect and rising temperatures.

Darkened snow on Greenland's icecap

Greenland's icecap is melting, and as it melts, the surface becomes darker and less reflective because particles of soot previously trapped in the snow and ice become exposed. This darkened surface absorbs an increased amount of solar radiation, and the result is accelerated melting.

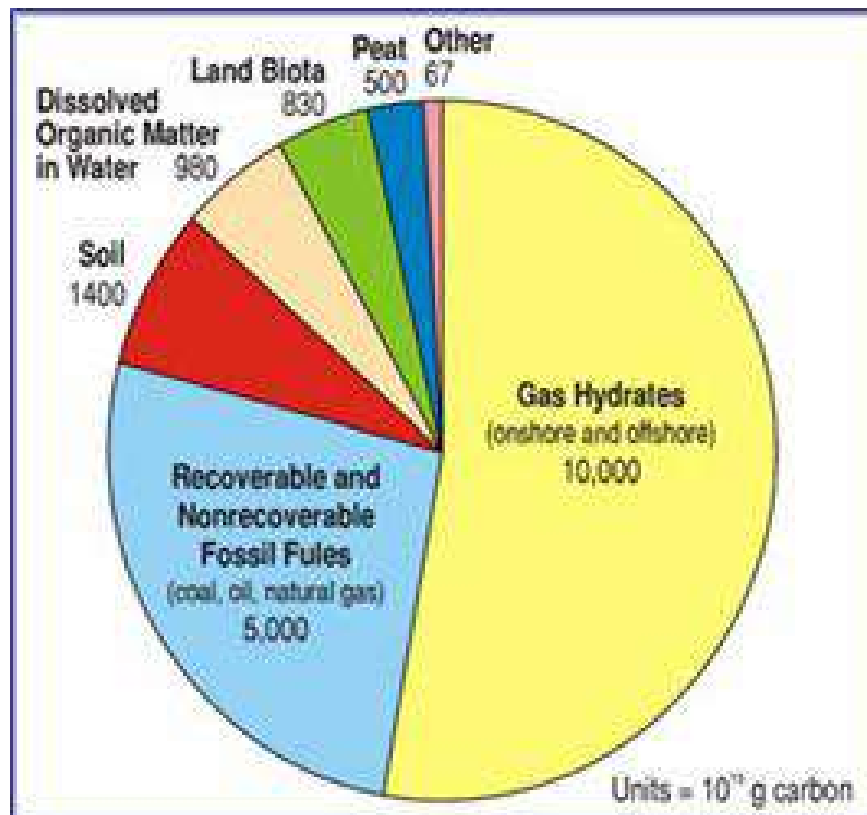


Figure 6.15: The worrying thing about the methane/hydrate feedback loop is the enormous amount of carbon in the form of hydrate crystals, 10,000 gigatons most of it on the continental shelves of oceans. This greater than the amount of carbon in all other forms that might potentially enter the earth's atmosphere.



Figure 6.16: When ocean temperatures rise, methane hydrate crystals become unstable, and methane gas bubbles up to ocean surfaces.

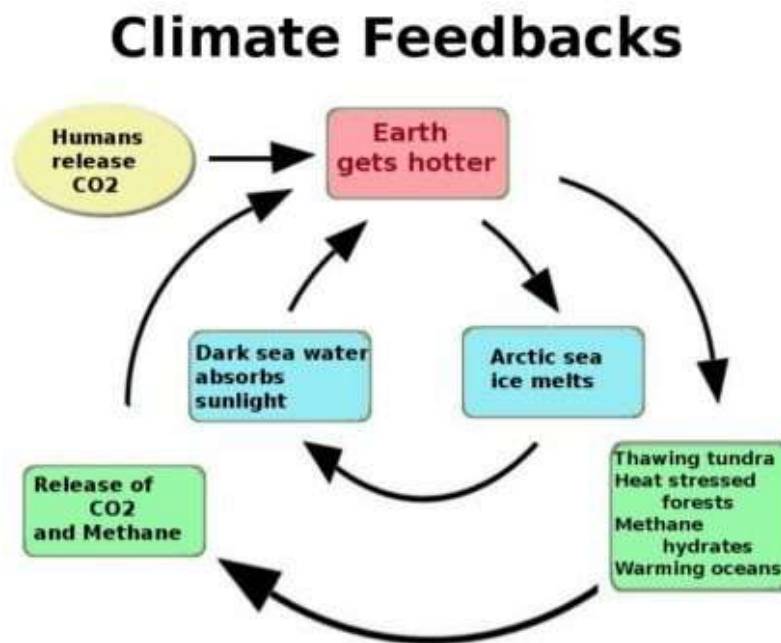


Figure 6.17: This diagram shows two important feedback loops, one involving the albedo effect, and the other involving methane hydrates.

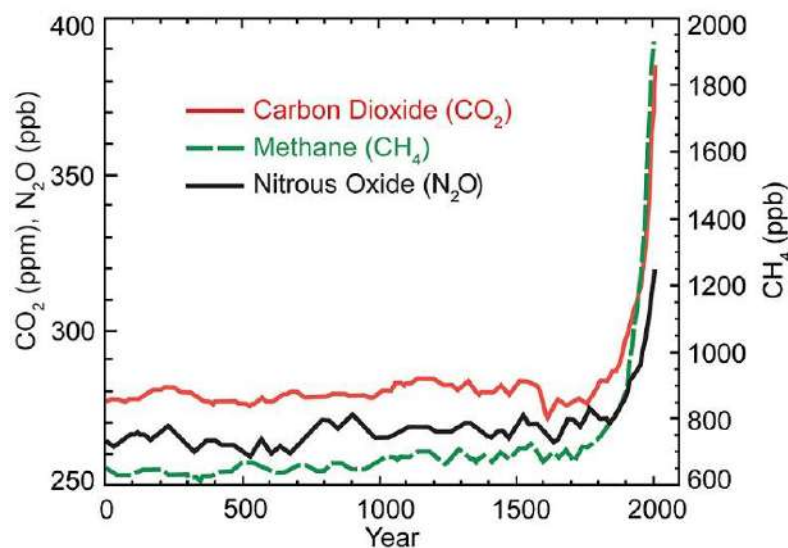


Figure 6.18: A “hockey stick” graph showing atmospheric concentrations of three important greenhouse gases during the last 2,000 years. The most dramatically increasing of these is methane.

6.17 The methane hydrate feedback loop

If we look at the distant future, by far the most dangerous feedback loop involves methane hydrates or methane clathrates. 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 and pressures which currently exist on ocean floors. However, if the temperature rises, the crystals become unstable, and methane gas bubbles up to the surface. Methane is a greenhouse gas which is 70 times as potent as CO_2 .

The worrying thing about the 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 of carbon in world CO_2 emissions since 1751 has only been 337 gigatons.

A runaway, exponentially increasing, feedback loop involving methane hydrates could lead to one of the great geological extinction events that have periodically wiped out most of the animals and plants then living. This must be avoided at all costs.

6.18 A feedback loop from warming of soils

On October 6, 2017, the journal *Science* published an article entitled *Long-term pattern and magnitude of soil carbon feedback to the climate system in a warming world*²¹. The

²¹J.M. Melillo et al., *Long-term pattern and magnitude of soil carbon feedback to the climate system in a warming world*, *Science*, Vol. 358, pp. 101-105, (2017).

lead author, Jerry Melillo, is an ecologist working at the Marine Biological Laboratory, Woods Hole Massachusetts. In an interview with *Newsweek*, he said: “This self-reinforcing feedback is potentially a global phenomenon with soils, and once it starts it may be very difficult to turn off. It’s that part of the problem that I think is sobering... We think that one of the things that may be happening is both a reorganization of the microbial community structure and its functional capacity,”

The study reported on three decades of observations of heated sections of a forest owned by Harvard University. The heated sections were 5°C warmer than control sections.

6.19 Drying of forests and forest fires

According to a recent article in *Nature*²², “Across the American west, the area burned each year has increased significantly over the past several decades, a trend that scientists attribute both to warming and drying and to a century of wildfire suppression and other human activities. Allen suggests that the intertwined forces of fire and climate change will take ecosystems into new territory, not only in the American west but also elsewhere around the world. In the Jemez, for example, it could transform much of the ponderosa pine (*Pinus ponderosa*) forest into shrub land. ‘We’re losing forests as we’ve known them for a very long time,’ says Allen. ‘We’re on a different trajectory, and we’re not yet sure where we’re going.’”

“All around the American west, scientists are seeing signs that fire and climate change are combining to create a ‘new normal’. Ten years after Colorado’s largest recorded fire burned 56,000 hectares southwest of Denver, the forest still has not rebounded in a 20,000-hectare patch in the middle, which was devastated by an intense crown fire. Only a few thousand hectares, which the US Forest Service replanted, look anything like the ponderosa-pine stands that previously dominated the landscape.”

6.20 Tipping points and feedback loops

A tipping point is usually defined as the threshold for an abrupt and irreversible change²³. To illustrate this idea, we can think of a book lying on a table. If we gradually push the book towards the edge of the table, we will finally reach a point after which more than half of the weight of the book will not be supported by the table. When this “tipping point” is passed the situation will suddenly become unstable, and the book will fall to the floor. Analogously, as the earth’s climate gradually changes, we may reach tipping points. If we pass these points, sudden instabilities and abrupt climatic changes will occur.

Greenland ice cores supply a record of temperatures in the past, and through geological evidence we have evidence of sea levels in past epochs. These historical records show that

²²<http://www.nature.com/news/forest-fires-burn-out-1.11424>

²³Other definitions of tipping points are possible. A few authors define these as points beyond which change is inevitable, emphasizing that while inevitable, the change may be slow.

abrupt climatic changes have occurred in the past.

Timothy Michael Lenton, FRS, Professor of Climate Change and Earth System Science at the University of Exeter, lists the following examples of climatic tipping points:

- Boreal forest dieback
- Amazon rainforest dieback
- Loss of Arctic and Antarctic sea ice (Polar ice packs) and melting of Greenland and Antarctic ice sheets
- Disruption to Indian and West African monsoon
- Formation of Atlantic deep water near the Arctic ocean, which is a component process of the thermohaline circulation.
- Loss of permafrost, leading to potential Arctic methane release and clathrate gun effect

It can be seen from this list that climate tipping points are associated with feedback loops. For example, the boreal forest dieback and the Amazon rainforest dieback tipping points are associated with the feedback loop involving the drying of forests and forest fires, while the tipping point involving loss of Arctic and Antarctic sea ice is associated with the Albedo effect feedback loop. The tipping point involving loss of permafrost is associated with the methane hydrate feedback loop.

Once a positive feedback loop starts to operate in earnest, change may be abrupt.

6.21 Greta Thunberg's TED talk

While political leaders and the older generation have been slow to react to the climate crisis, young people, whose future is at stake, are wide awake and are warning the world that action must be taken immediately if disaster is to be avoided. Massive global demonstrations have been initiated by the teenage activist, Greta Thunberg, who has succeeded where others have failed by speaking with extraordinary clarity, honesty and forcefulness.

Greta was born in Sweden in 2003. Her father, Svante Thunberg, is related to Svante Arrhenius, one of the important pioneers of climate science, and is named after him. Greta's mother was a successful opera singer. Greta Thunberg's strong belief in the urgency of action to prevent catastrophic climate change converted her parents, so that they made changes in their lives. For example, Greta's mother gave up her career as an opera singer because it involved air travel.

In November, 2018, Greta Thunberg gave an impressively clear TEDx talk in Stockholm, the video of which was recently released.²⁴ Here is a transcript of the talk.

²⁴<https://www.dailykos.com/stories/2018/12/16/1819508/-A-Call-to-Action-on-Climate-Change-by-15-year-Old-Greta-Thunberg>

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 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.

6.22 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 16-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.”

Appearing among billionaires, corporate CEO’s and heads of state at the Davos Economic Forum in Switzerland, like a new Joan of Arc, 16-year-old Swedish climate activist Greta Thunberg called on decision-makers to fulfil their responsibilities towards future generations. Here are some excerpts from her speech:

Greta’s speech at Davos

Our house is on fire. I am here to say, 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%...

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.





Figure 6.19: Greta Thunberg on the cover of Time Magazine, The Intergovernmental Panel on Climate Change, in their October 2018 report, used strong enough language to wake up at least part of the public: the children whose future is at stake. Here is an excerpt from a speech which 16-year-old Swedish climate activist Greta Thunberg made at the Davos Economic Forum in January, 2019: “Our house is on fire. I am here to say, 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%...”

6.23 Worldwide school strike, 15 March, 2019

Over 1.4 million young students across all continents took to the streets on Friday March 15th for 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 school strike was the largest climate action in history. Nevertheless it went almost unmentioned in the media,

Here are some of the statements by the students explaining why they took part in the strikes:

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.

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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²⁵<https://www.theguardian.com/environment/2019/apr/03/parents-around-the-world-mobilise-behind-youth-climate-strikes>

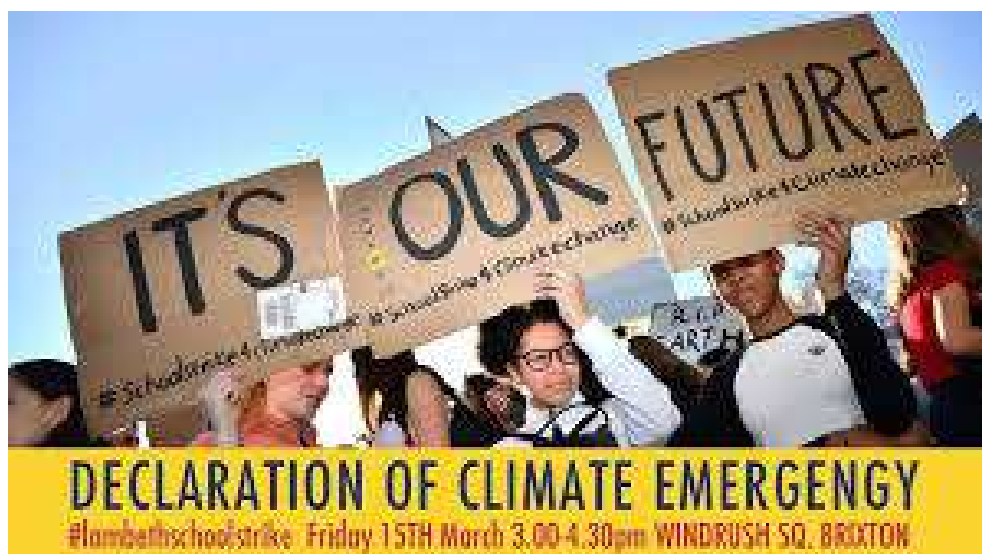






Figure 6.20: Eve White and her children join climate protesters in Tasmania. According to an article in *The Guardian*, parents and grandparents around the world are mobilizing in support of the youth climate movement that has swept the globe.

Concerns of young protesters are justified

In an article in the journal *Science* dated 12 April, 2019,²⁶ 20 prominent climate scientists stated that the concerns of student protesters around the world are fully justified. Here are some quotations from the article:

The world's youth have begun to persistently demonstrate for the protection of the climate and other foundations of human well-being. As scientists and scholars who have recently initiated similar letters of support in our countries, we call for our colleagues across all disciplines and from the entire world to support these young climate protesters. We declare: Their concerns are justified and supported by the best available science. The current measures for protecting the climate and biosphere are deeply inadequate.

Nearly every country has signed and ratified the Paris Agreement of 2015, committing under international law to hold global warming well below 2°C above preindustrial levels and to pursue efforts to limit the temperature increase to 1.5°C. The scientific community has clearly concluded that a global warming of 2°C instead of 1.5°C would substantially increase climate-related impacts and the risk of some becoming irreversible. Moreover, given the uneven distribution of most impacts, 2°C of warming would further exacerbate existing global inequalities.

It is critical to immediately begin a rapid reduction in CO₂ and other greenhouse gas emissions. The degree of climate crisis that humanity will experience in the future will be determined by our cumulative emissions; rapid reduction now will limit the damage. For example, the Intergovernmental Panel on Climate Change (IPCC) has recently assessed that halving CO₂ emissions by 2030 (relative to 2010 levels) and globally achieving net-zero CO₂ emissions by 2050 (as well as strong reductions in other greenhouse gases) would allow a 50% chance of staying below 1.5°C of warming. Considering that industrialized countries produced more of and benefited more from previous emissions, they have an ethical responsibility to achieve this transition more quickly than the world as a whole.

Many social, technological, and nature-based solutions already exist. The young protesters rightfully demand that these solutions be used to achieve a sustainable society. Without bold and focused action, their future is in critical danger. There is no time to wait until they are in power...

The enormous grassroots mobilization of the youth climate movement - including Fridays for Future, School (or Youth) Strike 4 Climate, Youth for (or 4) Climate, and Youth Climate Strike - shows that young people understand the situation. We approve and support their demand for rapid and forceful action. We see it as our social, ethical, and scholarly responsibility to state in no uncertain terms: Only if humanity acts quickly and resolutely can we limit

²⁶<https://science.sciencemag.org/content/364/6436/139.2>



global warming, halt the ongoing mass extinction of animal and plant species, and preserve the natural basis for the food supply and well-being of present and future generations. This is what the young people want to achieve. They deserve our respect and full support.



Figure 6.21: Greta Thunberg addressing a meeting of the European Parliament in April, 2019. She complained that Brexit was treated as an emergency by the European Union, but climate change, which is a far greater emergency has been almost neglected. The 16-year-old, who is due to meet the Pope on Wednesday, said, “We face an end to civilization as we know it unless permanent changes take place in our society...European elections are coming soon and many like me who are affected most by this crisis, are not allowed to vote. That is why millions of children are taking to the street to draw attention to the climate crisis... It is not too late to act but it will take far-reaching vision and fierce determination... My plea is: Please wake up and do the seemingly impossible.”

6.24 The World Meteorological Organization's report

According to a recent United Nations report, extreme weather events displaced 2 million people during 2018. While no single event can be unambiguously attributed to anthropogenic climate change, scientists believe the the increasing frequency of extreme weather events is definitely linked to global warming. The same is true of their increasing severity.

The report states that during 2018, extreme weather events impacted roughly 62 million people, of whom 2 million were displaced from their homes. In the words of the WMO report, "The physical signs and socio-economic impacts of climate change are accelerating, as record greenhouse gas concentrations drive global temperatures towards increasingly dangerous levels."

UN Secretary General Antonio Guterres, speaking at the launching of the WMO report, used the occasion to remind global leaders of the urgency of the climate emergency. Guterres has convened a climate summit meeting scheduled for September 23, 2019, and referring to the meeting, he said: "Don't come with a speech, come with a plan. This is what science says is needed. It is what young people around the globe are rightfully demanding." Two weeks previously, on March 15, one and a half million students from more than 130 countries had skipped school to participate in the largest climate demonstration in history, demanding action to save the future from the threat of catastrophic climate change.

6.25 Only 12 years left to limit climate change catastrophe

The world's leading scientists met at the Forty-Eighth Session of the IPCC and First Joint Session of Working Groups I, II, and III, 1-5 October 2018 in Incheon, Republic of Korea and openly declared that civilization is on track for collapse because of reckless use of fossil fuels, unless immediate action is taken to drastically cut the extraction and use of fossil fuels.

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.

"It's a line in the sand and what it says to our species is that this is the moment and we must act now," said Debra Roberts, a co-chair of the working group on impacts. "This is the largest clarion bell from the science community and I hope it mobilizes people and dents the mood of complacency."

"We have presented governments with pretty hard choices. We have pointed out the enormous benefits of keeping to 1.5C, and also the unprecedented shift in energy systems and transport that would be needed to achieve that," said Jim Skea, a co-chair of the working group on mitigation. "We show it can be done within laws of physics and chemistry.



