

ETHICS FOR THE FUTURE

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Introduction¹

Cultural evolution

In all terrestrial organisms, information is transmitted between generations by means of the genetic code; and genetic evolution takes place through natural selection acting on modifications of this code. In human cultural evolution, information is also transmitted between generations by means of language and writing. This second mode of evolution gave our species enormous adaptive advantages. While genetic changes are random and slow, cultural changes are purposeful and rapid. For example, when our ancestors moved out of Africa and spread over Europe and Asia, they did not adapt to the colder climate by growing long fur, but instead invented clothing.

Anachronistic human emotions

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.

After the invention of agriculture, roughly 10,000 years ago, humans began to live in societies 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.

The very long childhood of humans allows learned behavior to overwrite instinctive behavior.

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, politeness and kindness. The success of human cultural evolution demonstrates that this is possible. Ethics can overwrite tribalism!

¹This book draws heavily on chapters that I have previously published in various books, but a considerable amount of new material has also been added.

It is no accident that the great historical pioneers of ethics lived at a time when the agricultural revolution had made it possible for humans to abandon their hunter-gather lifestyle and to live in settled communities. Neolithic villages appeared in Europe, India, Egypt, China, and Mesoamerica. As agricultural civilization progresses, the political units that had to be held together by ethics and laws became still larger - cities, and then nations. Our early hunter-gatherer ancestors had long practiced fierce inter-tribal warfare as they competed for territory on the grasslands of Africa. However, after the neolithic agricultural revolution, the settlement of multi-ethnic communities required new ethics to overwrite our anachronistic tribal emotions and behavior patterns. Thus we see the appearance of great social philosophers and religious leaders who developed ethical principles at precisely the time when they were needed.

Science and technology have changed our world

During the initial stages of human cultural evolution, the rate of change was slow enough for genetic adaptation to keep pace. The co-evolution of speech, tool use, and an enlarged brain in hominids took place over a period of several million years, and there was ample time for cultural evolution and genetic adaptation to follow each other. The prolonged childhood that characterizes our species, and the behavior patterns of familial and tribal solidarity, were built into the genomes of our ancestors during the era of slow change, when cultural and genetic evolution moved together in equilibrium. However, as the pace of cultural information accumulation quickened, genetic change could no longer keep up.

Genetically we are almost identical with our Neolithic ancestors; but their world has been replaced by a world of quantum theory, relativity, supercomputers, antibiotics, genetic engineering and space telescopes - unfortunately also a world of nuclear weapons and nerve-gas. Because of the slowness of genetic evolution in comparison to the rapid and constantly-accelerating rate of cultural change, our bodies and emotions are not adapted to our new way of life. They still reflect the way of life of our hunter-gatherer ancestors. Luckily, education in ethical principles is able to overwrite our anachronistic emotions and behavior patterns.

Global ethics

Today we live in a society where global communication is instantaneous, and where countries throughout the world interact economically. We need a global ethical system to match our technologically advanced global society. A society that is technologically advanced, but ethically primitive, will destroy itself. To avert the twin threats of catastrophic climate change and an all-destroying nuclear war, our economic system must be given both an ecological conscience and a social conscience. We must construct a system of international law and governance that is appropriate for a united world. And finally, we need an ethical system in which loyalty to our own family and nation is broadened into loyalty to the large human family that includes all nations and all ethnic groups.

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

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Chapter 1

CULTURAL EVOLUTION AND THE NEED FOR ETHICS

1.1 Human cultural evolution

In all terrestrial organisms, information is transmitted between generations by means of the genetic code; and genetic evolution takes place through natural selection acting on modifications of this code. In human cultural evolution, information is also transmitted between generations by means of language. This second mode of evolution gave our species enormous adaptive advantages. While genetic changes are random and slow, cultural changes are purposeful and rapid. For example, when our ancestors moved out of Africa and spread over Europe and Asia, they did not adapt to the colder climate by growing long fur, but instead invented clothing.

An acceleration of human cultural development seems to have begun approximately 40,000 years ago. The first art objects date from that period, as do migrations which 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,¹ 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.

In the caves of Spain and southern France are the remains of vigorous hunting cultures which flourished between 30,000 and 10,000 years ago. The people of these upper Paleolithic cultures lived on the abundant cold-weather game which roamed the southern edge of the ice sheets during the Wurm glacial period: huge herds of reindeer, horses and wild cattle, as well as mammoths and woolly rhinos. The paintings found in the Dordogne

¹ A shaman is a special member of a hunting society who, while in a trance, is thought to be able to pass between the upper world, the present world, and the lower world, to cure illnesses, and to insure the success of a hunt.

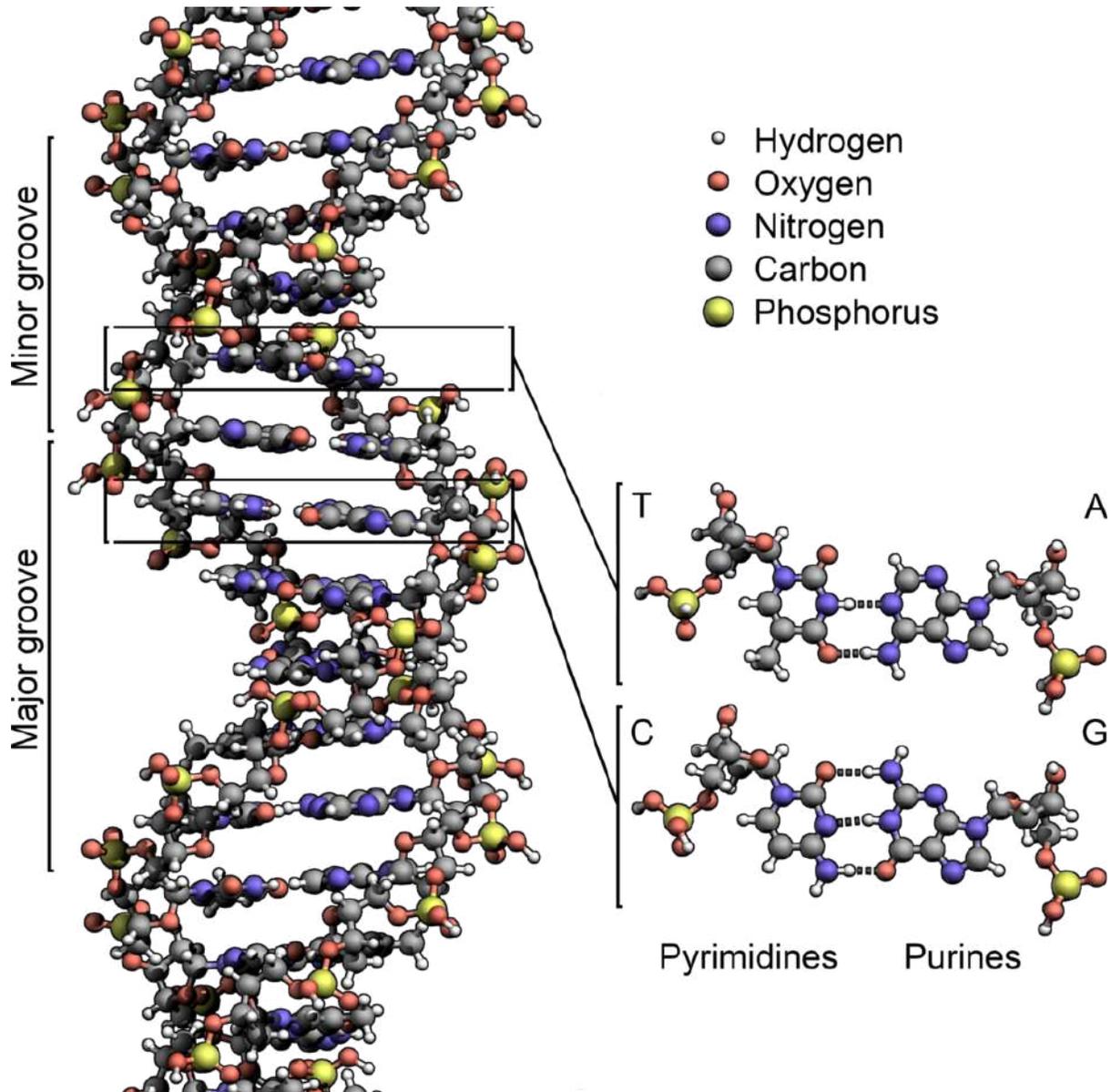


Figure 1.1: Genetic evolution takes place through changes in the DNA of an organism. The illustration shows the structure of DNA



Figure 1.2: Cultural evolution takes place through non-genetic methods for passing information between generations, for example through written texts. The illustration shows a tablet with proto-cuneiform pictographic characters from the end of 4th millennium BC.

region of France, for example, combine decorative and representational elements in a manner which contemporary artists might envy. Sometimes among the paintings are stylized symbols which can be thought of as the first steps towards writing.

In this period, not only painting, but also tool-making and weapon-making were highly developed arts. For example, the Solutrian culture, which flourished in Spain and southern France about 20,000 years ago, produced beautifully worked stone lance points in the shape of laurel leaves and willow leaves. The appeal of these exquisitely pressure-flaked blades must have been aesthetic as well as functional. The people of the Solutrian culture had fine bone needles with eyes, bone and ivory pendants, beads and bracelets, and long bone pins with notches for arranging the hair. They also had red, yellow and black pigments for painting their bodies. The Solutrian culture lasted for 4,000 years. It ended in about 17,000 B.C. when it was succeeded by the Magdalenian culture. Whether the Solutrian people were conquered by another migrating group of hunters, or whether they themselves developed the Magdalenian culture we do not know.

1.2 The neolithic agricultural revolution

Beginning about 10,000 B.C., the way of life of the hunters was swept aside by a great cultural revolution: the invention of agriculture. The earth had entered a period of unusual climatic stability, and this may have helped to make agriculture possible. The first agricultural villages date from this time, as well as the earliest examples of pottery. Dogs and reindeer were domesticated, and later, sheep and goats. Radio-carbon dating shows that by 8,500 B.C., people living in the caves of Shanidar in the foothills of the Zagros mountains in Iran had domesticated sheep. By 7,000 B.C., the village farming community at Jarmo in Iraq had domesticated goats, together with barley and two different kinds of wheat.

Starting about 8000 B.C., rice came under cultivation in East Asia. This may represent an independent invention of agriculture, and agriculture may also have been invented independently in the western hemisphere, made possible by the earth's unusually stable climate during this period. At Jericho, in the Dead Sea valley, excavations have revealed a prepottery neolithic settlement surrounded by an impressive stone wall, six feet wide and twelve feet high. Radiocarbon dating shows that the defenses of the town were built about 7,000 B.C. Probably they represent the attempts of a settled agricultural people to defend themselves from the plundering raids of less advanced nomadic tribes.

Starting in western Asia, the neolithic agricultural revolution swept westward into Europe, and eastward into the regions that are now Iran and India. By 4,300 B.C., the agricultural revolution had spread southwest to the Nile valley, where excavations along the shore of Lake Fayum have revealed the remains of grain bins and silos. The Nile carried farming and stock-breeding techniques slowly southward, and wherever they arrived, they swept away the hunting and food-gathering cultures. By 3,200 B.C. the agricultural revolution had reached the Hyrax Hill site in Kenya. At this point the southward movement of agriculture was stopped by the swamps at the headwaters of the Nile. Meanwhile, the

Mediterranean Sea and the Danube carried the revolution westward into Europe. Between 4,500 and 2,000 B.C. it spread across Europe as far as the British Isles and Scandinavia.

However, western Asia was only one of the places where the agricultural revolution took place. Wikipedia states that “ Agriculture began independently in different parts of the globe, and included a diverse range of taxa. At least eleven separate regions of the Old and New World were involved as independent centers of origin.

“Wild grains were collected and eaten from at least 20,000 BC. From around 9,500 BC, the eight Neolithic founder crops - emmer wheat, einkorn wheat, hulled barley, peas, lentils, bitter vetch, chick peas, and flax - were cultivated in the Levant. Rice was domesticated in China between 11,500 and 6,200 BC, followed by mung, soy and azuki beans. Pigs were domesticated in Mesopotamia around 11,000 BC, followed by sheep between 11,000 and 9,000 BC. Cattle were domesticated from the wild aurochs in the areas of modern Turkey and Pakistan around 8,500 BC. Sugarcane and some root vegetables were domesticated in New Guinea around 7,000 BC. Sorghum was domesticated in the Sahel region of Africa by 5,000 BC. In the Andes of South America, the potato was domesticated between 8,000 and 5,000 BC, along with beans, coca, llamas, alpacas, and guinea pigs. Bananas were cultivated and hybridized in the same period in Papua New Guinea. In Mesoamerica, wild teosinte was domesticated to maize by 4,000 BC. Cotton was domesticated in Peru by 3,600 BC. Camels were domesticated late, perhaps around 3,000 BC.”



Figure 1.3: Area of the fertile crescent, c. 7500 BCE, with main archaeological sites of the Pre-Pottery Neolithic period. The area of Mesopotamia proper did not have settlements until later.



Figure 1.4: Neolithic grindstone or quern for processing grain.



Figure 1.5: Genetic analysis on the spread of barley from 9,000 to 2,000 BP.

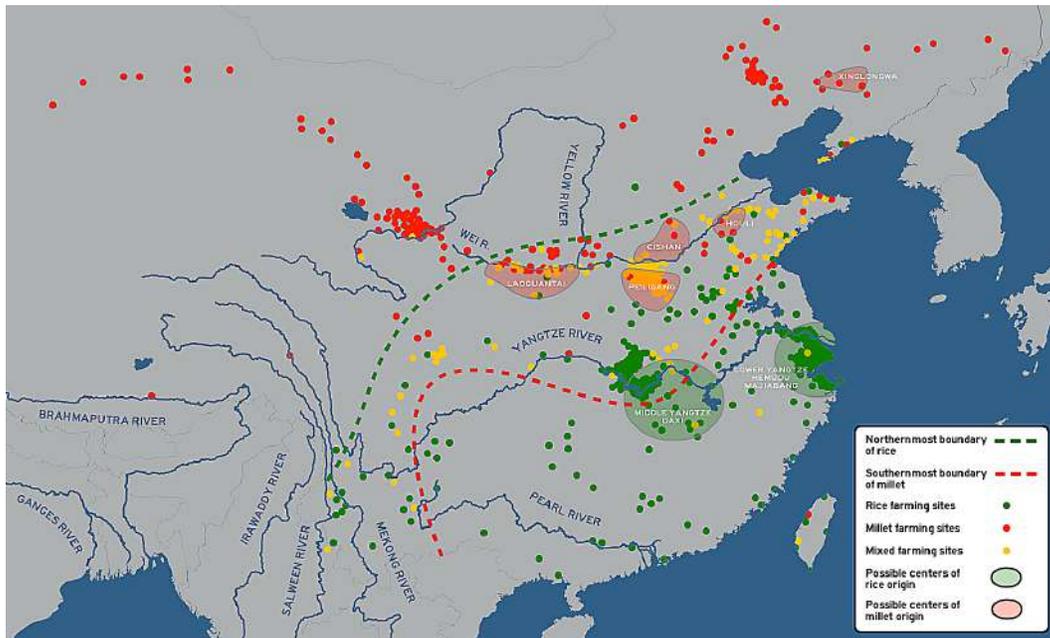


Figure 1.6: Spatial distribution of rice, millet and mixed farming sites in Neolithic China.

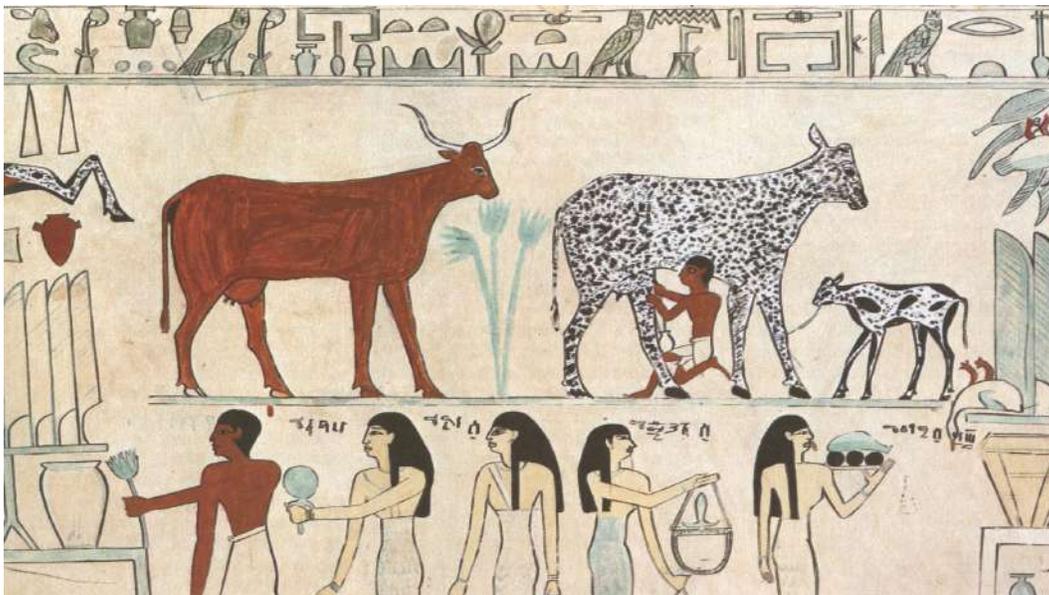


Figure 1.7: Domesticated cow being milked in Ancient Egypt.

1.3 Anachronistic human emotions

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 enforceable 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 species 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. /

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 chronicle 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



Figure 1.8: Adam and Eve in paradise (The Fall), Eve gives Adam the forbidden fruit, by Lucas Cranach the Elder, 1533. The biblical story of the expulsion of Adam and Eve from the Garden of Eden contains an element of historical truth. With the invention of agriculture, human populations became so large that that only agriculture could support them,

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.

1.4 Great pioneers of ethics

It is no accident that the great historical pioneers of ethics lived at a time when the agricultural revolution had made it possible for humans to abandon their hunter-gather lifestyle and to live in settled communities. Neolithic villages appeared in Europe, India, Egypt, China, and Mesoamerica. As agricultural civilization progresses, the political units that had to be held together by ethics and laws became still larger - cities, and then nations. Our early hunter-gatherer ancestors had long practiced fierce inter-tribal warfare as they competed for territory on the grasslands of Africa. However, after the neolithic agricultural revolution, the settlement of multi-ethnic communities required new ethics to overwrite our anachronistic tribal emotions and behavior patterns. Thus we see the appearance of great social philosophers and religious leaders who developed ethical principles at precisely the time when they were needed.



Figure 1.9: In Raphael's fresco *The School of Athens*, Pythagoras is shown writing in a book as a young man presents him with a tablet showing a diagrammatic representation of a lyre above a drawing of the sacred tetractys. Pythagoras was both a religious reformer and a scientist. His ethical ideal was harmony, and he found a kinship between social harmony and harmony in the physical and mathematical world.



Figure 1.10: Plato (left) and Aristotle (right) a detail of The School of Athens, a fresco by Raphael. Aristotle gestures to the earth while holding a copy of his Nicomachean Ethics in his hand. Plato holds his Timaeus and gestures to the heavens.



Figure 1.11: Moses by Michelangelo Buonarroti, 1513-1515, in Basilica San Pietro in Vincoli, Rome. The Ten Commandments are basic to ethics.



Figure 1.12: *Sermon on the Mount*, by Carl Bloch, 1877, depicts Jesus' important discourse. One of the most important principles from this sermon is our duty to love and forgive our enemies. This ethical principle, if followed, would make war impossible.



Figure 1.13: Confucius, Philosopher of the Chinese, published by Jesuit missionaries at Paris in 1687. The ethics of Confucius aim at defining the proper behavior needed for a harmonious society.



Figure 1.14: Gautama Buddha, Buddhist temple, Chennai, Tamil Nadu, India. The ethics of Buddha aim at removing the causes of human suffering.

1.5 Science and technology change our world

Modern science has, for the first time in history, offered humankind the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of death through infectious disease. At the same time, science has given humans the power to obliterate their civilization with nuclear weapons, or to make the earth uninhabitable through overpopulation and pollution. The question of which of these paths we choose is literally a matter of life or death for ourselves and our children.

Will we use the discoveries of modern science constructively, and thus choose the path leading towards life? Or will we use science to produce more and more lethal weapons, which sooner or later, through a technical or human failure, may result in a catastrophic nuclear war? Will we thoughtlessly destroy our beautiful planet through unlimited growth of population and industry? The choice among these alternatives is ours to make. We live at a critical moment of history - a moment of crisis for civilization.

Measured on the time-scale of genetic evolution, the cultural evolution of our species has been astonishingly rapid. Humans have been living on the earth for roughly two million years (more or less depending on where one draws the line between our human and prehuman ancestors). During almost all of this time, our ancestors lived by hunting and food-gathering. They were not at all numerous, and not conspicuously different from other animals.

Then, suddenly, during the brief space of ten thousand years, our species exploded in numbers from a few million to more than seven billion, populating all parts of the earth, and even setting foot on the moon. Genetically, we are almost identical with our hunter-gatherer ancestors who lived 10,000-40,000 years ago, but cultural evolution has changed our way of life beyond recognition.

During the initial stages of human cultural evolution, the rate of change was slow enough for genetic adaptation to keep pace. The co-evolution of speech, tool use, and an enlarged brain in hominids took place over a period of several million years, and there was ample time for cultural evolution and genetic adaptation to follow each other. The prolonged childhood that characterizes our species, and the behavior patterns of familial and tribal solidarity, were built into the genomes of our ancestors during the era of slow change, when cultural and genetic evolution moved together in equilibrium. However, as the pace of cultural information accumulation quickened, genetic change could no longer keep up.

Genetically we are almost identical with our Neolithic ancestors; but their world has been replaced by a world of quantum theory, relativity, supercomputers, antibiotics, genetic engineering and space telescopes - unfortunately also a world of nuclear weapons and nerve-gas. Because of the slowness of genetic evolution in comparison to the rapid and constantly-accelerating rate of cultural change, our bodies and emotions are not adapted to our new way of life. They still reflect the way of life of our hunter-gatherer ancestors. Luckily, education in ethical principles is able to overwrite our anachronistic emotions and behavior patterns.

1.6 Global ethics for a global society

Education for world citizenship

Besides a humane, democratic and just framework of international law and governance, we urgently need a new global ethic, - an ethic where loyalty to family, community and nation will be supplemented by a strong sense of the brotherhood of all humans, regardless of race, religion or nationality. Schiller expressed this feeling in his “Ode to Joy”, a part of which is the text of Beethoven’s Ninth Symphony. Hearing Beethoven’s music and Schiller’s words, most of us experience an emotion of resonance and unity with the message: All humans are brothers and sisters - not just some - all! It is almost a national anthem of humanity. The feelings that the music and words provoke are similar to patriotism, but broader. It is this higher loyalty to humanity as a whole, this sense of a universal human family, that we need to cultivate in education, in the mass media, and in religion.

Suggestions for further reading

1. Bock, Kenneth E. (1956), *The Acceptance of Histories: Toward a Perspective for Social Science*, Berkeley: University of California Press
2. Bock, Kenneth E. (1978), *Theories of Progress, Development, Evolution*, in Bottomore, T.; Nisbet, R. (eds.), *A History of Sociological Analysis*, New York: Basic Books, pp. 39-79
3. Bowler, Peter J. (1984), *Evolution: The History of an Idea*, Berkeley: University of California Press
4. Darwin, C. R. (1871), *The Descent of Man and Selection in Relation to Sex*, John Murray
5. Degroot, David H. (1976), *Philosophies of Essence: An Examination of the Category of Essence*, Amsterdam: B. R. Gruner Publishing Company
6. Dietz, Thomas; Burns, Thomas R.; Buttell, Frederick H. (1990), *Evolutionary Theory in Sociology: An Examination of Current Thinking*, *Sociological Forum*, 4: 47-70.
7. Lennox, James G. (1987), *Kinds, Forms of Kinds and the More and the Less in Aristotle’s Biology*, in Gotthelf, A.; Lennox, J.G. (eds.), *Philosophical Issues in Aristotle’s Biology*, Cambridge, MA: Cambridge University Press, pp. 339-359
8. Lovejoy, Arthur O. (1936), *The Great Chain of Being*, Cambridge, MA: Harvard University Press
9. McLaughlin, Paul (1998), *Rethinking the Agrarian Question: The Limits of Essentialism and the Promise of Evolutionism*, *Human Ecology Review*, 5 (2): 25-39
10. McLaughlin, Paul (2012), *The Second Darwinian Revolution: Steps Toward a New Evolutionary Environmental Sociology*, *Nature and Culture*, 7 (3): 231-258,
11. Nisbet, Robert (1969), *Social Change and History*, New York: Oxford University Press
12. Richards, Richard A. (2010), *The Species Problem: A Philosophical Analysis*, New York: Cambridge University Press

13. Rist, Gilbert (2002), *The History of Development: From Western Origins to Global Faith*, New York: Zed Books
14. Sober, Elliot (1980), *Evolution, Population Thinking, and Essentialism*, *Philosophy of Science*, 47 (3): 350-383,
15. D.R. Griffin, *Animal Mind - Human Mind*, Dahlem Konferenzen 1982, Springer, Berlin, (1982).
16. S. Savage-Rumbaugh, R. Lewin, et al., *Kanzi: The Ape at the Brink of the Human Mind*, John Wiley and Sons, New York, (1996).
17. R. Dunbar, *Grooming, Gossip, and the Evolution of Language*, Harvard University Press, (1998).
18. J.H. Greenberg, *Research on language universals*, *Annual Review of Anthropology*, 4, 75-94 (1975).
19. M.E. Bitterman, *The evolution of intelligence*, *Scientific American*, January, (1965).
20. R. Fox, *In the beginning: Aspects of hominid behavioral evolution*, *Man*, NS 2, 415-433 (1967).
21. M.S. Gazzaniga, *The split brain in man*, *Scientific American*, 217, 24-29 (1967).
22. D. Kimura, *The asymmetry of the human brain*, *Scientific American*, 228, 70-78 (1973).
23. R.G. Klein, *Anatomy, behavior, and modern human origins*, *Journal of World Prehistory*, 9 (2), 167-198 (1995).
24. N.G. Jablonski and L.C. Aiello, editors, *The Origin and Diversification of Language*, *Wattis Symposium Series in Anthropology. Memoirs of the California Academy of Sciences*, No. 24, The California Academy of Sciences, San Francisco, (1998).
25. S. Pinker, *The Language Instinct: How the Mind Creates Language*, Harper-Collins Publishers, New York, (1995).
26. S. Pinker, *Talk of genetics and visa versa*, *Nature*, 413, 465-466, (2001).
27. S. Pinker, *Words and rules in the human brain*, *Nature*, 387, 547-548, (1997).
28. J.H. Barkow, L. Cosmides and J. Tooby, editors, *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, Oxford University Press, (1995).
29. D.R. Begun, C.V. Ward and M.D. Rose, *Function, Phylogeny and Fossils: Miocene Hominid Evolution and Adaptations*, Plenum Press, New York, (1997).
30. R.W. Byrne and A.W. Whitten, *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*, Cambridge University Press, (1988),
31. V.P. Clark, P.A. Escholz and A.F. Rosa, editors, *Language: Readings in Language and Culture*, St Martin's Press, New York, (1997).
32. T.W. Deacon, *The Symbolic Species: The Co-evolution of Language and the Brain*, W.W. Norton and Company, New York, (1997).
33. C. Gamble, *Timewalkers: The Prehistory of Global Colonization*, Harvard University Press, (1994).
34. K.R. Gibson and T. Ingold, editors, *Tools, Language and Cognition in Human Evolution*, Cambridge University Press, (1993).

35. P. Mellers, *The Emergence of Modern Humans: An Archeological Perspective*, Edinburgh University Press, (1990).
36. P. Mellers, *The Neanderthal Legacy: An Archeological Perspective of Western Europe*, Princeton University Press, (1996).
37. S. Mithen, *The Prehistory of the Mind*, Thames and Hudson, London, (1996).
38. D. Haraway, *Signs of dominance: from a physiology to a cybernetics, of primate biology*, C.R. Carpenter, 1939-1970, *Studies in History of Biology*, 6, 129-219 (1983).
39. D. Johanson and M. Edey, *Lucy: The Beginnings of Humankind*, Simon and Schuster, New York, (1981).
40. B. Kurten, *Our Earliest Ancestors*, Columbia University Press, New York, (1992).
41. R. Lass, *Historical Linguistics and Language Change*, Cambridge University Press, (1997).
42. R.E. Leakey and R. Lewin, *Origins Reconsidered*, Doubleday, New York, (1992).
43. P. Lieberman, *The Biology and Evolution of Language*, Harvard University Press, (1984).
44. C.S.L. Lai, S.E. Fisher, J.A. Hurst, F. Vargha-Khadems, and A.P. Monaco, *A forkhead-domain gene is mutated in a severe speech and language disorder*, *Nature*, 413, 519-523, (2001).
45. W. Enard, M. Przeworski, S.E. Fisher, C.S.L. Lai, V. Wiebe, T. Kitano, A.P. Monaco, and S. Paabo, *Molecular evolution of FOXP2, a gene involved in speech and language*, *Nature AOP*, published online 14 August 2002.
46. M. Gopnik and M.B. Crago, *Familial aggregation of a developmental language disorder*, *Cognition*, 39, 1-50 (1991).
47. K.E. Watkins, N.F. Dronkers, and F. Vargha-Khadem, *Behavioural analysis of an inherited speech and language disorder. Comparison with acquired aphasia*, *Brain*, 125, 452-464 (2002).
48. J.D. Wall and M. Przeworski, *When did the human population size start increasing?*, *Genetics*, 155, 1865-1874 (2000).
49. L. Aiello and C. Dean, *An Introduction to Human Evolutionary Anatomy*, Academic Press, London, (1990).
50. F. Ikawa-Smith, ed., *Early Paleolithic in South and East Asia*, Mouton, The Hague, (1978).
51. M. Aitken, *Science Based Dating in Archeology*, Longman, London, (1990).
52. R.R. Baker, *Migration: Paths Through Space and Time*, Hodder and Stoughton, London, (1982).
53. P. Bellwood, *Prehistory of the Indo-Malaysian Archipelago*, Academic Press, Sidney, (1985).
54. P.J. Bowler, *Theories of Human Evolution: A Century of Debate, 1884-1944*, Basil Blackwell, Oxford, (1986).
55. G. Isaac and M. McCown, eds., *Human Origins: Louis Leaky and the East African Evidence*, Benjamin, Menlo Park, (1976).
56. F.J. Brown, R. Leaky, and A. Walker, *Early Homo erectus skeleton from west Lake Turkana, Kenya*, *Nature*, 316, 788-92 (1985).

57. K.W. Butzer, *Archeology as Human Ecology*, Cambridge University Press, (1982).
58. A.T. Chamberlain and B.A. Wood, *Early hominid phylogeny*, *Journal of Human Evolution*, *16*, 119-33, (1987).
59. P. Mellars and C. Stringer, eds., *The Human Revolution: Behavioural and Biological Perspectives in the Origins of Modern Humans*, Edinburgh University Press, (1989).
60. G.C. Conroy, *Primate Evolution*, W.W. Norton, New York, (1990).
61. R.I.M. Dunbar, *Primate Social Systems*, Croom Helm, London, (1988).
62. B. Fagan, *The Great Journey: The Peopling of Ancient America*, Thames and Hudson, London, (1987).
63. R.A. Foley, ed., *Hominid Evolution and Community Ecology*, Academic Press, New York, (1984).
64. S.R. Binford and L.R. Binford, *Stone tools and human behavior*, *Scientific American*, *220*, 70-84, (1969).
65. G. Klein, *The Human Career, Human Biological and Cultural Origins*, University of Chicago Press, (1989).
66. B.F. Skinner and N. Chomsky, *Verbal behavior*, *Language*, *35*, 26-58 (1959).
67. D. Bickerton, *The Roots of Language*, Karoma, Ann Arbor, Mich., (1981).
68. E. Lenneberg in *The Structure of Language: Readings in the Philosophy of Language*, J.A. Fodor and J.A. Katz editors, Prentice-Hall, Englewood Cliffs N.J., (1964).
69. M. Ruhelen, *The Origin of Language*, Wiley, New York, (1994).
70. C.B. Stringer and R. McKie, *African Exodus: The Origins of Modern Humanity*, Johnathan Cape, London (1996).
71. R. Lee and I. DeVore, editors, *Kalahari Hunter-Gatherers*, Harvard University Press, (1975).
72. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
73. D.R. Griffin, *Animal Mind - Human Mind*, Dahlem Conferenzen 1982, Springer, Berlin, (1982).
74. S. Savage-Rumbaugh, R. Lewin, et al., *Kanzi: The Ape at the Brink of the Human Mind*, John Wiley and Sons, New York, (1996).
75. R. Dunbar, *Grooming, Gossip, and the Evolution of Language*, Harvard University Press, (1998).
76. J.H. Greenberg, *Research on language universals*, *Annual Review of Anthropology*, *4*, 75-94 (1975).
77. M.E. Bitterman, *The evolution of intelligence*, *Scientific American*, January, (1965).
78. R. Fox, *In the beginning: Aspects of hominid behavioral evolution*, *Man*, **NS 2**, 415-433 (1967).
79. M.S. Gazzaniga, *The split brain in man*, *Scientific American*, **217**, 24-29 (1967).
80. D. Kimura, *The asymmetry of the human brain*, *Scientific American*, **228**, 70-78 (1973).
81. R.G. Klein, *Anatomy, behavior, and modern human origins*, *Journal of World Prehistory*, **9 (2)**, 167-198 (1995).

82. N.G. Jablonski and L.C. Aiello, editors, *The Origin and Diversification of Language*, Wattis Symposium Series in Anthropology. Memoirs of the California Academy of Sciences, **No. 24**, The California Academy of Sciences, San Francisco, (1998).
83. S. Pinker, *The Language Instinct: How the Mind Creates Language*, Harper-Collins Publishers, New York, (1995).
84. J.H. Barkow, L. Cosmides and J. Tooby, editors, *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, Oxford University Press, (1995).
85. D.R. Begun, C.V. Ward and M.D. Rose, *Function, Phylogeny and Fossils: Miocene Hominid Evolution and Adaptations*, Plenum Press, New York, (1997).
86. R.W. Byrne and A.W. Whitten, *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*, Cambridge University Press, (1988),
87. V.P. Clark, P.A. Escholz and A.F. Rosa, editors, *Language: Readings in Language and Culture*, St Martin's Press, New York, (1997).
88. T.W. Deacon, *The Symbolic Species: The Co-evolution of Language and the Brain*, W.W. Norton and Company, New York, (1997).
89. C. Gamble, *Timewalkers: The Prehistory of Global Colonization*, Harvard University Press, (1994).
90. K.R. Gibson and T. Ingold, editors, *Tools, Language and Cognition in Human Evolution*, Cambridge University Press, (1993).
91. P. Mellers, *The Emergence of Modern Humans: An Archeological Perspective*, Edinburgh University Press, (1990).
92. P. Mellers, *The Neanderthal Legacy: An Archeological Perspective of Western Europe*, Princeton University Press, (1996).
93. S. Mithen, *The Prehistory of the Mind*, Thames and Hudson, London, (1996).
94. D. Haraway, *Signs of dominance: from a physiology to a cybernetics, of primate biology*, C.R. Carpenter, 1939-1970, Studies in History of Biology, **6**, 129-219 (1983).
95. D. Johanson and M. Edey, *Lucy: The Beginnings of Humankind*, Simon and Schuster, New York, (1981).
96. B. Kurten, *Our Earliest Ancestors*, Columbia University Press, New York, (1992).
97. R. Lass, *Historical Linguistics and Language Change*, Cambridge University Press, (1997).
98. R.E. Leakey and R. Lewin, *Origins Reconsidered*, Doubleday, New York, (1992).
99. P. Lieberman, *The Biology and Evolution of Language*, Harvard University Press, (1984).
100. C.S.L. Lai, S.E. Fisher, J.A. Hurst, F. Vargha-Khadems, and A.P. Monaco, *A forkhead-domain gene is mutated in a severe speech and language disorder*, Nature, **413**, 519-523, (2001).
101. W. Enard, M. Przeworski, S.E. Fisher, C.S.L. Lai, V. Wiebe, T. Kitano, A.P. Monaco, and S. Paabo, *Molecular evolution of FOXP2, a gene involved in speech and language*, Nature AOP, published online 14 August 2002.
102. M. Gopnik and M.B. Crago, *Familial aggregation of a developmental language disorder*, Cognition, **39**, 1-50 (1991).

103. K.E. Watkins, N.F. Dronkers, and F. Vargha-Khadem, *Behavioural analysis of an inherited speech and language disorder. Comparison with acquired aphasia*, *Brain*, **125**, 452-464 (2002).
104. J.D. Wall and M. Przeworski, *When did the human population size start increasing?*, *Genetics*, **155**, 1865-1874 (2000).
105. L. Aiello and C. Dean, *An Introduction to Human Evolutionary Anatomy*, Academic Press, London, (1990).
106. F. Ikawa-Smith, ed., *Early Paleolithic in South and East Asia*, Mouton, The Hague, (1978).
107. M. Aitken, *Science Based Dating in Archeology*, Longman, London, (1990).
108. R.R. Baker, *Migration: Paths Through Space and Time*, Hodder and Stoughton, London, (1982).
109. P. Bellwood, *Prehistory of the Indo-Malaysian Archipelago*, Academic Press, Sydney, (1985).
110. P.J. Bowler, *Theories of Human Evolution: A Century of Debate, 1884-1944*, Basil Blackwell, Oxford, (1986).
111. G. Isaac and M. McCown, eds., *Human Origins: Louis Leaky and the East African Evidence*, Benjamin, Menlo Park, (1976).
112. F.J. Brown, R. Leaky, and A. Walker, *Early Homo erectus skeleton from west Lake Turkana, Kenya*, *Nature*, **316**, 788-92 (1985).
113. K.W. Butzer, *Archeology as Human Ecology*, Cambridge University Press, (1982).
114. A.T. Chamberlain and B.A. Wood, *Early hominid phytogeny*, *Journal of Human Evolution*, **16**, 119-33, (1987).
115. P. Mellars and C. Stringer, eds., *The Human Revolution: Behavioural and Biological Perspectives in the Origins of Modern Humans*, Edinburgh University Press, (1989).
116. G.C. Conroy, *Primate Evolution*, W.W. Norton, New York, (1990).
117. R.I.M. Dunbar, *Primate Social Systems*, Croom Helm, London, (1988).
118. B. Fagan, *The Great Journey: The Peopling of Ancient America*, Thames and Hudson, London, (1987).
119. R.A. Foley, ed., *Hominid Evolution and Community Ecology*, Academic Press, New York, (1984).
120. S.R. Binford and L.R. Binford, *Stone tools and human behavior*, *Scientific American*, **220**, 70-84, (1969).
121. G. Klein, *The Human Career, Human Biological and Cultural Origins*, University of Chicago Press, (1989).
122. B.F. Skinner and N. Chomsky, *Verbal behavior*, *Language*, **35**, 26-58 (1959).
123. D. Bickerton, *The Roots of Language*, Karoma, Ann Arbor, Mich., (1981).
124. E. Lenneberg in *The Structure of Language: Readings in the Philosophy of Language*, J.A. Fodor and J.A. Katz editors, Prentice-Hall, Englewood Cliffs N.J., (1964).
125. S. Pinker, *Talk of genetics and visa versa*, *Nature*, **413**, 465-466, (2001).
126. S. Pinker, *Words and rules in the human brain*, *Nature*, **387**, 547-548, (1997).
127. M. Ruhelen, *The Origin of Language*, Wiley, New York, (1994).

128. C.B. Stringer and R. McKie, *African Exodus: The Origins of Modern Humanity*, Johnathan Cape, London (1996).
129. R. Lee and I. DeVore, editors, *Kalahari Hunter-Gatherers*, Harvard University Press, (1975).
130. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
131. D. Schmand-Besserat, *Before Writing, Volume 1, From Counting to Cuneiform*, University of Texas Press, Austin, (1992).
132. D. Schmand-Besserat, *How Writing Came About*, University of Texas Press, Austin, (1992).
133. A. Robinson, *The Story of Writing*, Thames, London, (1995).
134. A. Robinson, *Lost Languages: The Enigma of the World's Great Undeciphered Scripts*, McGraw-Hill, (2002).
135. D. Jackson, *The Story of Writing*, Taplinger, New York, (1981).
136. G. Jeans, *Writing: The Story of Alphabets and Scripts*, Abrams and Thames, (1992).
137. W.M. Senner, editor, *The Origins of Writing*, University of Nebraska Press, Lincoln and London, (1989).
138. F. Coulmas, *The Writing Systems of the World*, Blackwell, Oxford, (1989).
139. F. Coulmas, *The Blackwell Encyclopedia of Writing Systems*, Blackwell, Oxford, (1996).
140. P.T. Daniels and W. Bright, editors, *The World's Writing Systems*, Oxford University Press, (1996).
141. H.J. Nissen, *The Early History of the Ancient Near East, 9000-2000 B.C.*, University of Chicago Press, (1988).
142. H.J. Nissen, *Archaic Bookkeeping: Early Writing and Techniques of Economic Administration in the Ancient Near East*, University of Chicago Press, (1993).
143. J. Bottero, *Ancient Mesopotamia: Everyday Life in the First Civilization*, Edinburgh University Press, (2001).
144. J. Bottero, *Mesopotamia: Writing, Reasoning and the Gods*, University of Chicago Press, (1992).
145. J.T. Hooker, *Reading the Past: Ancient Writing, from Cuneiform to the Alphabet*, University of California Press, Berkeley and Los Angeles, (1990).
146. W.A. Fairservis, Jr., *The Script of the Indus Valley*, Scientific American, March (1983), 41-49.
147. C.H. Gordon, *Forgotten Scripts: Their Ongoing Discovery and Decipherment*, Dorset Press, New York, (1992).
148. G. Ferraro, *Cultural Anthropology, 3rd Edition*, Wadsworth, Belmont CA, (1998).
149. R. David, *Handbook to Life in Ancient Egypt*, Facts on File, New York, (1998).
150. D. Sandison, *The Art of Egyptian Hieroglyphs*, Reed, London, (1997).
151. K.T. Zauzich, *Hieroglyphs Without Mystery*, University of Texas Press, Austin, (1992).
152. B. Watterson, *Introducing Egyptian Hieroglyphs*, Scottish Academic Press, Edinburgh, (1981).

153. M. Pope, *The Story of Decipherment, from Egyptian Hieroglyphs to Maya Script*, Thames and Hudson, London, (1999).
154. M.D. Coe, *Breaking the Maya Script*, Thames and Hudson, New York, (1992).
155. M.D. Coe, *The Maya, 5th Edition*, Thames and Hudson, New York, (1993).
156. M.D. Coe, *Mexico: From the Olmecs to the Aztecs, 4th Edition*, Thames and Hudson, New York, (1994).
157. D. Preidel, L. Schele and J. Parker, *Maya Cosmos: Three Thousand Years on the Shaman's Path*, William Morrow, New York, (1993).
158. W.G. Bolz, *The Origin and Early Development of the Chinese Writing System*, American Oriental Society, New Haven Conn., (1994).
159. T.F. Carter, *The Invention of Printing in China and its Spread Westward*, Ronald Press, (1925).
160. E. Eisenstein, *The Printing Revolution in Early Modern Europe*, Cambridge University Press, (1983).
161. M. Olmert, *The Smithsonian Book of Books*, Wing Books, New York, (1992).
162. R. Axelrod, *The Evolution of Cooperation*, Basic Books, New York, (1984).
163. W. Brandt, *World Armament and World Hunger: A Call for Action*, Victor Gollanz Ltd., London, (1982).
164. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Francisco, (1982).
165. I. Eibl-Eibesfeldt, *The Biology of War and Peace*, Thames and Hudson, New York, (1979).
166. R.A. Hinde, *Biological Basis for Human Social Behaviour*, McGraw-Hill, New York, (1977).
167. R.A. Hinde, *Towards Understanding Relationships*, Academic Press, London, (1979).
168. M. Khanert and others (eds.), *Children and War*, Peace Union of Finland, Helsinki, (1983).
169. K. Lorentz, *On Aggression*, Bantam Books, New York, (1977).
170. Medical Association's Board of Science and Education, *The Medical Effects of Nuclear War*, Wiley, (1983).
171. M. Renner, *Swords into Plowshares: Converting to a Peace Economy*, Worldwatch Paper 96, Worldwatch Institute, Washington D.C., (1990).
172. J. Rotblat (ed.), *Shaping Our Common Future: Dangers and Opportunities (Proceedings of the Forty-Second Pugwash Conference on Science and World Affairs)*, World Scientific, London, (1994).
173. R.L. Sivard, *World Military and Social Expenditures*, World Priorities, Box 25140, Washington, D.C. 20007, (published annually).
174. J.E. Slater, *Governance*, Aspen Institute for Humanistic Studies, New York, (1976).
175. P.B. Smith, J.D. Schilling and A.P. Haines, *Introduction and Summary*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
176. A. Szent-Györgyi, *The Crazy Ape*, Philosophical Library, New York, (1970).
177. J. Tinbergen (coordinator), *Reshaping the International Order*, Dutton, New York, (1976).

178. C. Zahn-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press, (1986).
179. J.L. Henderson, *Hiroshima*, Longmans (1974).
180. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
181. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
182. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).
183. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
184. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
185. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
186. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
187. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
188. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
189. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
190. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
191. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
192. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
193. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).
194. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
195. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
196. IAEA, *International Safeguards and the Non-proliferation of Nuclear Weapons*, International Atomic Energy Agency, Vienna, (1985).
197. J. Schear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
198. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
199. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
200. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
201. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
202. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).

203. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
204. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
205. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
206. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
207. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
208. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
209. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
210. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
211. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
212. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
213. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
214. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).
215. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
216. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
217. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
218. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
219. G.K. Bertsch and S.R. Grillot, (Eds.), *Arms on the Market: Reducing the Risks of Proliferation in the Former Soviet Union*, Routledge, New York, (1998).
220. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
221. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
222. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
223. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
224. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
225. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).

226. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
227. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).
228. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
229. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
230. R. Forsberg et al., *Nonproliferation Primer: Preventing the Spread of Nuclear, Chemical and Biological Weapons*, MIT Press, Cambridge, (1995).
231. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).
232. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
233. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
234. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
235. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
236. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).
237. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
238. C. Langley, *Soldiers in the Laboratory: Military Involvement in Science and Technology and Some Alternatives*, Scientists for Global Responsibility, (2005).
239. M.T. Klare, *Blood and Oil: The Dangers and Consequences of America's Growing Dependency on Imported Petroleum*, Metropolitan Books, New York, (2004); paperback, Owl Books, (2005).
240. M.T. Klare, *Resource Wars: The New Landscape of Global Conflict*, reprint edition, Owl Books, New York, (2002).
241. M. Renner, *The Anatomy of Resource Wars*, Worldwatch Paper #162, Worldwatch Institute, (2002).
242. W.B. Gallie, *Understanding War: Points of Conflict*, Routledge, London, (1991).
243. R. Falk and S.S. Kim, eds., *The War System: An Interdisciplinary Approach*, Westview, Boulder, CO, (1980).
244. J.D. Clarkson and T.C. Cochran, eds., *War as a Social Institution*, Columbia University Press, New York, (1941).
245. S. Melman, *The Permanent War Economy*, Simon and Schuster, (1974).
246. B. Broms, *United Nations*, Suomalainen Tiedeakatemia, Helsinki, (1990).
247. S. Rosenne, *The Law and Practice at the International Court*, Dordrecht, (1985).
248. S. Rosenne, *The World Court - What It Is and How It Works*, Dordrecht, (1995).

249. J. D'Arcy and D. Harris, *The Procedural Aspects of International Law (Book Series), Volume 25*, Transnational Publishers, Ardsley, New York, (2001).
250. H. Cullen, *The Collective Complaints Mechanism Under the European Social Charter*, European Law Review, Human Rights Survey, p. 18-30, (2000).
251. S.D. Bailey, *The Procedure of the Security Council*, Oxford, (1988).
252. R.A. Akindale, *The Organization and Promotion of World Peace: A Study of Universal-Regional Relationships*, Univ. Toronto Press, Toronto, Ont., (1976).
253. J.S. Applegate, *The UN Peace Imperative*, Vantage Press, New York, (1992).
254. S.E. Atkins, *Arms Control, Disarmament, International Security and Peace: An Annotated Guide to Sources, 1980-1987*, Clio Press, Santa Barbara, CA, (1988).
255. N. Ball and T. Halevy, *Making Peace Work: The Role of the International Development Community*, Overseas Development Council, Washington DC, (1996).
256. F. Barnaby, Ed., *The Gaia Peace Atlas: Survival into the Third Millennium*, Doubleday, New York, (1988)
257. J.H. Barton, *The Politics of Peace: An Evaluation of Arms Control*, Stanford Univ. Press, Stanford, CA, (1981).
258. W. Bello, *Visions of a Warless World*, Friends Committee on National Education Fund, Washington DC, (1986).
259. A. Boserup and A. Mack, *Abolishing War: Cultures and Institutions; Dialogue with Peace Scholars Elise Boulding and Randall Forsberg*, Boston Research Center for the Twenty-first Century, Cambridge, MA, (1998).
260. E. Boulding et al., *Bibliography on World Conflict and Peace*, Westview Press, Boulder, CO, (1979).
261. E. Boulding et al., Eds., *Peace, Culture and Society: Transnational Research Dialogue*, Westview Press, Boulder, CO, (1991).
262. A.T. Bryan et al., Eds., *Peace, Development and Security in the Caribbean*, St. Martins Press, New York, (1988).
263. A.L. Burns and N. Heathcote, *Peace-Keeping by UN Forces from Suez to Congo*, Praeger, New York, (1963).
264. F. Capra and C. Spretnak, *Green Politics: The Global Promise*, E.P. Dutton, New York, (1986).
265. N. Carstarphen, *Annotated Bibliography of Conflict Analysis and Resolution*, Inst. for Conflict Analysis and Resolution, George Mason Univ., Fairfax, VA, (1997).
266. N. Chomsky, *Peace in the Middle East? Reflections on Justice and Nationhood*, Vintage Books, New York, (1974).
267. G. Clark and L. Sohn, *World Peace Through World Law*, World Without War Pubs., Chicago, IL, (1984).
268. K. Coates, *Think Globally, Act Locally: The United Nations and the Peace Movements*, Spokesman Books, Philadelphia, PA, (1988).
269. G. De Marco and M. Bartolo, *A Second Generation United Nations: For Peace and Freedom in the 20th Century*, Columbia Univ. Press, New York, (1997).
270. F.M. Deng and I.W. Zartman, Eds., *Conflict Resolution in Africa*, Brookings Institution, Washington, DC, (1991).

271. W. Desan, *Let the Future Come: Perspectives for a Planetary Peace*, Georgetown Univ. Press, Washington, DC, (1987).
272. D. Deudney, *Whole Earth Security. A Geopolitics of Peace*, Worldwatch paper 55. Worldwatch Institute, Washington, DC, (1983).
273. A.J. Donovan, *World Peace? A Work Based on Interviews with Foreign Diplomats*, A.J. Donovan, New York, (1986).
274. R. Duffey, *International Law of Peace*, Oceania Pubs., Dobbs Ferry, NY, (1990).
275. L.J. Dumas, *The Socio-Economics of Conversion From War to Peace*, M.E. Sharpe, Armonk, NY, (1995).
276. W. Durland, *The Illegality of War*, National Center on Law and Pacifism, Colorado Springs, CO, (1982).
277. F. Esack, *Qur'an, Liberation and Pluralism: An Islamic Perspective on Interreligious Solidarity Against Oppression*, Oxford Univ. Press, London, (1997).
278. I. Hauchler and P.M. Kennedy, Eds., *Global Trends: The World Almanac of Development and Peace*, Continuum Pubs., New York, (1995).
279. H.B. Hollins et al., *The Conquest of War: Alternative Strategies for Global Security*, Westview Press, Boulder, CO, (1989).
280. H.J. Morgenthau, *Peace, Security and the United Nations*, Ayer Pubs., Salem, NH, (1973).
281. C.C. Moskos, *Peace Soldiers: The Sociology of a United Nations Military Force*, Univ. of Chicago Press, Chicago, IL, (1976).
282. L. Pauling, *Science and World Peace*, India Council for Cultural Relations, New Delhi, India, (1967).
283. C. Peck, *The United Nations as a Dispute Resolution System: Improving Mechanisms for the Prevention and Resolution of Conflict*, Kluwer, Law and Tax, Cambridge, MA, (1996).
284. D. Pepper and A. Jenkins, *The Geography of Peace and War*, Basil Blackwell, New York, (1985).
285. J. Perez de Cuellar, *Pilgrimage for Peace: A Secretary General's Memoir*, St. Martin's Press, New York, (1997).
286. R. Pickus and R. Woito, *To End War: An Introduction to the Ideas, Books, Organizations and Work That Can Help*, World Without War Council, Berkeley, CA, (1970).
287. S.R. Ratner, *The New UN Peacekeeping: Building Peace in Lands of Conflict after the Cold War*, St. Martins Press, New York, (1995).
288. I.J. Rikhye and K. Skjelsbaek, Eds., *The United Nations and Peacekeeping: Results, Limitations and Prospects: The Lessons of 40 Years of Experience*, St. Martins Press, New York, (1991).
289. J. Rotblat, Ed., *Scientists in Quest for Peace: A History of the Pugwash Conferences*, MIT Press, Cambridge, MA, (1972).
290. J. Rotblat, Ed., *Scientists, The Arms Race, and Disarmament*, Taylor and Francis, Bristol, PA, (1982).

291. J. Rotblat, Ed., *Striving for Peace, Security and Development in the World*, World Scientific, River Edge, NJ, (1991).
292. J. Rotblat, Ed., *Towards a War-Free World*, World Scientific, River Edge, NJ, (1995).
293. J. Rotblat, Ed., *Nuclear Weapons: The Road to Zero*, Westview, Boulder, CO, (1998).
294. J. Rotblat and L. Valki, Eds., *Coexistence, Cooperation and Common Security*, St. Martins Press, New York, (1988).
295. United Nations, *Peaceful Settlement of Disputes between States: A Select Bibliography*, United Nations, New York, (1991).
296. United States Arms Control and Disarmament Agency, *Arms Control and Disarmament Agreements: Texts and Histories of Negotiations*, USACDA, Washington, DC, (updated annually)
297. D. Fahrni, *An Outline History of Switzerland - From the Origins to the Present Day*, Pro Helvetia Arts Council of Switzerland, Zurich, (1994).
298. J.M. Luck, *A History of Switzerland*, Sposs, Palo Alto, CA, (1985).
299. T. Jackson, *Material Concerns: Pollution, Profit and the Quality of Life*, Routledge, (2004).
300. T. Jackson, *Motivating Sustainable Consumption*, Report to the Sustainable Development Research Network, January (2005).
301. T. Jackson, *The Earthscan Reader in Sustainable Consumption*, Earthscan, (2006).
302. J.S. Avery, *Information Theory and Evolution, 2nd Edition*, World Scientific, (2012).
303. A.J. Lotka, *Elements of Mathematical Biology*, Dover, (1956).
304. E.O. Wilson *Sociobiology: The New Synthesis*, Harvard University Press, (1975).
305. E.O. Wilson, *The Superorganism: The Beauty, Elegance, and Strangeness of Insect Societies*, W.W. Norton, (2009).
306. F. Soddy, *Wealth, Virtual Wealth and Debt. The solution of the economic paradox*, George Allen and Unwin, (1926).
307. F. Soddy, *The Role of Money*, George Routledge and Sons, London, (1934)
308. N. Georgescu-Roegen, *Energy and Economic Myths : Institutional and Analytical Economic Essays*, Pergamon Press, (1976).
309. N. Georgescu-Roegen, *The Entropy Law and the Economic Process*, Harvard University Press, (1971).
310. J. Rifkin and T. Howard, *Entropy: A New World View* The Viking Press, New York (1980).
311. P. Bartelmus, *Environment, Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, New York, (1994).
312. H.E. Daly and K.N. Townsend, (editors), *Valuing the Earth. Economics, Ecology, Ethics*, MIT Press, Cambridge, Massachusetts, (1993)
313. C. Flavin, *Slowing Global Warming: A Worldwide Strategy*, Worldwatch Paper 91, Worldwatch Institute, Washington D.C., (1989).
314. S.H. Schneider, *The Genesis Strategy: Climate and Global Survival*, Plenum Press, (1976).
315. WHO/UNFPA/UNICEF, *The Reproductive Health of Adolescents: A Strategy for Action*, World Health Organization, Geneva, (1989).

316. World Commission on Environment and Development, *Our Common Future*, Oxford University Press, (1987).
317. W. Jackson, *Man and the Environment*, W.C. Brown, Dubuque, Iowa, (1971).
318. T. Berry, *The Dream of the Earth*, Sierra Club Books, San Francisco, (1988).
319. T.M. Swanson, ed., *The Economics and Ecology of Biodiversity Decline: The Forces Driving Global Change*, Cambridge University Press, (1995).
320. F.H. Bormann, *Unlimited Growth: Growing, Growing, and Gone?*, *BioScience* 22: 706-9, (1972).
321. L.G. Brookes, *A Low-Energy Strategy for the United Kingdom*, *Atom* 269: 73-8, (1979).
322. J. Cherfas, *Skeptics and Visionaries Examine Energy Saving*, *Science* 251: 154-6, (1991).
323. C.J. Cleveland, *Energy Quality and Energy Surplus in the Extraction of Fossil Fuels in the US*, *Ecological Economics* 6: 139-62, (1992).
324. C.J. Cleveland, Robert Costanza, Charlie A.S. Hall and Robert Kaufmann, *Energy and the US Economy: A Biophysical Perspective*, *Science* 225 (4665): 890-7, (1984).
325. P. Cloud, *Entropy, Materials, and Prosperity*, *Geologische Rundschau* 66: 678-96, (1978).
326. H.E. Daly, *From Empty-World Economics to Full-World Economics: Recognizing a Historical Turning Point in Economic Development*, in R. Goodland, H. E. Daly and S. Serafy (eds) *Population, Technology, and Lifestyle*, pp. 23-37. Washington, DC: Island Press, (1992).
327. H.E. Daly, *On Nicholas Georgescu-Roegen's Contributions to Economics: An Obituary Essay*, *Ecological Economics* 13: 149-54, (1995).
328. H.E. Daly, *Georgescu-Roegen versus Solow/Stiglitz*, *Ecological Economics* 22: 267-8, (1997).
329. M. Eigen, *Selforganization of Matter and the Evolution of Biological Macro- molecules*, *Naturwissenschaften* 58(10): 465-523, (1971).
330. S.O. Funtowicz and Jerry R. Ravetz, *Post Normal Science: A New Science for New Times*, *Scientific European* 266: 20-2, (1990).
331. N. Georgescu-Roegen, *Fixed Coefficients of Production and the Marginal Productivity Theory*, *Review of Economic Studies* 3: 40-9, (1935a).
332. N. Georgescu-Roegen, (1935b) *Note on a Proposition of Pareto*, *Quarterly Journal of Economics* 49: 706-14.
333. N. Georgescu-Roegen, *Marginal Utility of Money and Elasticities of Demand*, *Quarterly Journal of Economics* 50: 533-9, (1936a).
334. N. Georgescu-Roegen, *The Pure Theory of Consumer's Behavior*, *Quarterly Journal of Economics* 50: 545-93, (1936b).
335. N. Georgescu-Roegen, *Process in Farming versus Process in Manufacturing: A Problem of Balanced Development*, in U. Papi and C. Nunn (eds) *Economic Problems of Agriculture in Industrial Societies*, pp. 497-528. London: Macmillan, (1969).
336. N. Georgescu-Roegen, *The Entropy Law and the Economic Process*, Cambridge, MA: Harvard University Press, (1971).

337. N. Georgescu-Roegen, *Energy and Economic Myths*, Southern Economic Journal 41: 347-81, (1975).
338. N. Georgescu-Roegen, *Energy and Economic Myths*. New York: Pergamon Press, (1976).
339. N. Georgescu-Roegen, *Inequality, Limits and Growth from a Bioeconomic Viewpoint*, Review of Social Economy 35: 361-75, (1977a).
340. N. Georgescu-Roegen, *The Steady State and Ecological Salvation: A Thermodynamic Analysis*, BioScience 27: 266-70, (1977b).
341. N. Georgescu-Roegen, *Energy Analysis and Economic Valuation*, Southern Economic Journal 45: 1023-58, (1979a).
342. N. Georgescu-Roegen, *Methods in Economic Science*, Journal of Economic Issues 13 (2): 317-28, (1979b).
343. N. Georgescu-Roegen, *Methods in Economic Science: A Rejoinder*, Economic Issues 15: 188-93, (1981).
344. N. Georgescu-Roegen, *The Promethean Condition of Viable Technologies*, Materials and Society 7: 425-35, (1983).
345. Georgescu-Roegen, Nicholas, *Man and Production*, in M. Baranzini and R. Scazzieri (eds) Foundations of Economics: Structures of Inquiry and Economic Theory, pp. 247-80. Oxford: Basil Blackwell, (1986).
346. N. Georgescu-Roegen, *An Emigrant from a Developing Country: Autobiographical Notes-I*, Banca Nazionale del Lavoro Quarterly Review 164: 3-31, (1988a).
347. N. Georgescu-Roegen, *The Interplay between Institutional and Material Factors: The Problem and Its Status*, in J.A. Kregel, E. Matzner and A. Roncaglia (eds) Barriers to Employment, pp. 297-326. London: Macmillan, (1988b).
348. N. Georgescu-Roegen, *Production Process and Dynamic Economics*, in M. Baranzini and R. Scazzieri (eds) The Economic Theory of Structure and Change, pp. 198-226. Cambridge: Cambridge University Press, (1990).
349. N. Georgescu-Roegen, *Nicholas Georgescu-Roegen about Himself*, in M. Szenberg (ed.) Eminent Economists: Their Life Philosophies, pp. 128-59. Cambridge: Cambridge University Press, (1992).
350. J. Gever, Robert Kaufmann, David Skole and Charles Vörösmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Niwot, CO: University Press of Colorado, (1991).
351. M. Giampietro, *Sustainability and Technological Development in Agriculture: A Critical Appraisal of Genetic Engineering*, BioScience 44(10): 677-89, (1994).
352. M. Giampietro and Kozo Mayumi, *Another View of Development, Ecological Degradation and North-South Trade*, Review of Social Economy 56: 21-37, (1998).
353. M. Giampietro and Kozo Mayumi, *The Biofuel Delusion: The Fallacy of Large Scale Agro-biofuel Production*, London: Earthscan, (2009).
354. R. Goldschmidt, *Some Aspects of Evolution*, Science 78: 539-47, (1933).
355. S.J. Gould, *The Return to Hopeful Monsters*, Natural History 86: 22-30, (1977).
356. S.J. Gould and Niles Eldredge, *Punctuated Equilibria: The Tempo and Mode of Evolution Reconsidered*, Paleobiology 3: 115-51, (1977).