Figure 6.22: A firefighter battles fire in California. The world is currently 1 degree Centigrade warmer than preindustrial levels.

Then the final tick box is political will. We cannot answer that. Only our audience can - and that is the governments that receive it.”

Bob Ward, of the Grantham Research Institute on Climate Change, said the final document was “incredibly conservative” because it did not mention the likely rise in climate-driven refugees or the danger of tipping points that could push the world on to an irreversible path of extreme warming.

Policymakers commissioned the report at the Paris climate talks in 2016, but since then the gap between science and politics has widened. Donald Trump has promised to withdraw the US - the world’s biggest source of historical emissions - from the accord. Brazil’s president, Jair Bolsonaro, threatens to do the same and also open the Amazon rainforest to agribusiness.

6.26 COP24, the climate summit in Poland

The UN Secretary General’s address to the opening session

Welcome to COP 24.

I thank President Duda, Minister Kowalczyk and COP President Designate Mijal Kurtyka for their warm welcome.

We are in trouble. We are in deep trouble with climate change.

Climate change is running faster than we are and we must catch up sooner rather than later before it is too late.

For many, people, regions even countries this is already a matter of life and death.

This meeting is the most important gathering on climate change since the Paris Agreement was signed.



Figure 6.23: UN Secretary-General Antonio Guterres: “It is hard to overstate the urgency of our situation. Even as we witness devastating climate impacts causing havoc across the world, we are still not doing enough, nor moving fast enough, to prevent irreversible and catastrophic climate disruption. Nor are we doing enough to capitalize on the enormous social, economic and environmental opportunities of climate action.”

It is hard to overstate the urgency of our situation.

Even as we witness devastating climate impacts causing havoc across the world, we are still not doing enough, nor moving fast enough, to prevent irreversible and catastrophic climate disruption.

Nor are we doing enough to capitalize on the enormous social, economic and environmental opportunities of climate action.

And so, I want to deliver four simple messages.

First: science demands a significantly more ambitious response.

Second: the Paris Agreement provides the framework for action, so we must operationalize it.

Third: we have a collective responsibility to invest in averting global climate chaos, to consolidate the financial commitments made in Paris and to assist the most vulnerable communities and nations.

Fourth: climate action offers a compelling path to transform our world for the better.

Let me turn first to science.

According to the World Meteorological Organization, the 20 warmest years on record have been in the past 22 years, with the top four in the past four years.

The concentration of carbon dioxide is the highest it has been in 3 million years.

Emissions are now growing again.

The recent special report from the Intergovernmental Panel on Climate Change finds that warming could reach 1.5 degrees as soon as 2030, with devastating impacts.

The latest UN Environment Programme Emissions Gap Report tells us that the current Nationally Determined Contributions under the Paris Agreement will lead to global warming of about 3 degrees by the end of the century.

Furthermore, the majority of countries most responsible for greenhouse gas emissions are behind in their efforts to meet their Paris pledges.

So, it is plain we are way off course.

We need more action and more ambition.

We absolutely have to close this emissions gap.

If we fail, the Arctic and Antarctic will continue to melt, corals will bleach and then die, the oceans will rise, more people will die from air pollution, water scarcity will plague a significant proportion of humanity, and the cost of disasters will skyrocket.

Last year I visited Barbuda and Dominica, which were devastated by hurricanes. The destruction and suffering I saw was heart-breaking. That story is repeated almost daily somewhere in the world.

These emergencies are preventable.

Emissions must decline by 45 per cent from 2010 levels by 2030 and be net zero by 2050.

Renewable energy will need to supply half to two-thirds of the world's primary energy by 2050 with a corresponding reduction in fossil fuels.

In short, we need a complete transformation of our global energy economy, as well as how we manage land and forest resources.

We need to embrace low-carbon, climate-resilient sustainable development.

I am hopeful that the Talanoa Dialogue will provide a very strong impulse for increased ambition in the commitments for climate action.

Excellencies,

This brings me to my second point.

The Paris Agreement provides a framework for the transformation we need.

It is our job here in Katowice is to finalize the Paris Agreement Work Programme – the rule book for implementation.

I remind all Parties that this is a deadline you set for yourselves and it is vital you meet it.

We need a unifying implementation vision that sets out clear rules, inspires action and promotes raised ambition, based on the principle of equity and common but differentiated responsibilities and respective capabilities, in light of different national circumstances.

We have no time for limitless negotiations.

A completed Work Programme will unleash the potential of the Paris Agreement.

It will build trust and make clear that countries are serious about addressing climate change.

Dear Friends,

This brings me to my third point: the central importance of finance.

We need concerted resource mobilization and investment to successfully combat climate change.

We need transformative climate action in five key economic areas - energy, cities, land use, water and industry.

Some 75 per cent of the infrastructure needed by 2050 still remains to be built.

How this is done will either lock us in to a high-emissions future or steer us towards truly sustainable low-emissions development.

Governments and investors need to bet on the green economy, not the grey.

That means embracing carbon pricing, eliminating harmful fossil fuel subsidies and investing in clean technologies.

It also means providing a fair transition for those workers in traditional sectors that face disruption, including through retraining and social safety nets.

We also have a collective responsibility to assist the most vulnerable communities and countries - such as small island nations and the least developed countries - by supporting adaptation and resilience.

Making clear progress to mobilize the pledged \$100 billion dollars a year will provide a much-needed positive political signal.

I have appointed the President of France and Prime Minister of Jamaica to lead the mobilization of the international community, both public and private, to reach that target in the context of preparation of the Climate Summit I have convened in September of next year.

I also urge Member States to swiftly implement the replenishment of the Green Climate Fund.

It is an investment in a safer, less costly future.

Dear Friends,

All too often, climate action is seen as a burden. My fourth point is this: decisive climate action today is our chance to right our ship and set a course for a better future for all.

We have the knowledge.

Many technological solutions are already viable and affordable.

Cities, regions, civil society and the business community around the world are moving ahead.

What we need is political more will and more far-sighted leadership.

This is the challenge on which this generation's leaders will be judged.

Climate action is not just the right thing to do - it makes social and economic sense.

Meeting the goals of the Paris Agreement would reduce air pollution - saving more than a million lives each year by 2030, according to the World Health

Organization.

According to the recent New Climate Economy report, ambitious climate action could yield 65 million jobs and a direct economic gain of \$26 trillion US dollars compared to business as usual over the next 12 years.

We are seeing early signs of this economic transformation, but we are nowhere near where we need to be.

The transition to a low-carbon economy needs political impetus from the highest levels.

And it requires inclusivity, because everyone is affected by climate change. That is the message of the Talanoa Dialogue.

We need a full-scale mobilization of young people.

And we need a global commitment to gender equality, because women's leadership is central to durable climate solutions.

A successful conference here in Katowice can provide the catalyst.

There is now significant global momentum for climate action.

It has galvanized private business and investors around the world, while cities and regional governments are also showing that ambitious climate action is possible and desirable.

Let us build on this momentum.

I am convening a Climate Summit in September next year to raise ambition and mobilize the necessary resources.

But that ambition needs to begin here, right now, in Katowice, driven by governments and leaders who understand that their legacies and the well-being of future generations are at stake.

We cannot afford to fail in Katowice.

Some might say that it will be a difficult negotiation. I know it is not easy. It requires a firm political will for compromise. But, for me, what is really difficult is to be a fisherman in Kiribati seeing his country in risk of disappearing or a farmer or herder in the Sahel losing livelihoods and losing peace. Or being a woman in Dominica or any other Caribbean nation enduring hurricane after hurricane destroying everything in its path.

Ladies and gentlemen,

Climate change is the single most important issue we face.

It affects all our plans for sustainable development and a safe, secure and prosperous world.

So, it is hard to comprehend why we are collectively still moving too slowly - and even in the wrong direction.

The IPCC's Special Report tells us that we still have time to limit temperature rise.

But that time is running out.

We achieved success in Paris because negotiators were working towards a common goal.



Figure 6.24: 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.”

I implore you to maintain the same spirit of urgent collaboration here in Katowice with a dynamic Polish leadership in the negotiations.

Katowice must ensure that the bonds of trust established in Paris will endure.

Incredible opportunity exists if we embrace a low-carbon future and unleash the power of the Paris Agreement.

But we must start today building the tomorrow we want.

Let us rise to the challenge and finish the work the world demands of us.

Thank you.

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



Figure 6.25: 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.”

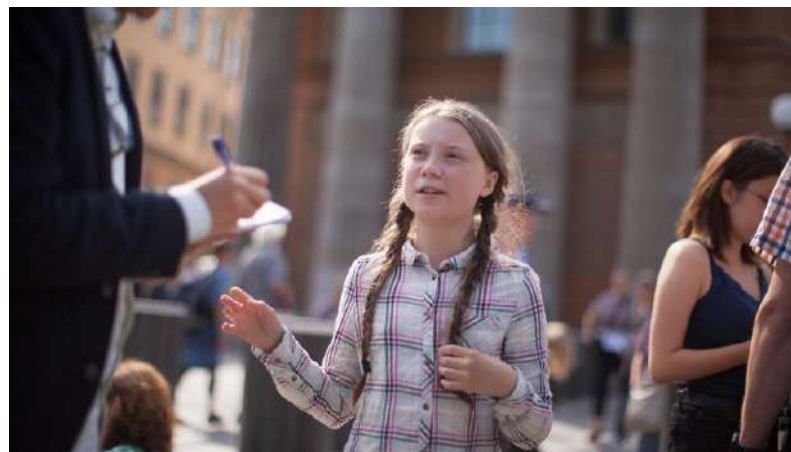


Figure 6.26: Greta: “Until you start focusing on what needs to be done, rather than what is politically possible, there is no hope. We cannot solve a crisis without treating it as a crisis. We need to keep the fossil fuels in the ground, and we need to focus on equity. And if solutions within the system are so impossible to find, then maybe we should change the system itself.”

transcript of her address to the opening session of COP24^{2728 29 30} is given below,

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.

²⁷<https://www.youtube.com/watch?v=VFkQSGyeCWg>

²⁸<https://www.youtube.com/watch?v=0TYyBtb1PH4>

²⁹<https://www.youtube.com/watch?v=DdAOgNTxxt0>

³⁰<https://www.youtube.com/watch?v=pJ1HRGA8g10>



Figure 6.27: Greta Thunberg addresses the National Assembly In Paris on July 23, 2019 in Paris, France.



Figure 6.28: Greta Thunberg crossing the Atlantic on a small emission-free boat.

6.27 The UK declares a climate emergency

Introducing the motion in the House of Commons, Labour leader Jeremy Corbyn said: “We have no time to waste. We are living in a climate crisis that will spiral dangerously out of control unless we take rapid and dramatic action now. This is no longer about a distant future. We’re talking about nothing less than the irreversible destruction of the environment within our lifetimes of members of this house.”

Here are some excerpts from an article by Amy Goodman and Nermeen Shaikh of Democracy now published in Truthout on May 2, 2019.³¹:

On Wednesday, the House of Commons became the first parliament in the world to declare a climate emergency. The resolution came on the heels of the recent Extinction Rebellion mass uprising that shut down Central London last month in a series of direct actions. Activists closed bridges, occupied public landmarks and even superglued themselves to buildings, sidewalks and trains to demand urgent action to combat climate change. Police arrested more than 1,000 protesters. Labour Party Leader Jeremy Corbyn told Parliament, “We are witnessing an unprecedented upsurge of climate activism, with groups like Extinction Rebellion forcing the politicians in this building to listen. For all the dismissive and defensive column inches the processes have provoked, they are a massive and, I believe, very necessary wake-up call. Today we have the opportunity to say, ‘We hear you.’” We speak with George Monbiot, British journalist, author and columnist with The Guardian. His recent piece for The Guardian is headlined “Only rebellion will prevent an ecological apocalypse.” Monbiot says capitalism “is like a gun pointed at the heart of the planet. It will essentially, necessarily destroy our life-support systems. Among those characteristics is the drive for perpetual economic growth on a finite planet.”

³¹<https://truthout.org/video/george-monbiot-on-the-uk-climate-emergency/>



6.28 Understatement of existential climate risk

Here are some excerpts from a 44-page report entitled *What Lies Beneath: The Understanding of Existential Climate Risk*, by David Spratt and Ian Dunlop³²:

Three decades ago, when serious debate on human-induced climate change began at the global level, a great deal of statesmanship was on display. There was a preparedness to recognize that this was an issue transcending nation states, ideologies and political parties which had to be addressed pro-actively in the long-term interests of humanity as a whole. This was the case even though the existential nature of the risk it posed was far less clear cut than it is today.

As global institutions, such as the United Nations Framework Convention on Climate Change (UNFCCC) which was established at the Rio Earth Summit in 1992, were developed to take up this challenge, and the extent of change this would demand of the fossil-fuel-dominated world order became clearer, the forces of resistance began to mobilize. Today, as a consequence, and despite the diplomatic triumph of the 2015 Paris Agreement, the debate around climate change policy has never been more dysfunctional, indeed Orwellian.

In his book 1984, George Orwell describes a double-think totalitarian state where most of the population accepts “the most flagrant violations of reality, because they never fully grasped the enormity of what was demanded of them, and were not sufficiently interested in public events to notice what was

³²<https://www.breakthroughonline.org.au/>

happening. By lack of understanding they remained sane.”

Orwell could have been writing about climate change and policymaking. International agreements talk of limiting global warming to 1.5-2 degrees Celsius ($^{\circ}\text{C}$), but in reality they set the world on a path of 3-5 $^{\circ}\text{C}$ of warming. Goals are reaffirmed, only to be abandoned. Coal is “clean”. Just 1 $^{\circ}\text{C}$ of warming is already dangerous, but this cannot be admitted. The planetary future is hostage to myopic national self-interest. Action is delayed on the assumption that as yet unproven technologies will save the day, decades hence. The risks are existential, but it is “alarmist” to say so.

A one-in-two or one-in-three chance of missing a goal is normalized as reasonable. Moral hazard permeates official thinking, in that there is an incentive to ignore the risks in the interests of political expediency.

Climate policymaking for years has been cognitively dissonant, “a flagrant violation of reality”. So it is unsurprising that there is a lack of understanding amongst the public and elites of the full measure of the climate challenge. Yet most Australians sense where we are heading: three-quarters of Australians see climate change as catastrophic risk, and half see our way of life ending within the next 100 years.

Politics and policymaking have norms: rules and practices, assumptions and boundaries, that constrain and shape them. In recent years, the previous norms of statesmanship and long-term thinking have disappeared, replaced by an obsession with short-term political and commercial advantage. Climate policymaking is no exception. Since 1992, short-term economic interest has trumped environmental and future human needs.

The world today emits 50% more carbon dioxide (CO_2) from the consumption of energy than it did 25 years ago, and the global economy has more than doubled in size. The UNFCCC strives “to enable economic development to proceed in a sustainable manner”, but every year humanity’s ecological footprint becomes larger and less sustainable. Humanity now requires the biophysical capacity of 1.7 Earths annually as it rapidly chews up natural capital.

A fast, emergency-scale transition to a post-fossil fuel world is absolutely necessary to address climate change. But this is excluded from consideration by policymakers because it is considered to be too disruptive. The orthodoxy is that there is time for an orderly economic transition within the current short-termist political paradigm. Discussion of what would be safe - less warming than we presently experience - is non-existent. And so we have a policy failure of epic proportions.

Policymakers, in their magical thinking, imagine a mitigation path of gradual change to be constructed over many decades in a growing, prosperous world. The world not imagined is the one that now exists: of looming financial instability; of a global crisis of political legitimacy and “fake news”; of a sustainability crisis that extends far beyond climate change to include all the fundamentals of human existence and most significant planetary boundaries

(soils, potable water, oceans, the atmosphere, biodiversity, and so on); and of severe global energy-sector dislocation.

In anticipation of the upheaval that climate change would impose upon the global order, the IPCC was established by the United Nations (UN) in 1988, charged with regularly assessing the global consensus on climate science as a basis for policymaking. The IPCC Assessment Reports (AR), produced every five-to-eight years, play a large part in the public framing of the climate narrative: new reports are a global media event.

AR5 was produced in 2013-14, with AR6 due in 2022. The IPCC has done critical, indispensable work of the highest standard in pulling together a periodic consensus of what must be the most exhaustive scientific investigation in world history.

It does not carry out its own research, but reviews and collates peer-reviewed material from across the spectrum of this incredibly complex area, identifying key issues and trends for policymaker consideration. However, the IPCC process suffers from all the dangers of consensus-building in such a wide-ranging and complex arena. For example, IPCC reports, of necessity, do not always contain the latest available information. Consensus-building can lead to “least drama”, lowest-common-denominator outcomes, which overlook critical issues. This is particularly the case with the “fat-tails” of probability distributions, that is, the high-impact but lower-probability events where scientific knowledge is more limited.

Vested-interest pressure is acute in all directions; climate denialists accuse the IPCC of alarmism, whereas many climate action proponents consider the IPCC to be far too conservative. To cap it all, the IPCC conclusions are subject to intense political oversight before being released, which historically has had the effect of substantially watering-down sound scientific findings.

These limitations are understandable, and arguably were not of overriding importance in the early period of the IPCC. However, as time has progressed, it is now clear that the risks posed by climate change are far greater than previously anticipated. We have moved out of the twilight period of much talk, but relatively limited climate impacts, into the harsh light of physically-evident existential threats. Climate change is now turning nasty, as we have witnessed recently in the North America, East and South Asia, the Middle East and Europe, with record-breaking heatwaves and wildfires, more intense flooding and more damaging hurricanes.

The distinction between climate science and risk is the critical issue, for the two are not the same. Scientific reticence - a reluctance to spell out the full risk implications of climate science in the absence of perfect information - has become a major problem. Whilst this is understandable, particularly when scientists are continually criticized by denialists and political apparatchiks for speaking out, it is extremely dangerous given the fat-tail risks of climate change. Waiting for perfect information, as we are continually urged to do

by political and economic elites, means it will be too late to act. Time is not on our side. Sensible risk management addresses risk in time to prevent it happening, and that time is now.

Irreversible, adverse climate change on the global scale now occurring is an existential risk to human civilization. Many of the world's top climate scientists - Kevin Anderson, James Hansen, Michael E. Mann, Michael Oppenheimer, Naomi Oreskes, Stefan Rahmstorf, Eric Rignot, Hans Joachim Schellnhuber, Kevin Trenberth and others - who are quoted in this report well understand these implications and are forthright about their findings, where we are heading, and the limitations of IPCC reports.

This report seeks to alert the wider community and business and political leaders to these limitations and urges changes to the IPCC approach, to the wider UNFCCC negotiations, and to national policymaking. It is clear that existing processes will not deliver the transformation to a carbon-negative world in the limited time now available. We urgently require a re-framing of scientific research within an existential risk-management framework. This requires special precautions that go well beyond conventional risk management. Like an iceberg, there is great danger in "what lies beneath".

Existential Risk to Human Civilization

In 2016, the World Economic Forum survey of the most impactful risks for the years ahead elevated the failure of climate change mitigation and adaptation to the top of the list, ahead of weapons of mass destruction, ranking second, and water crises, ranking third. By 2018, following a year characterized by high-impact hurricanes and extreme temperatures, extreme-weather events were seen as the single most prominent risk. As the survey noted: "We have been pushing our planet to the brink and the damage is becoming increasingly clear."

Climate change is an existential risk to human civilization: that is, an adverse outcome that would either annihilate intelligent life or permanently and drastically curtail its potential.

Temperature rises that are now in prospect, after the Paris Agreement, are in the range of 3-5 °C. At present, the Paris Agreement voluntary emission reduction commitments, if implemented, would result in planetary warming of 3.4 °C by 2100, without taking into account "long-term" carbon-cycle feedbacks. With a higher climate sensitivity figure of 4.5 °C, for example, which would account for such feedbacks, the Paris path would result in around 5 °C of warming, according to a MIT study.