357. J. Gowdy, *The Value of Biodiversity: Markets, Society and Ecosystems*, *Land Economics* 73(1): 25-41, (1997).
358. J. Gribbin, *The Death of the Sun* New York: Delacorte Press, (1980).
359. C.A.S. Hall, Cutler J. Cleveland and Robert Kaufman, *Energy and Resource Quality* New York: John Wiley and Sons, (1986).
360. S.R. Ichtiaque and Stephen H. Schneider, *Atmospheric Carbon Dioxide and Aerosols: Effects of Large Increases on Global Climate*, *Science* 173: 138-41, (1971).
361. K. Ito, *Setting Goals and Action Plan for Energy Efficiency Improvement*. Paper presented at the EAS Energy Efficiency and Conservation Conference, Tokyo (19 June), (2007).
362. F. Jevons, *Greenhouse: A Paradox*, *Search* 21: 171-2, (1990).
363. W.S. Jevons, *The Coal Question* (reprint of 3rd edn, 1906). New York: Augustus M. Kelley, (1965).
364. N. Kawamiya, *Entropii to Kougyoushakai no Sentaku (Entropy and Future Choices for the Industrial Society)*, Tokyo: Kaimei, (1983).
365. J.D. Khazzoom, *Economic Implications of Mandated Efficiency Standards for Household Appliances*, *Energy Journal* 1: 21-39, (1980).
366. J.D. Khazzoom, *Energy Saving Resulting from the Adoption of More Efficient Appliances*, *Energy Journal* 8: 85-9, (1987).
367. T.C. Koopmans, *Three Essays on the State of Economic Science*, New York: McGraw-Hill Book Company, (1957).
368. T.S. Kuhn, *The Structure of Scientific Revolutions*, Chicago, IL: The University of Chicago Press, (1962).
369. J. von Liebig, *Letters on Modern Agriculture* (J. Blyth ed.). New York: John Wiley, (1959).
370. A.J. Lotka, *Elements of Mathematical Biology*, New York: Dover Publications, (1956).
371. G. Luft, *Fueling the Dragon: China's Race Into the Oil Market*. <http://www.iags.org/china.htm>, (2007).
372. K. Mayumi, *The Origins of Ecological Economics: The Bioeconomics of Georgescu-Roegen*, London: Routledge, (2001).
373. K. Mayumi, *An Epistemological Critique of the Open Leontief Dynamic Model: Balanced and Sustained Growth, Delays, and Anticipatory Systems Theory*, *Structural Change and Economic Dynamics* 16: 540-56m (2005).
374. K. Mayumi, Mario Giampietro and John Gowdy, *Georgescu-Roegen/Daly versus Solow/Stiglitz Revisited*, *Ecological Economics* 27: 115-17. Legacies: Nicholas Georgescu-Roegen 1253, (1998).
375. W.H. Miernyk, *Economic Growth Theory and the Georgescu-Roegen Paradigm*, in K. Mayumi and J. Gowdy (eds) *Bioeconomics and Sustainability: Essays in Honour of Nicholas Georgescu-Roegen*, pp. 69-81. Cheltenham: Edward Elgar, (1999).
376. Newman, Peter, *Greenhouse, Oil and Cities*, *Futures* May: 335-48, (1991).
377. D. Pearce, *Substitution and Sustainability: Some Reflections on Georgescu-Roegen*, *Ecological Economics* 22: 295-7, (1997).

378. D. Pearce, Edward Barbier and Anil Markandya, *Sustainable Development*, Hampshire: Edward Elgar, (1990).
379. J. Polimeni, Kozo Mayumi, Mario Giampietro and Blake Alcott, *The Jevons Paradox and the Myth of Resource Efficiency Improvements*, London: Earthscan, (2008).
380. J.F. Randolph, *Basic Real and Abstract Analysis*, New York: Academic Press, (1968).
381. D. Ricardo, *On the Principles of Political Economy and Taxation*, in P. Sraffa (ed.) *The Works and Correspondence of David Ricardo*, Vol. 1. Cambridge: Cambridge University Press, (1951).
382. E. Schrödinger, *What is Life? With Mind and Matter and Autobiographical Sketches*, Cambridge: Cambridge University Press, (1967).
383. J.A. Schumpeter, *The Theory of Economic Development*, Cambridge, MA: Harvard Economic Press, (1951).
384. G.T. Seaborg, *The Erehwon Machine: Possibilities for Reconciling Goals by Way of New Technology*, in S.H. Schurr (ed.) *Energy, Economic Growth, and the Environment*, pp. 125-38. Baltimore, MD: Johns Hopkins University Press, (1972).
385. M.R. Simmons, *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy* New Jersey: John Wiley and Sons, Inc., (2005).
386. B.J. Skinner, *Earth Resource (3rd edn)*, New Jersey: Prentice Hall, (1986).
387. V. Smil, *Global Catastrophes and Trends: The Next Fifty Years* Cambridge, MA: MIT Press, (2008).
388. R. Solow, *Technical Change and the Aggregate Production Function*, *Review of Economics and Statistics* 39: 312-20, (1957).
389. R. Solow, *The Economics of Resources or the Resources of Economics*, *American Economic Review* 64: 1-14, (1974).
390. R.E. Ulanowicz, *Growth and Development: Ecosystem Phenomenology* New York: Springer-Verlag, (1986).
391. US Geological Survey, *Commodity Statistics and Information*, (2005).
392. G.K. Zipf, *National Unity and Disunity: The Nation as a Bio-social Organism*. Bloomington, IN: Principia Press, (1941).

Chapter 2

THE EVOLUTION OF COOPERATION

“Alas, two souls are living in my breast!”

Goethe's Faust

“No man is an island, entire of itself; every man is a piece of the continent, a part of the main. If a clod be washed away by the sea, Europe is the less, as well as if a promontory were, as well as if a manor of thy friend's or thine own were...”

John Donne

2.1 Introduction

Human nature contains an element of tribalism, which we have inherited from our ancestors who lived in small generically-homogeneous tribes, competing for territory on the grasslands of Africa. But humans also have a genius for cooperation. Our enormously successful civilization has been built through the sharing of ideas and innovations. All cultural groups have contributed.

Today it is vital that the cooperative side of human nature should be supported by our educational systems, our mass media and our religious leaders.

2.2 The passions of mankind

The explosion of human knowledge

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.

Every species changes gradually through genetic evolution; but with humans, cultural evolution has rushed ahead with such a speed that it has completely outstripped the slow rate of genetic change. Genetically we are quite similar to our neolithic ancestors, but their world has been replaced by a world of quantum theory, relativity, supercomputers, antibiotics, genetic engineering and space telescopes - unfortunately also a world of nuclear weapons and nerve gas.

Because of the slowness of genetic evolution in comparison to the rapid and constantly-accelerating rate of cultural change, our bodies and emotions (as Malthus put it, the "passions of mankind") are not completely adapted to our new way of life. They still reflect the way of life of our hunter-gatherer ancestors.

Within rapidly-moving cultural evolution, we can observe that technical change now moves with such astonishing rapidity that neither social institutions, nor political structures, nor education, nor public opinion can keep pace. The lightning-like pace of technical progress has made many of our ideas and institutions obsolete. For example, the absolutely-sovereign nation-state and the institution of war have both become dangerous anachronisms in an era of instantaneous communication, global interdependence and all-destroying weapons.

In many respects, human 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

threatens 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.

Tribal emotions and nationalism

In discussing conflicts, we must be very careful to distinguish between two distinct types of aggression exhibited by both humans and animals. The first is intra-group aggression, which is often seen in rank-determining struggles, for example when two wolves fight for pack leadership, or when males fight for the privilege of mating with females. Another, completely different, type of aggression is seen when a group is threatened by outsiders. Most animals, including humans, then exhibit a communal defense response - self-sacrificing and heroic combat against whatever is perceived to be an external threat. It is this second type of aggression that makes war possible.

Arthur Koestler has described inter-group aggression in an essay entitled *The Urge to Self-Destruction*¹, where he writes: “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 below in biological terms by the Nobel Laureate ethologist Konrad Lorenz.

In *On Aggression*, 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,

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

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.”

Members of tribe-like groups are bound together by strong bonds of altruism and loyalty. Echos of these bonds can be seen in present-day family groups, in team sports, in the fellowship of religious congregations, and in the bonds that link soldiers to their army comrades and to their nation.

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.

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. Unfortunately these emotions make war possible; and today a Third World War might lead to the destruction of civilization.



Figure 2.1: Nikolaas Tinbergen (left) and Konrad Lorenz. They and Karl von Frisch shared the 1973 Nobel Prize in Medicine and Physiology for studies of behavior patterns in animals.

2.3 Population genetics

The mystery of self-sacrifice in war

At first sight, the willingness of humans to die defending their social groups seems hard to explain from the standpoint of Darwinian natural selection. After the heroic death of such a human, he or she will be unable to produce more children, or to care for those already born. Therefore one might at first suppose that natural selection would work strongly to eliminate the trait of self-sacrifice from human nature. However, the theory of population genetics and group selection can explain both the willingness of humans to sacrifice themselves for their own group, and also the terrible aggression that they sometimes exhibit towards competing groups. It can explain both intra-group altruism and inter-group aggression.

Fisher, Haldane and Hamilton

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.

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



Figure 2.2: **Sir Ronald Aylmer Fischer (1890-1962)**. In his book “**The Genetical Foundations of Natural Selection**”, published in 1930, Fischer laid the foundations of population genetics.

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.

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, successful aggression against a neighboring group could 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.

Language, religion and tribal markings

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, she 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 his 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, kilts, tartans, school ties, veils, chadours, and headdresses; caste markings in India; use or non-use 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; 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 are many people in New York who would never think of marrying someone who could not appreciate 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

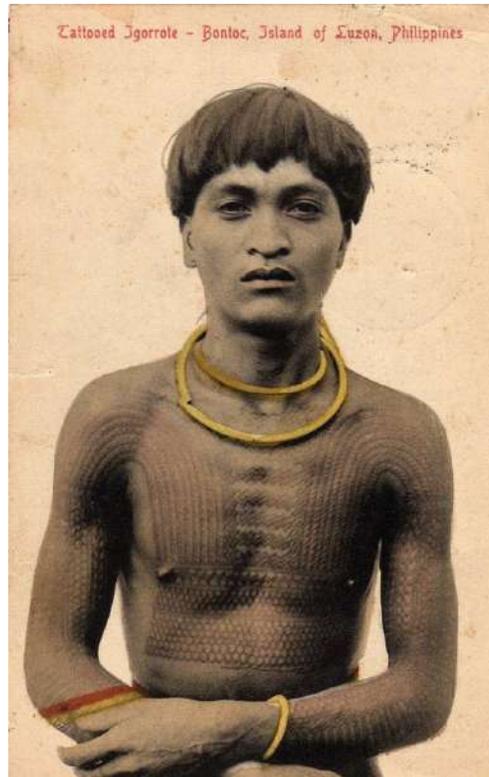


Figure 2.3: 1908 photo of a Filipino Bontoc warrior bearing a Head hunters 'Chaklag' Tattoo. Tribal markings help social groups to establish their identity and to sharply define the boundaries of the group. Within the group boundaries, humans tend to exhibit altruism, while across the boundaries, aggression is often exhibited. In modern nations, genetically dissimilar humans often use tribal markings to establish social cohesion over a larger group than would otherwise be possible.

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. 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 as universal as it is.

Formation of group identity

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.

As an example of the use of tribal markings to establish social cohesion over a large group of genetically dissimilar humans, one can think of the role of baseball and football in the United States. Affection for these sports and knowledge of their intricacies is able to establish social bonds that transcend racial and religious barriers.

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.

2.4 Non-human examples of aggression and altruism

Aggression associated with mating

We must be careful not to confuse intergroup aggression with aggression associated with mating behavior. Among many species of fish, birds and animals, males fight for the privilege of mating. This type of aggression is often associated with sexual dimorphism, i.e. secondary differences in structure between males and females of the same species. For example, the large antlers of male deer are used for rank-determining fights, which confer greater reproductive success on the winner; but herds of deer do not engage in war with other herds. Thus there is a distinction between rank-determining aggression and inter-group aggression.

Chimpanzees and bonobos

The line of descent leading to humans diverged from the line leading to chimpanzees and bonobos between 5 and 6 million years ago. Chimps and bonobos look very similar, and until recent times, naturalists did not realize that they are separate species. However, modern studies have revealed the distinctness of the two species, as well as great differences in their social behavior. Chimpanzee groups are male-dominated, and far more aggressive than bonobo societies, which are female-dominated. Besides the aggression associated with mating (just discussed), chimpanzees also exhibit terrible inter-group aggression.

In his book *Before the Dawn*, Nicholas Wade describes what Jane Goodall, John Mitani, and other primatologists have discovered concerning male chimpanzees' aggression towards neighboring groups of their own species: "Chimpanzees carefully calculate the odds, and seek to minimize risk, a very necessary procedure if one fights on a regular basis. They prefer to attack an isolated individual, and then retreat into their own territory. If they encounter an opposing patrol, they will assess the size of their opponents' party, and retreat if outnumbered. Researchers have confirmed this behavior by playing the call of a single male to chimp parties of various sizes. They find that the chimps will approach if they number three or more; parties of two will slink away. Three against one is the preferred odds: two to hold the victim down, and a third to batter him to death." Interestingly, the female-dominated bonobo societies do not exhibit this type of inter-group warfare, which, among chimpanzees, is conducted exclusively by the males.

The social insects

The social² insects, ants, bees, wasps and termites, exhibit nearly perfect altruism towards members of their own group. This extreme form of altruism towards near relations (kin altruism) is closely connected with the peculiar method of reproduction of the social insects³. The workers are sterile or nearly sterile, while the queen is the only reproductive female. The result of this special method of reproduction is that very nearly perfect altruism is possible within a hive or nest, since genetic changes favoring antisocial behavior would be detrimental to the hive or nest as a whole. The hive or nest can, in some sense, be regarded as a superorganism, with the individuals cooperating totally in much the same way that cells cooperate within a multicellular organism. The social insects exhibit aggression towards members of their own species from other hives or nests, and can be said to engage in wars.

2.5 The evolution of cooperation

From Thomas Huxley to Lynn Margulis and symbiosis

Charles Darwin (1809-1882) was acutely aware of close and mutually beneficial relationships between organisms. For example, in his work on the fertilization of flowers, he studied the ways in which insects and plants can become exquisitely adapted to each other's needs.

On the other hand Thomas Henry Huxley (1825-1895), although he was a strong supporter of Darwin, saw competition as the main mechanism of evolution. In his essay *Struggle for Existence and its Bearing Upon Man* Huxley wrote: "From the point of view of the moralist, the animal world is about on the same level as a gladiators' show. The creatures are fairly well treated and set to fight; hereby the strongest, the swiftest, and the cunningest live to fight another day. The spectator has no need to turn his thumbs down, as no quarter is granted."

²The technical term is *eusocial*.

³Interestingly a similar method of reproduction, associated with extreme intra-group altruism has evolved among mammals, but is represented by only two species: the naked mole rat and Damaraland mole rat.



Figure 2.4: Thomas Henry Huxley (1825-1895), caricatured in *Vanity Fair*. Huxley was a strong supporter of Darwin, but he placed much more emphasis on competition in evolution than Darwin did. In fact, Darwin himself was strongly aware of the great role that cooperation plays.

2.6 Peter Kropotkin

The activist, writer, revolutionary, scientist, economist, sociologist, historian, essayist, researcher, political scientist, biologist, geographer and philosophe Prince Peter Kropotkin (1842-1921) was born into an ancient dynasty that had ruled Russia before the Romanoffs came to power. However, at the age of 12 he renounced his princely title, and rebuked his friends when they used it.

He was arrested for his revolutionary views, both in Russia and in France, but finally found refuge in England. Returning to Russia after the 1917 Russian Revolution, he was welcomed by cheering crowds numbering 10,000 or more, and offered the post of Minister of Education. He refused this post, however, and he criticized the dictatorial government that had come to power.

As a biologist, Kropotkin believed that cooperation is a more important evolutionary force than competition. In his book, *Mutual Aid: A Factor in Evolution*, he wrote:

“In the animal world we have seen that the vast majority of species live in societies, and that they find in association the best arms for the struggle for life: understood, of course, in its wide Darwinian sense - not as a struggle for the sheer means of existence, but as a struggle against all natural conditions unfavourable to the species. The animal species... in which individual struggle has been reduced to its narrowest limits[...] and the practice of mutual aid has attained the greatest development... are invariably the most numerous, the most prosperous, and the most open to further progress. The mutual protection which is obtained in this case, the possibility of attaining old age and of accumulating experience, the higher intellectual development, and the further growth of sociable habits, secure the maintenance of the species, its extension, and its further progressive evolution. The unsociable species, on the contrary, are doomed to decay.”

Peter Kropotkin’s books

- In Russian and French Prisons, London: Ward and Downey; 1887.
- The Conquest of Bread (Paris, 1892) Project Gutenberg e-text, Project LibriVox audiobook
- The Great French Revolution, 1789-1793 (French original: Paris, 1893; English translation: London, 1909). e-text (in French), Anarchist Library e-text (in English)
- The Terror in Russia, 1909, RevoltLib e-text Words of a Rebel, 1885,
- Fields, Factories and Workshops (London and New York, 1898).
- Memoirs of a Revolutionist, London : Smith, Elder; 1899. Anarchist Library e-text, Anarchy Archives e-text
- Mutual Aid: A Factor of Evolution (London, 1902) Project Gutenberg e-text, Project LibriVox audiobook Russian Literature: Ideals and Realities (New York: A. A. Knopf, 1905). Anarchy Archives e-text

- *The State: Its Historic Role*, published 1946, *Ethics: Origin and Development* (unfinished). Included as first part of *Origen y evolución de la moral* (Spanish e-text)
- *Modern Science and Anarchism*, 1930,

Today, the insights of modern biology show that although competition plays an important role, most of the great upward steps in evolution have involved cooperation. The biologist Lynn Margulis (1938-) has been one of the pioneers of the modern viewpoint which recognizes symbiosis as a central mechanism in evolution.

One-celled organisms seen as examples of cooperation

The first small bacterial cells (prokaryotic cells) can be thought of as cooperative communities in which autocatalytic molecules thrived better together than they had previously done separately.

The next great upward step in evolution, the development of large and complex (eukaryotic) cells, also involved cooperation: Many of their components, for example mitochondria (small granular structures that are needed for respiration) and chloroplasts (the photosynthetic units of higher plants) are believed to have begun their existence as free-living prokaryotic cells. They now have become components of complex cells, cooperating biochemically with the other subcellular structures. Both mitochondria and chloroplasts possess their own DNA, which shows that they were once free-living bacteria-like organisms, but they have survived better in a cooperative relationship.

Cooperation between cells; multicellular organisms

Multicellular organisms evolved from cooperative communities of eukaryotic cells. Some insights into how this happened can be gained from examples which are just on the borderline between the multicellular organisms and single-celled ones. The cooperative behavior of a genus of unicellular eukaryotes called slime molds is particularly interesting because it gives us a glimpse of how multicellular organisms may have originated. The name of the slime molds is misleading, since they are not fungi, but are similar to amoebae. Under ordinary circumstances, the individual cells wander about independently searching for food, which they draw into their interiors and digest. However, when food is scarce, they send out a chemical signal of distress. (Researchers have analyzed the molecule which expresses slime mold unhappiness, and they have found it to be cyclic adenosine monophosphate.) At this signal, the cells congregate and the mass of cells begins to crawl, leaving a slimy trail. As it crawls, the community of cells gradually develops into a tall stalk, surmounted by a sphere - the "fruiting body". Inside the sphere, spores are produced by a sexual process. If a small animal, for example a mouse, passes by, the spores may adhere to its coat; and in this way they may be transported to another part of the forest where food is more plentiful. Thus slime molds represent a sort of missing link between unicellular and multicellular organisms. Normally the cells behave as individualists, wandering about independently, but when challenged by a shortage of food, the slime mold cells join

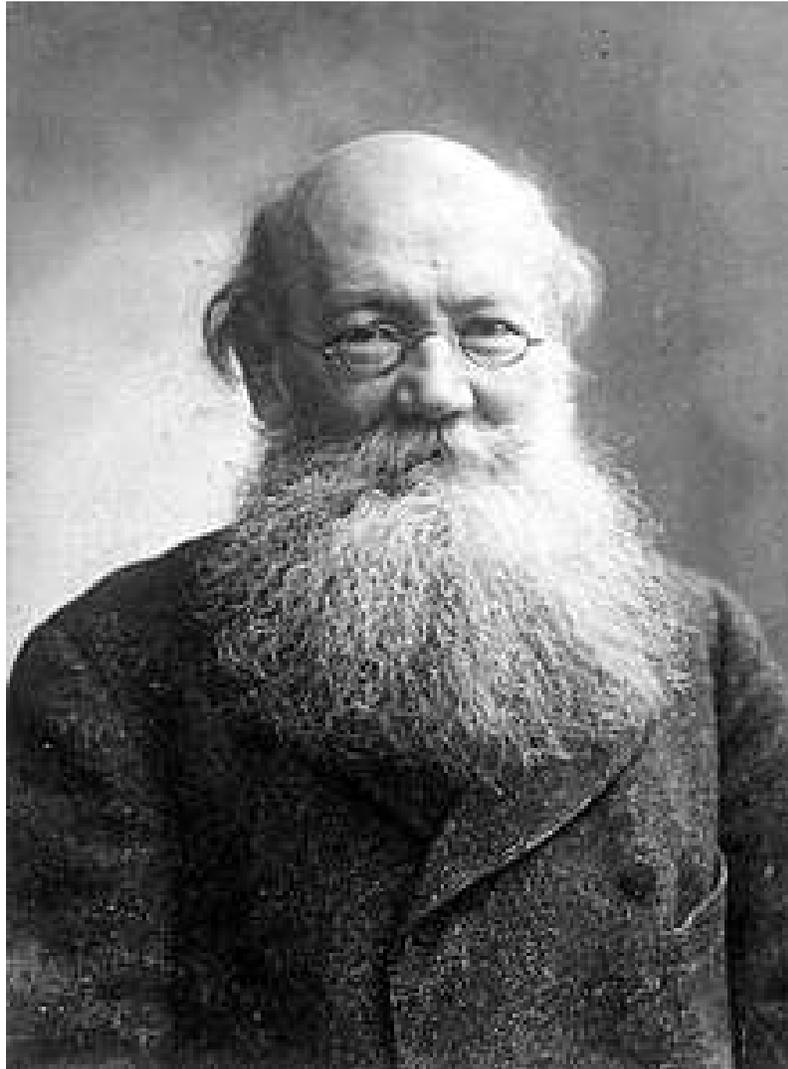


Figure 2.5: **Peter Kropotkin (1842-1921).** He was a prince of an ancient Russian dynasty by birth, but renounced his title. In Kropotkin's view, cooperation is more important than competition as an evolutionary force, and human nature is best suited to societies based on sharing rather than competitive individualism.



Figure 2.6: The biologist Lynn Margulis argued strongly that eukaryotic cells should be regarded as cooperative communities of simpler organisms that once lived independently. At first she was almost alone in this view, but today it is generally accepted. Most of the great upward steps in evolution have involved cooperation.



Figure 2.7: **A photo showing several types of sponges. Sponges and slime molds are on the borderline between single celled organisms and multicellular ones. The single cells of these species can live independently, but they can also function as members of a cooperating colony.** (Public domain)

together into an entity which closely resembles a multicellular organism. The cells even seem to exhibit altruism, since those forming the stalk have little chance of survival, and yet they are willing to perform their duty, holding up the sphere at the top so that the spores will survive and carry the genes of the community into the future.

Multicellular organisms often live in a symbiotic relationship with other species. For example, in both animals and humans, bacteria are essential for the digestion of food. Fungi on the roots of plants aid their absorption of water and nutrients. Communities of bacteria and other organisms living in the soil are essential for the recycling of nutrients. Insects are essential to many plants for pollination.



Figure 2.8: A honey bee collecting pollen. The almost perfectly altruistic behavior of bees towards members of their own hive is a consequence of their special method of reproduction, which insures that all the members of the hive are more closely related to each other than they would be to a potential offspring. A hive of bees can be regarded as a superorganism, with the individuals playing roles that are analogous to the roles played by individual cells in a multicellular organism. The degree of cooperation in human society is so great that it too can to some extent be regarded as a superorganism.

Cooperation in groups of animals and human groups

The social behavior of groups of animals, flocks of birds and communities of social insects involves cooperation as well as rudimentary forms of language. Various forms of language, including chemical signals, postures and vocal signals, are important tools for orchestrating cooperative behavior.

The highly developed language of humans made possible an entirely new form of evolution. In cultural evolution (as opposed to genetic evolution), information is passed between generations not in the form of a genetic code, but in the form of linguistic symbols. With the invention of writing, and later the invention of printing, the speed of human cultural evolution greatly increased. Cooperation is central to this new form of evolution. Cultural advances can be shared by all humans.

2.7 The evolution of human cooperation

Intertribal aggression in prehistoric humans

In his book *War Before Civilization* (Oxford University Press, 1996), Professor Lawrence H. Keeley of the University of Illinois states that 87% of all prehistoric tribal societies were at war at least once per year, with 65% fighting continuously with neighboring tribes. Keeley cites as an example a massacre at Crow Creek, South Dakota, where “archaeologists found the remains of more than 500 men, women and children, who had been slaughtered, scalped and mutilated a century and a half before the arrival of Columbus (ca. AD 1325).” Other examples include a 12,000 year old Nubian cemetery, where half of the bodies apparently died by violence. Also cited is a nineteenth century study of intertribal warfare among Australia’s indigenous Murgin people showing that over a twenty-year period, a quarter of the men died in war. Many more examples are given by Harvard archaeologist Stephen A. LeBlanc in *Constant Battles*, (St. Martin’s Press, 2003). Commenting on such studies, Nicolas Wade wrote (in *Before the Dawn*, Penguin Group, 2007), “Had the same casualty rate been suffered by the population of the twentieth century, its war deaths would have totaled two billion people.” Thus, despite the terrifying effectiveness of modern weapons, the percentage of the population killed by war seems to be much smaller today than it was in prehistoric times. However, we need to abolish nuclear weapons before a catastrophic thermonuclear war changes this hopeful statistic.

Trading in primitive societies

Although primitive societies engaged in frequent wars, they also cooperated through trade. Peter Watson, an English historian of ideas, believes that long-distance trade took place as early as 150,000 before the present. There is evidence that extensive trade in obsidian and flint took place during the stone age. Evidence for wide ranging prehistoric obsidian and flint trading networks has been found in North America. Ancient burial sites in Southeast

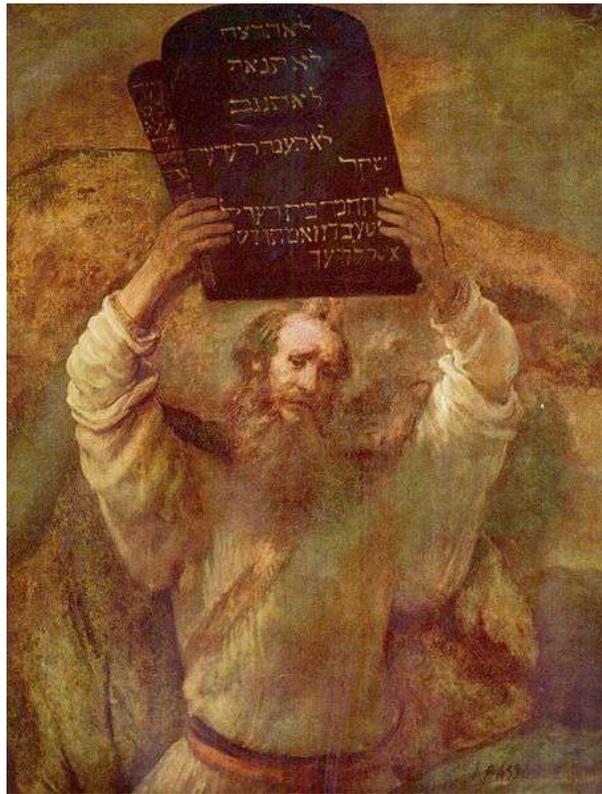


Figure 2.9: Moses depicted in a painting by Rembrandt. Many of the great ethical teachers of history lived at a time when the social unit was increasing in size - when tribalism needed to be replaced by a wider ethic.

Asia show that there too, prehistoric trading took place across very large distances. Analysis of jade jewelry from the Philippines, Thailand, Malaysia and Viet Nam shows that the jade originated in Taiwan.

The invention of writing was prompted by the necessities of trade. In prehistoric Mesopotamia, clay tokens marked with simple symbols were used for accounting as early as 8,000 BC. Often these tokens were kept in clay jars, and symbols on the outside of the jars indicated the contents. About 3,500 BC, the use of such tokens and markings led to the development of pictographic writing in Mesopotamia, and this was soon followed by the cuneiform script, still using soft clay as a medium. The clay tablets were later dried and baked to ensure permanency. The invention of writing led to a great acceleration of human cultural evolution. Since ideas could now be exchanged and preserved with great ease through writing, new advances in technique could be shared by an ever larger cooperating community of humans. Our species became more and more successful as its genius for cooperation developed.

Gracilization and decreasing sexual dimorphism

Early ancestors of modern humans had a relatively heavy (robust) bone structure in relation to their height. This robust bone structure seems to have been favored by frequent combat. During their evolution, modern humans became less robust and more gracile. In other words, their skeletons became lighter in relation to their height. Simultaneously the height and weight of males became less different from the height and weight of females. These trends are generally interpreted as indicating that combat became less important as present-day humans evolved.

Ethics and growth of the social unit

Early religions tended to be centered on particular tribes, and the ethics associated with them were usually tribal in nature. However, the more cosmopolitan societies that began to form after the Neolithic agricultural revolution required a more universal code of ethics. It is interesting to notice that many of the great ethical teachers of human history, for example Moses, Socrates, Plato, Aristotle, Lao Tzu, Confucius, Buddha, and Jesus, lived at the time when the change to larger social units was taking place. Tribalism was no longer appropriate. A wider ethic was needed.