A study by Schroeder Investment Management published in June 2017 found - after taking into account indicators across a wide range of the political, financial, energy and regulatory sectors - the average temperature increase implied for the Paris Agreement across all sectors was 4.1 °C.

Yet 3 °C of warming already constitutes an existential risk. A 2007 study

by two US national security think-tanks concluded that 3 °C of warming and a 0.5 meter sea-level rise would likely lead to “outright chaos” and “nuclear war is possible”, emphasizing how “massive non-linear events in the global environment give rise to massive nonlinear societal event”.

The Global Challenges Foundation (GCF) explains what could happen: “If climate change was to reach 3 °C, most of Bangladesh and Florida would drown, while major coastal cities - Shanghai, Lagos, Mumbai - would be swamped, likely creating large flows of climate refugees. Most regions in the world would see a significant drop in food production and increasing numbers of extreme weather events, whether heat waves, floods or storms. This likely scenario for a 3 °C rise does not take into account the considerable risk that self-reinforcing feedback loops set in when a certain threshold is reached, leading to an ever increasing rise in temperature. Potential thresholds include the melting of the Arctic permafrost releasing methane into the atmosphere, forest die-back releasing the carbon currently stored in the Amazon and boreal forests, or the melting of polar ice caps that would no longer reflect away light and heat from the sun.”

Warming of 4 °C or more could reduce the global human population by 80% or 90%, and the World Bank reports “there is no certainty that adaptation to a 4 °C world is possible.”

Prof. Kevin Anderson says a 4 °C future “is incompatible with an organized global community, is likely to be beyond ‘adaptation’, is devastating to the majority of ecosystems, and has a high probability of not being stable”.

This is a commonly-held sentiment amongst climate scientists. A recent study by the European Commission’s Joint Research Centre found that if the global temperature rose 4 °C, then extreme heatwaves with “apparent temperatures” peaking at over 55 °C will begin to regularly affect many densely populated parts of the world, forcing much activity in the modern industrial world to stop. (“Apparent temperatures” refers to the Heat Index, which quantifies the combined effect of heat and humidity to provide people with a means of avoiding dangerous conditions.)

In 2017, one of the first research papers to focus explicitly on existential climate risks proposed that “mitigation goals be set in terms of climate risk category instead of a temperature threshold”, and established a “dangerous” risk category of warming greater than 1.5 °C, and a “catastrophic” category for warming of 3 °C or more. The authors focussed on the impacts on the world’s poorest three billion people, on health and heat stress, and the impacts of climate extremes on such people with limited adaptation resources. They found that a 2 °C warming “would double the land area subject to deadly heat and expose 48% of the population (to deadly heat). A 4 °C warming by 2100 would subject 47% of the land area and almost 74% of the world population to deadly heat, which could pose existential risks to humans and mammals alike unless massive adaptation measures are implemented.”

A 2017 survey of global catastrophic risks by the Global Challenges Foundation found that: “In high-end [climate] scenarios, the scale of destruction is beyond our capacity to model, with a high likelihood of human civilization coming to an end.”

84% of 8000 people in eight countries surveyed for the Foundation considered climate change a “global catastrophic risk”.

Existential risk may arise from a fast rate of system change, since the capacity to adapt, in both the natural and human worlds, is inversely proportional to the pace of change, amongst other factors. In 2004, researchers reported on the rate of warming as a driver of extinction...

At 4 °C of warming “the limits for adaptation for natural systems would largely be exceeded throughout the world”.

Ecological breakdown of this scale would ensure an existential human crisis. By slow degrees, these existential risks are being recognized. In May 2018, an inquiry by the Australian Senate into national security and global warming recognized “climate change as a current and existential national security risk... defined as ‘one that threatens the premature extinction of Earth-originating intelligent life or the permanent and drastic destruction of its potential for desirable future development’”.

In April 2018, the Intelligence on European Pensions and Institutional Investment think-tank warned business leaders that “climate change is an existential risk whose elimination must become a corporate objective”.

However the most recent IPCC Assessment Report did not consider the issue. Whilst the term “risk management” appears in the 2014 IPCC Synthesis Report fourteen times, the terms “existential” and “catastrophic” do not appear...

6.29 The 2018 IPCC report

Excerpts from an article summarizing the report

Here are excerpts from an article entitled **UN Experts Warn of ‘Climate Catastrophe’ by 2040** by Jessica Corbett. The article was published in Common Dreams on Monday, October 8, 2018.³³:

“The climate crisis is here and already impacting the most vulnerable,” notes 350.org’s program director. “Staying under 1.5°C is now a matter of political will.”

Underscoring the need for “rapid, far-reaching, and unprecedented” changes to life as we know it to combat the global climate crisis, a new report from

³³<https://www.commondreams.org/news/2018/10/08/un-experts-warn-climate-catastrophe-2040-without-rapid-and-unprecedented-global>

the Intergovernmental Panel on Climate Change (IPCC) - the United Nations' leading body for climate science - details what the world could look like if the global temperature rises to 1.5°C versus 2°C (2.7°F versus 3.6°F) above pre-industrial levels, and outlines pathways to reducing greenhouse gas emissions in the context of sustainable development and efforts to eradicate poverty.

"Climate change represents an urgent and potentially irreversible threat to human societies and the planet," the report reads. "Human-induced warming has already reached about 1°C (1.8°F) above pre-industrial levels at the time of writing of this Special Report... If the current warming rate continues, the world would reach human-induced global warming of 1.5°C around 2040."

Approved by the IPCC in South Korea on Saturday ahead of COP24 in Poland in December, *Global Warming of 1.5°C* was produced by 91 authors and reviewers from 40 countries. Its release has elicited calls to action from climate campaigners and policymakers the world over.

"This is a climate emergency. The IPCC 1.5 report starkly illustrates the difference between temperature rises of 1.5°C and 2°C - for many around the world this is a matter of life and death," declared Karin Nansen, chair of Friends of the Earth International (FOEI). "It is crucial to keep temperature rise well below 1.5 degrees ... but the evidence presented by the IPCC shows that there is a narrow and shrinking window in which to do so."

The report was requested when the international community came together in December of 2015 for the Paris agreement, which aims to keep global warming within this century "well below" 2°C, with an ultimate target of 1.5°C. President Donald Trump's predecessor supported the accord, but Trump has vowed to withdraw the United States, even as every other nation on the planet has pledged their support for it. In many cases, however, sworn support hasn't led to effective policy.

"It's a fresh reminder, if one was needed, that current emissions reduction pledges are not enough to meet the long-term goals of the Paris agreement. Indeed, they are not enough for any appropriately ambitious temperature target, given what we know about dangerous climate impacts already unfolding even at lower temperature thresholds," Rachel Cleetus, lead economist and climate policy manager for the Union of Concerned Scientists (UCS), wrote ahead of its release.

"The policy implications of the report are obvious: We need to implement a suite of policies to sharply limit carbon emissions and build climate resilience, and we must do all this in a way that prioritizes equitable outcomes particularly for the world's poor and marginalized communities," Cleetus added.

"We want a just transition to a clean energy system that benefits people not corporations," Nansen emphasized. "Only with a radical transformation of our energy, food and economic systems, embracing environmental, social, gender and economic justice, can we prevent climate catastrophe and temperature rises exceeding 1.5°C."

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 16-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 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 Neil 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.

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.³⁴

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.³⁵

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

³⁴<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>

³⁵<http://steadystate.org/category/herman-daly/>

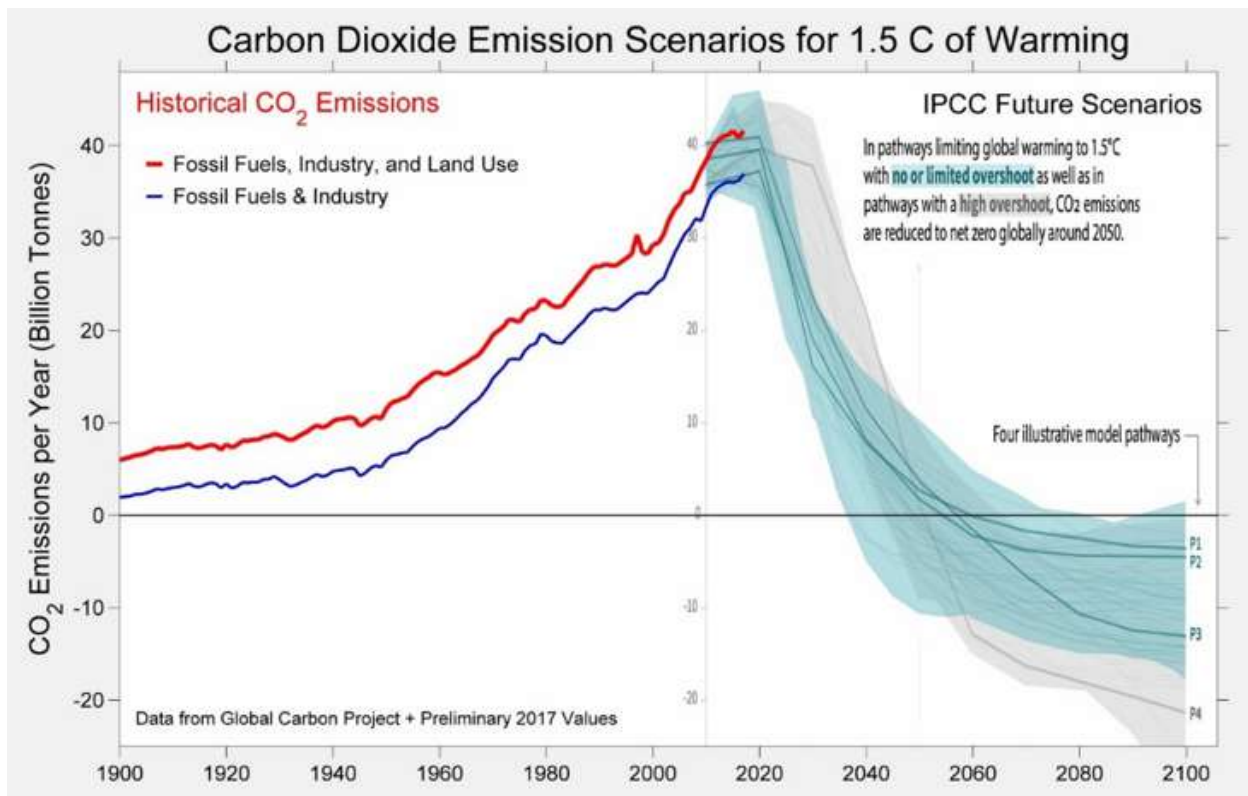
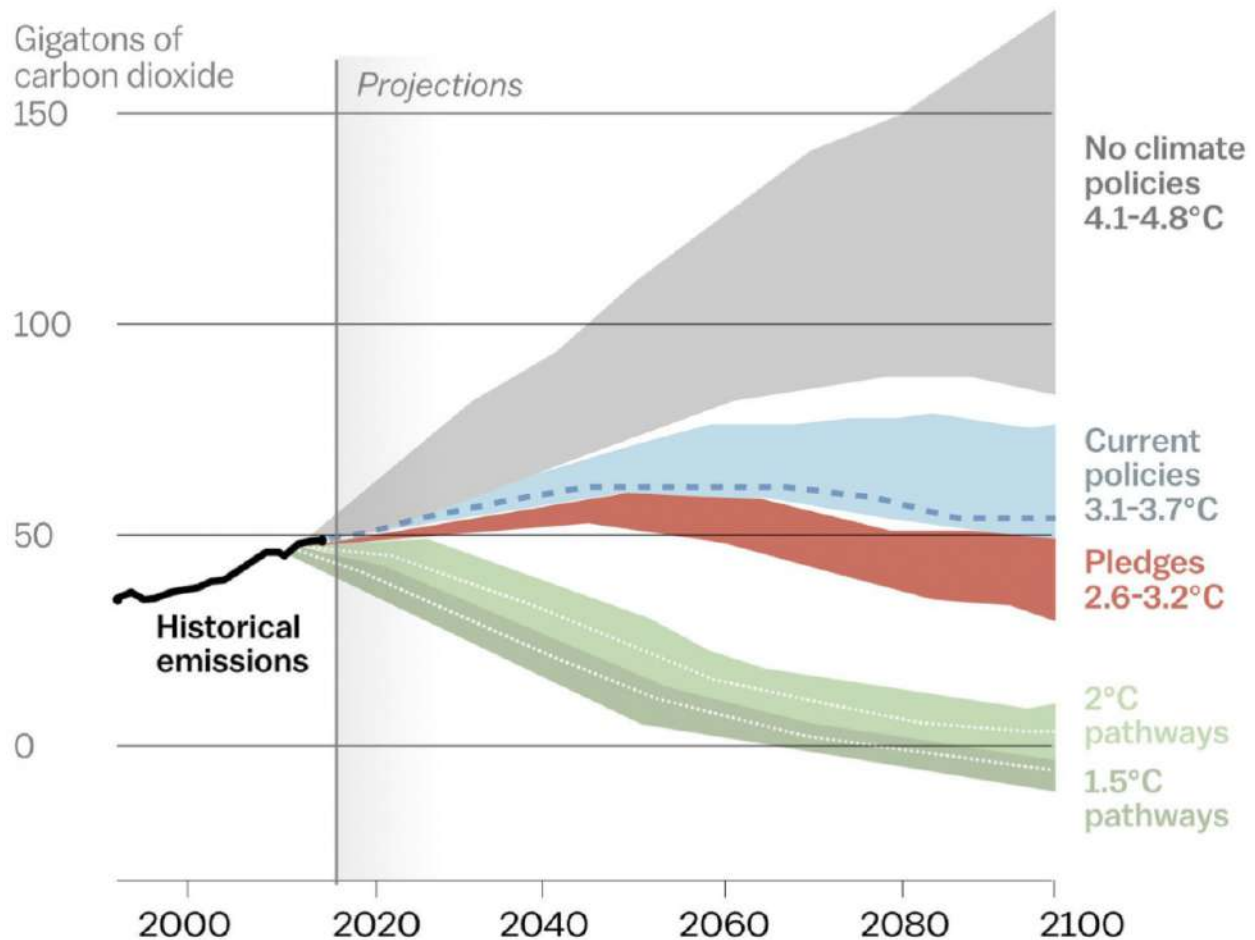


Figure 6.29: Our carbon budget. If global warming is to be limited to 1.5°C, CO₂ emissions must fall extremely rapidly. This means radical and fundamental changes for economies and lifestyles.

Effect of current pledges and policies

Global greenhouse gas emissions



Source: Climate Action Tracker

Vox

Figure 6.30: Predicted gigatons of carbon emitted during the present century under various policies. Under current policies, temperatures at the end of the century are predicted to be 3.1-3.7°C higher than normal, which would be disastrous. This implies that quick action must be taken to change current policies.

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Chapter 7

MALTHUS REVISITED

7.1 Birth Control in England: The Utilitarians

James Mill and John Stuart Mill

John Stuart Mill (1806-1873) showed his genius at an early age, and his father, the Utilitarian philosopher and political economist James Mill, immediately began to groom him to replace Jeremy Bentham as the leader of the Utilitarian movement. From the age of 3 onwards, Mill was deliberately kept away from children of his own age and made to spend all his waking hours in study. Play was not allowed, since it would break the habit of continual diligence.

At the age of three, Mill was taught Greek. By the time he reached eight, he had read Aesop's Fables, Xenophon's Anabasis, and all the works of Herodotus. He was also acquainted with Lucian, Diogenes Laërtius, Isocrates and six dialogues of Plato, in their original language. Furthermore, he had also read a great deal of history in English and had been taught arithmetic, physics and astronomy.

When he was twelve, Mill began a thorough study of the scholastic logic, at the same time reading Aristotle's logical treatises in the original language. At thirteen, he was introduced to political economy and studied the classical economists Adam Smith and David Ricardo. In fact Ricardo, who was a close friend of his father, used to invite the young Mill to his house for a walk in order to talk about political economy.

At the age of fourteen, Mill spent a year in France, where he attended the winter courses on chemistry, zoology, logic of the Faculté des Sciences, as well as taking a course of the higher mathematics. He also met the economist Jean-Baptiste Say, a friend of his father, and the political philosopher Henri Saint-Simon.

Limits to growth

John Stuart Mill pioneered the concept of a steady.state economy. He realized that on a finite earth, neither the population of humans nor the economy can continue to grow



Figure 7.1: The Utilitarian philosopher and political economist James Mill (1773-1836) was an early advocate of birth control. In his *Elements of Political Economy*, he wrote: “The result to be aimed at is to secure to the great body of the people all the happiness which is capable of being derived from the matrimonial union, (while) preventing the evils which the too rapid increase of their numbers would entail. The progress of legislation, the improvement of the education of the people, and the decay of superstition will, in time, it may be hoped, accomplish the difficult task of reconciling these important objects.”

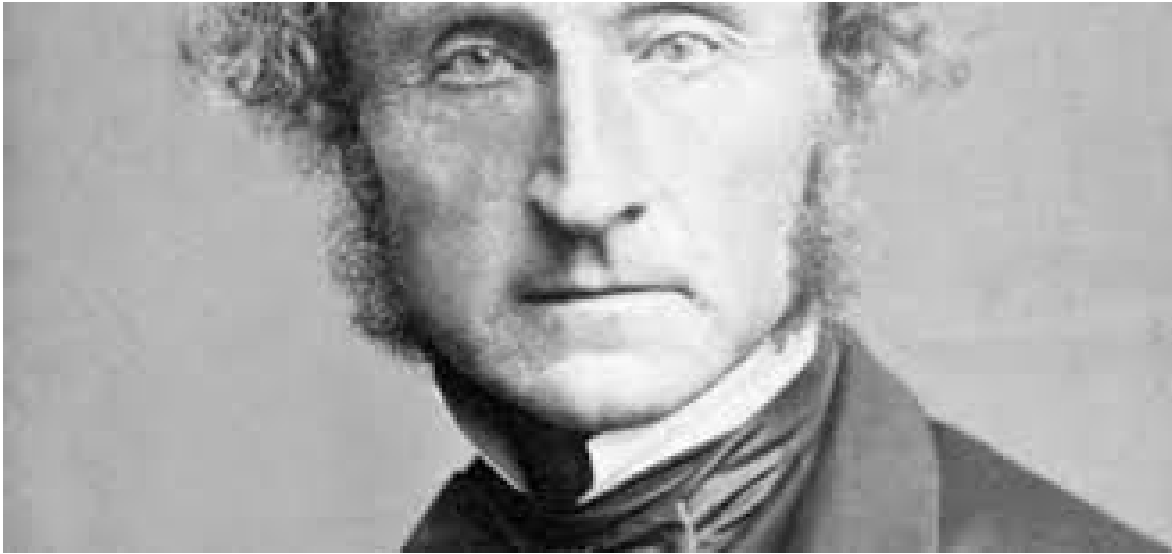


Figure 7.2: As a Member of Parliament, John Stuart Mill (1806-1873) introduced a law, the first of its kind, to give votes to women. Unfortunately it was defeted, but it set a precedent. He also foresaw that economic growth would have to end.

forever. In 1848 (when there were just over one billion people in the world), he 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 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.”

Contributions to Utilitarian theory

Jeremy Bentham (1748-1832) had written that “it is the greatest happiness of the greatest number that is the measure of right and wrong”. Mill refined this basic principle of

Utilitarianism by pointing out the difference between higher pleasures, for example moral or intellectual pleasures, and lower ones, such as pleasures of the flesh. Mill remarked that “It is better to be a human being dissatisfied than a pig satisfied; better to be Socrates dissatisfied than a fool satisfied. And if the fool, or the pig, are of a different opinion, it is because they only know their own side of the question.”

Ideas on economics and on individual liberty

According to David Ricardo’s “Iron Law of Wages”, laborers must always live on the exact borderline between starvation and survival. Wages, Ricardo argued, are determined by the laws of supply and demand. If wages increase above the starvation level, more children of workers survive, the supply of workers increases, and the wages fall once more.

Mill rebelled against Ricardo’s dismal “Iron Law” by pointing out that although the means of production might be regulated by the necessities of economics, social conscience can determine the way in which the goods are distributed. (Later Mahatma Gandhi extended this idea by showing that social conscience can also play a role in the way that goods are produced).

John Stuart Mill also contributed importantly to the idea of individual liberty as opposed to unlimited control by the state or by social opinion. He is the author of the following influential principle: “The only purpose for which power can be rightfully exercised over any member of a civilized community, against his will, is to prevent harm to others.”

Opposition to slavery

Regarding slavery, Mill wrote: “This absolutely extreme case of the law of force, condemned by those who can tolerate almost every other form of arbitrary power, and which, of all others, presents features the most revolting to the feeling of all who look at it from an impartial position, was the law of civilized and Christian England within the memory of persons now living: and in one half of Angle-Saxon America three or four years ago, not only did slavery exist, but the slave trade, and the breeding of slaves expressly for it, was a general practice between slave states. Yet not only was there a greater strength of sentiment against it, but, in England at least, a less amount either of feeling or of interest in favour of it, than of any other of the customary abuses of force: for its motive was the love of gain, unmixed and undisguised: and those who profited by it were a very small numerical fraction of the country, while the natural feeling of all who were not personally interested in it, was unmitigated abhorrence.”

Member of Parliament and advocate of for votes for women

During the years between 1865 and 1868, John Stuart Mill served simultaneously as a Member of Parliament and as Lord Rector of the University of St. Andrews. In Parliament, Mill was the first person to call for votes for women. His motion was defeated, but it set

an important precedent. Mill may have been influenced by his wife, Harriet Taylor Mill, who was a brilliant person in her own right.

Together with his wife and stepdaughter, Mill composed a book entitled *The Subjugation of Women*, which was completed in 1861. It contains a passage arguing that “the legal subordination of one sex to another - is wrong in itself, and now one of the chief hindrances to human improvement; and that it ought to be replaced by a system of perfect equality, admitting no power and privilege on the one side, nor disability on the other.

Ricardo’s model accurately described the condition of industrial workers at the time when he was living. However, this model did not take into account the possibility of trade unions and social legislation fixing the minimum wage; nor did Ricardo’s model take into account the possibility that workers would use birth control to limit their population growth.

We have seen that Malthus himself was opposed to birth control, advocating late marriage and “moral restraint” instead as the proper means for avoiding excessive population growth. However others in England, notably the Utilitarians, while accepting Malthus’ ideas concerning population pressure, advocated birth control as a means of relieving it. In 1821, the Utilitarian philosopher James Mill (the father of John Stuart Mill) wrote in his *Elements of Political Economy*: “The result to be aimed at is to secure to the great body of the people all the happiness which is capable of being derived from the matrimonial union, (while) preventing the evils which the too rapid increase of their numbers would entail. The progress of legislation, the improvement of the education of the people, and the decay of superstition will, in time, it may be hoped, accomplish the difficult task of reconciling these important objects.”

This somewhat vague advocacy of birth control was made much more explicit by the trade union leader Francis Place (1771-1854). In 1822 Place published, at considerable risk to himself, a pamphlet entitled *To the Married of Both Sexes of the Working People*. Place’s pamphlet contains the following passages:

“It is a great truth, often told and never denied, that when there are too many working people in any trade or manufacture, they are worse paid than they ought to be paid, and are compelled to work more hours than they ought to work. When the number of working people in any trade or manufacture has for some years been too great, wages are reduced very low, and the working people become little better than slaves.” “When wages have thus been reduced to a very small sum, working people can no longer maintain their children as all good and respectable people wish to maintain their children, but are compelled to neglect them; - to send them to different employments; - to Mills and Manufactories, at a very early age.”

“The miseries of these poor children cannot be described, and need not be described to you, who witness them and deplore them every day of your lives.”

“The sickness of yourselves and your children, the privation and pain and premature death of those you love but cannot cherish as you wish, need only be alluded to. You know all these evils too well.” “And what, you will ask, is the remedy? How are we to avoid these miseries? The answer is short and plain: the means are easy. Do as other people do, to avoid having more children than they wish to have, and can easily maintain.”

Place's pamphlet then goes on to describe very explicitly the sponge method of contraception. "What is to be done is this. A piece of soft sponge is tied by a bobbin or penny ribbon, and inserted just before intercourse takes place. Many tie a sponge to each end of a ribbon, and they take care not to use the same sponge again until it has been washed. If the sponge be large enough, that is, as large as a green walnut, or a small apple, it will prevent conception.... without diminishing the pleasures of married life..."

In 1832, Dr. Charles Knowlton, a Boston physician, published a book entitled *The Fruits of Philosophy, or the Private Companion of Young Married People*. It reviewed the various methods of birth control then available, and it pointed out that in order to be reliable, the sponge method required the use of a saline douching solution. This small book was reprinted in England and sold for a number of years without opposition. However, in 1876, the book was classified as obscene under a new law, and a bookseller was sentenced to two years in prison for selling it. The feminist leader, Annie Besant, and the liberal politician, Charles Bradlaugh, then provoked a new trial by selling the book themselves. They sent a polite letter to the magistrates announcing when and where they intended to sell Knowlton's book, and asking to be arrested. The result was a famous trial, at which the arguments of Malthus were quoted both by the judge and by the defense. The result of trial was inconclusive, however: Annie Besant and Charles Bradlaugh were acquitted, but Knowlton's book was held to be obscene.

As the nineteenth century progressed, birth control gradually came to be accepted in England, and the average number of children per marriage fell from 6.16 in 1860 to 4.13 in 1890. By 1915 this figure had fallen to 2.43. Because of lowered population pressure, combined with the growth of trade unions and better social legislation, the condition of England's industrial workers improved; and under the new conditions, Ricardo's Iron Law of Wages fortunately no longer seemed to hold.

Trade unions and child labor laws

The battle to establish trade unions was not won easily. At the start of the 19th century, many countries had laws prohibiting organizing unions, and these invoked penalties up to and including death. In England, the Reform Act of 1832 made unions legal, but nevertheless in 1834, six men from Dorset who had formed the "Friendly Society of Agricultural Workers" were arrested and sentenced to a seven years' transportation to Australia. An obscure law from 1797 was invoked, which prohibited swearing secret oaths. This they had in fact done, but their main crime seems to have been refusing to work for less than 10 shillings a week. Despite bitter opposition, trade unions gradually developed both in England and in other industrial countries.

One of the important influences for reform was the Fabian Society, founded in London in 1884. The group advocated gradual rather than revolutionary reform (and took its name from Quintus Fabius Maximus, the Roman general who defeated Hannibal's Carthaginian army by using harassment and attrition rather than head-on battles). The Fabian Society came to include a number of famous people, including Sydney and Beatrice Webb, George Bernard Shaw, H.G. Wells, Annie Besant, Leonard Woolf, Emmeline Pankhurst, Bertrand



Figure 7.3: **Francis Place (1771-1854)**, was a trade union leader and reformer who was anxious to improve the lives of workers. His political activities brought him into contact with William Godwin, James Mill, John Stuart Mill, Robert Owen and Jeremy Bentham. He courageously advocated birth control at a time when it was dangerous to do so.



Figure 7.4: Annie Besant (1847-1933). She and the Liberal politician Charles Bradlaugh sent a polite letter to the magistrates announcing when and where they intended to sell Knowlton's book on birth control methods, and asking to be arrested. The result was a famous trial, at which the arguments of Malthus were quoted both by the judge and by the defense. The result of trial was inconclusive, however: Annie Besant and Charles Bradlaugh were acquitted, but Knowlton's book was held to be obscene.



Figure 7.5: Marie Stopes (1880-1958). She founded the first birth control clinic in Britain, and authored the controversial sex manual *Married Love*. Stopes disapproved of abortion and believed that birth control methods should be used to make abortion unnecessary. She edited the newsletter *Birth Control News*, which gave explicit practical advice.

Russell, John Maynard Keynes, Harold Laski, Ramsay MacDonald, Clement Attlee, Tony Benn and Harold Wilson. Jawaharlal Nehru, India's first Prime Minister, was greatly influenced by Fabian economic ideas.

The group was instrumental in founding the British Labour Party (1900), the London School of Economics and the New Statesman. In 1906, Fabians lobbied for a minimum wage law, and in 1911 they lobbied for the establishment of a National Health Service.

Adam Smith had praised division of labor as one of the main elements in industrial efficiency, but precisely this aspect of industrialism was criticized by Thomas Carlyle (1795-1891), John Ruskin (1819-1900) and William Morris (1834-1896). They considered the numbingly repetitive work of factory laborers to be degrading, and they rightly pointed out that important traditions of design were being lost and replaced by ugly mass produced artifacts. The Arts and Crafts movement founded by Ruskin and Morris advocated cooperative workshops, where creative freedom and warm human relationships would make work rewarding and pleasant. In several Scandinavian countries, whose industrialization came later than England's, efforts were made to preserve traditions of design. Hence the present artistic excellence of Scandinavian furniture and household articles.

Through the influence of reformers, the more brutal aspects of Adam Smith's economic model began to be moderated. Society was learning that free market mechanisms alone do not lead to a happy and just society. In addition, ethical and ecological considerations and some degree of governmental regulation are also needed.

The Reform Movement aimed at social goals, but left ecological problems untreated.

Thus our economic system still does not reflect the true price to society of environmentally damaging activities. For example, the price of coal does not reflect the cost of the environmental damage done by burning it. This being so, our growth-worshipping economic system of today thunders ahead towards an environmental mega-catastrophe, as we will see in the next chapter.

7.2 Birth control in the United States

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.”



Figure 7.6: Anthony Comstock (1844-1915). He boasted that he was responsible for 4,000 arrests and claimed he drove fifteen persons to suicide. 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.



Figure 7.7: Emma Goldman (1869-1940). She was arrested several times for illegally distributing information on birth control. Wikipedia states that “Her writing and lectures spanned a wide variety of issues, including prisons, atheism, freedom of speech, militarism, capitalism, marriage, free love, and homosexuality.”



Figure 7.8: 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.

“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. 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”.

7.3 China and India

Table 2.1 shows the population of China at the start of various dynasties. In 125 AD, at the start of the Eastern Han Dynasty, the population was 48,690,789. The precision of this figure is surprising, and it is perhaps the result of the strength of the central government of China even at that early date. As seen in Table 2.1 the population seems to have fallen again, probably to famine and war. Fear of these terrible Malthusian forces explains the Chinese preference for a strong central government. At the start of the Qing dynasty in the 17th century, the population of China began to increase rapidly, probably because of improved flood control and irrigation methods. By 1901, the population of China had reached 426,447,325.

Figure 2.19 shows the growth of Chinese population between 1960 and the present. China's population continues to increase, despite the government's one-child policy, and today the country has approximately 1.4 billion people. China's rate of population growth is currently only 0.59%.

The post-1949 Chinese government leaders at first viewed population growth as an asset. However, worries about falling water tables and the future availability of fresh water for agriculture, as well as the realization that rapid population growth would block economic development soon produced a policy switch; and the Chinese government began to strongly support both birth control and late marriage.

Since 1979, the Chinese government has advocated a one-child policy for both rural and urban areas. However, this policy admits many exceptions and has been most effective in cities, where the government is able to exert its power by giving apartments only to families with a single child. In 2016, the one-child policy began to be phased out.



Figure 7.9: The one-child policy: A Chinese mother and her only child at a market in Jiayuguan.

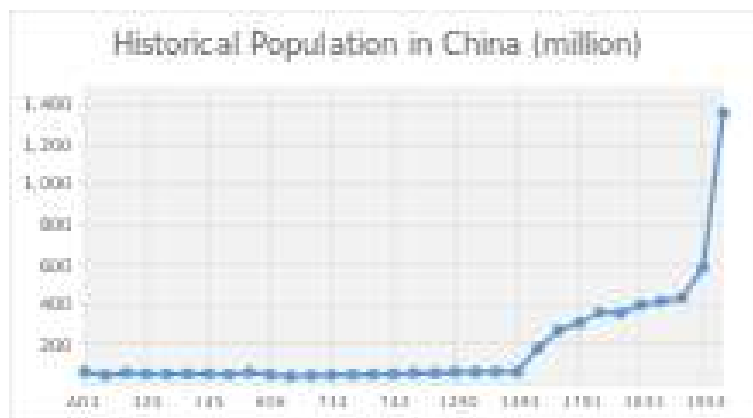


Figure 7.10: Historical estimates of China's population, in millions, from AD 2 until the present. After Ming and earlier period of Qing dynasty founded population moved around 100 million to 150 million until 1700s. In the period between 1749 and 1851, the population doubled in a century. During 1960-2015, the population doubled to nearly 1.4 billion .

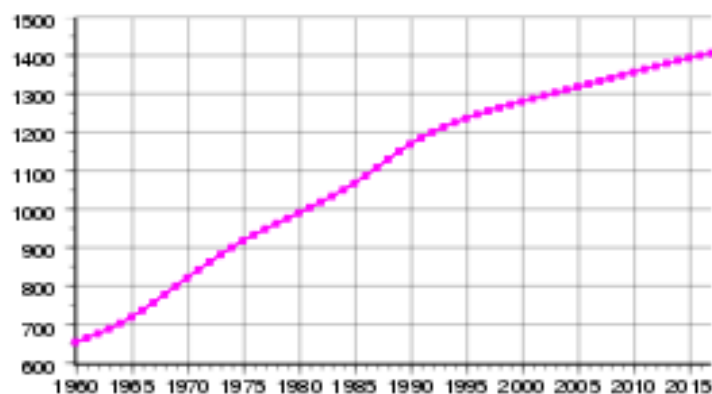


Figure 7.11: This graph shows the population growth of China, in billions, since 1900. Despite China's one-child policy, the country's population continues to grow because of exceptions to the policy and because so many young people are now reaching reproductive age.

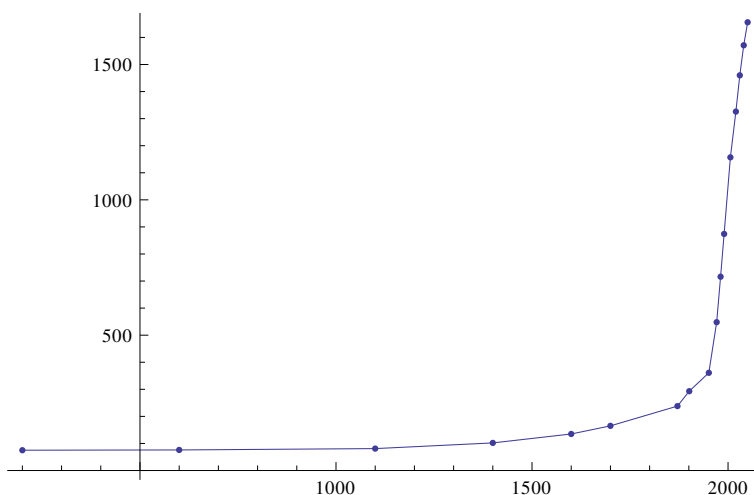


Figure 7.12: The historical and projected population of India as a function of time, from 200 AD to 2050, based on data from the Wikipedia article on *Demographics of India*. If the projections hold, there will be 1.4 billion people in India by 2050, making it the most populous country in the world. However, there is a danger that death rates may rise sharply because of famine and because of deaths due to rising temperatures.

Table 7.1: **China's Dynastic Census Data**

Dynasty	Date (AD)	Households	Population
Eastern Han	125	9,647,838	48,690,789
Western Jin	280	2,458,480	16,163,863
Tang	639	3,120,151	13,252,894
Song	1003	6,864,160	14,278,040
Ming	1398	10,699,399	58,323,933
Qing	1661	not recorded	58,323,933
Qing	1722	not recorded	103,053,992
Qing	1812	not recorded	333,700,560
Qing	1901	not recorded	426,447,325

Table 7.2: **World Population in 2050 (in billions)**

Region	2000	2050	growth
Asia	3.73	5.26	41%
Africa	0.82	2.53	209%
Europe	0.73	0.72	-2%
Latin America	0.53	0.78	48%
North America	0.31	0.43	39%
Oceania	0.03	0.06	84%
World	6.14	9.77	60%



Figure 7.13: This figure shows China’s economic growth rate in recent years. The doubling time for a quantity growing at the rate of 6.8% per year is only 11 years. This high rate of economic growth, compounded by China’s still-growing population, cannot continue without producing an ecological catastrophe, the beginnings of which can already be seen in China.

7.4 Population projections in Africa

Wikipedia’s article on *Projections of Population Growth* states that “By 2070, the bulk of the world’s population growth will take place in Africa: of the additional 2.4 billion people projected between 2015 and 2050, 1.3 billion will be added in Africa, 0.9 billion in Asia and only 0.2 billion in the rest of the world. Africa’s share of global population is projected to grow from 16% in 2015 to 25% in 2050 and 39% by 2100, while the share of Asia will fall from 60% in 2015 to 54% in 2050 and 44% in 2100. The strong growth of the African population will happen regardless of the rate of decrease of fertility, because of the exceptional proportion of young people already living today. For example, the UN projects that the population of Nigeria will surpass that of the United States by 2050.”

“During 2005-2050, twelve countries are expected to account for half of the world’s projected population increase: India, China, United States, Indonesia, Nigeria, Pakistan, Brazil, Democratic Republic of the Congo, Ethiopia, Philippines, Mexico and Egypt, listed according to the size of their contribution to population growth.”

The predictions shown in Table 2.2, especially the prediction that the population of Africa will be 2.53 billion people, raise some worrying questions. It seems likely that because of climate change, failure of the West African monsoon, desertification, and sale of African agricultural land to rich countries such as China and Saudi Arabia, the food available to the people of Africa will diminish rather than increase. Can the population of Africa really increase by 209% by 2050? Or will this be prevented by the terrible Malthusian forces of famine, disease and war? In some parts of Africa famine is already present.

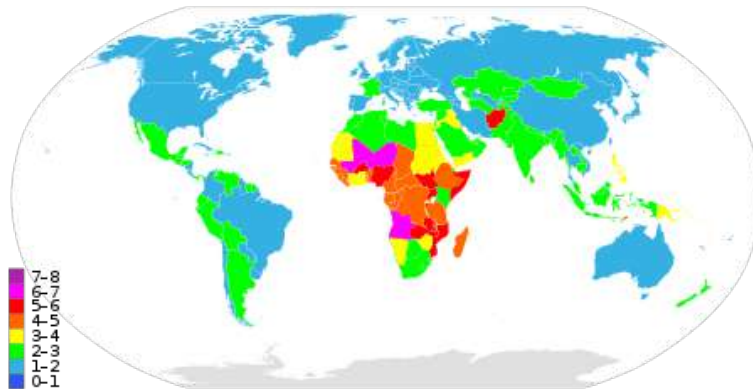


Figure 7.14: A map from the Wikipedia article showing global fertility rates in 2015. The highest fertility rates (purple, 7-8 children per woman-life) occur in Africa.