Today the size of the social unit is again being enlarged, this time enlarged to include the entire world. Narrow loyalties have become inappropriate and there is an urgent need for a new ethic - a global ethic. Loyalty to one's nation needs to be supplemented by a higher loyalty to humanity as a whole.

Interdependence in modern human society

All of the great upward steps in the evolution of life on earth have involved cooperation: Prokaryotes, the first living cells, can be thought of as cooperative communities of

autocatalysts; large, complex eukaryote cells are now believed to have evolved as cooperative communities of prokaryotes; multicellular organisms are cooperative communities of eukaryotes; multicellular organisms cooperate to form societies; and different species cooperate to form ecosystems. Indeed, James Lovelock has pointed out that the earth as a whole is a complex interacting system that can be regarded as a huge organism.

The enormous success of humans as a species is due to their genius for cooperation. The success of humans is a success of cultural evolution, a new form of evolution in which information is passed between generations, not in the form of DNA sequences but in the form of speech, writing, printing and finally electronic signals. Cultural evolution is built on cooperation, and has reached great heights of success as the cooperating community has become larger and larger, ultimately including the entire world.

Without large-scale cooperation, modern science would never have evolved. It developed as a consequence of the invention of printing, which allowed painfully gained detailed knowledge to be widely shared. Science derives its great power from concentration. Attention and resources are brought to bear on a limited problem until all aspects of it are understood. It would make no sense to proceed in this way if knowledge were not permanent, and if the results of scientific research were not widely shared. But today the printed word and the electronic word spread the results of research freely to the entire world. The whole human community is the repository of shared knowledge.

The achievements of modern society are achievements of cooperation. We can fly, but no one builds an airplane alone. We can cure diseases, but only through the cooperative efforts of researchers, doctors and medicinal firms. We can photograph and understand distant galaxies, but the ability to do so is built on the efforts of many cooperating individuals.

An isolated sponge cell can survive, but an isolated human could hardly do so. Like an isolated bee, a human would quickly die without the support of the community. The comfort and well-being that we experience depends on far-away friendly hands and minds, since trade is global, and the exchange of ideas is also global.

Finally, we should be conscious of our cooperative relationships with other species. We could not live without the bacteria that help us to digest our food. We could not live without the complex communities of organisms in the soil that convert dead plant matter into fertile topsoil. We could not live without plants at the base of the food chain, but plants require pollination, and pollination frequently requires insects. An intricate cooperative network of inter-species relationships is necessary for human life, and indeed necessary for all life. Competition plays a role in evolution, but the role of cooperation is greater.

2.8 Two sides of human nature

Looking at human nature, both from the standpoint of evolution and from that of everyday experience, we see the two faces of Janus; one face shines radiantly; the other is dark and menacing. Two souls occupy the human breast, one warm and friendly, the other murderous. Humans have developed a genius for cooperation, the basis for culture and

civilization; but they are also capable of genocide; they were capable of massacres during the Crusades, capable of genocidal wars against the Amerinds, capable of the Holocaust, of Hiroshima, of the killing-fields of Cambodia, of Rwanda, and of Darfur

As an example of the two sides of human nature, we can think of Scandinavia. The Vikings were once feared throughout Europe. The Book of Common Prayer in England contains the phrase "Protect us from the fury of the Northmen!". Today the same people are so peaceful and law-abiding that they can be taken as an example for how we would like a future world to look. Human nature has the possibility for both kinds of behavior depending on the circumstances. This being so, there are strong reasons to enlist the help of education and religion to make the bright side of human nature win over the dark side. Today, the mass media are an important component of education, and thus the mass media have a great responsibility for encouraging the cooperative and constructive side of human nature rather than the dark and destructive side. In the next chapter we will explore the question of how the media can better fulfill this responsibility.

Suggestions for further reading

1. D.R. Griffin, *Animal Mind - Human Mind*, Dahlem Konferenzen 1982, Springer, Berlin, (1982).
2. S. Savage-Rumbaugh, R. Lewin, et al., *Kanzi: The Ape at the Brink of the Human Mind*, John Wiley and Sons, New York, (1996).
3. R. Dunbar, *Grooming, Gossip, and the Evolution of Language*, Harvard University Press, (1998).
4. R.I.M. Dunbar, *Primate Social Systems*, Croom Helm, London, (1988).
5. J.H. Greenberg, *Research on language universals*, Annual Review of Anthropology, **4**, 75-94 (1975).
6. M.E. Bitterman, *The evolution of intelligence*, Scientific American, January, (1965).
7. R. Fox, *In the beginning: Aspects of hominid behavioral evolution*, Man, **NS 2**, 415-433 (1967).
8. M.S. Gazzaniga, *The split brain in man*, Scientific American, **217**, 24-29 (1967).
9. D. Kimura, *The asymmetry of the human brain*, Scientific American, **228**, 70-78 (1973).
10. R.G. Klein, *Anatomy, behavior, and modern human origins*, Journal of World Prehistory, **9 (2)**, 167-198 (1995).
11. G. Klein, *The Human Career, Human Biological and Cultural Origins*, University of Chicago Press, (1989).
12. N.G. Jablonski and L.C. Aiello, editors, *The Origin and Diversification of Language*, Wattis Symposium Series in Anthropology. Memoirs of the California Academy of Sciences, No. 24, The California Academy of Sciences, San Francisco, (1998).
13. S. Pinker, *The Language Instinct: How the Mind Creates Language*, Harper-Collins Publishers, New York, (1995).
14. S. Pinker, *Talk of genetics and visa versa*, Nature, **413**, 465-466, (2001).
15. S. Pinker, *Words and rules in the human brain*, Nature, **387**, 547-548, (1997).

16. J.H. Barkow, L. Cosmides and J. Tooby, editors, *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, Oxford University Press, (1995).
17. D.R. Begun, C.V. Ward and M.D. Rose, *Function, Phylogeny and Fossils: Miocene Hominid Evolution and Adaptations*, Plenum Press, New York, (1997).
18. R.W. Byrne and A.W. Whitten, *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*, Cambridge University Press, (1988),
19. V.P. Clark, P.A. Escholz and A.F. Rosa, editors, *Language: Readings in Language and Culture*, St Martin's Press, New York, (1997).
20. T.W. Deacon, *The Symbolic Species: The Co-evolution of Language and the Brain*, W.W. Norton and Company, New York, (1997).
21. C. Gamble, *Timewalkers: The Prehistory of Global Colonization*, Harvard University Press, (1994).
22. K.R. Gibson and T. Ingold, editors, *Tools, Language and Cognition in Human Evolution*, Cambridge University Press, (1993).
23. P. Mellars, *The Emergence of Modern Humans: An Archeological Perspective*, Edinburgh University Press, (1990).
24. P. Mellars, *The Neanderthal Legacy: An Archeological Perspective of Western Europe*, Princeton University Press, (1996).
25. S. Mithen, *The Prehistory of the Mind*, Thames and Hudson, London, (1996).
26. D. Haraway, *Signs of dominance: from a physiology to a cybernetics of primate biology*, *C.R. Carpenter, 1939-1970*, *Studies in History of Biology*, **6**, 129-219 (1983).
27. D. Johanson and M. Edey, *Lucy: The Beginnings of Humankind*, Simon and Schuster, New York, (1981).
28. B. Kurtén, *Our Earliest Ancestors*, Columbia University Press, New York, (1992).
29. R. Lass, *Historical Linguistics and Language Change*, Cambridge University Press, (1997).
30. R.E. Leakey and R. Lewin, *Origins Reconsidered*, Doubleday, New York, (1992).
31. P. Lieberman, *The Biology and Evolution of Language*, Harvard University Press, (1984).
32. C.S.L. Lai, S.E. Fisher, J.A. Hurst, F. Vargha-Khadems, and A.P. Monaco, *A forkhead-domain gene is mutated in a severe speech and language disorder*, *Nature*, **413**, 519-523, (2001).
33. W. Enard, M. Przeworski, S.E. Fisher, C.S.L. Lai, V. Wiebe, T. Kitano, A.P. Monaco, and S. Pääbo, *Molecular evolution of FOXP2, a gene involved in speech and language*, *Nature AOP*, published online 14 August 2002.
34. M. Gopnik and M.B. Crago, *Familial aggregation of a developmental language disorder*, *Cognition*, **39**, 1-50 (1991).
35. K.E. Watkins, N.F. Dronkers, and F. Vargha-Khadem, *Behavioural analysis of an inherited speech and language disorder. Comparison with acquired aphasia*, *Brain*, **125**, 452-464 (2002).
36. J.D. Wall and M. Przeworski, *When did the human population size start increasing?*, *Genetics*, **155**, 1865-1874 (2000).

37. L. Aiello and C. Dean, *An Introduction to Human Evolutionary Anatomy*, Academic Press, London, (1990).
38. F. Ikawa-Smith, ed., *Early Paleolithic in South and East Asia*, Mouton, The Hague, (1978).
39. M. Aitken, *Science Based Dating in Archeology*, Longman, London, (1990).
40. R.R. Baker, *Migration: Paths Through Space and Time*, Hodder and Stoughton, London, (1982).
41. P. Bellwood, *Prehistory of the Indo-Malaysian Archipelago*, Academic Press, Sidney, (1985).
42. P.J. Bowler, *Theories of Human Evolution: A Century of Debate, 1884-1944*, Basil Blackwell, Oxford, (1986).
43. P.J. Bowler, *Evolution: The History of an Idea*, University of California Press, (1989).
44. P.J. Bowler, *Fossils and Progress: Paleontology and the Idea of Progressive Evolution in the Nineteenth Century*, Science History Publications, New York, (1976).
45. G. Isaac and M. McCown, eds., *Human Origins: Louis Leaky and the East African Evidence*, Benjamin, Menlo Park, (1976).
46. F.J. Brown, R. Leaky, and A. Walker, *Early Homo erectus skeleton from west Lake Turkana, Kenya*, *Nature*, **316**, 788-92, (1985).
47. K.W. Butzer, *Archeology as Human Ecology*, Cambridge University Press, (1982).
48. A.T. Chamberlain and B.A. Wood, *Early hominid phylogeny*, *Journal of Human Evolution*, **16**, 119-33, (1987).
49. P. Mellars and C. Stringer, eds., *The Human Revolution: Behavioural and Biological Perspectives in the Origins of Modern Humans*, Edinburgh University Press, (1989).
50. B. Fagan, *The Great Journey: The Peopling of Ancient America*, Thames and Hudson, London, (1987).
51. R.A. Foley, ed., *Hominid Evolution and Community Ecology*, Academic Press, New York, (1984).
52. S.R. Binford and L.R. Binford, *Stone tools and human behavior*, *Scientific American*, **220**, 70-84, (1969).
53. B.F. Skinner and N. Chomsky, *Verbal behavior*, *Language*, **35** 26-58 (1959).
54. D. Bickerton, *The Roots of Language*, Karoma, Ann Arbor, Mich., (1981).
55. E. Lenneberg in *The Structure of Language: Readings in the Philosophy of Language*, J.A. Fodor and J.A. Katz editors, Prentice-Hall, Englewood Cliffs N.J., (1964).
56. M. Ruhelen, *The Origin of Language*, Wiley, New York, (1994).
57. C.B. Stringer and R. McKie, *African Exodus: The Origins of Modern Humanity*, Johnathan Cape, London (1996).
58. R. Lee and I. DeVore, editors, *Kalahari Hunter-Gatherers*, Harvard University Press, (1975).
59. D. Schamand-Besserat, *Before Writing, Volume 1, From Counting to Cuneiform*, University of Texas Press, Austin, (1992).
60. D. Schamandt-Besserat, *How Writing Came About*, University of Texas Press, Austin, (1992).
61. A. Robinson, *The Story of Writing*, Thames, London, (1995).

62. A. Robinson, *Lost Languages: The Enigma of the World's Great Undeciphered Scripts*, McGraw-Hill, (2002).
63. D. Jackson, *The Story of Writing*, Taplinger, New York, (1981).
64. G. Jeans, *Writing: The Story of Alphabets and Scripts*, Abrams and Thames, (1992).
65. W.M. Senner, editor, *The Origins of Writing*, University of Nebraska Press, Lincoln and London, (1989).
66. F. Coulmas, *The Writing Systems of the World*, Blackwell, Oxford, (1989).
67. W.G. Bolz, *The Origin and Early Development of the Chinese Writing System*, American Oriental Society, New Haven Conn., (1994).
68. T.F. Carter, *The Invention of Printing in China and its Spread Westward*, Ronald Press, (1925).
69. E. Eisenstein, *The Printing Revolution in Early Modern Europe*, Cambridge University Press, (1983).
70. M. Olmert, *The Smithsonian Book of Books*, Wing Books, New York, (1992).
71. D.J. Futuyma, *Evolutionary Biology*, Sinauer Associates, Sunderland Mass., (1986).
72. B. Glass, O. Temkin, and W.L. Strauss, eds., *Forerunners of Darwin: 1745-1859*, Johns Hopkins Press, Baltimore, (1959).
73. R. Milner, *The Encyclopedia of Evolution*, an Owl Book, Henry Holt and Company, New York, (1990).
74. T.A. Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin*, Oxford University Press, (1987).
75. P. Corsi, *The Age of Lamarck: Evolutionary Theories in France, 1790-1834*, University of California Press, Berkeley, (1988).
76. M. McNeil, *Under the Banner of Science: Erasmus Darwin and his Age*, Manchester University Press, Manchester, (1987).
77. L.G. Wilson, *Sir Charles Lyell's Scientific Journals on the Species Question*, Yale University Press, New Haven, (1970).
78. E.O. Wilson, *Sociobiology*, Harvard University Press (1975).
79. E.O. Wilson, *On Human Nature*, Bantam Books, New York, (1979).
80. A.B. Adams, *Eternal Quest: The Story of the Great Naturalists*, G.P. Putnam's Sons, New York, (1969).
81. A.S. Packard, *Lamarck Pinker, the Founder of Evolution: His Life and Work*, Longmans, Green, and Co., New York, (1901).
82. C. Darwin, *An historical sketch of the progress of opinion on the Origin of Species, previously to the publication of this work*, Appended to third and later editions of *On the Origin of Species*, (1861).
83. L. Eiseley, *Darwin's Century: Evolution and the Men who Discovered It*, Doubleday, New York, (1958).
84. Francis Darwin (editor), *The Autobiography of Charles Darwin and Selected Letters*, Dover, New York (1958).
85. Charles Darwin, *The Voyage of the Beagle*, J.M. Dent and Sons Ltd., London (1975).
86. Charles Darwin, *The Origin of Species*, Collier MacMillan, London (1974).

87. Charles Darwin, *The Expression of Emotions in Man and Animals*, The University of Chicago Press (1965).
88. H.F. Osborne, *From the Greeks to Darwin: The Development of the Evolution Idea Through Twenty-Four Centuries*, Charles Scribner and Sons, New York, (1929).
89. Sir Julian Huxley and H.B.D. Kettlewell, *Charles Darwin and his World*, Thames and Hudson, London (1965).
90. Allan Moorehead, *Darwin and the Beagle*, Penguin Books Ltd. (1971).
91. Ruth Moore, *Evolution*, Time-Life Books (1962).
92. L. Barber, *The Heyday of Natural History: 1820-1870*, Doubleday and Co., Garden City, New York, (1980).
93. A. Desmond, *Huxley*, Addison Wesley, Reading, Mass., (1994).
94. A. Desmond and J. Moore, *Darwin*, Penguin Books, (1992).
95. R. Owen, (P.R. Sloan editor), *The Hunterian Lectures in Comparative Anatomy, May-June, 1837*, University of Chicago Press, (1992).
96. C. Nichols, *Darwinism and the social sciences*, Phil. Soc. Scient. **4**, 255-277 (1974).
97. M. Ruse, *The Darwinian Revolution*, University of Chicago Press, (1979).
98. R. Dawkins, *The Extended Phenotype*, Oxford University Press, (1982).
99. R. Dawkins, *The Blind Watchmaker*, W.W. Norton, (1987).
100. R. Dawkins, *River out of Eden: A Darwinian View of Life*, Harper Collins, (1995).
101. R. Dawkins, *Climbing Mount Improbable*, W.W. Norton, (1996).
102. R. Dawkins, *The Selfish Gene*, Oxford University Press, (1989).
103. S.J. Gould, *Ever Since Darwin*, W.W. Norton, (1977).
104. R.G.B. Reid, *Evolutionary Theory: The Unfinished Synthesis*, Croom Helm, (1985).
105. M. Ho and P.T. Saunders, editors, *Beyond Neo-Darwinism: An Introduction to a New Evolutionary Paradigm*, Academic Press, London, (1984).
106. J. Maynard Smith, *Did Darwin Get it Right? Essays on Games, Sex and Evolution*, Chapman and Hall, (1989).
107. E. Sober, *The Nature of Selection: Evolutionary Theory in Philosophical Focus*, University of Chicago Press, (1984).
108. B.K. Hall, *Evolutionary Developmental Biology*, Chapman and Hall, London, (1992).
109. J. Thompson, *Interaction and Coevolution*, Wiley and Sons, (1982).
110. R.A. Fischer, *The Genetical Theory of Natural Selection*, Clarendon, Oxford, (1930).
111. J.B.S. Haldane, *Population genetics*, New Biology **18**, 34-51, (1955).
112. N. Tinbergen, *The Study of Instinct*, Oxford University Press, (1951).
113. N. Tinbergen, *The Herring Gull's World*, Collins, London, (1953).
114. N. Tinbergen, *Social Behavior in Animals*, Methuen, London, (1953).
115. N. Tinbergen, *Curious Naturalists*, Country Life, London, (1958).
116. N. Tinbergen, *The Animal in its World: Explorations of an Ethologist*, Allan and Unwin, London, (1973).
117. K. Lorenz, *On the evolution of behavior*, Scientific American, December, (1958).
118. K. Lorenz, *Evolution and Modification of Behavior* Harvard University Press, Cambridge, MA, (1961).

119. K. Lorenz, *Studies in Animal and Human Behavior. I and II.*, Harvard University Press, (1970) and (1971).
120. K. Lorenz, *On Aggression*, Bantem Books, (1977).
121. P.H. Klopfer and J.P. Hailman, *An Introduction to Animal Behavior: Ethology's First Century*, Prentice-Hall, New Jersey, (1969).
122. J. Jaynes, *The historical origins of "Ethology" and "Comparative Psychology"*, *Anim. Behav.* **17**, 601-606 (1969).
123. W.H. Thorpe, *The Origin and Rise of Ethology: The Science of the Natural Behavior of Animals*, Heinemann, London, (1979).
124. R.A. Hinde, *Animal Behavior: A Synthesis of Ethological and Comparative Psychology*, McGraw-Hill, New York, (1970).
125. R.A. Hinde, *Biological Bases of Human Social Behavior*, McGraw-Hill, New York (1977).
126. R.A. Hinde, *Individuals, Relationships and Culture: Links Between Ethology and the Social Sciences*, Cambridge University Press, (1987).
127. R.A. Hinde, *Ethology: Its Nature and Relationship With Other Sciences*
128. R.A. Hinde, *Non-Verbal Communication*, Cambridge University Press, (1972).
129. R.A. Hinde, A.-N. Perret-Clermont and J. Stevenson-Hinde, editors, *Social Relationships and Cognitive Development*, Clarendon, Oxford, (1985).
130. R.A. Hinde and J. Stevenson-Hinde, editors, *Relationships Within Families: Mutual Influences*, Clarendon Press, Oxford, (1988).
131. J.H. Crook, editor, *Social Behavior in Birds and Mammals*, Academic Press, London, (1970).
132. P. Ekman, editor, *Darwin and Facial Expression*, Academic Press, New York, (1973).
133. P. Ekman, W.V. Friesen and P. Ekworth, *Emotions in the Human Face*, Pergamon, New York, (1972).
134. N. Blurton Jones, editor, *Ethological Studies of Child Behavior*, Cambridge University Press, (1975).
135. M. von Cranach, editor, *Methods of Inference from Animals to Human Behavior*, Chicago/Mouton, Haag, (1976); Aldine, Paris, (1976).
136. I. Eibl-Eibesfeldt, *Ethology, The Biology of Behavior*, Holt, Rinehart and Winston, New York, (1975).
137. I. Eibl-Eibesfeldt and F.K. Salter, editors, *Indoctrinability, Ideology, and Warfare: Evolutionary Perspectives*, Berghahn Books, (1998).
138. I. Eibl-Eibesfeldt, *Human Ethology*, Walter De Gruyter Inc., (1989).
139. I. Eibl-Eibesfeldt, *Love and Hate*, Walter De Gruyter Inc., (1996).
140. I. Eibl-Eibesfeldt, *The Biology of Peace and War*, Thames and Hudson, New York (1979).
141. I. Eibl-Eibesfeldt, *Der Vorprogrammiert Mensch*, Molden, Vienna, (1973).
142. I. Eibl-Eibesfeldt, *Liebe und Hass*, Molden, Vienna, (1973).
143. J. Bowlby, *By ethology out of psychoanalysis: An experiment in interbreeding*, *Animal Behavior*, **28**, 649-656 (1980).
144. B.B. Beck, *Animal Tool Behavior*, Garland STPM Press, New York, (1980).

145. R. Axelrod, *The Evolution of Cooperation*, Basic Books, New York, (1984).
146. J.D. Carthy and F.L. Ebling, *The Natural History of Aggression*, Academic Press, New York, (1964)
147. D.L. Cheney and R.M. Seyfarth, *How Monkeys See the World: Inside the Mind of Another Species*, University of Chicago Press, (1990).
148. F. De Waal, *Chimpanzee Politics*, Cape, London, (1982).
149. M. Edmunds, *Defense in Animals*, Longman, London, (1974).
150. R.D. Estes, *The Behavior Guide to African Mammals*, University of California Press, Los Angeles, (1991).
151. R.F. Ewer, *Ethology of Mammals*, Logos Press, London, (1968).
152. E. Morgan, *The Scars of Evolution*, Oxford University Press, (1990).
153. W.D. Hamilton, *The genetical theory of social behavior. I and II*, J. Theor. Biol. **7**, 1-52 (1964).
154. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
155. Albert Szent-Györgyi, *The Crazy Ape*, Philosophical Library, New York (1970).
C. Zhan-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press (1986).
156. R. Dart, *The predatory transition from ape to man*, International Anthropological and Linguistic Review, **1**, (1953).
157. R. Fox, *In the beginning: Aspects of hominid behavioral evolution*, Man, **NS 2**, 415-433 (1967).
158. R.G. Klein, *Anatomy, behavior, and modern human origins*, Journal of World Prehistory, **9 (2)**, 167-198 (1995).
159. D.R. Begun, C.V. Ward and M.D. Rose, *Function, Phylogeny and Fossils: Miocene Hominid Evolution and Adaptations*, Plenum Press, New York, (1997).
160. P.J. Bowler, *Theories of Human Evolution: A Century of Debate, 1884-1944*, Basil Blackwell, Oxford, (1986).
161. G.C. Conroy, *Primate Evolution*, W.W. Norton, New York, (1990).
162. G. Klein, *The Human Career, Human Biological and Cultural Origins*, University of Chicago Press, (1989).
163. D.P. Barash *Sociobiology and Behavior*, Elsevier, New York, (1977).
164. N.A. Chagnon and W. Irons, eds., *Evolutionary Biology and Human Social Behavior, an Anthropological Perspective*, Duxbury Press, N. Scituate, MA, (1979).
165. E. Danielson, *Vold, en Ond Arv?*, Gyldendal, Copenhagen, (1929).
166. M.R. Davie, *The Evolution of War*, Yale University Press, New Haven, CT, (1929).
167. T. Dobzhanski, *Mankind Evolving*, Yale University Press, New Haven, CT, (1962).
168. R.L. Holloway, *Primate Aggression: Territoriality and Xenophobia*, Academic Press, New York, (1974).
169. P. Kitcher, *Vaulting Ambition: Sociobiology and the Quest for Human Nature*, MIT Press, Cambridge, MA, (1985).
170. S.L.W. Mellen, *The Evolution of Love*, Freeman, Oxford, (1981).

171. A. Roe and G.G. Simpson, *Behavior and Evolution*, Yale University Press, New Haven, CT, (1958).
172. N.J. Smelser, *The Theory of Collective Behavior*, Free Press, New York, (1963).
173. R. Trivers, *Social Evolution*, Benjamin/Cummings, Menlo Park, CA, (1985).
174. W. Weiser, *Konrad Lorenz und seine Kritiker*, Piper, Munich, (1976).
175. W. Wickler, *Biologie der 10 Gebote*, Piper, Munich, (1971).
176. J. Galtung, *A structural theory of aggression*, Journal of Peace Research, **1**, 95-119, (1964).
177. G.E. Kang, *Exogamy and peace relations of social units: A cross-cultural test*, Ethology, **18**, 85-99, (1979).
178. A. Montagu, *Man and Aggression*, Oxford University Press, New York, (1968).
179. W.A. Nesbitt, *Human Nature and War*, State Education Department of New York, Albany, (1973).
180. W. Suttles, *Subhuman and human fighting*, Anthropologica, **3**, 148-163, (1961).
181. V. Vale and Andrea Juno, editors, *Modern Primitives: An Investigation of Contemporary Adornment and Ritual*, San Francisco Research, (1990).
182. P.P.G. Bateson and R.A. Hinde, editors, *Growing Points in Ethology: Based on a Conference Sponsored by St. John's College and King's College, Cambridge*, Cambridge University Press, (1976).
183. P. Bateson, editor, *The Development and Integration of Behaviour: Essays in Honour of Robert Hinde*, Cambridge University Press, (1991).

Chapter 3

WHAT IS SCIENCE?

3.1 What is science?

In his autobiography, Charles Darwin says that “science consists in arranging facts in such a way that general conclusions may be drawn from them”. In other words, scientists try to find patterns in our observations of nature. These patterns stand temporarily as “laws of nature”, until exceptions are found. Very often it is possible to use such patterns or laws to make accurate predictions about the future, and when this is possible, it strengthens the credibility of the pattern that was used to make the predictions. Thus the test of a law of nature is its usefulness in making predictions about the future; and scientists find it hardly worthwhile to talk about assertions from which no predictions can be made.

When exceptions to natural laws are found, they are of extreme importance, and great efforts must be made to clarify the situation: If an exception to a natural law is found to be genuine, it means that the law must be modified, and this is the way scientific progress is made; hence the extreme importance of exceptions, and the massive attention which is given to them by scientists.

We seem to live in a universe in which the behavior of matter and energy is predictable. For example, if you put a coin into a box and shut the lid, you can say with some confidence, “The coin is inside the box”, even though you cannot see the coin. From this assertion, many predictions follow: You can predict that if you shake the box, the coin will rattle. The box will be slightly heavier than before because of the presence of the coin. An X-ray photograph would reveal the coin. If you open the box again, the coin will still be there, and so on. It would be hard to live in a world where this degree of predictability did not hold.

Besides predictability, the universe in which we live seems to have another remarkable characteristic: The most general and fundamental laws of nature that have been discovered have great simplicity and mathematical beauty. Pythagoras and his followers were the first to discover that “mathematics is the language of nature”.

Pythagoras, who lived from 582 B.C. to 497 B.C., is one of the most important and interesting figures in the history of European culture. It is hard to decide whether he was

a religious leader or a scientist. He was a leader and reformer of the Orphic religion of ancient Greece, and he was the first to maintain that mathematics is the key to the understanding of nature. In the Pythagorean view of nature, mathematical harmony governs the fundamental laws of the universe. In the Pythagorean ethic, the highest vocation is that of the philosopher, and the aim of philosophy is to understand nature through the discovery of the mathematical relationships which govern the universe.

Today, much of what Pythagoras hoped to achieve in mathematics has been attained. For example, quantum theory has shown that the inner structure of an atom is governed by mathematical relationships closely analogous to those governing the harmonics of a lyre string. We have indeed found mathematical harmony in the fundamental laws of nature; but one can ask whether philosophy has brought harmony to human relations, as Pythagoras would have hoped!

As examples of the simplicity and beauty of the fundamental laws of nature, we can think of Maxwell's equations for electromagnetic fields, or Schrödinger's non-relativistic wave equation for electrons, or Dirac's relativistic wave equation. All of them require mathematical language to be properly expressed, and all have great mathematical beauty. In fact, P.A.M Dirac, whose relativistic wave equation was just mentioned, wrote a famous paper in the Canadian Journal of Physics, where he maintained that the beauty of fundamental physical laws can be taken as a fact of nature, and therefore we can find new laws by following our sense of mathematical beauty. Apparently this method of research worked for him!

Furthermore, all of the fundamental laws of nature that have until now been discovered, fit together in a self-consistent way. Therefore, when something new is discovered, the first reaction of the scientific community is to see how the new discovery is related to the entire existing body of knowledge. If no relationship can be found, then either the new discovery is suspect or else it is of enormous importance. In any case, no one rests until the situation is clarified.

Modern astronomy has shown the Universe to be almost unimaginably large. Wikipedia states that: "The size of the Universe is unknown; it may be infinite. The region visible from Earth (the observable universe) is a sphere with a radius of about 46 billion light years, based on where the expansion of space has taken the most distant objects observed. For comparison, the diameter of a typical galaxy is 30,000 light-years, and the typical distance between two neighboring galaxies is 3 million light-years. As an example, the Milky Way Galaxy is roughly 100,000 light years in diameter, and the nearest sister galaxy to the Milky Way, the Andromeda Galaxy, is located roughly 2.5 million light years away. There are probably more than 100 billion (10^{11}) galaxies in the observable Universe. Typical galaxies range from dwarfs with as few as ten million (10^7) stars up to giants with one trillion (10^{12}) stars, all orbiting the galaxy's center of mass. A 2010 study by astronomers estimated that the observable Universe contains 300 sextillion (3×10^{23}) stars."