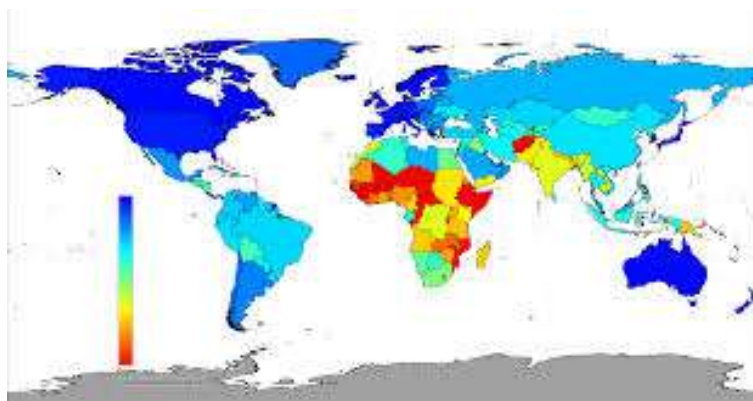


Figure 7.15: A map showing the human development index (HDI) in various parts of the world. The index is based on educational levels, life expectancy, and GDP per capita. It can be seen that regions of high fertility generally have low HDI values.

7.5 What is the future of megacities?

A transformation in cities is going on. Over 80% of the people on the planet today are living in cities. Over 100 new cities will be created within 25 years in China alone. Over 20 new Megacities will redefine the consumer marketplace and society. Most of these cities of over 8 million people each will be in the developing world. With the huge migration to cities of the global population, what challenges will these cities face? What are the opportunities and risks? How should global organizations prepare for the future of cities?

Transition Towns

The Transition Town Movement of today is a response to the end of the fossil fuel era and the threat of economic collapse. It can be thought of as a modern branch of the Cooperative Movement. In 2006, the Transition Town of Totnes in Devon, England was the first to use this name, which implied a transition from globalism, consumerism and growth to a sustainable, local and self-sufficient economy. The ideal was to produce locally all the necessary food for the town, and as much of other necessities as possible. In this way, the energy expenditures involved in transportation could be avoided.

Today there are more than a thousand Transition Towns and they are located in 43 countries. Many of them have local currencies which are legal tender within the town. If the pioneers of this movement are right in saying that this is the only sustainable model for the future, we may wonder whether mega-cities will be able to survive in the long-term future.¹

Gandhi's vision of India's future

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

¹<https://en.wikipedia.org/wiki/Degrowth>
<http://commondreams.org/views/2015/07/31/we-are-all-greece>
<http://www.localfutures.org/>
<http://www.powells.com/biblio/7-9780871566430-2>

Table 7.3: The World's Largest Cities in 2016

Rank	Name	Country	Population
1	Tokyo	Japan	38,140,000
2	Shanghai	China	34,000,000
3	Jakarta	Indonesia	31,500,000
4	Delhi	India	27,200,000
5	Seoul	Korea	25,600,000
6	Guangzhou	China	25,000,000
7	Beijing	China	24,900,000
8	Manila	Philippines	24,100,000
9	Mumbai	India	23,900,000
10	New York City	United States	23,876,155
11	Shenzhen	China	23,300,000
12	Sao Paulo	Brazil	21,242,939



Figure 7.16: Totnes, Devon, England: a transition town.

the villages that are as ancient as herself and India of the cities which are a creation of foreign domination...”

Suggestions for further reading

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Chapter 8

ETHICS CAN OVERWRITE ANACHRONISTIC EMOTIONS

8.1 Anachronistic human emotions

Today, human greed and folly are destroying the global environment. As if this were not enough, there is a great threat to civilization and the biosphere from an all-destroying thermonuclear war. Both of these severe existential threats are due to faults our inherited emotional nature.

From the standpoint of evolutionary theory, this is a paradox. As a species, we are well on the road to committing collective suicide, driven by the flaws in human nature. But isn't natural selection supposed to produce traits that lead to survival? Today, our emotions are not leading us towards survival, but instead driving us towards extinction. What is the reason for this paradox?

Some stories from the Bible

The Old Testament is the common heritage of the three Abrahamic religions, Christianity, Judaism and Islam. Some of the stories which it contains can be seen as attempts to explain the paradoxes of human emotional nature: Why are we born with emotions that drive us to commit the seven deadly sins? Why are pride, envy, wrath, gluttony, lust, sloth and greed so much a part of human nature? The story of Adam and Eve and the Garden of Eden attempts to answer this question, as do stories about the role of Satan in the world.

According to the biblical account, Adam and Eve ate apples from the Tree of Knowledge and were therefore expelled from the Garden of Eden. This story can be seen as containing elements of historical truth. Humans were originally hunter-gatherers. Populations were so sparse that gathering roots, berries and fruits from their environment gave them enough to eat. Occasionally they obtained additional protein from the meat of animals that they were able to kill. Then agriculture was invented. Humans had eaten from the Tree of Knowledge! Populations rapidly became so dense that humans were no longer able to live

simply by gathering fruit from the Garden of Eden. Expelled from the garden, they were henceforth forced to sweat for their daily bread.

What about “original sin” and the role of the Devil in the world? In the Bible, the Devil, or Satan, appears as a fallen angel who tempts humans to commit sins, i.e to break the rules of their societies. The existence of Satan is the biblical explanation of the presence of evil in the world. An alternative explanation is given by the doctrine of “original sin”, which maintains that humans are born with a sinful nature.

Like the story of the Garden of Eden, these biblical concepts may also cronicle true historical events in human evolution. A sinful human is sometimes described as “behaving like an animal”. In fact, what is regarded a sin in humans can be a necessary survival trait in an animal. It would be ridiculous to say “Thou shalt not steal” to a mouse or “Thou shalt not kill” to a tiger.

Our emotions have an extremely long evolutionary history. Both lust and rage are emotions that we share with many animals. However, with the rapid advance of human cultural evolution, our ancestors began to live together in progressively larger groups, and in these new societies, our inherited emotional nature was often inappropriate. What once was a survival trait became a sin which needed to be suppressed by morality and law.

Today we live in a world that is entirely different from the one into which our species was born. We face the problems of the 21st century: exploding populations, vanishing resources, and the twin threats of catastrophic climate change and thermonuclear war. We face these severe problems with our poor cave-man’s brain, with an emotional nature that has not changed much since our ancestors lived in small tribes, competing for territory on the grasslands of Africa.

8.2 Ethics can overwrite tribalism!

After the invention of agriculture, roughly 10,000 years ago, humans began to live in progressively larger groups, which were sometimes multi-ethnic. In order to make towns, cities and finally nations function without excessive injustice and violence, both ethical and legal systems were needed. Today, in an era of global economic interdependence, instantaneous worldwide communication and all-destroying thermonuclear weapons, we urgently need new global ethical principles and a just and enforcible system of international laws.

The very long childhood of humans allows learned behavior to overwrite instinctive behavior. A newborn antelope is able to stand on its feet and follow the herd almost immediately after birth. By contrast, a newborn human is totally helpless. With cultural evolution, the period of dependence has become progressively longer. Today, advanced education often requires humans to remain dependent on parental or state support until they are in their middle 20’s!

Humans are capable of tribalistic inter-group atrocities such as genocides and wars, but they also have a genius for cooperation. Cultural evolution implies inter-group exchange of ideas and techniques. It is a cooperative enterprise in which all humans participate. It

is cultural evolution that has given our special dominance. But cultural evolution depends on overwriting destructive tribalism with the principles of law, ethics and politeness. The success of human cultural evolution demonstrates that this is possible. Ethics can overwrite tribalism!

What is law?

The principles of law, ethics, politeness and kindness function in slightly different ways, but all of these behavioral rules help human societies to function in a cohesive and trouble-free way. Law is the most coarse. The mesh is made finer by ethics, while the rules of politeness and kindness fill in the remaining gaps.

Legal systems began at a time when tribal life was being replaced by life in villages, towns and cities. One of the oldest legal documents that we know of is a code of laws enacted by the Babylonian king Hammurabi in about 1754 BC. It consists of 282 laws, with scaled punishments, governing household behavior, marriage, divorce, paternity, inheritance, payments for services, and so on. An ancient 2.24 meter stele inscribed with Hammurabi's Code can be seen in the Louvre. The laws are written in the Akkadian language, using cuneiform script.

Humanity's great ethical systems also began during a period when the social unit was growing very quickly. It is an interesting fact that many of history's greatest ethical teachers lived at a time when the human societies were rapidly increasing in size. One can think, for example of Moses, Confucius, Lao-Tzu, Gautama Buddha, the Greek philosophers, and Jesus. Muhammad came slightly later, but he lived and taught at a time when tribal life was being replaced by city life in the Arab world. During the period when these great teachers lived, ethical systems had become necessary to over-write raw inherited human emotional behavior patterns in such a way that increasingly large societies could function in a harmonious and cooperative way, with a minimum of conflicts.



Figure 8.1: **Hammurabi's code**



Figure 8.2: **Hammurabi's code**

8.3 The Ten Commandments

Here is a description of the Ten Commandments, as given in the chapter Exodus 20 of the King James Version of the Bible:

And God spake all these words, saying,

I am the Lord thy God, which have brought thee out of the land of Egypt, out of the house of bondage.

Thou shalt have no other gods before me.

Thou shalt not make unto thee any graven image, or any likeness of any thing that is in heaven above, or that is in the earth beneath, or that is in the water under the earth.

Thou shalt not bow down thyself to them, nor serve them: for I the Lord thy God am a jealous God, visiting the iniquity of the fathers upon the children unto the third and fourth generation of them that hate me;

And showing mercy unto thousands of them that love me, and keep my commandments.

Thou shalt not take the name of the Lord thy God in vain; for the Lord will not hold him guiltless that taketh his name in vain.

Remember the sabbath day, to keep it holy.

Six days shalt thou labor, and do all thy work:

But the seventh day is the sabbath of the Lord thy God: in it thou shalt not do any work, thou, nor thy son, nor thy daughter, thy manservant, nor thy maidservant, nor thy cattle, nor thy stranger that is within thy gates:

For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day: wherefore the Lord blessed the sabbath day, and hallowed it.

Honor thy father and thy mother: that thy days may be long upon the land which the Lord thy God giveth thee.

Thou shalt not kill.

Thou shalt not commit adultery.

Thou shalt not steal.

Thou shalt not bear false witness against thy neighbor.

Thou shalt not covet thy neighbor's house, thou shalt not covet thy neighbor's wife, nor his manservant, nor his maidservant, nor his ox, nor his ass, nor any thing that is thy neighbor's.

And all the people saw the thunderings, and the lightnings, and the noise of the trumpet, and the mountain smoking: and when the people saw it, they removed, and stood afar off.

And they said unto Moses, Speak thou with us, and we will hear: but let not God speak with us, lest we die.

And Moses said unto the people, Fear not: for God is come to prove you, and that his fear may be before your faces, that ye sin not.

And the people stood afar off, and Moses drew near unto the thick darkness where God was.

And the Lord said unto Moses, Thus thou shalt say unto the children of Israel, Ye have seen that I have talked with you from heaven.

Ye shall not make with me gods of silver, neither shall ye make unto you gods of gold.

An altar of earth thou shalt make unto me, and shalt sacrifice thereon thy burnt offerings, and thy peace offerings, thy sheep, and thine oxen: in all places where I record my name I will come unto thee, and I will bless thee.

And if thou wilt make me an altar of stone, thou shalt not build it of hewn stone: for if thou lift up thy tool upon it, thou hast polluted it.

Neither shalt thou go up by steps unto mine altar, that thy nakedness be not discovered thereon.



Figure 8.3: The Ten Commandments

8.4 The life and message of Gautama Buddha

Evidence of a very early river-valley civilization in India has been found at a site called Mohenjo-Daro. However, in about 2,500 B.C., this early civilization was destroyed by some great disaster, perhaps a series of floods; and for the next thousand years, little is known about the history of India. During this dark period between 2,500 B.C. and 1,500 B.C., India was invaded by the Indo-Aryans, who spoke Sanskrit, a language related to Greek. The Indo-Aryans partly drove out and partly enslaved the smaller and darker native Dravidians. However, there was much intermarriage between the groups, and to prevent further intermarriage, the Indo-Aryans introduced a caste system sanctioned by religion.

According to Hindu religious belief, the soul of a person who has died is reborn in another body. If, throughout his life, the person has faithfully performed the duties of his caste, then his or her soul may be reborn into a higher caste. Finally, after existing as a Brahman, the soul may be so purified that it can be released from the cycle of death and rebirth.

In the 6th century B.C., Gautama Buddha founded a new religion in India. Gautama Buddha was convinced that all the troubles of humankind spring from attachment to earthly things. He felt that the only escape from sorrow is through the renunciation of earthly desires. He also urged his disciples to follow a high ethical code, the Eightfold Way. Among the sayings of Buddha are the following:

“Hatred does not cease by hatred at any time; hatred ceases by love.”

“Let a man overcome anger by love; let him overcome evil by good.”

“All men tremble at punishment. All men love life. Remember that you are like them, and do not cause slaughter.”

One of the early converts to Buddhism was the emperor Ashoka Maurya, who reigned in India between 273 B.C. and 232 B.C.. During one of his wars of conquest, Ashoka Maurya became so sickened by the slaughter that he resolved never again to use war as an instrument of policy. He became one of the most humane rulers in history, and he also did much to promote the spread of Buddhism throughout Asia.

Under the Mauryan dynasty (322 B.C. - 184 B.C.), the Gupta dynasty (320 B.C. - 500 A.D.) and also under the rajah Harsha (606 A.D. - 647 A.D.), India had periods of unity, peace and prosperity. At other times, the country was divided and upset by internal wars. The Gupta period especially is regarded as the golden age of India's classical past. During this period, India led the world in such fields as medicine and mathematics.

The Guptas established both universities and hospitals. According to the Chinese Buddhist pilgrim, Fa-Hsien, who visited India in 405 A.D., "The nobles and householders have founded hospitals within the city to which the poor of all countries, the destitute, crippled and diseased may go. They receive every kind of help without payment."

Indian doctors were trained in cleansing wounds, in using ointments and in surgery. They also developed antidotes for poisons and for snakebite, and they knew some techniques for the prevention of disease through vaccination.

When they had completed their training, medical students in India took an oath, which resembled the Hippocratic oath: "Not for yourself, not for the fulfillment of any earthly desire or gain, but solely for the good of suffering humanity should you treat your patients."

In Indian mathematics, algebra and trigonometry were especially highly developed. For example, the astronomer Brahmagupta (598 A.D. - 660 A.D.) applied algebraic methods to astronomical problems. The notation for zero and the decimal system were invented in India, probably during the 8th or 9th century A.D.. These mathematical techniques were later transmitted to Europe by the Arabs.

Many Indian techniques of manufacture were also transmitted to the west by the Arabs. Textile manufacture in particular was highly developed in India, and the Arabs, who were the middlemen in the trade with the west, learned to duplicate some of the most famous kinds of cloth. One kind of textile which they copied was called "quttan" by the Arabs, a word which in English has become "cotton". Other Indian textiles included cashmere (Kashmir), chintz and calico (from Calcutta, which was once called Calicut). Muslin derives its name from Mosul, an Arab city where it was manufactured, while damask was made in Damascus.

Indian mining and metallurgy were also highly developed. The Europeans of the middle ages prized fine laminated steel from Damascus; but it was not in Damascus that the technique of making steel originated. The Arabs learned steelmaking from the Persians, and Persia learned it from India.

The Noble Eightfold Path

1. **Right understanding.** *And what is right understanding? There are fruits, and results of good and bad actions. There is this world and the next world. There is mother and father. There are spontaneously reborn beings; there are contemplatives*



Figure 8.4: Buddha

and Brahmans who faring rightly and practicing rightly, proclaim this world and the next after having directly known and realized it for themselves.’ This is the right view with effluents, siding with merit, resulting in acquisitions

2. **Right resolve.** *And what is right resolve? Being resolved on renunciation, on freedom from ill will, on harmlessness: This is called right resolve.*
3. **Right speech.** *And what is right speech? Abstaining from lying, from divisive speech, from abusive speech, and from idle chatter: This is called right speech.*
4. **Right action.** *And what is right action? Abstaining from killing, abstaining from stealing, abstaining from sexual misconduct. This is called right action.*
5. **Right livelihood.** *And what is right livelihood? Not possessing more than is strictly necessary. Avoiding causing suffering to sentient beings by cheating them, or harming or killing them in any way.*
6. **Right effort.** *And what is right effort? Here the monk arouses his will, puts forth effort, generates energy, exerts his mind, and strives to prevent the arising of evil and unwholesome mental states that have not yet arisen. He arouses his will... and strives to eliminate evil and unwholesome mental states that have already arisen, to keep them free of delusion, to develop, increase, cultivate, and perfect them. This is called right effort.*
7. **Right mindfulness.** *And what is right mindfulness? Here the monk remains contemplating the body as body, resolute, aware and mindful, having put aside worldly desire and sadness; he remains contemplating feelings as feelings; he remains contemplating mental states as mental states; he remains contemplating mental objects as mental objects, resolute, aware and mindful, having put aside worldly desire and sadness; This is called right mindfulness.*

8. **Right concentration.** *And what is right concentration? [i] Here, the monk, detached from sense-desires, detached from unwholesome states, enters and remains in the first jhana (level of concentration, in which there is applied and sustained thinking, together with joy and pleasure born of detachment; [ii] And through the subsiding of applied and sustained thinking, with the gaining of inner stillness and oneness of mind, he enters and remains in the second jhana, which is without applied and sustained thinking, and in which there are joy and pleasure born of concentration; [iii] And through the fading of joy, he remains equanimous, mindful and aware, and he experiences in his body the pleasure of which the Noble Ones say: “equanimous, mindful and dwelling in pleasure”, and thus he enters and remains in the third jhana; [iv] And through the giving up of pleasure and pain, and through the previous disappearance of happiness and sadness, he enters and remains in the fourth jhana, which is without pleasure and pain, and in which there is pure equanimity and mindfulness. This is called right concentration.*

Some of the sayings of Gautama Buddha

In the end, only three things matter: How much you loved, how gently you lived, and how gracefully you let go of things not meant for you.

Buddha was asked, “What have you gained from meditation?” He replied NOTHING! However let me tell you what i have lost: anger, anxiety, depression, insecurity, fear of old age and death.

When the student is ready, the teacher will appear.

The less you respond to negative people, the more peaceful your life will become.

Health is the greatest gift, contentment is the greatest wealth, A trusted friend is the best relative, liberated mind is the greatest bliss.

The thought manifests as the word: the word manifests as the deed: the deed develops into character. So watch the thought and its ways with care, and let it spring from love born out of concern for all beings.

Do not learn how to react learn how to respond.

If your compassion does not include yourself, It is incomplete.

Everything that has a beginning has an ending. Make your peace with that and all will be well.

If anything is worth doing, do it with all your heart.

Your worst enemy cannot harm you as much as your own unguarded thoughts.

The root of suffering is attachment.

Holding onto anger is like drinking poison and expecting the other person to die.

All that we are is the result of what we have thought.

Do not dwell in the past, do not dream of the future, concentrate the mind on the present moment.

What you think you become, what you feel, you attract. what you imagine, you create.

Nothing can harm you as much as your own thoughts unguarded.

The trouble is you think you have time.

Your work is to discover your world and then with all your heart give yourself to it.

Believe nothing, no matter where you read it or who has said it, not even if i have said it. Unless it agrees with your own reason and your own common sense.

On the long journey of human life, Faith is the best of companions.

To understand everything is to forgive everything.

No one saves us but ourselves. No one can and no one may. We ourselves must walk the past.

There is no path to happiness: Happiness is the path.

No matter how hard the past, you can always begin again.

If you want to fly, give up everything that weighs you down.

You only lose what you cling to.

When we meet real tragedy in life, we can react in two ways- Either by losing hope and falling into self-destructive habits or by using the challenge to find our inner strength.

Don't rush anything. When the time is right, it will happen.

The whole secret of existence is to have no fear.

Be kind to all creatures; this is the true religion.

Those who are free of resentful thoughts surely find peace.

It is during our darkest moments that we must focus to see the light

Quiet the mind, and the soul will speak.

Each morning we are born again. What we do today is what matters most.