Among this incredibly vast number of stars it is believed that there are innumerable stars that have planets similar to the Earth and hence able to support life. We also now know that given conditions that are favorable to life, it will almost certainly develop and evolve. The Earth seems to be only of extremely minor importance on the scale

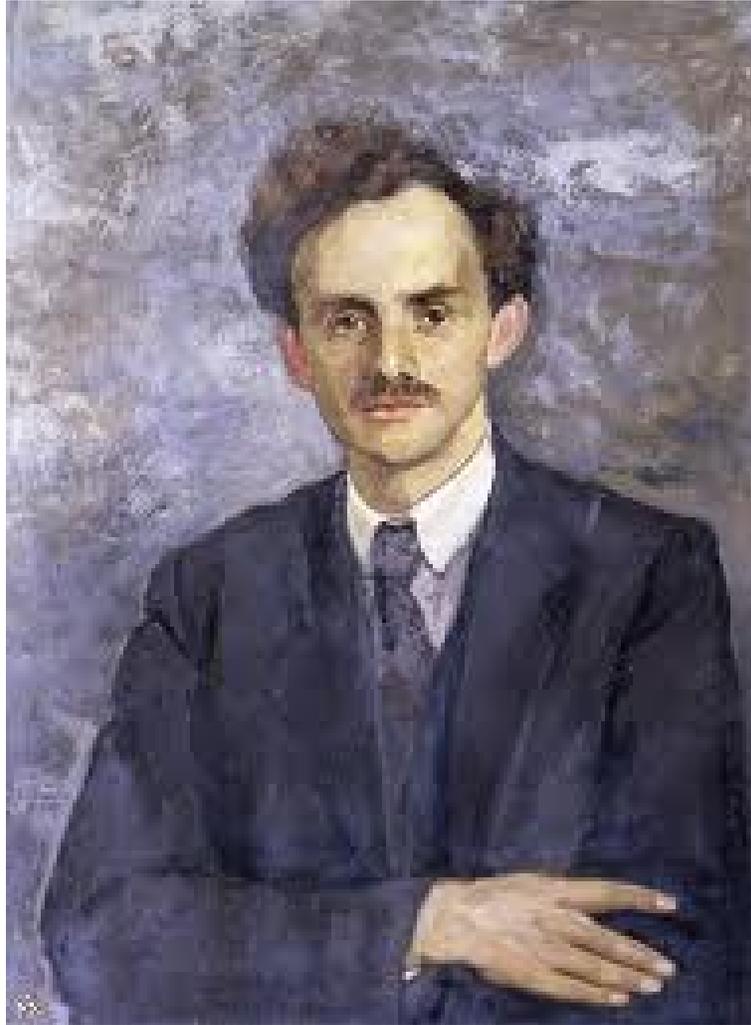


Figure 3.1: Paul Adrian Maurice Dirac (1902-1984), discoverer of the relativistic wave equation that holds for electrons and other spin- $\frac{1}{2}$ particles. He maintained that since mathematical beauty is a characteristic of the most fundamental physical laws, we can find new ones by following our sense of mathematical beauty.

of the Universe. Given these facts, and given that the fundamental laws of nature are mathematical, I find it difficult to believe that the entire Universe and the laws that govern it were arranged for the benefit of humans, especially since humans have only existed for a brief instant on the time-scale of the Universe. If asked where the Universe came from and why, the scientist must answer with honesty, "I don't know".

3.2 The blindness of science

Ethical considerations have traditionally been excluded from scientific discussions. This tradition perhaps has its roots in the desire of the scientific community to avoid the bitter religious controversies which divided Europe following the Reformation. Whatever the historical reason may be, it has certainly become customary to speak of scientific problems in a dehumanized language, as though science had nothing to do with ethics or politics.

The great power of science is derived from an enormous concentration of attention and resources on the understanding of a tiny fragment of nature; but this concentration is at the same time a distortion of values. To be effective, a scientist must believe, at least temporarily, that the problem on which he or she is working is more important than anything else in the world, which is of course untrue. Thus a scientist, while seeing a fragment of reality better than anyone else, becomes blind to the larger whole. For example, when one looks into a microscope, one sees the tiny scene on the slide in tremendous detail, but that is all one sees. The remainder of the universe is blotted out by this concentration of attention.

The system of rewards and punishments in the training of scientists produces researchers who are highly competent when it comes to finding solutions to technical problems, but whose training has by no means encouraged them to think about the ethical or political consequences of their work.

Scientists may, in fact, be tempted to escape from the intractable moral and political difficulties of the world by immersing themselves in their work. Enrico Fermi, (whose research as much as that of any other person made nuclear weapons possible), spoke of science as "soma" - the escapist drug of Aldous Huxley's *Brave New World*. Fermi perhaps used his scientific preoccupations as an escape from the worrying political problems of the '30's and '40's.

The education of a scientist often produces a person with a strong feeling of loyalty to a particular research discipline, but perhaps without sufficient concern for the way in which progress in that discipline is related to the general welfare of humankind. To remedy this lack, it would be very desirable if the education of scientists could include some discussion of ethics, as well as a review of the history of modern science and its impact on society.

The explosive growth of science-driven technology during the last two centuries has changed the world completely; and our social and political institutions have adjusted much too slowly to the change. The great problem of our times is to keep society from being shaken to pieces by the headlong progress of science, the problem of harmonizing our social and political institutions with technological change. Because of the great importance of



Figure 3.2: **The blindness of science:** Enormous concentration of attention on a small fragment of reality blinds the researcher to the larger whole.

this problem, it is perhaps legitimate to ask whether anyone today can be considered to be educated without having studied the impact of science on society. Should we not include this topic in the education of both scientists and non-scientists?

Science has given us great power over the forces of nature. If wisely used, this power will contribute greatly to human happiness; if wrongly used, it will result in misery. In the words of the Spanish writer, Ortega y Gasset, “We live at a time when man, lord of all things, is not lord of himself”; or as Arthur Koestler has remarked, “We can control the movements of a spaceship orbiting about a distant planet, but we cannot control the situation in Northern Ireland.”

To remedy this situation, educational reforms are needed. Science and engineering students ought to have some knowledge of the history and social impact of science. They could be given a course on the history of scientific ideas; but in connection with modern historical developments, such as the industrial revolution, the global population explosion, the development of nuclear weapons, genetic engineering, and information technology, some discussion of social impact could be introduced. One might hope to build up in science and engineering students an understanding of the way in which their work is related to the general welfare of humankind. These elements are needed in science education if rapid technological development is to be beneficial rather than harmful.

3.3 Is there a conflict between science and religion?

Is there a conflict between science and religion? This is a frequently-asked question, and many different answers have been given. My own opinion is that there are two aspects to religion - ethics and cosmology. I think that when we talk about cosmology, there is often a conflict between science and religion. But with respect to ethics, there is very little room for conflict because science has almost nothing to say about ethics.

Why do I say “almost nothing” instead of “nothing”? It is often said that ethical principles cannot be derived from science, that they must come from somewhere else. Nevertheless, when nature is viewed through the eyes of modern science, we obtain some insights which seem almost ethical in character. Biology at the molecular level has shown us the complexity and beauty of even the most humble living organisms, and the interrelatedness of all life on earth. Looking through the eyes of contemporary biochemistry, we can see that even the single cell of an amoeba is a structure of miraculous complexity and precision, worthy of our respect and wonder.

Knowledge of the second law of thermodynamics, the statistical law favoring disorder over order, reminds us that life is always balanced like a tight-rope walker over an abyss of chaos and destruction. Living organisms distill their order and complexity from the flood of thermodynamic information which reaches the earth from the sun. In this way, they create local order; but life remains a fugitive from the second law of thermodynamics. Disorder, chaos, and destruction remain statistically favored over order, construction, and complexity.

It is easier to burn down a house than to build one, easier to kill a human than to raise

and educate one, easier to force a species into extinction than to replace it once it is gone, easier to burn the Great Library of Alexandria than to accumulate the knowledge that once filled it, and easier to destroy a civilization in a thermonuclear war than to rebuild it from the radioactive ashes. Knowing this, we can form an almost ethical insight: To be on the side of order, construction, and complexity, is to be on the side of life. To be on the side of destruction, disorder, chaos and war is to be against life, a traitor to life, an ally of death. Knowing the precariousness of life, knowing the statistical laws that favor disorder and chaos, we should resolve to be loyal to the principle of long continued construction upon which life depends.

War is based on destruction, destruction of living persons, destruction of homes, destruction of infrastructure, and destruction of the biosphere. If we are on the side of life, if we are not traitors to life and allies of death, we must oppose the institution of war. We must oppose the military-industrial complex. We must oppose the mass media when they whip up war-fever. We must oppose politicians who vote for obscenely enormous military budgets at a time of financial crisis. We must oppose these things by working with dedication, as though our lives depended on it. In fact, they do.

But let us turn to religious ethics. Not only do they not conflict with science, but there is also a general agreement on ethical principles between the major religions of the world.

The central ethical principles of Christianity can be found in the Sermon on the Mount and in the Parable of the Good Samaritan. In the Sermon on the Mount, we are told that we must not only love our neighbors as much as we love ourselves; we must also love and forgive our enemies. This seemingly impractical advice is in fact of great practicality, since escalatory cycles of revenge and counter-revenge can only be ended by unilateral acts of kindness.

In the Parable of the Good Samaritan, we are told that our neighbor, whom we must love, is not necessarily a member of our own ethnic group. Our neighbor may live on the other side of the world and belong to an entirely different race or culture; but he or she still deserves our love and care.

It is an interesting fact that the Golden Rule, “Do unto others as you would have them do unto you”, appears in various forms in all of the world’s major religions. The Wikipedia article on the Golden Rule gives an impressive and fascinating list of the forms in which the rule appears in many cultures and religions. For example, in ancient China, both Confucius and Laozi express the Golden Rule, but they do it slightly differently: Zi Gong asked, saying, “Is there one word that may serve as a rule of practice for all one’s life?” The Master said, “Is not reciprocity such a word?” (Confucius) and “The sage has no interest of his own, but takes the interests of the people as his own. He is kind to the kind; he is also kind to the unkind: for Virtue is kind. He is faithful to the faithful; he is also faithful to the unfaithful: for Virtue is faithful.” (Laozi)

In the Jewish tradition, we have “The stranger who resides with you shall be to you as one of your citizens; you shall love him as yourself, for you were strangers in the land of Egypt” (Leviticus) In Islam: A Bedouin came to the prophet, grabbed the stirrup of his camel and said: O the messenger of God! Teach me something to go to heaven with it. The Prophet said: “As you would have people do to you, do to them; and what you



Figure 3.3: A painting illustrating the Parable of the Good Samaritan

dislike to be done to you, don't do to them. This maxim is enough for you; go and act in accordance with it!" (Kitab al-Kafi, vol. 2, p. 146)

The principle of reciprocity is an ancient one in human history, and it is thus embedded in our emotions. It is an important part of human nature. Reciprocity is the basis of non-market economies, and also the basis of social interactions between family members, friends and colleagues. In hunter-gatherer societies, it is customary to share food among all the members of the group. "Today I receive food from you, and tomorrow you will receive food from me." Similarly, among friends in modern society, no payment is made for hospitality, but it is expected that sooner or later the hospitality will be returned.

According to Wikipedia "Reciprocity in Social Psychology refers to responding to a positive action with another positive action, rewarding kind actions. As a social construct, reciprocity means that in response to friendly actions, people are frequently much nicer and much more cooperative than predicted by the self-interest model; conversely, in response to hostile actions they are frequently much more nasty and even brutal." As Wikipedia points out, reciprocity can also be negative, as in the case of escalatory cycles of revenge and counter-revenge.

The Buddhist concept of karma has great value in human relations. The word "karma" means simply "action". In Buddhism, one believes that actions return to the actor. Good actions will be returned, and bad actions will also be returned. This is obviously true in social relationships. If we behave with kindness and generosity to our neighbors, they will return our kindness. Conversely, a harmful act may lead to vicious circles of revenge and counter revenge, such as those we see today in the Middle East and elsewhere. These vicious circles can only be broken by returning good for evil.

However the concept of karma has a broader and more abstract validity beyond the direct return of actions to the actor. When we perform a good action, we increase the total amount of good karma in the world. If all people similarly behave well, the the world as a whole will become more pleasant and more safe. Human nature seems to have a built-in recognition of this fact, and we are rewarded by inner happiness when we perform good and kind actions. In his wonderful book, "Ancient Wisdom, Modern World", the Dalai Lama says that good actions lead to happiness and bad actions to unhappiness even if our neighbors do not return these actions. Inner peace, he tells us, is incompatible with bad karma and can be achieved only through good karma, i.e. good actions.

In Buddhist philosophy, the concept of Karma, action and reaction, also extends to our relationship with nature. Both Hindu and Buddhist traditions emphasize the unity of all life on earth. Hindus regard killing an animal as a sin, and many try to avoid accidentally stepping on insects as they walk.

The Hindu and Buddhist picture of the relatedness of all life on earth has been confirmed by modern biological science. We now know that all living organisms have the same fundamental biochemistry, based on DNA, RNA, proteins and polysaccharides, and we know that our own human genomes are more similar to than different from the genomes of our close relations in the animal world.

The peoples of the industrialized nations urgently need to acquire a non-anthropocentric element in their ethics, similar to reverence for all life found in the Hindu and Buddhist

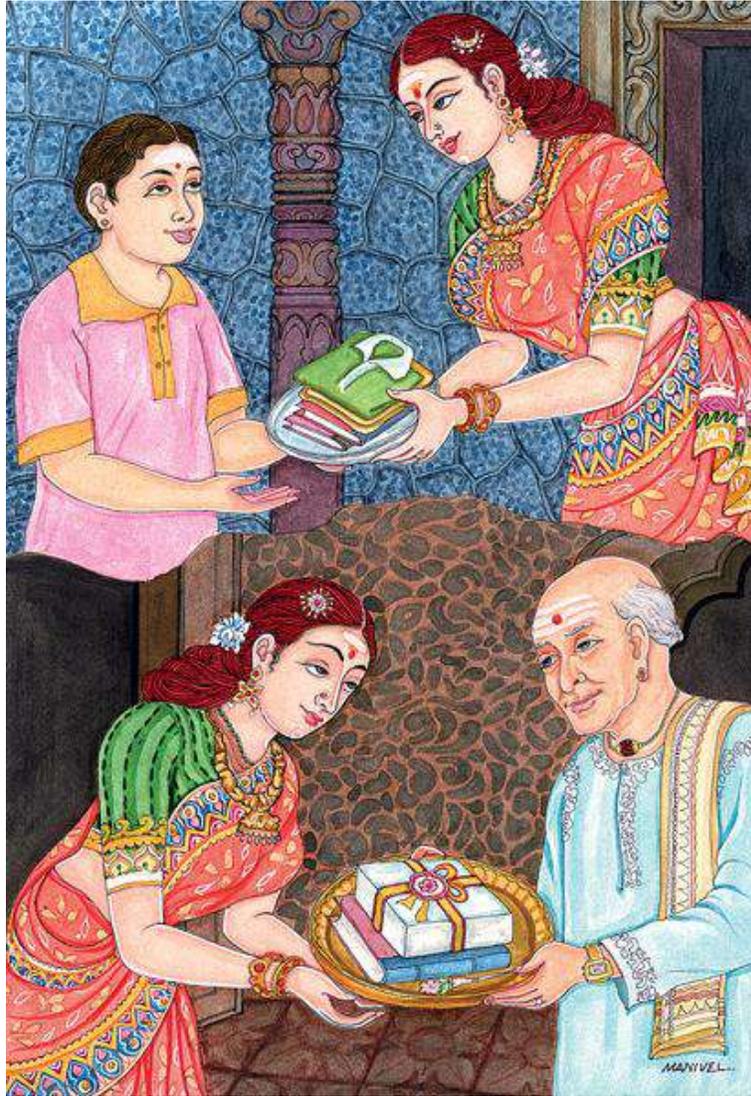


Figure 3.4: This painting illustrates the concept of karma. A lady gives books and clothing to a poor student. Later she receives a gift from a neighbor. There may sometimes be a direct causal connection between such events, but often they are connected only by the fact that each act of kindness makes the world a better place. (Himalayan Academy Publications, Kapaa, Kauai, Hawaii.)

traditions, as well as in the teachings of Saint Francis of Assisi and Albert Schweitzer. We need to learn to value other species for their own sakes, and not because we expect to use them for our own economic goals.

Today a few societies still follow a way of life similar to that of our hunter-gatherer ancestors. Anthropologists are able to obtain a vivid picture of the past by studying these societies. Often the religious ethics of the hunter-gatherers emphasizes the importance of harmony with nature. For example, respect for nature appears in the tribal traditions of Native Americans. The attitude towards nature of the Sioux can be seen from the following quotations from “Land of the Spotted Eagle” by the Lakota (Western Sioux) chief, Standing Bear (ca. 1834-1908):

“The Lakota was a true lover of Nature. He loved the earth and all things of the earth... From Waken Tanka (the Great Spirit) there came a great unifying life force that flowered in and through all things, the flowers of the plains, blowing winds, rocks, trees, birds, animals, and was the same force that had been breathed into the first man. Thus all things were kindred and were brought together by the same Great Mystery.”

“Kinship with all creatures of the earth, sky, and water was a real and active principle. For the animal and bird world there existed a brotherly feeling that kept the Lakota safe among them. And so close did some of the Lakota come to their feathered and furred friends that in true brotherhood they spoke a common tongue.”

“The animal had rights, the right of man’s protection, the right to live, the right to multiply, the right to freedom, and the right to man’s indebtedness, and in recognition of these rights the Lakota never enslaved the animal, and spared all life that was not needed for food and clothing.”

“This concept of life was humanizing and gave to the Lakota an abiding love. It filled his being with the joy and mystery of things; it gave him reverence for all life; it made a place for all things in the scheme of existence with equal importance to all. The Lakota could despise no creature, for all were one blood, made by the same hand, and filled with the essence of the Great Mystery.”

A similar attitude towards nature can be found in traditional Inuit cultures, and in some parts of Africa, a man who plans to cut down a tree offers a prayer of apology, telling the tree why necessity has forced him to harm it. This preindustrial attitude is something from which the industrialized North could learn. In industrial societies, land “belongs” to some one has the “right” to ruin the land or to kill the communities of creatures living on it if this happens to give some economic advantage, in much the same way that a Roman slaveowner was thought to have the “right” to kill his slaves. Preindustrial societies have a much less rapacious and much more custodial attitude towards the land and towards its non-human inhabitants.

We have received many gifts from modern technology, but if we are to build a happy, sustainable and war-free world we must combine our new scientific techniques with humanity’s ancient wisdom.



Figure 3.5: Chief Luther Standing Bear, author of “Land of the Spotted Eagle” and many other books.

3.4 Complementarity

Can two contradictory statements both be true? The physicist Niels Bohr thought that this could happen, and he called such an occurrence “complementarity”. I think that I understand what Niels Bohr meant: Whenever we make a statement about the real world we are making a model which is simpler than what it is supposed to represent. Therefore every statement must to some extent be false because it is an oversimplification. In fact, a model of the world is an abstraction, and it is possible to make two conflicting abstractions, starting with the same real object.

If you say, “The eye is like a camera”, you are making an abstraction by concentrating on the way that the eye works and the way that a camera works. Both use a lens to form an image. If you say “The eye is like a small onion”, you are again making an abstraction, but this time concentrating the size and texture of the eye. It is somewhat round, elastic and damp. If you drop it on a stone floor, it will bounce rather than breaking. Both these abstractions have a certain degree of truth, although they are contradictory.

Similarly, science and religion are both abstractions, and both oversimplify the real world, which is much more complex than either of them. Which abstraction we should use depends on the problem that we wish to discuss. If we are talking about atomic spectra, then Schrödinger and Dirac should be our guides. But if the lecture is on how to achieve peace in the world, I would far rather hear it from Mahatma Gandhi than from either Schrödinger or Dirac.

3.5 Right hand, left hand

I vividly remember a speech made by His Holiness Pope John Paul II on the relationship between science and religion. I think that it was in 1981 or 1982. I was in Rome, attending a conference on quantum theory applied to chemistry. One of the topics at the conference was research on drugs that could be used for treating cancer. Because of this humanitarian aspect of the conference, the Italian professor who organized it succeeded in arranging for the participants to have an audience with the Pope, the day after Easter.

On Easter day itself I was walking through Rome, and I happened to meet some Swedish friends. They told me that they were about to join a march protesting against nuclear weapons. They would march through Rome, carrying antinuclear banners, and end at the Vatican in time to hear the Pope’s Easter address. I joined the march with my Swedish friends, and when we arrived at St. Peter’s Cathedral the entire square was full people, packed tightly, shoulder to shoulder so that one could almost not move. The atmosphere was a festive one, and our antinuclear banners were matched by religious banners carried by others in the throng. I had never seen such a large crowd in my life, but it was a happy crowd.

After a while the doors of the Vatican were opened, and the Pope came out onto the terrace accompanied by the College of Cardinals. He began to address us in Latin. We were so far away that we would not have been able to see or hear him, had it not been



Figure 3.6: **His Holiness Pope John Paul II**

for loudspeakers and two large screens showing his image, with subtitles in Italian and in English.

At the end of the Pope's address to the crowd, the Cardinals went into the Vatican and the doors were ceremonially closed, but the Pope himself walked down the steps of the terrace and into the crowd, where he mingled with everyone, shook hands with as many as he could, and talked with as many as he could. This showed remarkable courage, since he had only recently recovered from almost-fatal gunshot wounds at the hands of a would-be assassin.

On the appointed day for our audience, which was the day after Easter, we ascended the stairway to the audience chambers at the top of the Vatican, passing the impressive and colorful Swiss Guards on the way, and also passing beautiful tapestries that covered the walls.

The Pope was very busy because of his obligations to the many pilgrims who had come to Rome to celebrate Easter. We were told that it would be at least an hour before the Pope

could address us. During that time we were free to wander about the audience chamber and to look at the tapestries. We would know when the Pope was about to arrive, because the lights would become brighter for the sake of the television, and because we would hear a choir singing. Then we should take our seats and wait for the Pope's arrival.

It happened just as we had been told. After an hour or so, the lights went up and we heard the choir singing. We took our seats, and a few minutes later the Pope arrived. As he began to speak with us he gave the impression of an energetic and physically strong person, with an extremely modest, attractive and charismatic personality.

The Pope spoke in English, both to us, and to a much larger public, since his address was televised. He talked about the relationship between science and religion, mentioning that one of the topics to which our conference had been devoted was the treatment of cancer. He said that science had done very much to improve human health and comfort. Science and technology have given us the material goods of our modern world. However, Pope John Paul told us, material goods are not enough to ensure happiness. It is possible to be very well off from a material standpoint, but at the same time, very miserable. He said that for happiness, we also need ethics and wisdom - the traditional wisdom of humanity. By "the traditional wisdom of humanity", I think that he meant the wisdom that is preserved in the world's religions, but he did not specifically mention religion.

When he had finished talking, the Pope came down to the floor of the audience chamber and shook hands with us. All through his speech a baby had been crying, and the Pope, who was undoubtedly used to such disturbances, made a point of kissing the baby. He shook my hand too. There was a Polish professor named Wlodzimierz Kolos with our group, and when the Pope came to the place where Kolos was standing, he stood and talked with the professor for about two minutes.

I was curious about what the Pope and Kolos had been saying to each other, but I did not have a chance to ask on that occasion. However, a year or so later I met Prof. Kolos at another conference, and I asked him. He replied, "I don't remember. I see the Pope so often that I don't remember what we said on that particular occasion."

I was astonished, and I asked Kolos to explain. He told me that when Pope John Paul took his summer vacations, he lived in a large villa near to Rome. He had the custom of inviting philosophers, theologians and scientists (many of them Polish) to visit him there for informal discussions. They always sat around a large table and talked about subjects like the relationship between science and religion. On those occasions, the Pope did not wear his robes of office, but only ordinary clothing. Every session ended with a discussion of the current situation in Poland.

Due to the Pope's efforts, the situation in Poland improved, and he also helped to make a reconciliation between science and the Catholic Church. I regard it as a great privilege to have seen his courage at Easter, and to have heard him speak. He is very justly regarded as one of the greatest Popes of all time.

I also had the privilege of hearing His Holiness the 14th Dalai Lama of Tibet speak on the same topic, the relationship between science and religion. The Dalai Lama was visiting Denmark, and I was invited to a lecture by him, arranged by the Danish-Tibetan Society.

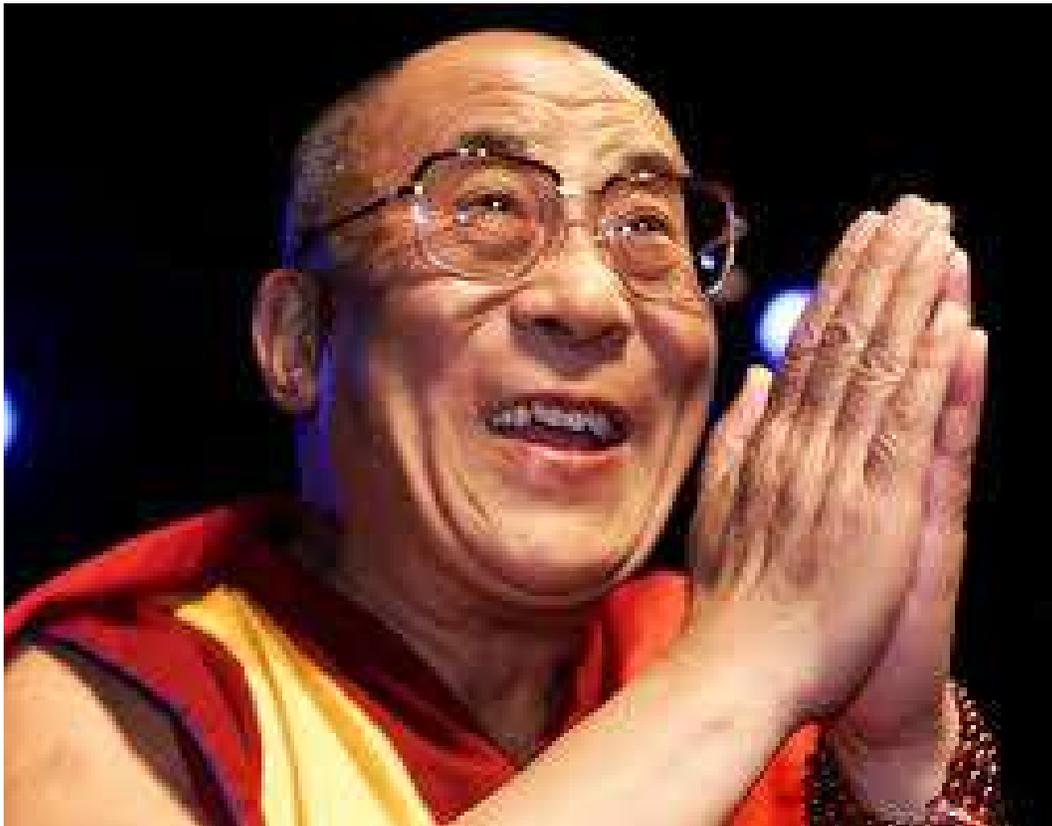


Figure 3.7: **His Holiness the 14th Dalai Lama of Tibet**

The lecture took place at a very large hall called Forum, and such was the interest in his talk that the hall was completely filled. There were many flowers to greet the Dalai Lama, and many yellow-robed monks to assist him. When he began to talk, he gave the same impression as Pope John Paul II had done - energy and physical strength, combined with modesty and an attractive and charismatic personality.

Unfortunately, the acoustics of the hall were terrible, and it was difficult to hear what he said. The problem was made worse by his special accent as he spoke in English. Nevertheless, I managed to understand quite a bit of what he said.

The Dalai Lama told us that we need two hands for our tasks in life, the right hand and the left hand. Without both hands, we cannot cope properly with the problems of life. These two hands, both of which we need, are science and ethics. It was essentially the same message as that of Pope John Paul. The two hands are different, but both are needed.

3.6 How are science and religion related to war?

What is the relationship between science, religion and war? We mentioned that the world's major religions have at their core the principle of universal human brotherhood, which, if practiced, would be enough to make war impossible. However, the principle of loving and forgiving one's enemies is rarely practiced.

Many wars have been fought in the name of religion. We can think, for example, of the Crusades, or the Islamic conquests in the Middle East, North Africa and Spain, or the wars between Catholics and Protestants in Europe, or the brutal treatment of the native populations of Central and South America in the name of religion. The list by no means stops there.

What about science and technology? How are they related to war? As we start the 21st century and the new millennium, our scientific and technological civilization seems to be entering a period of crisis. Today, for the first time in history, science has given to humans the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of infectious disease. At the same time, science has given us the power to destroy civilization through thermonuclear war, as well as the power to make our planet uninhabitable through pollution and overpopulation. The question of which of these alternatives we choose is a matter of life or death to ourselves and our children.

Science and technology have shown themselves to be double-edged, capable of doing great good or of producing great harm, depending on the way in which we use the enormous power over nature, which science has given to us. For this reason, ethical thought is needed now more than ever before. The wisdom of the world's religions, the traditional wisdom of humankind, can help us as we try to ensure that our overwhelming material progress will be beneficial rather than disastrous.

The crisis of civilization, which we face today, has been produced by the rapidity with which science and technology have developed. Our institutions and ideas adjust too slowly to the change. The great challenge which history has given to our generation is the task



Figure 3.8: Three-stage (fission-fusion-fission) bombs may be made enormously powerful at little extra cost, since the last stage uses ordinary unenriched uranium. A 58 megaton bomb was exploded by the Soviet Union in 1961. It was roughly 5,000 times as powerful as the nuclear weapons that destroyed Hiroshima and Nagasaki. At present the total explosive power of the nuclear weapons in the world is approximately half a million times the power of the Hiroshima-Nagasaki bombs, enough to destroy human civilization and much of the biosphere.

of building new international political structures, which will be in harmony with modern technology. At the same time, we must develop a new global ethic, which will replace our narrow loyalties by loyalty to humanity as a whole.

In the long run, because of the enormously destructive weapons, which have been produced through the misuse of science, the survival of civilization can only be insured if we are able to abolish the institution of war.

Suggestions for further reading

1. Barr, Stephen M. *The Believing Scientist: Essays on Science and Religion*, Wm. B. Eerdmans Publishing Co., 2016
2. Brooke, John H., Margaret Osler, and Jitse M. van der Meer, editors. *Science in Theistic Contexts: Cognitive Dimensions*, Osiris, 2nd ser., vol. 16(2001),
3. Brooke, John H., *Science And Religion: Some Historical Perspectives*, New York: Cambridge University Press, 1991,
4. Bunge, Mario, *Chasing Reality: Strife over Realism*. Toronto: University of Toronto Press.
5. Buxhoeveden, Daniel; Woloschak, Gayle, eds. (2011). *Science and the Eastern Orthodox Church* (1. ed.). Farnham: Ashgate.
6. Cavanaugh, William T. and James K. A. Smith, editors, *Evolution and the Fall*, Wm. B. Eerdmans Publishing Co., 2017
7. Cook, Melvin Alonzo, and Melvin Garfield Cook. *Science and Mormonism: Correlations, Conflicts, and Conciliations*. [Salt Lake City, Utah]: Deseret News Press, 1967.
8. Crisp, Thomas. M., Steven L. Porter, and Gregg A. Ten Elshof, eds, *Neuroscience and the Soul: The Human Person in Philosophy, Science, and Theology*, Wm. B. Eerdmans Publishing Co., 2016
9. Haisch, Bernard. *The God Theory: Universes, Zero-point Fields, and What's Behind It All*, Red Wheel/Weiser, 2006,
10. Harper, Sharon M.P. (ed.) (2000). *The Lab, the Temple, and the Market: Reflections at the Intersection of Science, Religion, and Development*. International Development Research Centre.
11. Harrison, Peter, *The Cambridge Companion to Science and Religion*, (Cambridge, 2010).
12. Huxley, Thomas Henry, *Science and Hebrew Tradition: Essays*, D. Appleton and Company, 1897, 372 pages
13. Johnston, Howard Agnew. *Scientific Faith*. [London]: Hodder & Stoughton; New York: G. H. Doran Co., 1904.
14. Lenaers, Roger. *Nebuchadnezzar's Dream or The End of a Medieval Catholic Church*. Piscataway, NJ: Gorgias Press, 2007.
15. Nelson, Thomas L. *Scientific Aspects of Mormonism: or, Religion in Terms of Life*. Chicago, Ill.: Press of Hillison & Etten Co., 1904, t.p. 1918.

16. Oord, Thomas Jay, ed., *Divine Grace and Emerging Creation: Wesleyan Forays in Science and Theology of Creation*, Pickwick Publications, 2009,
17. Oord, Thomas Jay, *Science of Love: The Wisdom of Well-Being*, Templeton, 2003,
18. Restivo, Sal, *The Social Relations of Physics, Mysticism, and Mathematics*. Kluwer Academic Publishers, 1983.
19. Richardson, Mark - Wesley Wildman (ed.), *Religion & Science: History, Method, Dialogue*, Routledge, 1996.
20. Ruse, Michael. *Can a Darwinian Be a Christian? The Relationship Between Science and Religion*. New York, N.Y.: Cambridge University Press, 2000.
21. Ruse, Michael. *Science and Spirituality: Making Room for Faith in the Age of Science*. New York, N.Y.: Cambridge University Press, 2010.
22. Spierer, Eugen. *God-of-the-Gaps Arguments in Light of Luther's Theology of the Cross*.
23. Stump, J.B., and Alan G. Padgett (eds.) *The Blackwell Companion to Science and Christianity* Malden, MA: Wiley-Blackwell (2012).
24. Van Huyssteen, J. Wentzel (editor), *Encyclopedia of Science and Religion*, MacMillan, 2003,
25. Walsh, James J., *The Popes and Science; the History of the Papal Relations to Science During the Middle Ages and Down to Our Own Time*, Kessinger Publishing, 1908, reprinted 2003.
26. Waters, F. W. *The Way in and the Way out: Science and Religion Reconciled*. Toronto: Oxford University Press, Canadian Branch, 1967. x, [2], 269 p.
27. Watson, Simon R. (2019). *God in Creation: A Consideration of Natural Selection as the Sacrificial Means of a Free Creation*. *Studies in Religion/Sciences Religieuses*. 48 (2): 216-236.
28. Wilber, Ken, *The Marriage of Sense and Soul: Integrating Science and Religion*, Broadway; Reprint edition, 1999,
29. Stefan Zweig, *Tolstoi's Udødelige Tanker (Tolstoy's Immortal Thoughts)*, Danish translation by Kai Friis Møller, Martin's Forlag, Copenhagen, (1939).
30. Ronald Duncan, *Selected Writings of Mahatma Gandhi*, Faber and Faber Ltd., London, (1941).
31. M.K. Gandhi, *An Autobiography or The Story of my Experiments with Truth*, translated from the original Gujarati by Mahadev Dasai, Penguin Books, (1982).
32. Ved Mehta, *Mahatma Gandhi and his Apostles*, Penguin Books, (1977).
33. Henry David Thoreau, *On the Duty of Civil Disobedience*, in *Social and Political Philosophy*, John Sommerville and Ronald Santoni editors, Doubleday and Company, New York, (1963).
34. William Robert Miller, *Martin Luther King, Jr., His Life, Martyrdom, and Meaning for the World*, Weybright and Talley, New York, (1968).
35. Martin Luther King, Jr., *Strength to Love*, Harper and Row, New York, (1963).
36. A. Montagu, ed., *Learning Non-Aggression*, Oxford University Press, (1978).
37. C.A. Robarchek, *The image of nonviolence: The world view of the Semai Senoi*, Federated States Museums, **24**, (1981).

38. S.J. Tambiah, *World Conqueror and World Renouncer: A Study of Buddhism and Polity in Tailand Against a Historical Background*, Cambridge University Press, (1976).
39. Tenzin Gyatso (His Holiness the Dalai Lama), *Ancient Wisdom, Modern World: Ethics for the New Millennium*, Abacus, London, (2000).
40. H.A. Schmidt, *Quakers and Nazis: Inner Light in Outer Darkness*, University of Missouri Press, Colombus MO, (1997).

Chapter 4

THE SOCIAL RESPONSIBILITY OF SCIENTISTS

4.1 Modern war would be impossible without their help

Scientists and engineers need to be aware of the fact that without their active cooperation, modern warfare would be impossible. Furthermore, the misused achievements of science and engineering have made war prohibitively dangerous. Together with catastrophic climate change thermonuclear war threatens both human civilization and the biosphere. Thus scientists and engineers have an enormous responsibility: They must not contribute in any way to the development, or use, or threat of use of weapons.

The US Student Pugwash Group has proposed the following pledge, to be taken by graduating science and engineering students.¹ The oath is analogous to the one taken by graduating medical students:

“I promise to work for a better world, where science and technology are used in socially responsible ways. I will not use my education for any purpose intended to harm human beings or the environment. Throughout my career, I will consider the ethical implications of my work before I take action. While the demands placed upon me may be great, I sign this declaration because I recognize that individual responsibility is the first step on the path to peace.”

In an ideal world, the United Nations would be given the very much increased financial report commensurate with its importance. This would allow its agencies, such as the World Food Organization, the World Health Organization and UNESCO to function effectively. UNESCO could then become the patron of science and engineering, and young men and women graduating in these fields could find socially beneficial jobs, rather than jobs that facilitate the production of weapons.

¹<http://web.cs.ucdavis.edu/~rogaway/classes/188/materials/pledges.pdf>

Science, ethics and politics

Ethical considerations have traditionally been excluded from scientific discussions. This tradition perhaps has its roots in the desire of the scientific community to avoid the bitter religious controversies which divided Europe following the Reformation. Whatever the historical reason may be, it has certainly become customary to speak of scientific problems in a dehumanized language, as though science had nothing to do with ethics or politics.

The great power of science is derived from an enormous concentration of attention and resources on the understanding of a tiny fragment of nature; but this concentration is at the same time a distortion of values. To be effective, a scientist must believe, at least temporarily, that the problem on which he or she is working is more important than anything else in the world, which is of course untrue. Thus a scientist, while seeing a fragment of reality better than anyone else, becomes blind to the larger whole. For example, when one looks into a microscope, one sees the tiny scene on the slide in tremendous detail, but that is all one sees. The remainder of the universe is blotted out by this concentration of attention.

The system of rewards and punishments in the training of scientists produces researchers who are highly competent when it comes to finding solutions to technical problems, but whose training has by no means encouraged them to think about the ethical or political consequences of their work.

Scientists may, in fact, be tempted to escape from the intractable moral and political difficulties of the world by immersing themselves in their work. Enrico Fermi, (whose research as much as that of any other person made nuclear weapons possible), spoke of science as “soma” - the escapist drug of Aldous Huxley’s *Brave New World*. Fermi perhaps used his scientific preoccupations as an escape from the worrying political problems of the '30's and '40's.

The education of a scientist often produces a person with a strong feeling of loyalty to a particular research discipline, but perhaps without sufficient concern for the way in which progress in that discipline is related to the general welfare of humankind. To remedy this lack, it would be very desirable if the education of scientists could include some discussion of ethics, as well as a review of the history of modern science and its impact on society.

The explosive growth of science-driven technology during the last two centuries has changed the world completely; and our social and political institutions have adjusted much too slowly to the change. The great problem of our times is to keep society from being shaken to pieces by the headlong progress of science, the problem of harmonizing our social and political institutions with technological change. Because of the great importance of this problem, it is perhaps legitimate to ask whether anyone today can be considered to be educated without having studied the impact of science on society. Should we not include this topic in the education of both scientists and non-scientists?

Science has given us great power over the forces of nature. If wisely used, this power will contribute greatly to human happiness; if wrongly used, it will result in misery. In the words of the Spanish writer, Ortega y Gasset, “We live at a time when man, lord of all things, is not lord of himself”; or as Arthur Koestler has remarked, “We can control

the movements of a spaceship orbiting about a distant planet, but we cannot control the situation in Northern Ireland.”

To remedy this situation, educational reforms are needed. Science and engineering students ought to have some knowledge of the history and social impact of science. They could be given a course on the history of scientific ideas; but in connection with modern historical developments, such as the industrial revolution, the global population explosion, the development of nuclear weapons, genetic engineering, and information technology, some discussion of social impact could be introduced. One might hope to build up in science and engineering students an understanding of the way in which their work is related to the general welfare of humankind. These elements are needed in science education if rapid technological development is to be beneficial rather than harmful.

As an example of the horrors that have been produced by lack of conscience in the application of science and engineering, one can think of drones, which make the illegal killing of men, women and children in distant countries into a sort of computer game played by operators sitting in the comfort of their Nevada bunkers. Now, apparently, there is a move to make killer robots completely free from human control, as can be seen from the following excerpt from a statement by the Campaign to Ban Killer Robots:

“Over the past decade, the expanded use of unmanned armed vehicles has dramatically changed warfare, bringing new humanitarian and legal challenges. Now rapid advances in technology are resulting in efforts to develop fully autonomous weapons. These robotic weapons would be able to choose and fire on targets on their own, without any human intervention. This capability would pose a fundamental challenge to the protection of civilians and to compliance with international human rights and humanitarian law.”

“Several nations with high-tech militaries, including China, Israel, Russia, the United Kingdom, and the United States, are moving toward systems that would give greater combat autonomy to machines. If one or more chooses to deploy fully autonomous weapons, a large step beyond remote-controlled armed drones, others may feel compelled to abandon policies of restraint, leading to a robotic arms race. Agreement is needed now to establish controls on these weapons before investments, technological momentum, and new military doctrine make it difficult to change course.”

“Allowing life or death decisions to be made by machines crosses a fundamental moral line.... The use of fully autonomous weapons would create an accountability gap, as there is no clarity on who would be legally responsible for a robot’s actions: the commander, programmer, manufacturer, or robot itself?... A comprehensive, pre-emptive prohibition on the development, production and use of fully autonomous weapons—weapons designed to kill without human intervention—is urgently needed.”

4.2 The threat of nuclear war

As bad as conventional arms and conventional weapons may be, it is the possibility of a catastrophic nuclear war that poses the greatest threat to humanity. There are today roughly 16,000 nuclear warheads in the world. The total explosive power of the warheads



Figure 4.1: **The 15 megaton explosion detonated by the United States at Bikini Atoll in 1954 produced lasting biological damage to humans and animals living on the distant Marshall Islands. Today, half a century later, the islanders still experience radiation sickness in the form of leukemia and birth defects. Source: www.theguardian.com**

that exist or that could be made on short notice is approximately equal to 500,000 Hiroshima bombs.

To multiply the tragedy of Hiroshima by a factor of half a million makes an enormous difference, not only quantitatively, but also qualitatively. Those who have studied the question believe that a nuclear catastrophe today would inflict irreversible damage on our civilization, genetic pool and environment.

Thermonuclear weapons consist of an inner core where the fission of uranium-235 or plutonium takes place. The fission reaction in the core is able to start a fusion reaction in the next layer, which contains isotopes of hydrogen. It is possible to add a casing of ordinary uranium outside the hydrogen layer, and under the extreme conditions produced by the fusion reaction, this ordinary uranium can undergo fission. In this way, a fission-fusion-fission bomb of almost limitless power can be produced.

For a victim of severe radiation exposure, the symptoms during the first week are nausea, vomiting, fever, apathy, delirium, diarrhoea, oropharyngeal lesions and leukopenia. Death occurs during the first or second week.

We can perhaps be helped to imagine what a nuclear catastrophe means in human terms by reading the words of a young university professor, who was 2,500 meters from the hypocenter at the time of the bombing of Hiroshima: “Everything I saw made a deep impression: a park nearby covered with dead bodies... very badly injured people evacuated in my direction... Perhaps most impressive were girls, very young girls, not only with their clothes torn off, but their skin peeled off as well. ... My immediate thought was that this was like the hell I had always read about. ... I had never seen anything which resembled it before, but I thought that should there be a hell, this was it.”

One argument that has been used in favor of nuclear weapons is that no sane political

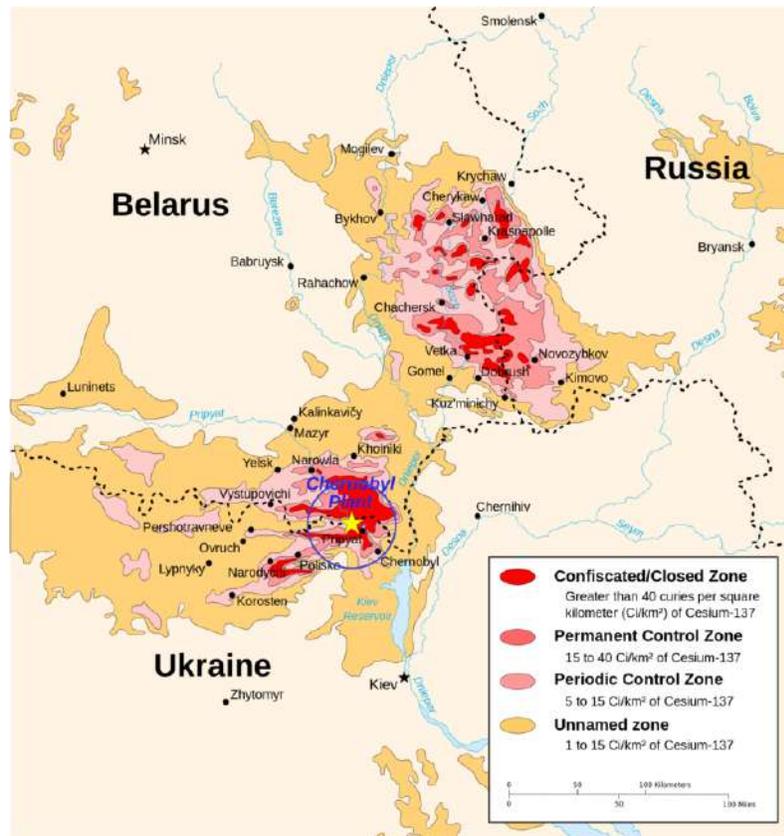


Figure 4.2: A nuclear war would be an ecological disaster, making large portions of the world permanently uninhabitable because of long-lasting radioactivity. Chernobyl radiation map 1996 30km zone by CIA Factbook. Licensed under CC BY-SA 2.5 via Wikimedia Commons.

leader would employ them. However, the concept of deterrence ignores the possibility of war by accident or miscalculation, a danger that has been increased by nuclear proliferation and by the use of computers with very quick reaction times to control weapons systems.

Recent nuclear power plant accidents remind us that accidents frequently happen through human and technical failure, even for systems which are considered to be very “safe.” We must also remember the time scale of the problem. To assure the future of humanity, nuclear catastrophe must be avoided year after year and decade after decade. In the long run, the safety of civilization cannot be achieved except by the abolition of nuclear weapons, and ultimately the abolition of the institution of war.

In 1985, International Physicians for the Prevention of Nuclear War received the Nobel Peace Prize. IPPNW had been founded in 1980 by six physicians, three from the Soviet Union and three from the United States. Today, the organization has wide membership among the world’s physicians. Professor Bernard Lowen of the Harvard School of Public Health, one of the founders of IPPNW, said in a recent speech:

“...No public health hazard ever faced by humankind equals the threat of nuclear war.



Figure 4.3: **Sculpture depicting Saint George slaying the dragon. The dragon is created from fragments of Soviet SS-20 and United States Pershing nuclear missiles. UN Photo/Milton Grant**

Never before has man possessed the destructive resources to make this planet uninhabitable... Modern medicine has nothing to offer, not even a token benefit, in the event of nuclear war..."

"We are but transient passengers on this planet Earth. It does not belong to us. We are not free to doom generations yet unborn. We are not at liberty to erase humanity's past or dim its future. Social systems do not endure for eternity. Only life can lay claim to uninterrupted continuity. This continuity is sacred."

The danger of a catastrophic nuclear war casts a dark shadow over the future of our species. It also casts a very black shadow over the future of the global environment. The environmental consequences of a massive exchange of nuclear weapons have been treated in a number of studies by meteorologists and other experts from both East and West. They predict that a large-scale use of nuclear weapons would result in fire storms with very high winds and high temperatures, which would burn a large proportion of the wild land fuels in the affected nations. The resulting smoke and dust would block out sunlight for a period of many months, at first only in the northern hemisphere but later also in the southern hemisphere.

Temperatures in many places would fall far below freezing, and much of the earth's plant life would be killed. Animals and humans would then die of starvation. The nuclear winter 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

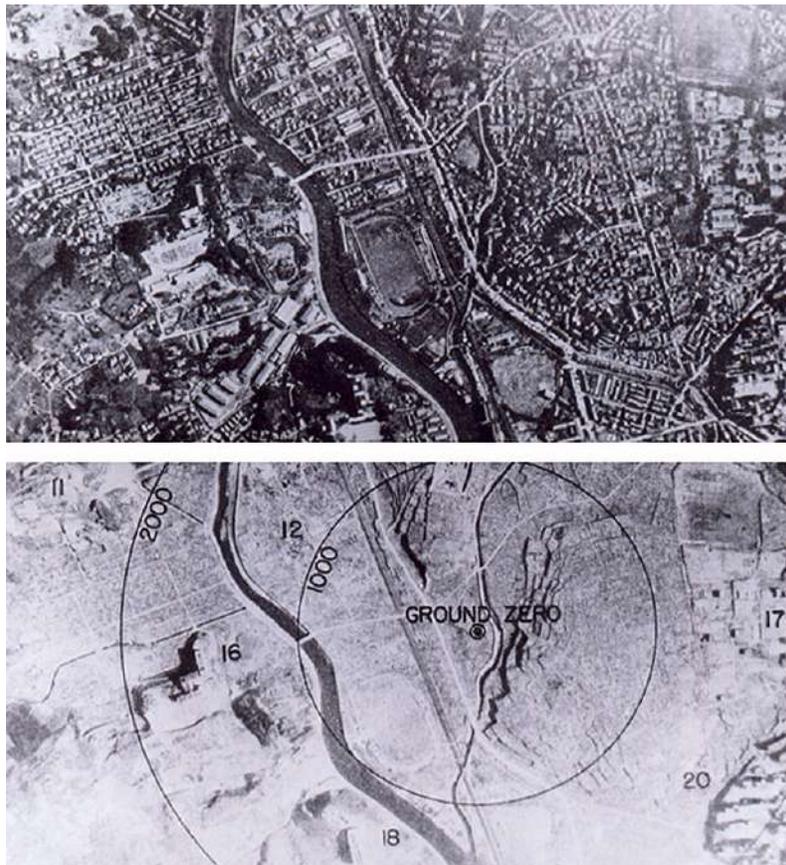


Figure 4.4: Nagasaki before and after the nuclear bombing, Public domain

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.”²

It is generally agreed that a full-scale nuclear war would have disastrous effects, not only on belligerent nations but also on neutral countries. A nuclear war would be the ultimate ecological catastrophe, inflicting enormous damage on global agriculture, and making very large regions of the world permanently uninhabitable through long-lasting radioactive contamination. Worst case scenarios even include the elimination of most life on earth. Mr. Javier Pérez de Cuéllar, former Secretary-General of the United Nations, emphasized this point in one of his speeches, where he cited the actions of nuclear weapon states as examples of the arrogance of power:

“I feel”, he said, “that the question may justifiably be put to the leading nuclear powers: by what right do they decide the fate of humanity? From Scandinavia to Latin America, from Europe and Africa to the Far East, the destiny of every man and woman is affected

²<http://www.voanews.com/content/pope-francis-calls-for-nuclear-weapons-ban/2909357.html>
<http://www.cadmusjournal.org/article/issue-4/flaws-concept-nuclear-deterrance>
<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-deterrance>
<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/>

by their actions. No one can expect to escape from the catastrophic consequences of a nuclear war on the fragile structure of this planet. ...”

“No ideological confrontation can be allowed to jeopardize the future of humanity. Nothing less is at stake: today’s decisions affect not only the present; they also put at risk succeeding generations. Like supreme arbiters, with our disputes of the moment, we threaten to cut off the future and to extinguish the lives of innocent millions yet unborn. There can be no greater arrogance. At the same time, the lives of all those who lived before us may be rendered meaningless; for we have the power to dissolve in a conflict of hours or minutes the entire work of civilization, with all the brilliant cultural heritage of humankind.”

“...In a nuclear age, decisions affecting war and peace cannot be left to military strategists or even to governments. They are indeed the responsibility of every man and woman. And it is therefore the responsibility of all of us... to break the cycle of mistrust and insecurity and to respond to humanity’s yearning for peace.”

These eloquent words by Javier Pérez de Cuéllar remind us that each of us has a stake in saving the future, and each of us has a duty to do everything within our abilities to save it.

4.3 Atoms for peace?

“Atoms for Peace”, the title of U.S. President Dwight D. Eisenhower’s 1953 speech to the U.N. General Assembly, may be regarded by future generations as being tragically self-contradictory. Nuclear power generation has led not only to dangerous proliferation of nuclear weapons, but also to disasters which have made large areas of the world permanently uninhabitable because of long-lived radioactive contamination.

According to Wikipedia, “...Under Atoms for Peace related programs, the US exported 25 tons of highly enriched uranium to 30 countries, mostly to fuel research reactors. The Soviet Union also exported 11 tons of HEU under a similar program.” This enormous quantity of loose weapons-usable highly enriched uranium, is now regarded as very worrying because of proliferation and terrorism risks.

A recent article in “The Examiner”³ pointed out that “...NRC and DOE could not account for the current location and disposition of U.S. HEU overseas in response to a 1992 congressional mandate. U.S. agencies, in a 1993 report produced in response to the mandate, were able to verify the location of only 1.160 kilograms out of 17,500 kilograms of U.S. HEU estimated to have been exported.”

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

³<http://www.examiner.com/article/nuclear-security-u-s-fails-to-protect-its-nuclear-materials-overseas>

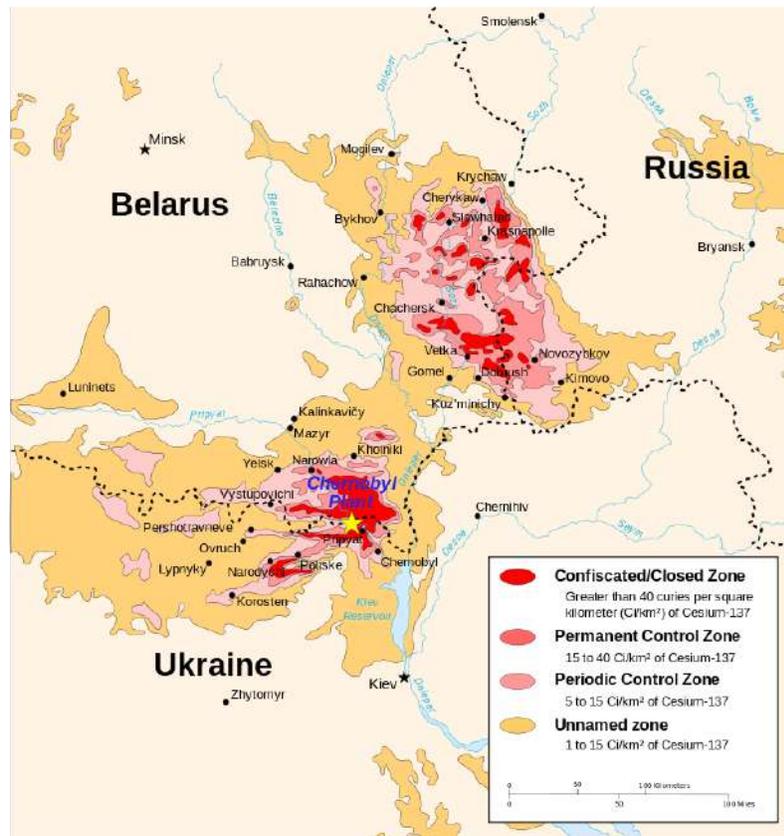


Figure 4.5: Map of radiation levels in 1996 around Chernobyl. CIA Factbook, [CC BY-SA 4.0], Wikimedia Commons.

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.

The more recent disaster of 11 March, 2011, may prove to be very much worse than Chernobyl. According to an article by Harvey Wasserman⁴, the ongoing fallout from the

⁴(<http://www.commondreams.org/view/2014/02/03-3>)

Fukushima catastrophe is already far in excess of that from Chernobyl. Ecosystems of the entire Pacific ocean are being contaminated by the 300 tons of radioactive water from Fukushima that continue to pour into the Pacific every day.

Meanwhile, the increasingly militaristic government of Japan's Prime Minister Shinzo Abe has passed a State Secrets Act that makes it an offense punishable by 5 year's imprisonment for journalists to report on the situation. Under this cloak of secrecy, attempts are being made to remove highly radioactive used fuel rods balanced precariously in a partially destroyed container hanging in the air above the stricken Unit Four. If an accident should occur, the released radioactivity could dwarf previous disasters.

Public opinion turned against nuclear power generation as a result of the Chernobyl and Fukushima catastrophes. Nevertheless, many governments insist on pushing forward their plans for opening new nuclear power plants, despite popular opposition. Nuclear power could never compete in price with solar energy or wind energy if it were not heavily subsidized by governments. Furthermore, if a careful accounting is made of the CO₂ released in the construction of nuclear power plants, the mining, refining and transportation of uranium ore, and the final decommissioning of the plants, the amount of CO₂ released is seen to be similar to that of coal-fired plants.

There are three basic reasons why nuclear power generation is one of the worst ideas ever conceived: First is the danger of proliferation of nuclear weapons, which will be discussed in detail below. Secondly, there is the danger of catastrophic accidents, such as the ones that occurred at Chernobyl and Fukushima. Finally, the problem of how to safely dispose of or store used fuel rods has not been solved.

In thinking about the dangers posed by radioactive waste, we should remember that many of the dangerous radioisotopes involved have half-lives of hundreds of thousands of years. Thus, it is not sufficient to seal them in containers that will last for a century, or even a millennium. We must find containers that will last for a hundred thousand years or more, longer than any human structure has ever lasted.

The danger of proliferation

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.

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

Nuclear power generation is not a solution to the problem of obtaining energy without producing dangerous climate change: Known reserves of uranium are only sufficient for the generation of about 25 terawatt-years of electrical energy (Craig, J.R., Vaughn, D.J. and Skinner, B.J., “Resources of the Earth: Origin, Use and Environmental Impact, Third

Edition”). This can be compared with the world’s current rate of energy use of over 14 terrawatts. Thus, if all of our energy were obtained from nuclear power, existing reserves of uranium would only be sufficient for about 2 years.

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 Korea 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 1979. In 1991 however, South Africa destroyed its nuclear weapons and signed the Nuclear Non-Proliferation Treaty.

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 article (1 February, 2004) 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..."

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.

There is a danger that Pakistan's unpopular government may be overthrown, and that the revolutionists might 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.

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 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.

The slogan "Atoms for Peace" has proved to be such a misnomer that it would be laughable if it were not so tragic. Nuclear power generation has been a terrible mistake. We must stop before we turn our beautiful earth into a radioactive wasteland.

4.4 An accident waiting to happen

In Stanley Kubrick's film, "Dr. Strangelove", a paranoid ultra-nationalist brigadier general, Jack D. Ripper, orders a nuclear attack on the Soviet Union because he believes that the Soviets are using water fluoridation as a means to rob Americans of their "precious bodily fluids". Efforts are made to recall the US bombers, but this proves to be impossible, and the attack triggers the Soviet "Doomsday Machine". The world is destroyed.

Kubrick's film is a black comedy, and we all laugh at it, especially because of the brilliant performance of Peter Sellers in multiple roles. Unfortunately, however, the film comes uncomfortably close to reality. An all-destroying nuclear war could very easily be started by an insane or incompetent person whose hand happens to be on the red button.

This possibility (or probability) has recently come to public attention through newspaper articles revealing that 11 of the officers responsible for launching US nuclear missiles have been fired because of drug addiction. Furthermore, a larger number of missile launch officers were found to be cheating on competence examinations. Three dozen officers were involved in the cheating ring, and some reports state that an equal number of others may have known about it, and remained silent. Finally, it was shown that safety rules were being deliberately ignored. The men involved, were said to be "burned out".

According to an article in *The Guardian* (Wednesday, 15 January, 2014), "Revelations of misconduct and incompetence in the nuclear missile program go back at least to 2007, when six nuclear-tipped cruise missiles were accidentally loaded onto a B-52 bomber in Minot, North Dakota, and flown to a base in Louisiana."

"Last March, military inspectors gave officers at the ICBM base in Minot the equivalent of a 'D' grade for launch mastery. A month later, 17 officers were stripped of their authority to launch the missiles."

"In October, a senior air force officer in charge of 450 ICBM's, major general Michael Carey, was fired after accusations of drunken misconduct during a summer trip to Moscow. An internal investigation found that Carey drank heavily, cavorted with two foreign women and visited a nightclub called La Cantina, where Maj. Gen. Carey had alcohol and kept trying to get the band to let him play with them."

The possibility that a catastrophic nuclear war could be triggered by a madman gains force from the recent statements of Benjamin Netanyahu, who has said repeatedly that, with or without US help, Israel intends to attack Iran. Such an attack, besides being a war crime, would be literally insane.

If Netanyahu believes that a war with Iran would be short or limited, he is ignoring several very obvious dangers. Such a war would most probably escalate into a widespread general war in the Middle East. It could cause a revolution in Pakistan, and the new revolutionary government of Pakistan would be likely to enter the war on the side of Iran, bringing with it Pakistan's nuclear weapons. Russia and China, both staunch allies of Iran, might be drawn into the conflict. There is a danger that the conflict could escalate into a Third World War, where nuclear weapons might easily be used, either by accident or intentionally.

China could do grave economic damage to the United States through its large dollar holdings. Much of the world's supply of petroleum passes through the Straits of Hormuz, and a war in the region could greatly raise the price of oil, triggering a depression that might rival or surpass the Great Depression of the 1920's and 1930's.⁵

The probability of a catastrophic nuclear war occurring by accident is made greater by the fact that several thousand nuclear weapons are kept on "hair-trigger alert" with a quasi-automatic reaction time measured in minutes. There is a constant danger that a nuclear war will be triggered by an error in evaluating a signal on a radar screen.

A number of prominent political and military figures (many of whom have ample knowledge of the system of deterrence, having been part of it)⁶ have expressed concern about the danger of accidental nuclear war. Colin S. Grey (Chairman of the National Institute of Public Policy) expressed this concern as follows: "The problem, indeed the enduring problem, is that we are resting our future on a deterrence system concerning which we cannot tolerate even a single malfunction."

General Curtis E. LeMay, has written: "In my opinion a general war will grow through a series of political miscalculations and accidents, rather than through any deliberate attack by either side."

Bruce G. Blair of Brookings Institution has remarked that "It is obvious that the rushed nature of the process, from warning to decision to action, risks causing a catastrophic mistake... This system is an accident waiting to happen."

Fred Ikle of the Rand Corporation has written: "But nobody can predict that a fatal accident or unauthorized act will never happen... Given the huge and far-flung missile forces, ready to be launched from land or sea on both sides, the scope for disaster by accident is immense,.. In a matter of seconds, through technical accident or human failure, mutual deterrence might thus collapse."