A man who conquers himself is greater than one who conquers a thousand men in a battle.

All human unhappiness comes from not facing reality squarely, exactly as it is.

It is better to be hated for what you are than to be loved for what you are not.

He who does not understand your silence will probably not understand your words.

You will not be punished for your anger, you will be punished by your anger.

Whatever befalls you, walk on untouched, unattached.

8.5 Confucius and Chinese civilization

After the fall of Rome in the 5th century A.D., Europe became a culturally backward area. However, the great civilizations of Asia and the Middle East continued to flourish, and it was through contact with these civilizations that science was reborn in the west.

During the dark ages of Europe, a particularly high level of civilization existed in China. The art of working in bronze was developed in China during the Shang dynasty (1,500 B.C. - 1,100 B.C.) and it reached a high pitch of excellence in the Chou dynasty (1,100 B.C. - 250 B.C.). “ In the Chou period, many of the cultural characteristics which we recognize as particularly Chinese were developed. During this period, the Chinese evolved a code of behavior based on politeness and ethics. Much of this code of behavior is derived from the teachings of K’ung Fu-tzu (Confucius), a philosopher and government official who lived between 551 B.C. and 479 B.C.. In his writings about ethics and politics, K’ung Fu-tzu advocated respect for tradition and authority, and the effect of his teaching was

to strengthen the conservative tendencies in Chinese civilization. He was not a religious leader, but a moral and political philosopher, like the philosophers of ancient Greece. He is traditionally given credit for the compilation of the Five Classics of Chinese Literature, which include books of history, philosophy and poetry, together with rules for religious ceremonies.

Some sayings of Confucius

By three methods we may learn wisdom: First, by reflection, which is noblest; Second, by imitation, which is easiest; and third by experience, which is the bitterest.

Everything has beauty, but not everyone sees it.

Wheresoever you go, go with all your heart.

It does not matter how slowly you go as long as you do not stop.

Life is really simple, but we insist on making it complicated.

If you make a mistake and do not correct it, this is called a mistake.

The man who moves a mountain begins by carrying away small stones.

The funniest people are the saddest ones.

Before you embark on a journey of revenge, dig two graves.

To be wronged is nothing, unless you continue to remember it.

Respect yourself and others will respect you.

Silence is a true friend who never betrays.

You cannot open a book without learning something.

When you see a good person, think of becoming like her/him. When you see someone not so good, reflect on your own weak points.

Attack the evil that is within yourself, rather than attacking the evil that is in others.

The man who asks a question is a fool for a minute, the man who does not ask is a fool for life.

What the superior man seeks is in himself; what the small man seeks is in others.

I hear and I forget. I see and I remember. I do and I understand.

Music produces a kind of pleasure which human nature cannot do without.

The hardest thing of all is to find a black cat in a dark room, especially if there is no cat.

It is not the failure of others to appreciate your abilities that should trouble you, but rather your failure to appreciate theirs.

The man of wisdom is never of two minds; the man of benevolence never worries; the man of courage is never afraid.

The gem cannot be polished without friction, nor man perfected without trials.

Give a bowl of rice to a man and you will feed him for a day. Teach him how to grow his own rice and you will save his life.

Only the wisest and stupidest of men never change.

It is more shameful to distrust our friends than to be deceived by them.

Real knowledge is to know the extent of one's ignorance.

And remember, no matter where you go, there you are.

Hold faithfulness and sincerity as first principles.

If what one has to say is not better than silence, then one should keep silent.

Forget injuries, never forget kindnesses.

When it is obvious that the goals cannot be reached, don't adjust the goals, adjust the action steps.

Better a diamond with a flaw than a pebble without.

To put the world in order, we must first put the nation in order; to put the nation in order, we must first put the family in order; to put the family in order, we must first cultivate our personal life; we must first set our hearts right.

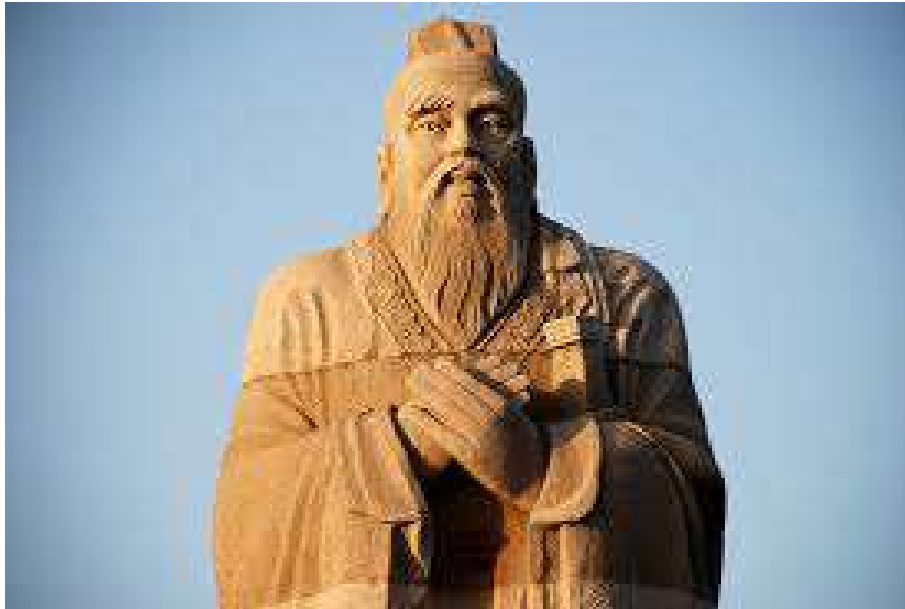


Figure 8.5: Confucius

A lion chased me up a tree, and I greatly enjoyed the view from the top.

To be wealthy and honored in an unjust society is a disgrace.

In a country well governed, poverty is something to be ashamed of. In a country badly governed, wealth is something to be ashamed of.

If your plan is for one year plant rice. If your plan is for ten years plant trees. If your plan is for one hundred years educate children.

Don't do unto others what you don't want done unto you.

Education breeds confidence. Confidence breeds hope. Hope breeds peace.

To see what is right and not do it is the worst cowardice.

Time flows away like the water in the river.

The superior man thinks always of virtue; the common man thinks of comfort.

8.6 Lao Tzu: Unity with nature

The rational teachings of K'ung Fu-tzu were complemented by the more mystical and intuitive doctrines of Lao-tzu and his followers. Lao-tzu lived at about the same time as K'ung Fu-tzu, and he founded the Taoist religion. The Taoists believed that unity with nature could be achieved by passively blending oneself with the forces of nature.

On the whole, politicians and scholars followed the practical teachings of K'ung Fu-tzu, while poets and artists became Taoists. The intuitive sensitivity to nature inspired by Taoist beliefs allowed these artists and poets to achieve literature and art of unusual vividness and force with great economy of means. The Taoist religion has much in common with Buddhism, and its existence in China paved the way for the spread of Buddhism from India to China and Japan.

From 800 B.C. onwards, the central authority of the Chou dynasty weakened, and China was ruled by local landlords. This period of disunity was ended in 246 B.C. by Shih Huang Ti, a chieftain from the small northern state of Ch'in, who became the first real emperor of China. (In fact, China derives its name from the state of Ch'in).

Shih Huang Ti was an effective but ruthless ruler. It was during his reign (246 B.C. -210 B.C.) that the great wall of China was built. This wall, built to protect China from the savage attacks of the mounted Mongolian hordes, is one of the wonders of the world. It runs 1,400 miles, over all kinds of terrain, marking a rainfall boundary between the rich agricultural land to the south and the arid steppes to the north.

In most places, the great wall is 25 feet high and 15 feet thick. To complete this fantastic building project, Shih Huang Ti carried absolutism to great extremes, uprooting thousands of families and transporting them to the comfortless north to work on the wall. He burned all the copies of the Confucian classics which he could find, since his opponents quoted these classics to show that his absolutism had exceeded proper bounds.

Soon after the death of Shih Huang Ti, there was a popular reaction to the harshness of his government, and Shih's heirs were overthrown. However, Shih Huang Ti's unification of China endured, although the Ch'in dynasty (250 B.C. - 202 B.C.) was replaced by the Han dynasty (202 B.C. -220 A.D.). The Han emperors extended the boundaries of China to the west into Turkestan, and thus a trade route was opened, through which China exported silk to Persia and Rome.

During the Han period, China was quite receptive to foreign ideas, and was much influenced by the civilization of India. For example, the Chinese pagoda was inspired by the Buddhist shrines of India. The Han emperors adopted Confucianism as the official philosophy of China, and they had the Confucian classics recopied in large numbers. The invention of paper at the end of the first century A.D. facilitated this project, and it greatly stimulated scholarship and literature.

The Han emperors honored scholarship and, in accordance with the political ideas of K'ung Fu-tzu, they made scholarship a means of access to high governmental positions. During the Han dynasty, the imperial government carried through many large-scale irrigation and flood-control projects. These projects were very successful. They increased the food production of China, and gave much prestige to the imperial government.

Like the Roman Empire, the Han dynasty was ended by attacks of barbarians from the north. However, the Huns who overran northern China in 220 A.D. were quicker to adopt civilization than were the tribes which conquered Rome. Also, in the south, the Chinese remained independent; and therefore the dark ages of China were shorter than the European dark ages.

In 581 A.D., China was reunited under the Sui dynasty, whose emperors expelled most of the Huns, built a system of roads and canals, and constructed huge granaries for the prevention of famine. These were worthwhile projects, but in order to accomplish them, the Sui emperors used very harsh methods. The result was that their dynasty was soon overthrown and replaced by the T'ang dynasty (618 A.D. - 906 A.D.).

The T'ang period was a brilliant one for China. Just as Europe was sinking further and further into a mire of superstition, ignorance and bloodshed, China entered a period of peace, creativity and culture. During this period, China included Turkestan, northern Indochina and Korea. The T'ang emperors re-established and strengthened the system of civil-service examinations which had been initiated during the Han dynasty.

Some sayings of Lau Tzu

Being deeply loved by someone gives you strength, while loving someone deeply gives you courage.

Simplicity, patience, compassion. These three are your greatest treasures. Simple in actions and thoughts, you return to the source of being. Patient with both friends and enemies, you accord with the way things are. Compassionate toward yourself, you reconcile all beings in the world.

The journey of a thousand miles begins with a single step."

*Knowing others is intelligence; knowing yourself is true wisdom.
Mastering others is strength; mastering yourself is true power.*

A good traveler has no fixed plans and is not intent on arriving.

Life is a series of natural and spontaneous changes. Don't resist them; that only creates sorrow. Let reality be reality. Let things flow naturally forward in whatever way they like.

Those who know do not speak. Those who speak do not know.

When you are content to be simply yourself and don't compare or compete, everyone will respect you.

The truth is not always beautiful, nor beautiful words the truth

When I let go of what I am, I become what I might be.

Time is a created thing. To say 'I don't have time,' is like saying, 'I don't want to.'

Because one believes in oneself, one doesn't try to convince others. Because one is content with oneself, one doesn't need others' approval. Because one accepts oneself, the whole world accepts him or her.

A man with outward courage dares to die; a man with inner courage dares to live.

Care about what other people think and you will always be their prisoner.

If you are depressed you are living in the past. If you are anxious you are living in the future. If you are at peace you are living in the present.

Be careful what you water your dreams with. Water them with worry and fear and you will produce weeds that choke the life from your dream. Water them with optimism and solutions and you will cultivate success. Always be on the lookout for ways to turn a problem into an opportunity for success. Always be on the lookout for ways to nurture your dream.

Be content with what you have; rejoice in the way things are. When you realize there is nothing lacking, the whole world belongs to you.

Nature does not hurry, yet everything is accomplished.

Silence is a source of Great Strength.

Do you have the patience to wait until your mud settles and the water is clear?

If you understand others you are smart. If you understand yourself you are illuminated. If you overcome others you are powerful. If you overcome yourself you have strength. If you know how to be satisfied you are rich. If you can act with vigor, you have a will. If you don't lose your objectives you can be long-lasting. If you die without loss, you are eternal.

Kindness in words creates confidence. Kindness in thinking creates profoundness. Kindness in giving creates love.

Manifest plainness, Embrace simplicity, Reduce selfishness, Have few desires.

The flame that burns Twice as bright burns half as long.

Music in the soul can be heard by the universe.



Figure 8.6: Lao Tzu

Respond intelligently even to unintelligent treatment.

Act without expectation.

8.7 Socrates and Plato: Dialogues on ethics

The Sophists and Socrates

Since Athens was a democracy, the citizens often found themselves speaking at public meetings. Eloquence could be turned into influence, and the wealthy Athenians imported teachers to help them master the art of rhetoric. These teachers, called “Sophists” (literally “wisdomists”), besides teaching rhetoric, also taught a form of philosophy which denied the existence of absolute truth, absolute beauty and absolute justice. According to the Sophists, “man is the measure of all things”, all truths are relative, “beauty is in the eye of the beholder”, and justice is not divine or absolute but is a human institution.

Opposed to the Sophists was the philosopher Socrates, who believed passionately in the existence of the absolutes which the Sophists denied. According to Socrates, a beautiful object would be beautiful whether or not there were any humans to observe it. Socrates adopted from the Sophists a method of conducting arguments by asking questions which made people see for themselves the things which Socrates wanted them to see.

The Sophists talked about moral and political questions, rather than about the nature of the universe. Socrates was an opponent of the Sophists, but like them he also neglected

the study of nature and concentrated on the moral and political problems of man, “the measure of all things”. The Sophists, together with Socrates and his pupil Plato, exerted a great influence in causing a split between moral philosophy and natural philosophy.

The beginning of the end of classical Greek civilization came in 431 B.C., when Athens, pushing her aggressive commercial policy to an extreme, began to expel Corinthian merchants from markets around the Aegean. Corinth reacted by persuading the Peloponnesian League to declare war on Athens. This was the beginning of a long war which ruined Greece.

Realizing that they could not resist the Spartan land forces, the Athenians abandoned the farmland outside their city, and took refuge inside the walls. The Athenians continued their prosperous foreign trade, and they fed their population with grain imported from the east. Ships bringing grain also brought the plague. A large part of the population of Athens died of the plague, including the city’s great leader, Pericles. No leader of equal stature was found to replace him, and the democratic Athenian government degenerated into mob rule.

In 404 B.C., when the fleet of Athens was destroyed in a disastrous battle, the city surrendered to the Spartans. However, the Spartans remembered that without Athens, they would be unable to resist the Persian Empire. Therefore they did not destroy Athens totally, but were content to destroy the walls of Athens, reducing the city to the status of a satellite of Sparta.

Looking for scapegoats on whom to blame this disaster, the Athenian mobs seized Socrates (one of the few intellectuals who remained alive after the Peloponnesian War), and they condemned him to death for failing to believe in the gods of the city.

For a short period, Sparta dominated the Greek world; but soon war broke out again, and the political scene degenerated into a chaos of wars between the city states.

Plato

Darkness was falling on the classical Greek world, but the light of civilization had not quite gone out. Socrates was dead, but Plato, the student of Socrates, kept his memory alive by writing dialogues in which Socrates appeared as a character.

Plato (427 B.C. - 317 B.C.) was an Athenian aristocrat, descended from the early kings of Athens. His real name was Aristocles, but he was called by his nickname, Platon (meaning “broad”) because of his broad shoulders. After the death of Socrates, Plato left Athens, saying that the troubles of the city would never end until a philosopher became king. (He may have had himself in mind!) He travelled to Italy and studied under the Pythagoreans. In 387 he returned to Athens and founded a school, which was called the Academy because it stood on ground which had once belonged to a Greek named Academus.

Plato developed a philosophy which was based on the idealism of the Pythagoreans. In Pythagorean philosophy, a clear distinction was made between mathematical ideas and their physical expression. For example, geometry was considered to deal, not with real physical objects, but with idealized figures, constructed from lines of perfect straightness

Figure 8.7: **Socrates**

and infinite thinness. Plato developed and exaggerated the idealism of Pythagoras. In Plato's philosophy, the real world is corruptible and base, but the world of ideas is divine and eternal. A real table, for example, is an imperfect expression of the idea of a table. Therefore we ought to turn our eyes away from the real world and live in the world of ideas.

Plato's philosophy was just what the Athenians wanted! All around them, their world was crumbling. They gladly turned their backs on the unpleasantness of the real world, and accepted Plato's invitation to live in the world of ideas, where nothing decays and where the golden laws of mathematics rule eternally.

By all accounts, Plato was an excellent mathematician, and through his influence mathematics obtained a permanent place in education.

According to Plato, Socrates thought that knowledge is of the utmost importance because, since no man sins wittingly, only knowledge is needed to make men and women perfectly virtuous.

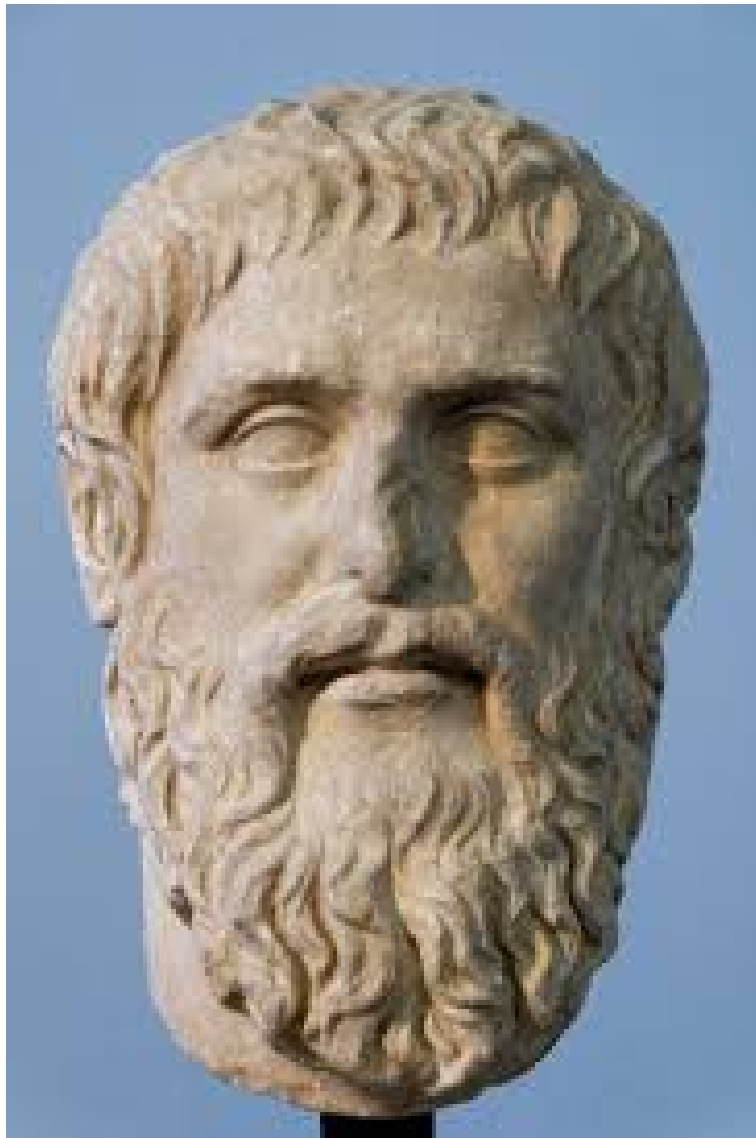


Figure 8.8: **Plato**

8.8 The ethical message of Greek drama

In ancient Greece, drama was an essential part of ethical culture. Performances of the plays of great dramatists, such as Sophocles, Aeschylus and Euripides, allowed the public to debate questions of morality. A recurring theme was the punishment of *hubris* (excessive pride) by *nemesis* (the revenge of the gods). Hubris is arrogance in word, deed and thought. For example, hubris is having or maintaining stubbornly an attitude which goes against or ignores, say, the prophecies, counsel or pronouncements of the Delphic Oracle. The central meaning of hubris is doing deeds and thinking thoughts more than a mere mortal human should do and think, thereby showing impiety towards the gods.