In the perilous situation in which we find ourselves today, the only way that we can ensure that our children and grandchildren will live to enjoy our beautiful world, is to get rid of nuclear weapons entirely. To do so is the ardent wish of the vast majority of the world's peoples.

The Nuclear Weapons Convention ⁵

On July 7, 2017, a treaty banning nuclear weapons was adopted by an overwhelming majority at the United Nations General Assembly. Although opposed by all of the nuclear weapon states, the treaty is a great achievement. Article I states that each state party undertakes never under any circumstances to

- Develop, test, produce, manufacture, otherwise acquire, possess, or stockpile nuclear weapons or other nuclear explosive devices.

⁵<https://www.un.org/disarmament/ptnw/>
<http://www.abolition2000.org/en/>

- Transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices, directly or indirectly.
- Receive the transfer of or control over nuclear weapons or other nuclear explosive devices directly or indirectly.
- Use or threaten to use nuclear weapons or other nuclear explosive devices.
- Assist, encourage, or induce, in any way, anyone to engage in any activity prohibited to a state party.

ICAN receives the 2017 Nobel Peace Prize

The International Campaign to Abolish Nuclear Weapons, abbreviated ICAN, is a coalition of 468 NGO's in 101 countries. The purpose of ICAN is to change the focus in the disarmament debate to “the the humanitarian threat posed by nuclear weapons, drawing attention to their unique destructive capacity, their catastrophic health and environmental consequences, their indiscriminate targeting, the debilitating impact of a detonation on medical infrastructure and relief measures, and the long-lasting effects of radiation on the surrounding area.”

ICAN was founded in 2007 by the International Physicians for the Prevention of Nuclear War, an organization which itself received a Nobel Peace Prize in 1985. IPPNW was inspired by the success of the campaign that achieved the Ottawa Treaty in 1997, a treaty which banned antipersonnel land-mines against bitter opposition from the worst offenders. Thus, from the start. ICAN envisioned a treaty passed and without the participation or signatures of the nuclear weapons states. ICAN believed that such a treaty would have the great value of unambiguously underlining the illegality, immorality and omnicidal nature of nuclear weapons. Nuclear weapons states would eventually be forced to yield to the will of the vast majority of humankind.

On July 7, 2017, the Treaty on the Prohibition of Nuclear Weapons was adopted by an overwhelming majority, 122 to 1, by the United Nations General Assembly. The adoption of the treaty, a milestone in humanity's efforts to rid itself of nuclear insanity, was to a large extent due to the efforts of ICAN's participating organizations.

On December 10, 2017 ICAN's efforts were recognized by the award of the Nobel Peace Prize. Part of the motivation for the award was the fact that the threat of a thermonuclear global catastrophe is higher today than it has been at any time since the Cuban Missile Crisis. Because of the belligerent attitudes and mental instability of Donald Trump and Kim Jong Un, the end of human civilization and much of the biosphere is, in the words of Beatrice Fihn, “only a tantrum away”.



Figure 4.6: From left to right: Berit Reiss-Andersen, Chairman of the Norwegian Nobel Committee, Setsuko Thurlow, an 85-year-old survivor of the 1945 atomic bombing of Hiroshima, and ICAN Executive Director Beatrice Fihn.



Figure 4.7: Celebrating the award.

4.5 Nuclear weapons are criminal! Every war is a crime!

War was always madness, always immoral, always the cause of unspeakable suffering, economic waste and widespread destruction, and always a source of poverty, hate, barbarism and endless cycles of revenge and counter-revenge. It has always been a crime for soldiers to kill people, just as it is a crime for murderers in civil society to kill people. No flag has ever been wide enough to cover up atrocities.

But today, the development of all-destroying modern weapons has put war completely beyond the bounds of sanity and elementary humanity.

Today, war is not only insane, but also a violation of international law. Both the United Nations Charter and the Nuremberg Principles make it a crime to launch an aggressive war. According to the Nuremberg Principles, every soldier is responsible for the crimes that he or she commits, even while acting under the orders of a superior officer.

Nuclear weapons are not only insane, immoral and potentially omnicidal, but also criminal under international law. In response to questions put to it by WHO and the UN General Assembly, the International Court of Justice ruled in 1996 that “the threat and use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and particularly the principles and rules of humanitarian law.” The only possible exception to this general rule might be “an extreme circumstance of self-defense, in which the very survival of a state would be at stake”. But the Court refused to say that even in this extreme circumstance the threat or use of nuclear weapons would be legal. It left the exceptional case undecided. In addition, the Court added unanimously that “there exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control.”

Can we not rid ourselves of both nuclear weapons and the institution of war itself? We must act quickly and resolutely before everything that we love in our beautiful world is reduced to radioactive ashes.

4.6 The task before us

As a result of the Fukushima catastrophe, world public opinion now increasingly rejects nuclear power generation. We can hope that the disaster will also contribute to a rejection of nuclear weapons.

We value and love our natural environment for its beauty, but we are also starting to realize how closely our lives are linked to nature. We are becoming more conscious of how human activities may damage the natural systems on which we depend for our existence. There is much worry today about climate change, but an ecological catastrophe of equal or greater magnitude could be produced by a nuclear war. One can gain a small idea of what this would be like by thinking of the radioactive contamination that has made large areas near to Chernobyl and Fukushima uninhabitable, or the testing of hydrogen bombs

in the Pacific, which continues to cause leukemia and birth defects in the Marshall Islands more than half a century later.

In 1954, the United States tested a hydrogen bomb at Bikini. The bomb was 1,300 times more powerful than the bombs that destroyed Hiroshima and Nagasaki. Fallout from the bomb contaminated the island of Rongelap, one of the Marshall Islands 120 kilometers from Bikini. The islanders experienced radiation illness, and many died from cancer. Even today, half a century later, both people and animals on Rongelap and other nearby islands suffer from birth defects.

A girl from Rongelap describes the situation in the following words: “I cannot have children. I have had miscarriages on seven occasions. Our culture and religion teach us that reproductive abnormalities are a sign that women have been unfaithful. For this reason, many of my friends keep quiet about the strange births that they have had. In privacy they give birth, not to children as we like to think of them, but to things we could only describe as ‘octopuses’, ‘apples’, ‘turtles’, and other things in our experience. We do not have Marshallese words for these kinds of babies, because they were never born before the radiation came.”

The environmental effects of a nuclear war would be catastrophic. It would produce radioactive contamination of the kind that we have already experienced in the areas around Chernobyl and Fukushima and in the Marshall Islands, but on an enormously increased scale. We have to remember that the total explosive power of the nuclear weapons in the world today is 500,000 times as great as the power of the bombs that destroyed Hiroshima and Nagasaki. What is threatened by a nuclear war today is the complete breakdown of human civilization.

Besides spreading deadly radioactivity throughout the world, a nuclear war would inflict catastrophic damage on global agriculture. Firestorms in burning cities would produce millions of tons of black, thick, radioactive smoke. The smoke would rise to the stratosphere where it would spread around the earth and remain for a decade. Prolonged cold, decreased sunlight and rainfall, and massive increases in harmful ultraviolet light would shorten or eliminate growing seasons, producing a nuclear famine. Even a small nuclear war could endanger the lives of the billion people who today are chronically undernourished. A full-scale nuclear war would mean that most humans would die from hunger. Many animal and plant species would also be threatened with extinction.

Today, the system that is supposed to give us security is called Mutually Assured Destruction, appropriately abbreviated as MAD. It is based on the idea of deterrence, which maintains that because of the threat of massive retaliation, no sane leader would start a nuclear war.

Before discussing other defects in the concept of deterrence, it must be said very clearly that the idea of “massive nuclear retaliation” is a form of genocide and is completely unacceptable from an ethical point of view. It violates not only the principles of common human decency and common sense, but also the ethical principles of every major religion.

Having said this, we can now turn to some of the other faults 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, or by terrorism. 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 “hair-trigger 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.

Incidents in which global disaster is avoided by a hair’s breadth are constantly occurring. For example, on the night of 26 September, 1983, Lt. Col. Stanislav Petrov, a young software engineer, was on duty at a surveillance center near Moscow. Suddenly the screen in front of him turned bright red.

An alarm went off. It’s enormous piercing sound filled the room. A second alarm followed, and then a third, fourth and fifth. “The computer showed that the Americans had launched a strike against us”, Petrov remembered later. His orders were to pass the information up the chain of command to Secretary General Yuri Andropov. Within minutes, a nuclear counterattack would be launched. However, because of certain inconsistent features of the alarm, Petrov disobeyed orders and reported it as a computer error, which indeed it was.

Most of us probably owe our lives to his coolheaded decision and knowledge of software systems. The narrowness of this escape is compounded by the fact that Petrov was on duty only because of the illness of another officer with less knowledge of software, who would have accepted the alarm as real.

Narrow escapes such as this show us clearly that in the long run, the combination of space-age science and stone-age politics will destroy us. We urgently need new political structures and new ethics to match our advanced technology. Modern science has, for the first time in history, offered humankind the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of death through infectious disease. At the same time, science has given humans the power to obliterate their civilization with nuclear weapons, or to make the earth uninhabitable through overpopulation and pollution. The question of which of these paths we choose is literally a matter of life or death for ourselves and our children.

Will we use the discoveries of modern science constructively, and thus choose the path leading towards life? Or will we use science to produce more and more lethal weapons, which sooner or later, through a technical or human failure, will result in a catastrophic nuclear war? Will we thoughtlessly destroy our beautiful planet through unlimited growth of population and industry? The choice among these alternatives is ours to make. We live at a critical moment of history, a moment of crisis for civilization.

No one alive today asked to be born at a time of crisis, but history has given each of us an enormous responsibility. Of course we have our ordinary jobs, which we need to do in order to stay alive; but besides that, each of us has a second job, the duty to devote both time and effort to solving the serious problems that face civilization during the 21st century. We cannot rely on our politicians to do this for us. Many politicians are under the influence of powerful lobbies. Others are waiting for a clear expression of popular will. It is the people of the world themselves who must choose their own future and work hard to build it.

No single person can achieve the changes that we need, but together we can do it. The

problem of building a stable, just, and war-free world is difficult, but it is not impossible. The large regions of our present-day world within which war has been eliminated can serve as models. There are a number of large countries with heterogeneous populations within which it has been possible to achieve internal peace and social cohesion, and if this is possible within such extremely large regions, it must also be possible globally.

We must replace the old world of international anarchy, chronic war, and institutionalized injustice by a new world of law. The United Nations Charter, the Universal Declaration of Human Rights and the International Criminal Court are steps in the right direction. These institutions need to be greatly strengthened and reformed. We also need a new global ethic, where loyalty to one's family and nation will be supplemented by a higher loyalty to humanity as a whole. Tipping points in public opinion can occur suddenly. We can think, for example, of the Civil Rights Movement, or the rapid fall of the Berlin Wall, or the sudden change that turned public opinion against smoking, or the sudden movement for freedom and democracy in the Arab world. A similar sudden change can occur soon regarding war and nuclear weapons.

We know that war is madness. We know that it is responsible for much of the suffering that humans experience. We know that war pollutes our planet and that the almost unimaginable sums wasted on war prevent the happiness and prosperity of mankind. We know that nuclear weapons are insane, and that the precariously balanced deterrence system can break down at any time through human error or computer errors or through terrorist actions, and that it definitely will break down within our lifetimes unless we abolish it. We know that nuclear war threatens to destroy civilization and much of the biosphere.

The logic is there. We must translate into popular action which will put an end to the undemocratic, money-driven, power-lust-driven war machine. The peoples of the world must say very clearly that nuclear weapons are an absolute evil; that their possession does not increase anyone's security; that their continued existence is a threat to the life of every person on the planet; and that these genocidal and potentially omnicidal weapons have no place in a civilized society.

Modern science has abolished time and distance as factors separating nations. On our shrunken globe today, there is room for one group only: the family of humankind. We must embrace all other humans as our brothers and sisters. More than that, we must feel that all of nature is part of the same sacred family; meadow flowers, blowing winds, rocks, trees, birds, animals, and other humans, all these are our brothers and sisters, deserving our care and protection. Only in this way can we survive together. Only in this way can we build a happy future.

4.7 Organizations working for the abolition of nuclear weapons

- Abolition 2000, <http://www.abolition2000.org/en/>

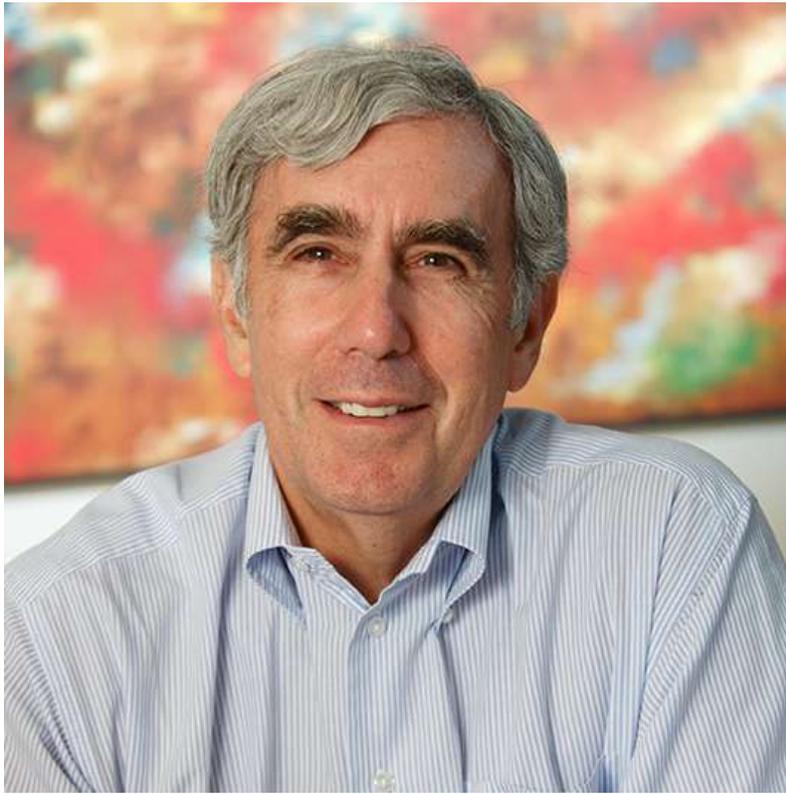


Figure 4.8: **Dr. David Krieger**, founder and president of the Nuclear Age Peace Foundation

4.7. ORGANIZATIONS WORKING FOR THE ABOLITION OF NUCLEAR WEAPONS¹²¹

- Alliance for Nuclear Accountability, <http://www.ananuclear.org/>
- Campaign for a Nuclear Weapon Free World, <http://www.nuclearweaponsfree.org/>
- International Campaign to Abolish Nuclear Weapons (ICAN), <http://www.icanw.org/>
- International Network of Engineers and Scientists for Global Responsibility (INES), <http://www.inesglobal.com/>
- International Peace Bureau, <http://www.ipb.org/>
- Middle Powers Initiative, <http://www.middlepowers.org/>
- Peace and Planet, <http://www.peaceandplanet.org/>
- World Future Council, <https://www.worldfuturecouncil.org/>
- Basel Peace Office, <http://www.baselpeaceoffice.org/>
- Campaign for Nuclear Disarmament, <https://cnduk.org/>
- Disarmament and Security Centre, <http://disarmsecure.org/>
- Federation of American Scientists, <https://fas.org/>
- Free the Children, <https://www.we.org/>
- Global Security Institute, <https://gsinstitute.org/>
- Ground Zero Center for Nonviolent Action, <http://www.gzcenter.org/>
- Hibakusha Stories, <http://hibakushastories.org/>
- Hiroshima Peace Media Center, <http://www.hiroshimapeacemedia.jp/?lang=en>
- Hiroshima Peace Museum, <http://www.pcf.city.hiroshima.jp/>
- International Association of Lawyers Against Nuclear Arms (IALANA), <https://www.ialana.de/>
- International Network of Engineers and Scientists Against Proliferation (INESAP), <http://www.inesap.org/>
- International Physicians for the Prevention of Nuclear War (IPPNW), <http://www.ippnw.org/>
- Japan Council Against A and H Bombs (Gensuikyo), <https://www.antiatom.org/GSKY/en/>

- Lawyers' Committee on Nuclear Policy, <http://www.lcnp.org/>
- Mayors for Peace, <http://www.mayorsforpeace.org/english/index.html>
- Nagasaki Atomic Bomb Museum,
- Nevada Desert Experience, <http://nevadadesertexperience.org/>
- Nobel Women's Initiative, <https://nobelwomensinitiative.org>
- Nuclear Age Peace Foundation, <https://www.wagingpeace.org/>
- Nuclear Famine, <http://www.nucleardarkness.org/>
- Nuclear Watch New Mexico, <https://nukewatch.org/>
- Nuclear Watch South, <http://www.nonukesyall.org/>
- Parliamentarians for Nuclear Non-Proliferation and Disarmament, <http://pnnd.org/>

- Pax Christi International, <https://www.paxchristi.net/>
- Peace Action, <https://www.peaceaction.org/>
- Peace Action New York State, <https://www.panys.org/>
- Phronesis Lab at Oregon State University, <http://blogs.oregonstate.edu/phronesis/>
- Physicians for Social Responsibility, <https://www.psr.org/>
- Project Ploughshares, <http://ploughshares.ca/>
- Pugwash Conferences on Science and World Affairs, <https://pugwash.org/>
- Reaching Critical Will, <http://www.reachingcriticalwill.org/>
- Pugwash Conferences on Science and World Affairs, <https://pugwash.org/>
- Soka Gakkai International, <https://www.sgi.org/>
- Veterans for Peace, <https://www.veteransforpeace.org/>
- Western States Legal Foundation, <http://www.wslfweb.org/>
- Women's Action for New Directions, <https://www.wand.org/>
- Women's International League for Peace and Freedom, <https://wilpf.org/>

4.8 The Nuremberg Principles and individual responsibility

At the end of the Second World War, when the full extent of the atrocities that had been committed by the Nazi's became known, it was decided to prosecute Nazi leaders for crimes against peace, war crimes, and crimes against humanity (such as extermination camps). There was disagreement about how such trials should be held, but after some debate between the Allied countries, it was agreed that 24 Nazi officials and military leaders would be tried by an International Tribunal in Nuremberg, Germany, a former center of Nazi politics. There were originally 24 defendants, but two of them committed suicide. One was presumed dead but was nevertheless tried in absentia. Of the twenty-one remaining defendants, eleven were given the death penalty, eight were sentenced to long prison terms, and three were acquitted. Similar trials also took place in Japan.

In 1946 the United Nations General Assembly unanimously affirmed "the principles of international law recognized by the Charter of the Nuremberg Tribunal and the judgment of the Tribunal". The General Assembly also established an International Law Commission to formalize the Nuremberg Principles, and the result was the following list. The reader is invited to compare the crimes listed under Principle VI with events that have been occurring for a number of years in the Middle East and in other parts of the world.

- Principle I: Any person who commits an act which constitutes a crime under international law is responsible, and therefore liable to punishment.
- Principle II: The fact that internal law does not impose a penalty for an act which constitutes a crime under international law does not relieve the person who committed the act from responsibility under international law.
- Principle III: The fact that the person who committed an act which constitutes a crime under international law acted as Head of State or responsible government official does not relieve him from responsibility under international law.
- Principle IV: The fact that a person acted pursuant to order of his Government or of a superior does not relieve him of responsibility under international law, provided that a moral choice was in fact possible for him.
- Principle V: Any person charged with a crime under international law has the right to a fair trial on the facts and law.
- Principle VI: The crimes hereinafter set out are punishable as crimes under international law: a. Crimes against peace: (i) Planning, preparation, initiation or waging of war of aggression or a war in violation of international treaties, agreements or assurances; (ii) Participation in a common plan or conspiracy for the accomplishment of any of the acts mentioned under (i). b. War crimes: Violations of the laws or

customs of war which include, but are not limited to, murder, ill-treatment of prisoners of war or persons on the seas, killing of hostages, plunder of public or private property, wanton destruction of cities, towns or villages, or devastation not justified by military necessity. c. Crimes against humanity: Atrocities and offenses, including but not limited to, murder, extermination, deportation, imprisonment, torture, rape, or other inhumane acts committed against any civilian population, or persecutions on political, racial or religious grounds, whether or not in violation of the laws of the country where perpetrated.

- Principle VII: Complicity in the commission of a crime against peace, a war crime, or a crime against humanity as set forth in Principle VI is a crime under international law.

The Nuremberg Principles are being used today as the basis for the International Criminal Court's trials of individuals accused of genocide and war crimes in the former Yugoslavia and elsewhere.

The Principles throw an interesting light onto the status of soldiers. According to the Nuremberg Principles, it is not only the right, but also the duty of individuals to make moral and legal judgments concerning wars in which they are asked to fight. If a soldier participates in an illegal war (and all wars, apart from actions of the UN Security Council, are now illegal) then the soldier is liable to prosecution for violating international law. The fact that he or she was acting under orders is not an excuse. The training of soldiers is designed to remove the burdens of moral and legal responsibility from a soldier's individual shoulders; but the Nuremberg Principles put these burdens squarely back where they belong - on the shoulders of the individual.

Although only 24 Nazi leaders were held responsible for their crimes at the Nuremberg Trials, Principles IV and VII make it clear that a much larger number of people could have been tried, since "complicity in the commission of a crime against peace, a war crime, or a crime against humanity... is a crime under international law". In other words, all adult citizens are breaking international law if they are complicity in the crimes committed by their governments.

All of us are responsible for what our governments do! I personally would like to extend the principle of individual responsibility still further: - I think that all of us are responsible for working actively, with all our strength, to solve the serious problems that are facing the world today, whether the problems are related to the abolition of war, to the prevention of poverty, the prevention of famine, or to saving the biosphere.



Figure 4.9: Defendants in their dock at the Nuremberg Trials; Goering, Hess, von Ribbentrop, and Keitel in front row. Public domain, Wikimedia Commons

Suggestions for further reading

1. A. Robock, L. Oman, G. L. Stenchikov, O. B. Toon, C. Bardeen, and R. Turco, *Climatic consequences of regional nuclear conflicts*, Atmospheric Chemistry and Physics, Vol. 7, p. 2003-2012, (2007).
2. M. Mills, O. Toon, R. Turco, D. Kinnison, R. Garcia, *Massive global ozone loss predicted following regional nuclear conflict*, Proceedings of the National Academy of Sciences (USA), vol. 105(14), pp. 5307-12, Apr 8, (2008).
3. O. Toon, A. Robock, and R. Turco, *The Environmental Consequences of Nuclear War*, Physics Today, vol. 61, No. 12, p. 37-42, (2008).
4. R. Turco, O. Toon, T. Ackermann, J. Pollack, and C. Sagan, *Nuclear Winter: Global consequences of multiple nuclear explosions*, Science, Vol. 222, No. 4630, pp. 1283-1292, December (1983).
5. A. Robock, L. Oman, G. Stenchikov, *Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences*, Journal of Geophysical Research - Atmospheres, Vol. 112, No. D13, p. 4 of 14, (2007).
6. I. Helfand, *An Assessment of the Extent of Projected Global Famine Resulting From Limited, Regional Nuclear War*, International Physicians for the Prevention of Nuclear War, Physicians for Social Responsibility, Leeds, MA, (2007).
7. George P. Schultz, William J. Perry, Henry A. Kissinger and Sam Nunn, *A World Free of Nuclear Weapons*, The Wall Street Journal, January 4, 2007, page A15 and January 15, (2008), page A15.

8. Mikhail Gorbachev, *The Nuclear Threat*, The Wall Street Journal, January 30, (2007), page A15.
9. Massimo D'Alema, Gianfranco Fini, Giorgio La Malfa, Arturo Parisi and Francesco Calogero, *For a World Free of Nuclear Weapons*, Corriere Della Sera, July 24, (2008).
10. Hoover Institution, *Reykjavik Revisited; Steps Towards a World Free of Nuclear Weapons*, October, (2007).
11. Douglas Hurd, Malcolm Rifkind, David Owen and George Robertson, *Start Worrying and Learn to Ditch the Bomb*, The Times, June 30, (2008).
12. Des Brown, Secretary of State for Defense, UK, *Laying the Foundations for Multilateral Disarmament*, Geneva Conference on Disarmament, February 5, (2008).
13. Government of Norway, International Conference on *Achieving the Vision of a World Free of Nuclear Weapons*, Oslo, Norway, February 26-27, (2008).
14. Jonas Gahr Støre, Foreign Minister, Norway, *Statement at the Conference on Disarmament*, Geneva, March 4, (2008).
15. Anne-Grete Strøm-Erichsen, Defense Minister, Norway, *Emerging Opportunities for Nuclear Disarmament*, Pugwash Conference, Canada, July 11, (2008).
16. Kevin Rudd, Prime Minister, Australia, *International Commission on Nuclear Non-Proliferation and Disarmament*, Media Release, July 9, (2008).
17. Helmut Schmidt, Richard von Weizsäcker, Egon Bahr and Hans-Dietrich Genscher, *Towards a Nuclear-Free World: a German View*, International Herald Tribune, January 9, (2009).
18. Hans M. Kristensen and Elliot Negin, *Support Growing for Removal of U.S. Nuclear Weapons from Europe*, Common Dreams Newscenter, first posted May 6, (2005).
19. David Krieger, *President-elect Obama and a World Free of Nuclear Weapons*, Nuclear Age Peace Foundation Website, (2008).
20. J.L. Henderson, *Hiroshima*, Longmans (1974).
21. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
22. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
23. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).
24. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
25. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
26. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
27. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
28. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
29. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
30. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).

31. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
32. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
33. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
34. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).
35. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
36. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
37. J. Schear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
38. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
39. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
40. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
41. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
42. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
43. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
44. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
45. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
46. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
47. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
48. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
49. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
50. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
51. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
52. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
53. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
54. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).

55. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
56. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
57. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
58. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
59. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
60. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
61. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
62. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
63. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
64. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
65. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
66. A. Cohen, *Israel and the Bomb*, Colombia University Press, New York, (1998).
67. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
68. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
69. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).
70. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
71. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
72. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
73. R.E. Powaski, *March to Armageddon: The United States and the Nuclear Arms Race, 1939 to the Present*, Oxford University Press, (1987).
74. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
75. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).

76. U.S. Congress Office of Technology Assessment (Ed.), *Dismantling the Bomb and Managing the Nuclear Materials*, U.S. Government Printing Office, Washington D.C., (1993).
77. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
78. P. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, University of North Carolina Press, (1985).
79. C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, (1984).
80. P. Rogers, *The Risk of Nuclear Terrorism in Britain*, Oxford Research Group, Oxford, (2006).
81. MIT, *The Future of Nuclear Power: An Interdisciplinary MIT Study*, <http://web.mit.edu/nuclearpow> (2003).
82. Z. Mian and A. Glaser, *Life in a Nuclear Powered Crowd*, INES Newsletter No. 52, 9-13, April, (2006).
83. K. Bergeron, *Nuclear Weapons: The Death of No Dual-use*, Bulletin of the Atomic Scientists, 15-17, January, (2004).
84. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).
85. Medical Association's Board of Science and Education, *The Medical Effects of Nuclear War*, Wiley, (1983).
86. Kevin Rudd, Prime Minister, Australia, "International Commission on Nuclear Non-Proliferation and Disarmament", Media Release, July 9, 2008.
87. Global Zero, www.globalzero.org/paris-conference
88. Helmut Schmidt, Richard von Weizäcker, Egon Bahr and Hans-Dietrich Genscher, "Towards a Nuclear-Free World: a German View", International Herald Tribune, January 9, 2009.
89. Hans M. Kristensen and Elliot Negin, "Support Growing for Removal of U.S. Nuclear Weapons from Europe", Common Dreams Newscenter, first posted May 6, 2005.
90. David Krieger, "President-elect Obama and a World Free of Nuclear Weapons", Nuclear Age Peace Foundation Website, 2008.
91. J.L. Henderson, *Hiroshima*, Longmans (1974).
92. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
93. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
94. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).
95. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
96. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
97. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
98. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
99. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).

100. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
101. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
102. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
103. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
104. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
105. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).
106. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
107. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
108. IAEA, *International Safeguards and the Non-proliferation of Nuclear Weapons*, International Atomic Energy Agency, Vienna, (1985).
109. J. Schear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
110. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
111. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
112. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
113. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
114. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
115. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
116. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
117. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
118. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
119. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
120. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
121. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
122. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).

123. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
124. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
125. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
126. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).
127. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
128. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
129. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
130. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
131. G.K. Bertsch and S.R. Grillot, (Eds.), *Arms on the Market: Reducing the Risks of Proliferation in the Former Soviet Union*, Routledge, New York, (1998).
132. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
133. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
134. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
135. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
136. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
137. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
138. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
139. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).
140. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
141. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
142. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).
143. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
144. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).

145. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
146. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
147. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).
148. U.S. Congress Office of Technology Assessment (Ed.), *Dismantling the Bomb and Managing the Nuclear Materials*, U.S. Government Printing Office, Washington D.C., (1993).
149. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
150. P. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, University of North Carolina Press, (1985).
151. A. Makhijani and S. Saleska, *The Nuclear Power Deception: Nuclear Mythology From Electricity 'Too Cheap to Meter' to 'Inherently Safe' Reactors*, Apex Press, (1999).
152. C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, (1984).
153. P. Rogers, *The Risk of Nuclear Terrorism in Britain*, Oxford Research Group, Oxford, (2006).
154. MIT, *The Future of Nuclear Power: An Interdisciplinary MIT Study*, <http://web.mit.edu/nuclearpow> (2003).
155. Z. Mian and A. Glaser, *Life in a Nuclear Powered Crowd*, INES Newsletter No. 52, 9-13, April, (2006).
156. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).

Chapter 5

EVERY WAR IS A WAR AGAINST CHILDREN

5.1 The text of Kathy Kelly's essay

Transcend Media Service, 1 April, 2019

We, in the United States, have yet to realize both the futility and immense consequences of war even as we develop, store, sell, and use hideous weapons. The number of children killed is rising.

28 Mar 2019 - At 9:30 in the morning of March 26, the entrance to a rural hospital in northwest Yemen, supported by Save the Children, was teeming as patients waited to be seen and employees arrived at work. Suddenly, missiles from an airstrike hit the hospital, killing seven people, four of them children.

Jason Lee of Save the Children, told The New York Times that the Saudi-led coalition, now in its fifth year of waging war in Yemen, knew the coordinates of the hospital and should have been able to avoid the strike. He called what happened “a gross violation of humanitarian law.”

The day before, Save the Children reported that air raids carried out by the Saudi-led coalition have killed at least 226 Yemeni children and injured 217 more in just the last twelve months. “Of these children,” the report noted, “210 were inside or close to a house when their lives were torn apart by bombs that had been sold to the coalition by foreign governments.”

Last year, an analysis issued by Save the Children estimated that 85,000 children under age five have likely died from starvation or disease since the Saudi-led coalition's 2015 escalation of the war in Yemen.