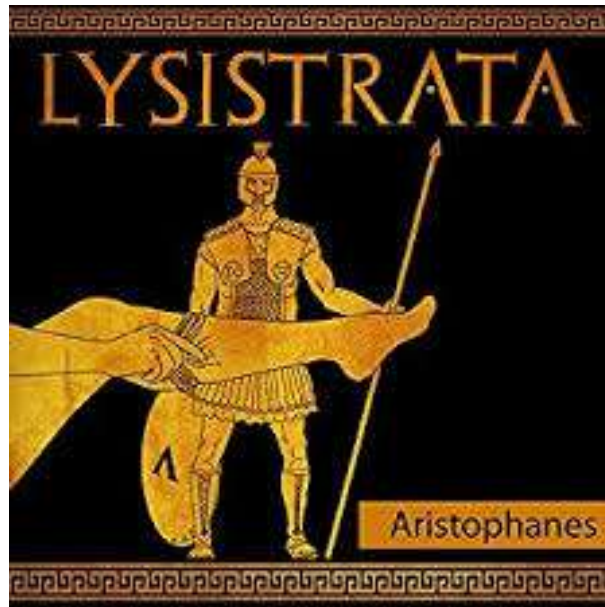
Starting in approximately 500 B.C., drama flourished in the Greek city-states, especially in Athens, which was an important cultural center. The presentation of dramas was part of a festival dedicated to the god Dionysus. Masks were used by the actors, and by members of the chorus. The chorus commented on the action, and often pointed to the moral that could be drawn from it.

***The Trojan Women*, by Euripides**

An example of a Greek tragedy with ethical implications, *The Trojan Women* follows the fate of the women of Troy after all their husbands and sons had been slaughtered by the conquering Greeks. The play makes it clear to the audience that the conquering Greeks were guilty of *hubris*.

***Lysistrata*, by Aristophanes**

Although *The Trojan Women* protested against the atrocities and horrors of war, the play did not attack the institution of war itself. However, in *Lysistrata*, a comedy by Aristophanes first performed in Athens in 411 B.C., war as an institution is attacked. In the play, the women of all parts of Greece are persuaded to withhold sex from their husbands and lovers until the painfully long Peloponnesian Wars are ended. After much comic struggle, the men, of course, give in and agree to peace, since their overpowering desire for sex is greater than their addiction to fighting.

Figure 8.9: **Lysistrata**

8.9 Christian ethics

The three Abrahamic religions, Judaism, Christianity and Islam, have a total of 4 billion followers today, of which 2.4 billion are Christian. At its start, the Christian religion can be seen as a reform of Jewish traditions, a protest against the overly legalistic teachings of the Pharisees and a revelation of a new, more powerful and more universal system of ethics. Later, Saint Paul saw it as his mission to bring Christianity to the Gentiles (i.e. non-Jews).

If Christian ethics were really followed, war would be impossible, but wars have nevertheless persisted, and many of the most brutal wars have been fought in the name of Christianity. In the words of the American poet, Edna St. Vincent Millay,¹

*Up goes the man of God before the crowd.
 With voice of honey and with eyes of steel
 He drones your humble Gospel to the proud.
 Nobody listens, less than the wind that blows
 Are all your words to us you died to save.
 Oh Prince of Peace! O Sharon's dewy Rose!
 How mute you lie within your vaulted grave!
 The stone the angel rolled away with tears
 Is back upon your mouth these thousand years.*

¹from her poem. *To Jesus, on His Birthday*

The Seven Deadly Sins

Here is a list of important human failings as recognized by Christianity. They are rooted in emotions which we share with our animal ancestors. Today these emotions are inappropriate for civilized human society, and they must be overwritten by ethical principles.

1. **LUST** Regarding lust, Schopenhauer wrote: *Lust is the ultimate goal of almost all human endeavor, exerts an adverse influence on the most important affairs, interrupts the most serious business, sometimes for a while confuses even the greatest minds, does not hesitate with its trumpery to disrupt the negotiations of statesmen and the research of scholars, has the knack of slipping its love-letters and ringlets even into ministerial portfolios and philosophical manuscripts.*
2. **GLUTTONY** Saint Thomas Aquinas argued that gluttony could include, besides eating too much, an obsessive anticipation of meals, and the constant eating of delicacies and excessively costly foods. He even proposed five categories of Gluttony: 1. *Laute: eating too expensively.* 2. *Studiose: eating too daintily.* 3. *Nimis: eating too much.* 4. *Praepropere: eating too soon.* 5. *Ardenter: eating too eagerly.*
3. **GREED** As defined outside Christian writings, greed is an inordinate desire to acquire or possess more than one needs, especially with respect to material wealth. Like pride, it can lead to not just some, but all evil. Saint Thomas Aquinas wrote: *Greed is a sin against God, just as all mortal sins, in as much as man condemns things eternal for the sake of temporal things.* In the New Testament, we can find many passages condemning greed, for example: *For the love of money is the root of all evil: which while some coveted after, they have erred from the faith, and pierced themselves through with many sorrows.* Timothy 6:10, and *Lay not up for yourselves treasures upon earth, where moth and rust doth corrupt, and where thieves break through and steal.* Mathew 6:19
4. **SLOTH** Unlike the other deadly sins, Sloth is characterized by sins of omission. In his play *Per Gynt*, Henrik Ibsen portrays his protagonist as hearing voices which tell him: *We are the tears you should have shed. That cutting ice, which all hearts dread, we could have melted, but now its dart is frozen into a stubborn heart. Our power is lost. We are the deeds you should have done, strangled by doubt, spoiled e're begun. At the judgement day, we will be there to tell our tale. How will you fare?* *Per Gynt* answers: *You can't condemn a man for what he has not done!*, but Ibsen's message is: Yes, you can condemn a person for sins of omission. They too are deadly sins.
5. **WRATH** According to the Catholic Church, *Hatred is the sin of desiring that someone else may suffer misfortune or evil, and is a mortal sin when one desires grave harm.* The Catholic Church also states that *If anger reaches the point of a deliberate desire to kill or seriously wound a neighbor, it is gravely against charity; it is a mortal sin.* We can also remember the words of Gautama Buddha, *Hatred does not cease by hatred at any time; hatred ceases by love.*

6. **ENVY** Envy can be directly related to the Ten Commandments, specifically, *Neither shall you covet... anything that belongs to your neighbor*. If we are free from envy, our happiness is greatly increased, since we can derive pleasure from the success and happiness of others.
7. **PRIDE** C.S. Lewis wrote that *Unchastity, anger, greed, drunkenness, and all that, are mere fleabites in comparison: it was through Pride that the devil became the devil: Pride leads to every other vice: it is the complete anti-God state of mind*. In ancient Greece, both philosophers and dramatists considered excessive pride, which they called *hubris*, to be a sin against the gods, which always led to punishment. According to Wikipedia, *Hubris means extreme pride or arrogance. Hubris often indicates a loss of contact with reality, and an overestimation of one's own competence or capabilities, especially when the person exhibiting it is in a position of power.... The word is also used to describe actions of those who challenged the gods or their laws, especially in Greek tragedy, resulting in the protagonist's fall*. We can think, for example of the Titanic. The invention and use of nuclear weapons can also be thought of as an example of *hubris*.

Excerpts from *The Sermon on the Mount*

Many of the important ethical principles of Christianity are contained in the Sermon on the Mount. Here is the first part of the sermon, as given by the Gospel According to Mathew, Chapter 6:

And seeing the multitudes, he went up into a mountain: and when he was set, his disciples came unto him: And he opened his mouth, and taught them, saying,

Blessed are the poor in spirit: for theirs is the kingdom of heaven.

Blessed are they that mourn: for they shall be comforted.

Blessed are the meek: for they shall inherit the earth.

Blessed are they which do hunger and thirst after righteousness: for they shall be filled.

Blessed are the merciful: for they shall obtain mercy.

Blessed are the pure in heart: for they shall see God.

Blessed are the peacemakers: for they shall be called the children of God.

Blessed are they which are persecuted for righteousness' sake: for theirs is the kingdom of heaven.

Blessed are ye, when men shall revile you, and persecute you, and shall say all manner of evil against you falsely, for my sake.

Rejoice, and be exceeding glad: for great is your reward in heaven: for so persecuted they the prophets which were before you.

Ye are the salt of the earth: but if the salt have lost his savour, wherewith shall it be salted? it is thenceforth good for nothing, but to be cast out, and to be trodden under foot of men.

Ye are the light of the world. A city that is set on an hill cannot be hid. Neither do men light a candle, and put it under a bushel, but on a candlestick; and it giveth light unto all that are in the house.

Let your light so shine before men, that they may see your good works, and glorify your Father which is in heaven.

Think not that I am come to destroy the law, or the prophets: I am not come to destroy, but to fulfil.

For verily I say unto you, Till heaven and earth pass, one jot or one tittle shall in no wise pass from the law, till all be fulfilled.

Whosoever therefore shall break one of these least commandments, and shall teach men so, he shall be called the least in the kingdom of heaven: but whosoever shall do and teach them, the same shall be called great in the kingdom of heaven.

For I say unto you, That except your righteousness shall exceed the righteousness of the scribes and Pharisees, ye shall in no case enter into the kingdom of heaven.

Ye have heard that it was said by them of old time, Thou shalt not kill; and whosoever shall kill shall be in danger of the judgment:

But I say unto you, That whosoever is angry with his brother without a cause shall be in danger of the judgment: and whosoever shall say to his brother, Raca, shall be in danger of the council: but whosoever shall say, Thou fool, shall be in danger of hell fire.

Therefore if thou bring thy gift to the altar, and there rememberest that thy brother hath ought against thee;

Leave there thy gift before the altar, and go thy way; first be reconciled to thy brother, and then come and offer thy gift.

Agree with thine adversary quickly, whiles thou art in the way with him; lest at any time the adversary deliver thee to the judge, and the judge deliver thee to the officer, and thou be cast into prison.

Verily I say unto thee, Thou shalt by no means come out thence, till thou hast paid the uttermost farthing. Ye have heard that it was said by them of old time, Thou shalt not commit adultery:

But I say unto you, That whosoever looketh on a woman to lust after her hath committed adultery with her already in his heart.

And if thy right eye offend thee, pluck it out, and cast it from thee: for it is profitable for thee that one of thy members should perish, and not that thy whole body should be cast into hell.

And if thy right hand offend thee, cut it off, and cast it from thee: for it is profitable for thee that one of thy members should perish, and not that thy whole body should be cast into hell.

It hath been said, Whosoever shall put away his wife, let him give her a writing of divorcement: But I say unto you, That whosoever shall put away his wife, saving for the cause of fornication, causeth her to commit adultery: and whosoever shall marry her that is divorced committeth adultery.

Again, ye have heard that it hath been said by them of old time, Thou shalt not forswear thyself, but shalt perform unto the Lord thine oaths:

But I say unto you, Swear not at all; neither by heaven; for it is God's throne:

Nor by the earth; for it is his footstool: neither by Jerusalem; for it is the city of the great King. Neither shalt thou swear by thy head, because thou canst not make one hair white or black. But let your communication be, Yea, yea; Nay, nay: for whatsoever is more than these cometh of evil. Ye have heard that it hath been said, An eye for an eye, and a tooth for a tooth:

But I say unto you, That ye resist not evil: but whosoever shall smite thee on thy right cheek, turn to him the other also.

And if any man will sue thee at the law, and take away thy coat, let him have thy cloke also.

And whosoever shall compel thee to go a mile, go with him twain.

Give to him that asketh thee, and from him that would borrow of thee turn not thou away.

Ye have heard that it hath been said, Thou shalt love thy neighbour, and hate thine enemy.

But I say unto you, Love your enemies, bless them that curse you, do good to them that hate you, and pray for them which despitefully use you, and persecute you;

That ye may be the children of your Father which is in heaven: for he maketh his sun to rise on the evil and on the good, and sendeth rain on the just and on the unjust.

For if ye love them which love you, what reward have ye? do not even the publicans the same?

And if ye salute your brethren only, what do ye more than others? do not even the publicans so?

Be ye therefore perfect, even as your Father which is in heaven is perfect.

Notice particularly that Christians are required to love their enemies and to do good to those who have wronged them. This seemingly impractical advice is in fact very practical. Endless escalating cycles of revenge and counter-revenge can only be prevented by unilateral acts of kindness.

But do the governments of supposedly Christian countries follow this commandment? Absolutely not! As Edna St. Vincent Millay says, “Nobody listens. Less than the winds that blow are all your words to us you died to save.”

Contrast the duty to love and do good to one’s enemies with the doctrine of massive retaliation which is built into the concept of nuclear deterrence. In a nuclear war, the hundreds of millions, or even billions, of victims in every country of the world, also neutral countries, would include people of every kind: women, men, old people, children and infants, completely irrespective of any degree of guilt that they might have. This type of killing has to be classified as genocide.

If Christians were true to their beliefs, not only nuclear war, but every kind of war would be forbidden to them.

The Parable of the Good Samaritan

All of the major religions of humanity contain some form of the Golden Rule. Christianity offers an especially clear statement of this central ethical principle: According to the Gospel of Luke, after being told that he must love his neighbor as much as he loves himself, a man asks Jesus, “Who is my neighbor?”. Jesus then replies with the Parable of

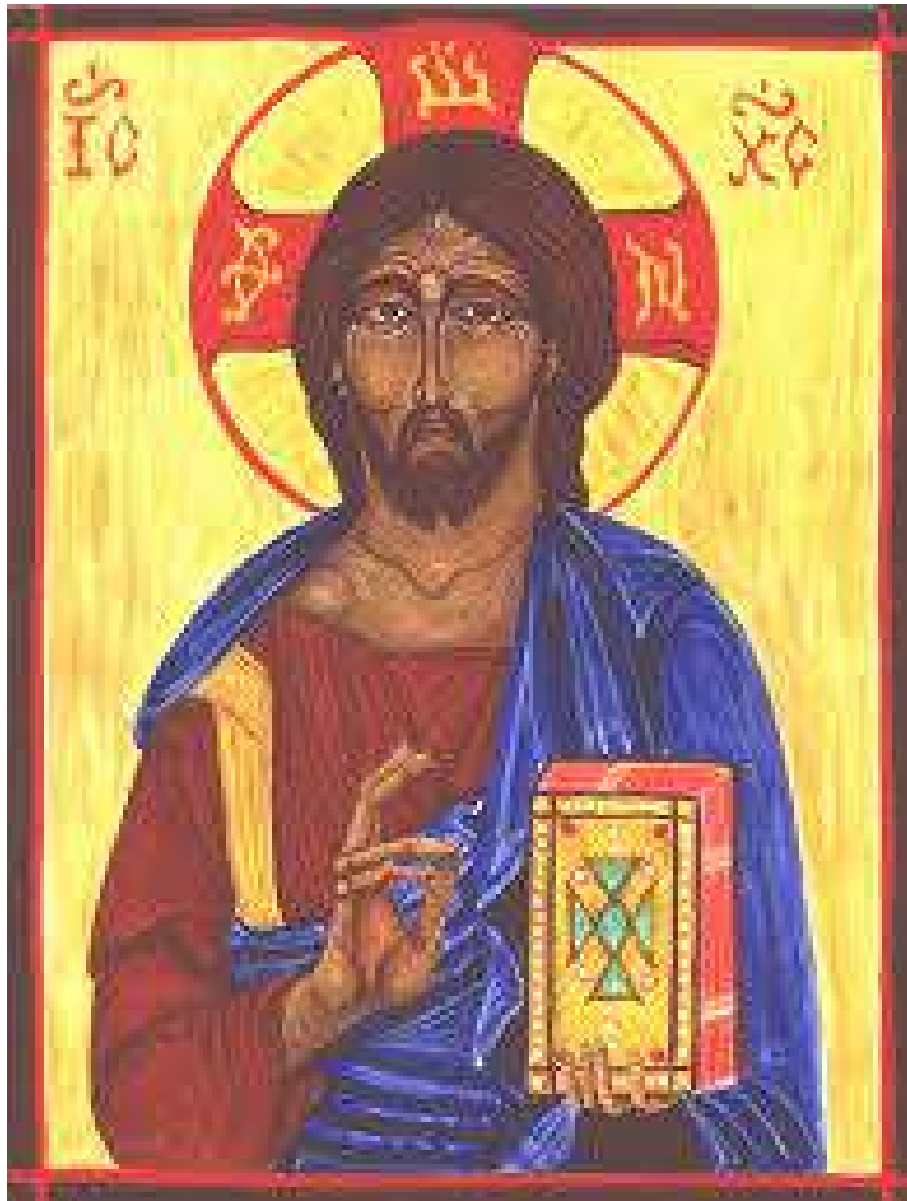


Figure 8.10: An ikon depicting Jesus

the Good Samaritan, in which we are told that our neighbor need not be a member of our own tribe, but can live far away and can belong to a completely different nation or ethnic group. Nevertheless, that person is still our neighbor, and deserves our love and care.

And, behold, a certain lawyer stood up, and tempted him, saying, Master, what shall I do to inherit eternal life?

He said unto him, What is written in the law? how readest thou?

And he answering said, Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy strength, and with all thy mind; and thy neighbour as thyself.

And he said unto him, Thou hast answered right: this do, and thou shalt live.

But he, willing to justify himself, said unto Jesus, And who is my neighbour?

And Jesus answering said, A certain man went down from Jerusalem to Jericho, and fell among thieves, which stripped him of his raiment, and wounded him, and departed, leaving him half dead.

And by chance there came down a certain priest that way: and when he saw him, he passed by on the other side.

And likewise a Levite, when he was at the place, came and looked on him, and passed by on the other side.

But a certain Samaritan, as he journeyed, came where he was: and when he saw him, he had compassion on him,

And went to him, and bound up his wounds, pouring in oil and wine, and set him on his own beast, and brought him to an inn, and took care of him.

And on the morrow when he departed, he took out two pence, and gave them to the host, and said unto him, Take care of him; and whatsoever thou spendest more, when I come again, I will repay thee.

Which now of these three, thinkest thou, was neighbour unto him that fell among the thieves?

And he said, He that shewed mercy on him. Then said Jesus unto him, Go, and do thou likewise.

Saint Paul's letter to the Corinthians

If I speak in the tongues of men or of angels, but do not have love, I am only a resounding gong or a clanging cymbal. If I have the gift of prophecy and can fathom all mysteries and all knowledge, and if I have a faith that can move mountains, but do not have love, I am nothing. If I give all I possess to the poor and give over my body to hardship that I may boast, but do not have love, I gain nothing.

Love is patient, love is kind. It does not envy, it does not boast, it is not proud. It does not dishonor others, it is not self-seeking, it is not easily angered, it keeps no record of wrongs. Love does not delight in evil but rejoices with the truth. It always protects, always trusts, always hopes, always perseveres. Love never fails. But where there are prophecies, they will cease; where there are tongues, they will be stilled; where there is knowledge, it will pass away. For we know in part and we prophesy in part, but when completeness comes,

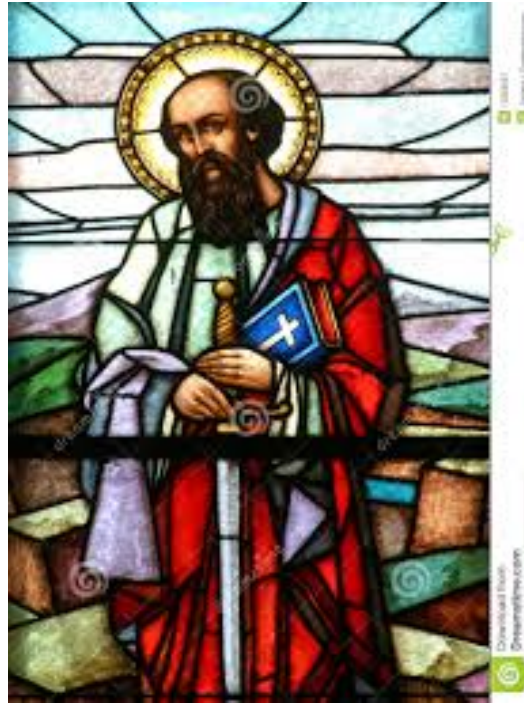


Figure 8.11: **Saint Paul**

what is in part disappears. When I was a child, I talked like a child, I thought like a child, I reasoned like a child. When I became a man, I put the ways of childhood behind me. For now we see only a reflection as in a mirror; then we shall see face to face. Now I know in part; then I shall know fully, even as I am fully known.

And now these three remain: faith, hope and love. But the greatest of these is love.



Figure 8.12: Saint Francis, in a painting by Giotto, preaching to the birds. Today Pope Francis I carries to us the message of Saint Francis. Pope Francis tells us that the true interpretation of Christianity includes respect for nature, social justice and opposition to the institution of war.

8.10 The ethical message of Islam

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 Rhazes (c. 860 - c. 950). He was born in the ancient city of Ray, near Teheran, and his name means "the man from Ray". Rhazes 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. Rhazes 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 Hussain Ibn Abdullah Ibn Sina, 980-1037), was also a Persian, like Rhazes. 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 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.

A few verses from the Quran

1. THE OPENING:

All praise is due to Allah, the Lord of the Worlds.

The Beneficent, the Merciful.

Master of the Day of Judgment.

Thee do we serve and Thee do we beseech for help.

Keep us on the right path.

The path of those upon whom Thou hast bestowed favors.

Not (the path) of those upon whom Thy wrath is brought down, nor of those who go astray.

107. ALMS

In the name of Allah, the Beneficent, the Merciful.

Have you considered him who calls the judgment a lie?

That is the one who treats the orphan with harshness,

*And does not urge (others) to feed the poor.
So woe to the praying ones,
Who are unmindful of their prayers,
Who do (good) to be seen,
And withhold the necessities of life.*

109. THE DISBELIEVERS

*In the name of Allah, the Beneficent, the Merciful.
Say: O unbelievers!
I do not serve that which you serve,
Nor do you serve Him Whom I serve:
Nor am I going to serve that which you serve,
Nor are you going to serve Him Whom I serve:
You shall have your religion and I shall have my religion.*

112. THE UNITY

*In the name of Allah, the Beneficent, the Merciful.
Say: He, Allah, is One.
Allah is He on Whom all depend.
He begets not, nor is He begotten.
And none is like Him.*

113. THE DAWN

*In the name of Allah, the Beneficent, the Merciful.
Say: I seek refuge in the Lord of the dawn,
From the evil of what He has created,
And from the evil of the utterly dark night when it comes,
And from the evil of those who blow on knots,
And from the evil of the envious when he envies.*

114. THE PEOPLE

*In the name of Allah, the Beneficent, the Merciful.
Say: I seek refuge in the Lord of men,
The King of men,
The God of men,
From the evil of the whisperings of the slinking (Shaitan),
Who whispers into the hearts of men,
From among the jinn and the men.*



Figure 8.13: Mosaics at the Alhambra



Figure 8.14: Mosaics at the Alhambra



Figure 8.15: The interior of the great mosque at Isfahan

8.11 East-West exchanges in Toledo

In the 12th century, parts of Spain, including the city of Toledo, were reconquered by the Christians. Toledo had been an Islamic cultural center, and many Muslim scholars, together with their manuscripts, remained in the city when it passed into the hands of the Christians. Thus Toledo became a center for the exchange of ideas between east and west; and it was in this city that many of the books of the classical Greek and Hellenistic philosophers were translated from Arabic into Latin.

Toledo had been an Islamic cultural center, and many Moslem scholars, together with their manuscripts, remained in the city when it passed into the hands of the Christians. Thus Toledo became a center for the exchange of ideas between east and west; and it was in this city that many of the books of the classical Greek and Hellenistic philosophers were translated from Arabic into Latin. By this roundabout route the culture that was lost because of the burning of the Great Library at Alexandria reentered the consciousness of Europe and contributed to the Renaissance.

In the 12th century, the translation was confined to books of science and philosophy. Classical Greek literature was forbidden by both the Christian and Moslem religions; and the beautiful poems and dramas of Homer, Sophocles and Euripides were not translated into Latin until the time of the Renaissance Humanists.

It is interesting and inspiring to visit Toledo. A tourist there can see ample evidence of a period of tolerance and enlightenment, when members of the three Abrahamic religions, Christianity, Judaism and Islam, lived side by side in harmony and mutual respect, exchanging important ideas which were to become the foundations of our modern civilization. One can also see a cathedral, a mosque and a synagogue, in each of which craftsmen from all three faiths worked cooperatively to produce a beautiful monument to human solidarity.



Figure 8.16: A view of Toledo

8.12 Tolstoy, Gandhi and non-violence

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 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..."

"This year, in the spring, at a Scripture examination in a girls' high school in Moscow, the teacher and the bishop present asked the girls questions on the Commandments, and especially on the sixth. After a correct answer, the bishop generally put another question, whether murder was always in all cases forbidden by God's law; and the unhappy young ladies were forced by previous instruction to answer 'not always' - that murder was permitted in war and in the execution of criminals. Still, when one of these unfortunate young ladies (what I am telling is not an invention, but a fact told to me by an eye witness) after her first answer, was asked the usual question, if killing was always sinful, she, agitated and blushing, decisively answered 'Always', and to all the usual sophisms of the bishop, she answered with decided conviction that killing always was forbidden in the Old Testament and forbidden by Christ, not only killing, but every wrong against a brother. Notwithstanding all his grandeur and arts of speech, the bishop became silent and the girl remained victorious."

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.

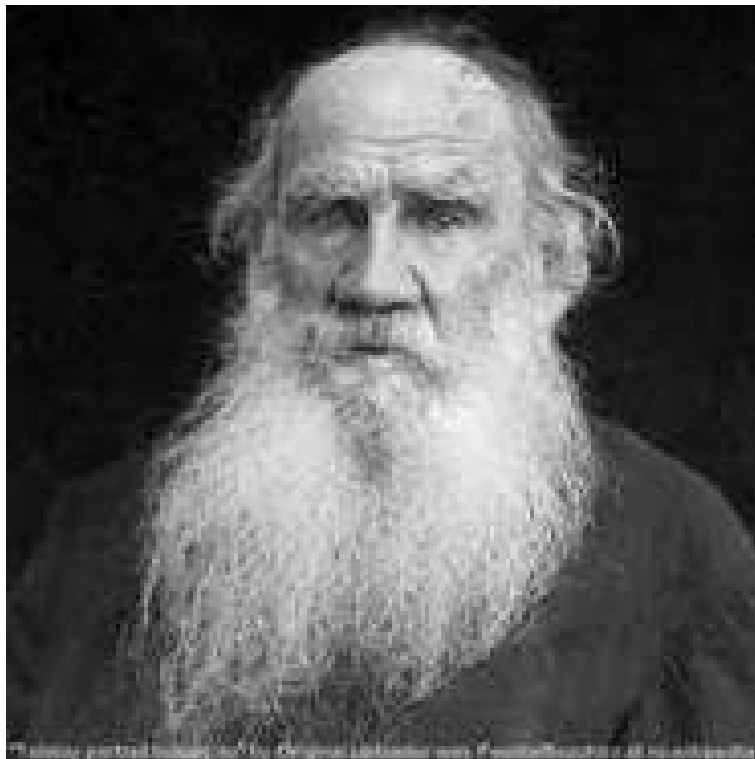


Figure 8.17: **Count Leo Tolstoy**



Figure 8.18: Mahatma Gandhi firmly rejected the pernicious doctrine that “the end justifies the means”. Gandhi said: “They say ‘means are after all means’. I would say ‘means are after all everything’. As the means so the end..... There is no wall of separation between means and end. Indeed the Creator has given us control (and that too very limited) over means, none over the end... The means may be likened to a seed, the end to a tree, and there is just the same inviolable connection between the means and the end as there is between the seed and the tree.”

8.13 We stand on each other's shoulders

Cultural evolution depends on the non-genetic storage, transmission, diffusion and utilization of information. The development of human speech, the invention of writing, the development of paper and printing, and finally, in modern times, mass media, computers and the Internet: all these have been crucial steps in society's explosive accumulation of information and knowledge. Human cultural evolution proceeds at a constantly-accelerating speed, so great in fact that it threatens to shake society to pieces.

In many respects, our cultural evolution can be regarded as an enormous success. However, at the start of the 21st century, most thoughtful observers agree that civilization is entering a period of crisis. As all curves move exponentially upward, population, production, consumption, rates of scientific discovery, and so on, one can observe signs of increasing environmental stress, while the continued existence and spread of nuclear weapons threaten civilization with destruction. Thus, while the explosive growth of knowledge has brought many benefits, the problem of achieving a stable, peaceful and sustainable world remains serious, challenging and unsolved.

Our modern civilization has been built up by means of a worldwide exchange of ideas and inventions. It is built on the achievements of many ancient cultures. China, Japan, India, Mesopotamia, Egypt, Greece, the Islamic world, Christian Europe, and the Jewish intellectual traditions, all have contributed. Potatoes, corn, squash, vanilla, chocolate, chili peppers, and quinine are gifts from the American Indians.

The sharing of scientific and technological knowledge is essential to modern civilization. The great power of science is derived from an enormous concentration of attention and resources on the understanding of a tiny fragment of nature. It would make no sense to proceed in this way if knowledge were not permanent, and if it were not shared by the entire world.

Science is not competitive. It is cooperative. It is a great monument built by many thousands of hands, each adding a stone to the cairn. This is true not only of scientific knowledge but also of every aspect of our culture, history, art and literature, as well as the skills that produce everyday objects upon which our lives depend. Civilization is cooperative. It is not competitive.

Our cultural heritage is not only immensely valuable; it is also so great that no individual comprehends all of it. We are all specialists, who understand only a tiny fragment of the enormous edifice. No scientist understands all of science. Perhaps Leonardo da Vinci could come close in his day, but today it is impossible. Nor do the vast majority people who use cell phones, personal computers and television sets every day understand in detail how they work. Our health is preserved by medicines, which are made by processes that most of us do not understand, and we travel to work in automobiles and buses that we would be completely unable to construct.

The fragility of modern society

As our civilization has become more and more complex, it has become increasingly vulnerable to disasters. We see this whenever there are power cuts or transportation failures due to severe storms. If electricity should fail for a very long period of time, our complex society would cease to function. The population of the world is now so large that it is completely dependent on the high efficiency of modern agriculture. We are also very dependent on the stability of our economic system.

The fragility of modern society is particularly worrying, because, with a little thought, we can predict several future threats which will stress our civilization very severely. We will need much wisdom and solidarity to get safely through the difficulties that now loom ahead of us.

We can already see the the problem of famine in vulnerable parts of the world. Climate change will make this problem more severe by bringing aridity to parts of the world that are now large producers of grain, for example the Middle West of the United States. Climate change has caused the melting of glaciers in the Himalayas and the Andes. When these glaciers are completely melted, China, India and several countries in South America will be deprived of their summer water supply. Water for irrigation will also become increasingly problematic because of falling water tables. Rising sea levels will drown many rice-growing areas in South-East Asia. Finally, modern agriculture is very dependent on fossil fuels for the production of fertilizer and for driving farm machinery. In the future, high-yield agriculture will be dealt a severe blow by the rising price of fossil fuels.

Economic collapse is another threat that we will have to face in the future. Our present fractional reserve banking system is dependent on economic growth. But perpetual growth of industry on a finite planet is a logical impossibility. Thus we are faced with a period of stress, where reform of our growth-based economic system and great changes of lifestyle will both become necessary.

How will we get through the difficult period ahead? I believe that solutions to the difficult problems of the future are possible, but only if we face the problems honestly and make the adjustments which they demand. Above all, we must maintain our human solidarity.

The great and complex edifice of human civilization is far too precious to be risked in a thermonuclear war. It has been built by all humans, working together. And by working together, we must now ensure that it is handed on intact to our children and grandchildren.

8.14 The collective human consciousness

No man is an island entire of itself; every man is a piece of the continent, a part of the main, John Donne (1572-1631)

If I have seen further it is by standing on ye shoulders of Giants, Isaac Newton (1643-1727)

One needs an exceptional stupidity even to question the urgency we are under to establish some effective World Pax, before gathering disaster overwhelms us. The problem of reshaping human affairs on a world-scale, this World problem, is drawing together an ever-increasing multitude of minds. H.G. Wells (1866-1946)

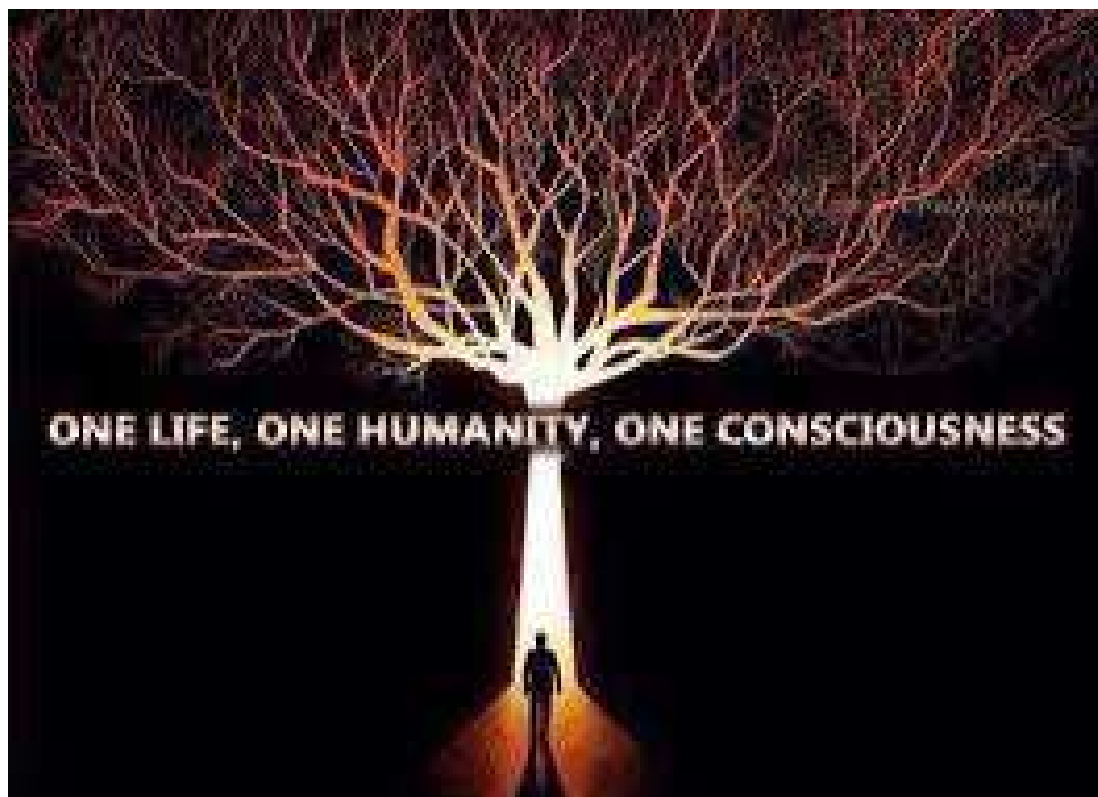
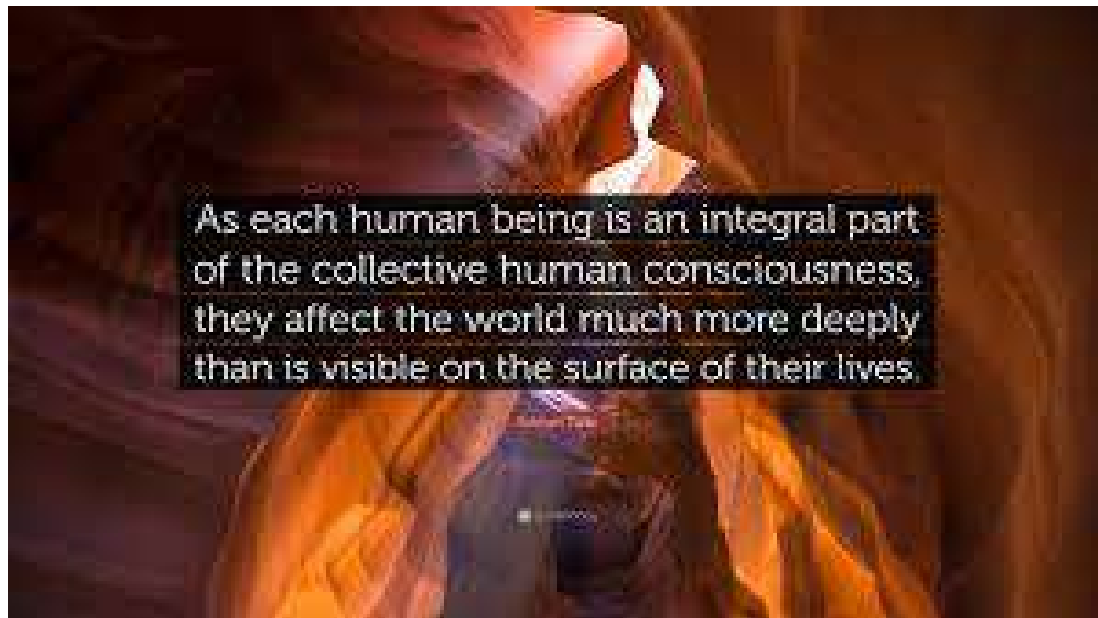
The Open Access Movement has fought valiantly to ensure that scientists do not sign their copyrights away but instead ensure their work is published on the Internet, under terms that allow anyone to access it., Aaron Schwartz (1986-2013)

Sharp qualitative discontinuities have occurred several times before during the earth's 4-billion year evolutionary history: A dramatic change occurred when autocatalytic systems first became surrounded by a cell membrane. Another sharp transition occurred when photosynthesis evolved, and a third when the enormously more complex eukaryotic cells developed from the prokaryotes. The evolution of multicellular organisms also represents a sharp qualitative change. Undoubtedly the change from molecular information transfer to cultural information transfer is an even more dramatic shift to a higher mode of evolution than the four sudden evolutionary gear-shifts just mentioned. Human cultural evolution began only an instant ago on the time-scale of genetic evolution. Already it has completely changed the planet. We have no idea where it will lead.

The whole is greater than the sum of its parts. Human society is a superorganism, far greater than any individual in history or in the present. The human superorganism has a supermind, a collective consciousness far greater than the consciousness of individuals. Each individual contributes a stone to the cairn of civilization, but our astonishing understanding of the universe is a collective achievement.

Science derives its great power from the concentration of enormous resources on a tiny fragment of reality. It would make no sense to proceed in this way if knowledge were not permanent and if information were not shared globally. But scientists of all nations pool their knowledge at international conferences and through international publications. Scientists stand on each other's shoulders. Their shared knowledge is far greater than the fragments that each contributes.

Other aspects of culture are also cooperative and global. For example, Japanese woodblock printers influenced the French Impressionists. The nonviolent tradition of Shelly, Thoreau, Tolstoy, Gandhi, Martin Luther King and Nelson Mandela is international. Culture is cooperative. It is not competitive. Global cultural cooperation can lead us to a sustainable and peaceful society. Our almost miraculous modern communications media, if properly used, can give us a stable, prosperous and cooperative future society.





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