“Children who die in this way suffer immensely as their vital organ functions slow down and eventually stop,” said Tamer Kirolos, Save the Children’s Country Director in Yemen. “Their immune systems are so weak they are more prone to infections with some too frail to even cry. Parents are having to witness their children wasting away, unable to do anything about it.” Kirolos and others who have continuously reported on the war in Yemen believe these deaths are entirely preventable. They are demanding an immediate suspension of arms sales to all warring parties, an end to blockades preventing distribution of food, fuel and humanitarian aid and the application of full diplomatic pressure to end the war.

The United States, a major supporter of the Saudi-led coalition, has itself been guilty of killing innocent patients and hospital workers by bombing a hospital. On October 3, 2015, U.S. airstrikes destroyed a Médecins Sans Frontières (Doctors Without Borders) hospital in Kunduz, Afghanistan, killing forty-two people. “Patients burned in their beds,” MSF reported, “medical staff were decapitated and lost limbs, and others were shot from the air while they fled the burning building.”

More recently, on March 23, 2019, eight children were among fourteen Afghan civilians killed by a U.S. airstrike also near Kunduz.

Atrocities of war accumulate, horrifically. We in the United States have yet to realize both the futility and immense consequences of war. We continue to develop, store, sell, and use hideous weapons. We rob ourselves and others of resources needed to meet human needs, including grappling with the terrifying realities of climate change.

We should heed the words and actions of Eglantyne Jebb, who founded Save the Children a century ago. Responding to the British post-war blockade of Germany and Eastern Europe, Jebb participated in a group attempting to deliver food and medical supplies to children who were starving.

In London’s Trafalgar Square, she distributed a leaflet showing the emaciated children and declaring: “Our blockade has caused this, - millions of children are starving to death.” She was arrested, tried, convicted, and fined. But the judge in the case was moved by her commitment to children and paid her fine. His generosity was Save the Children’s first donation.

“Every war,” said Jebb, “is a war against children.”



Figure 5.1: Kathy Kelly (born in 1952).



Figure 5.2: Eglantine Jebb (1876-1928).







5.2 The life and work of Eglantine Jebb

Eglantine Jebb was born in 1876 in Shropshire, England. Her family was a wealthy one, but not content to be merely wealthy, it had an impressive tradition of dedicated action for public service and social reform. After studying at Lady Margaret College, Oxford University, Eglantine moved to Cambridge to care for her sick mother. While in Cambridge, she became involved with the Charity Organization Society, which aimed at bringing scientific methods to charity work, and she published a book entitled *Cambridge, a Study in Social Questions*, based on her research on social conditions in the city. Eglantine was elected to the Education Committee of the Cambridge Borough Council in 1907, and she also set up employment agencies for young men and women.

As World War I neared its end, and as the economies of Germany, Austria and Hungary collapsed, Eglantine realized that the children in these countries must be suffering appallingly from hunger and cold. The Allied Blockade, which was continued even after an armistice was signed, prevented food from being imported to these countries. In April, 1919, Eglantine and her sister Dorothy worked with others to launch the Save The Children Fund at the Royal Albert Hall, London. The organization quickly raised large amounts of money for the famine relief of children in the defeated nations.

This success led Eglantine and Dorothy to establish the International Save the Children Union in Geneva in 1920. In 1921 the organization provided relief to starving children in Greece and in Soviet Russia.

In 1923 the Russian relief efforts were coming to an end, and Eglantine's thoughts turned to establishing a document outlining the international community's responsibilities towards children. She traveled to Geneva for a meeting of the International Save the Children Union, where she drafted the short and clear document, Declaration of the Rights of the Child (1924). This was adopted by the League of Nations. Later enlarged versions were adopted by the United Nations General Assembly in 1959 and in 1989.

Eglantine Jebb died in Geneva in 1928 after many years of illness due to thyroid problems. The organizations that she founded continue their work today. She is also remembered in the calendar of the Church of England. When we think of Eglantine Jebb's life and work, we must remember her words: "Every war is a war against children". Even if there were no other reason for ending the senseless destruction and waste that follow from the institution of war, the lives and future of our children would be enough. In war we think of other countries as "enemies". Are the children of those countries our enemies? What have those children done to us? They are completely innocent, and yet we are prepared to starve them and to kill them with bombs.

Some photos of World War I children

Below are some photos of children in the aftermath of World War I. Children such as these were helped by the organizations that Eglantine Jebb founded.







Figure 5.3: One of a series of prints which the German artist Käthe Kollwitz (1867-1945) made as a protest against the atrocities of World War I.



Figure 5.4: Another anti-war print by Käthe Kollwitz.

5.3 Children of Hiroshima and Nagasaki

On August 6, 1945, at 8:15 in the morning, an atomic bomb was exploded in the air over Hiroshima. The force of the explosion was equivalent to twenty thousand tons of T.N.T.. Out of a city of two hundred and fifty thousand people, almost one hundred thousand were killed by the bomb; and another hundred thousand were hurt.

In some places, near the center of the city, people were completely vaporized, so that only their shadows on the pavement marked the places where they had been. Many people who were not killed by the blast or by burns from the explosion, were trapped under the wreckage of their houses. Unable to move, they were burned to death in the fire which followed.

Some accounts of the destruction of Hiroshima, written by children who survived it, have been collected by Professor Arata Osada. Among them is the following account, written by a boy named Hisato Ito. He was 11 years old when the atomic bomb was exploded over the city:

“On the morning of August 5th (we went) to Hiroshima to see my brother, who was at college there. My brother spent the night with us in a hotel... On the morning of the 6th, my mother was standing near the entrance, talking with the hotel proprietor before paying the bill, while I played with the cat. It was then that a violent flash of blue-white light swept in through the doorway.”

“I regained consciousness after a little while, but everything was dark. I had been flung to the far end of the hall, and was lying under a pile of debris caused by the collapse of two floors of the hotel. Although I tried to crawl out of this, I could not move. The fine central pillar, of which the proprietor was so proud, lay flat in front of me. ”

“I closed my eyes and was quite overcome, thinking that I was going to die, when I heard my mother calling my name. At the sound of her voice, I opened my eyes; and then I saw the flames creeping close to me. I called frantically to my mother, for I knew that I should be burnt alive if I did not escape at once. My mother pulled away some burning boards and saved me. I shall never forget how happy I felt at that moment - like a bird let out of a cage.”

“Everything was so altered that I felt bewildered. As far as my eyes could see, almost all the houses were destroyed and on fire. People passed by, their bodies red, as if they had been peeled. Their cries were pitiful. Others were dead. It was impossible to go farther along the street on account of the bodies, the ruined houses, and the badly wounded who lay about moaning. I did not know what to do; and as I turned to the west, I saw that the flames were drawing nearer..”

“At the water’s edge, opposite the old Sentai gardens, I suddenly realized that I had become separated from my mother. The people who had been burned were plunging into the river Kobashi, and then were crying out: ‘It’s hot! It’s hot!’ They were too weak to swim, and they drowned while crying for help.”

In 1951, shortly after writing this account, Hisato Ito died of radiation sickness. His mother died soon afterward from the same cause.

When the news of the atomic bombing of Hiroshima and Nagasaki reached Albert



Figure 5.5: **It was like a scene from hell.** Source: SGI International.

Einstein, his sorrow and remorse were extreme. During the remainder of his life, he did his utmost to promote the cause of peace and to warn humanity against the dangers of nuclear warfare.

When Otto Hahn, the discoverer of fission, heard the news of the destruction of Hiroshima, he and nine other German atomic scientists were being held prisoner at an English country house near Cambridge. Hahn became so depressed that his colleagues feared that he would take his own life.

Among the scientists who had worked at Chicago and Los Alamos, there was relief that the war was over; but as descriptions of Hiroshima and Nagasaki became available, there were also sharp feelings of guilt. Many scientists who had worked on the bomb project made great efforts to persuade the governments of the United States, England and Russia to agree to international control of atomic energy; but these efforts met with failure; and the nuclear arms race feared by Bohr developed with increasing momentum.



Figure 5.6: Burned beyond recognition. Source: SGI International.



Figure 5.7: Memories of August 6. Source: SGI International.



Figure 5.8: The effects lasted a lifetime. Source: SGI International.



Figure 5.9: After the bombing. Source: SGI International.

5.4 The threat of nuclear war

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

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

Albert Einstein



Figure 5.10: **Saint Paul's Cathedral during the London Blitz. Determined fire-fighting by citizens saved the cathedral from burning,** (Wikipedia)

Introduction

Today, the greatest threats facing human civilization and the biosphere are catastrophic climate change and nuclear war. Each of these could potentially destroy our civilization, kill most humans, and make most of our planet uninhabitable for most species, including our own.

The peoples of the world must unite and work with dedication to avoid these twin threats.

Targeting civilians

The erosion of ethical principles during World War II

When Hitler invaded Poland in September, 1939, US President Franklin Delano Roosevelt appealed to Great Britain, France, and Germany to spare innocent civilians from terror bombing. “The ruthless bombing from the air of civilians in unfortified centers of population during the course of the hostilities”, Roosevelt said (referring to the use of air bombardment during World War I) “...has sickened the hearts of every civilized man and woman, and has profoundly shocked the conscience of humanity.” He urged “every Government which may be engaged in hostilities publicly to affirm its determination that its

armed forces shall in no event, and under no circumstances, undertake the bombardment from the air of civilian populations or of unfortified cities.”

Two weeks later, British Prime Minister Neville Chamberlain responded to Roosevelt's appeal with the words: “Whatever the lengths to which others may go, His Majesty's Government will never resort to the deliberate attack on women and children and other civilians for purposes of mere terrorism.”

Much was destroyed during World War II, and among the casualties of the war were the ethical principles that Roosevelt and Chamberlain announced at its outset. At the time of Roosevelt and Chamberlain's declarations, terror bombing of civilians had already begun in the Far East. On 22 and 23 September, 1937, Japanese bombers attacked civilian populations in Nanjing and Canton. The attacks provoked widespread protests. The British Under Secretary of State for Foreign Affairs, Lord Cranborne, wrote: “Words cannot express the feelings of profound horror with which the news of these raids has been received by the whole civilized world. They are often directed against places far from the actual area of hostilities. The military objective, where it exists, seems to take a completely second place. The main object seems to be to inspire terror by the indiscriminate slaughter of civilians...”

On the 25th of September, 1939, Hitler's air force began a series of intense attacks on Warsaw. Civilian areas of the city, hospitals marked with the Red Cross symbol, and fleeing refugees all were targeted in an effort to force the surrender of the city through terror. On the 14th of May, 1940, Rotterdam was also devastated. Between the 7th of September 1940 and the 10th of May 1941, the German Luftwaffe carried out massive air attacks on targets in Britain. By May, 1941, 43,000 British civilians were killed and more than a million houses destroyed.

By the end of the war the United States and Great Britain were bombing of civilians on a far greater scale than Japan and Germany had ever done. For example, on July 24-28, 1943, British and American bombers attacked Hamburg with an enormous incendiary raid whose official intention was “the total destruction” of the city.

The result was a firestorm that did, in fact, lead to the total destruction of the city. One airman recalled, that “As far as I could see was one mass of fire. A sea of flame has been the description, and that's an understatement. It was so bright that I could read the target maps and adjust the bomb-sight.” Another pilot was “...amazed at the awe-inspiring sight of the target area. It seemed as though the whole of Hamburg was on fire from one end to the other and a huge column of smoke was towering well above us - and we were on 20,000 feet! It all seemed almost incredible and, when I realized that I was looking at a city with a population of two millions, or about that, it became almost frightening to think of what must be going on down there in Hamburg.”

Below, in the burning city, temperatures reached 1400 degrees Fahrenheit, a temperature at which lead and aluminum have long since liquefied. Powerful winds sucked new air into the firestorm. There were reports of babies being torn by the high winds from their mothers arms and sucked into the flames. Of the 45,000 people killed, it has been estimated that 50 percent were women and children and many of the men killed were elderly, above military age. For weeks after the raids, survivors were plagued by “...droves of vicious rats,

grown strong by feeding on the corpses that were left unburied within the rubble as well as the potatoes and other food supplies lost beneath the broken buildings.”

The German cities Kassel, Pforzheim, Mainz, Dresden and Berlin were similarly destroyed, and in Japan, US bombing created firestorms in many cities, for example Tokyo, Kobe and Yokohama. In Tokyo alone, incendiary bombing caused more than 100,000 civilian casualties.

Hiroshima and Nagasaki

On August 6, 1945, at 8:15 in the morning, an atomic bomb was exploded in the air over Hiroshima. The force of the explosion was equivalent to twenty thousand tons of T.N.T.. Out of a city of two hundred and fifty thousand people, almost one hundred thousand were killed by the bomb; and another hundred thousand were hurt.

In some places, near the center of the city, people were completely vaporized, so that only their shadows on the pavement marked the places where they had been. Many people who were not killed by the blast or by burns from the explosion, were trapped under the wreckage of their houses. Unable to move, they were burned to death in the fire which followed.

Some accounts of the destruction of Hiroshima, written by children who survived it, have been collected by Professor Arata Osada. Among them is the following account, written by a boy named Hisato Ito. He was 11 years old when the atomic bomb was exploded over the city:

“On the morning of August 5th (we went) to Hiroshima to see my brother, who was at college there. My brother spent the night with us in a hotel... On the morning of the 6th, my mother was standing near the entrance, talking with the hotel proprietor before paying the bill, while I played with the cat. It was then that a violent flash of blue-white light swept in through the doorway.”

“I regained consciousness after a little while, but everything was dark. I had been flung to the far end of the hall, and was lying under a pile of debris caused by the collapse of two floors of the hotel. Although I tried to crawl out of this, I could not move. The fine central pillar, of which the proprietor was so proud, lay flat in front of me. ”

“I closed my eyes and was quite overcome, thinking that I was going to die, when I heard my mother calling my name. At the sound of her voice, I opened my eyes; and then I saw the flames creeping close to me. I called frantically to my mother, for I knew that I should be burnt alive if I did not escape at once. My mother pulled away some burning boards and saved me. I shall never forget how happy I felt at that moment - like a bird let out of a cage.”

“Everything was so altered that I felt bewildered. As far as my eyes could see, almost all the houses were destroyed and on fire. People passed by, their bodies red, as if they had been peeled. Their cries were pitiful. Others were dead. It was impossible to go farther along the street on account of the bodies, the ruined houses, and the badly wounded who lay about moaning. I did not know what to do; and as I turned to the west, I saw that the flames were drawing nearer..”



Figure 5.11: **Hiroshima** (duniverso.com.br)

“At the waters edge, opposite the old Sentai gardens, I suddenly realized that I had become separated from my mother. The people who had been burned were plunging into the river Kobashi, and then were crying out: ‘Its hot! Its hot! They were too weak to swim, and they drowned while crying for help.’”

In 1951, shortly after writing this account, Hisato Ito died of radiation sickness. His mother died soon afterward from the same cause.

The postwar nuclear arms race

When the news of the atomic bombing of Hiroshima and Nagasaki reached Albert Einstein, his sorrow and remorse were extreme. During the remainder of his life, he did his utmost to promote the cause of peace and to warn humanity against the dangers of nuclear warfare. Together with Bertrand Russell and Joseph Rotblat he helped to found Pugwash Conferences on Science and World Affairs (Nobel Peace Prize 1995), an organization of scientists and other scholars devoted to world peace and to the abolition of nuclear weapons.

When Otto Hahn, the discoverer of fission, heard the news of the destruction of Hiroshima, he and nine other German atomic scientists were being held prisoner at an English



Figure 5.12: Hiroshima. The greater absorption of thermal energy by dark colors resulted in the clothes pattern, in the tight-fitting areas on this survivor, being burnt into the skin.(Public domain)



Figure 5.13: **Nagasaki before the nuclear explosion and firestorm.** (Public domain)

country house near Cambridge. Hahn became so depressed that his colleagues feared that he would take his own life.

World public opinion was also greatly affected by the indiscriminate destruction of human life in Hiroshima and Nagasaki. Shortly after the bombings, the French existentialist author Albert Camus wrote: “Our technical civilization has just reached its greatest level of savagery. We will have to choose, in the more or less near future, between collective suicide and the intelligent use of our scientific conquests. Before the terrifying prospects now available to humanity, we see even more clearly that peace is the only battle worth waging. This is no longer a prayer, but a demand to be made by all peoples to their governments - a demand to choose definitively between hell and reason.”

Among the scientists who had worked at Chicago and Los Alamos, there was relief that the war was over; but as descriptions of Hiroshima and Nagasaki became available there were also sharp feelings of guilt. Many scientists who had worked on the bomb project made great efforts to persuade the governments of the United States, England and the Soviet Union to agree to international control of atomic energy; but these efforts met with failure; and the nuclear arms race developed with increasing momentum.

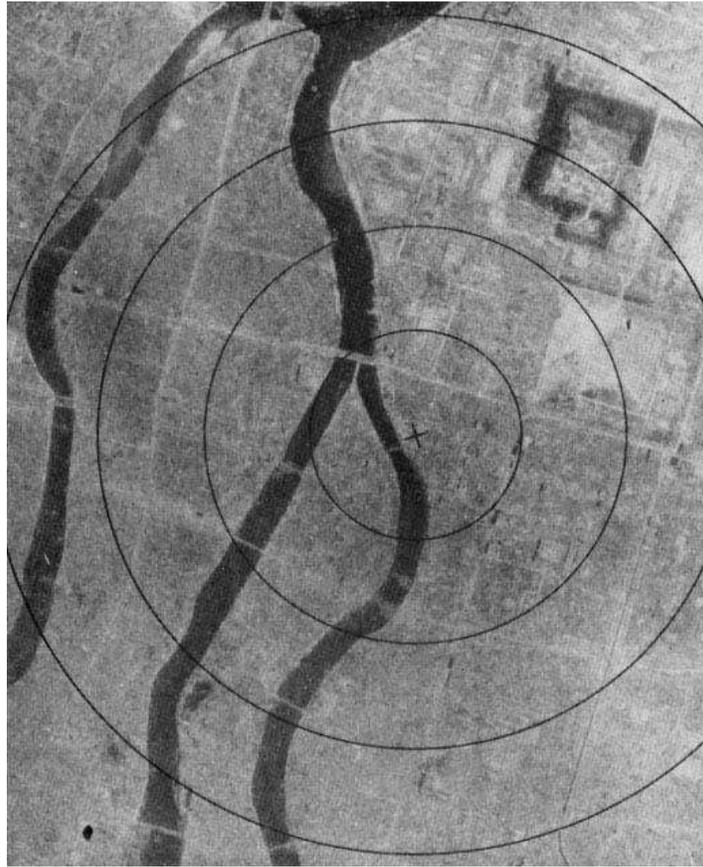


Figure 5.14: **Nagasaki afterwards.** (Public domain)

In 1946, the United States proposed the Baruch Plan to internationalize atomic energy, but the plan was rejected by the Soviet Union, which had been conducting its own secret nuclear weapons program since 1943. On August 29, 1949, the USSR exploded its first nuclear bomb. It had a yield equivalent to 21,000 tons of TNT, and had been constructed from Pu-239 produced in a nuclear reactor. Meanwhile the United Kingdom had begun to build its own nuclear weapons.

The explosion of the Soviet nuclear bomb caused feelings of panic in the United States, and President Truman authorized an all-out effort to build superbombs using thermonuclear reactions - the reactions that heat the sun and stars. The idea of using a U-235 fission bomb to trigger a thermonuclear reaction in a mixture of light elements had first been proposed by Enrico Fermi in a 1941 conversation with his Chicago colleague Edward Teller. After this conversation, Teller (perhaps the model for Stanley Kubrick's character Dr. Strangelove) became a fanatical advocate of the superbomb.

After Truman's go-ahead, the American program to build thermonuclear weapons made rapid progress, and on October 31, 1952, the first US thermonuclear device was exploded at Eniwetok Atoll in the Pacific Ocean. It had a yield of 10.4 megatons, that is to say it had an explosive power equivalent to 10,400,000 tons of TNT. Thus the first thermonuclear

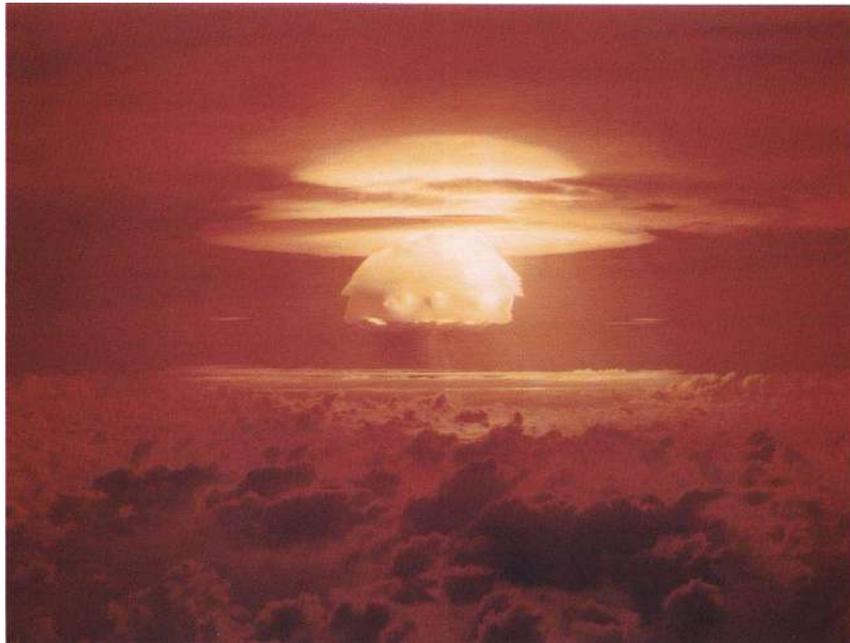


Figure 5.15: The United States exploded a hydrogen bomb near the island of Enewetak in the South Pacific in 1952. The explosive force of the bomb was 500 times greater than the bombs that destroyed Hiroshima and Nagasaki. The Soviet Union tested its first hydrogen bomb in 1953. In March, 1954, the US tested another hydrogen bomb at the Bikini Atoll in the Pacific Ocean. It was 1000 times more powerful than the Hiroshima bomb. The Japanese fishing boat, Lucky Dragon, was 130 kilometers from the Bikini explosion, but radioactive fallout from the test killed one crew member and made all the others seriously ill. (Public domain)



Figure 5.16: After discussing the Bikini test and its radioactive fallout with Joseph Rotblat, Lord Russell became concerned for the future of the human gene pool if large numbers of such bombs should ever be used in a war. To warn humanity of the danger, he wrote what came to be known as the Russell-Einstein Manifesto. On July 9, 1955, with Rotblat in the chair, Russell read the Manifesto to a packed press conference. The document contains the words: “Here then is the problem that we present to you, stark and dreadful and inescapable: Shall we put an end to the human race, or shall mankind renounce war?... There lies before us, if we choose, continual progress in happiness, knowledge and wisdom. Shall we, instead, choose death because we cannot forget our quarrels? We appeal as human beings to human beings: Remember your humanity, and forget the rest.” Lord Russell devoted much of the remainder of his life to working for the abolition of nuclear weapons. Here he is seen in 1962 in Trafalgar Square, London, addressing a meeting of the Campaign for Nuclear Disarmament. (Public domain)

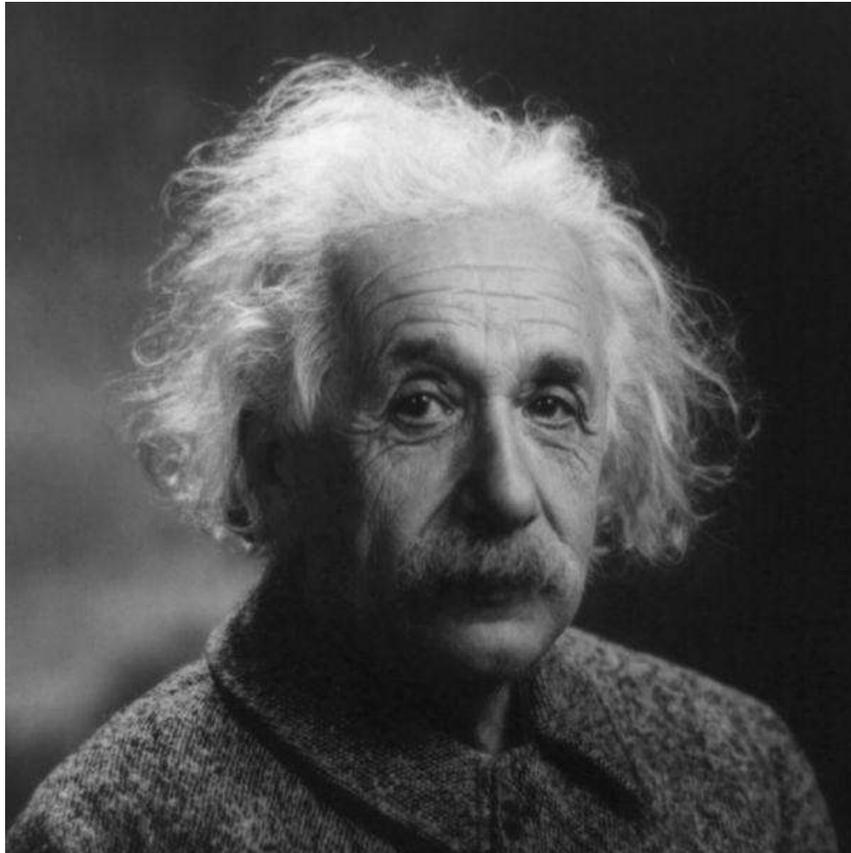


Figure 5.17: Albert Einstein wrote: “The unleashed power of the atom has changed everything save our modes of thinking, and we thus drift toward unparalleled catastrophes.” He also said, “I don’t know what will be used in the next world war, but the 4th will be fought with stones.”(Wikimedia)



Figure 5.18: Joseph Rotblat devoted the remainder of his life to working for peace and for the abolition of nuclear weapons. He became the president and guiding spirit of the Pugwash Conferences on Science and World Affairs, an organization of scientists and other scholars devoted to these goals. In his 1995 Nobel Peace Prize acceptance speech, Sir Joseph Rotblat (as he soon became) emphasized the same point that had been made in the Russell-Einstein Manifesto - that war itself must be eliminated in order to free civilization from the danger of nuclear destruction. (Pugwash Conferences)

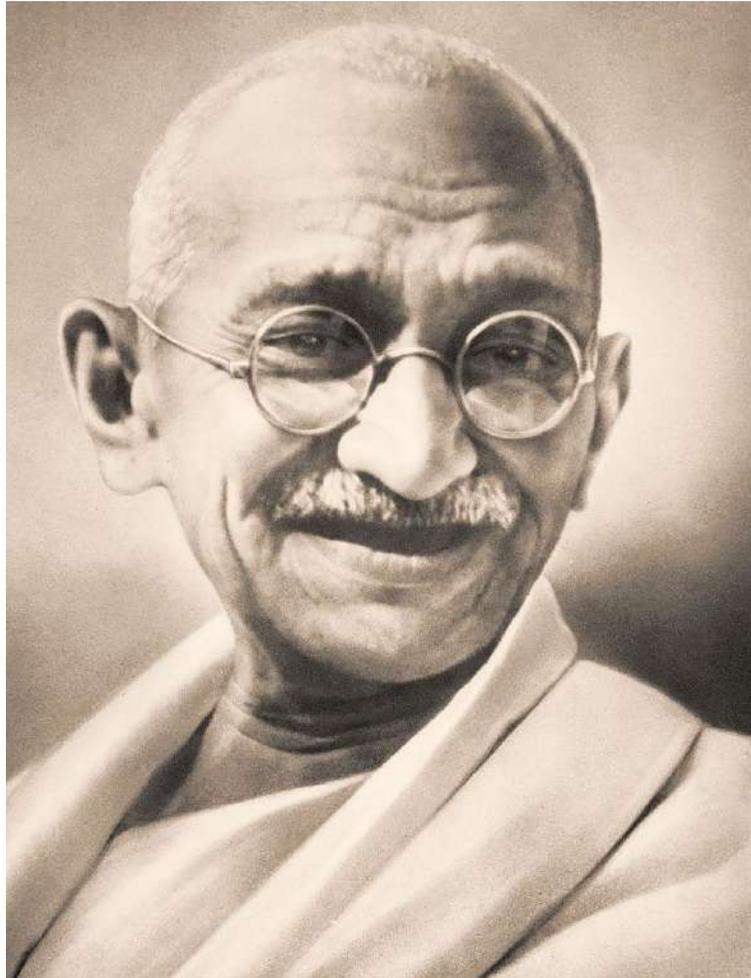


Figure 5.19: To the insidious argument that “the end justifies the means”, Mahatma Gandhi answered firmly: “They say ‘means are after all means. I would say ‘means are after all everything. As the means, so the end. Indeed the Creator has given us control (and that very limited) over means, none over 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, if evil means are used, the end achieved will be contaminated by the means used to achieve it. Gandhi’s insight can be applied to the argument that the nuclear bombings that destroyed Hiroshima and Nagasaki helped to end World War II and were therefore justified. In fact, these terrible events lead to a nuclear arms race that still casts an extremely dark shadow over the future of human civilization. (Public domain)

bomb was five hundred times as powerful as the bombs that had devastated Hiroshima and Nagasaki. Lighter versions of the device were soon developed, and these could be dropped from aircraft or delivered by rockets.

The Soviet Union and the United Kingdom were not far behind. In 1955 the Soviets exploded their first thermonuclear device, followed in 1957 by the UK. In 1961 the USSR exploded a thermonuclear bomb with a yield of 58 megatons. A bomb of this size, three thousand times the size of the Hiroshima bomb, would be able to totally destroy a city even if it missed it by 50 kilometers. Fall-out casualties would extend to a far greater distance.

In the late 1950s General Gavin, Chief of Army Research and Development in the United States, was asked by the Symington Committee, "If we got into a nuclear war and our strategic air force made an assault in force against Russia with nuclear weapons exploded in a way where the prevailing winds would carry them south-east over Russia, what would be the effect in the way of death?"

General Gavin replied: "Current planning estimates run on the order of several hundred million deaths. That would be either way depending on which way the wind blew. If the wind blew to the south-east they would be mostly in the USSR, although they would extend into the Japanese area and perhaps down into the Philippine area. If the wind blew the other way, they would extend well back into Western Europe."

Between October 16 and October 28, 1962, the Cuban Missile Crisis occurred, an incident in which the world came extremely close to a full-scale thermonuclear war. During the crisis, President Kennedy and his advisers estimated that the chance of an all-out nuclear war with Russia was 50%. Recently-released documents indicate that the probability of war was even higher than Kennedy's estimate. Robert McNamara, who was Secretary of Defense at the time, wrote later, "We came within a hairbreadth of nuclear war without realizing it... Its no credit to us that we missed nuclear war..."

In 1964 the first Chinese nuclear weapon was tested, and this was followed in 1967 by a Chinese thermonuclear bomb with a yield of 3.3 megatons. France quickly followed suit testing a fission bomb in 1966 and a thermonuclear bomb in 1968. In all about thirty nations contemplated building nuclear weapons, and many made active efforts to do so.

Because the concept of deterrence required an attacked nation to be able to retaliate massively even though many of its weapons might be destroyed by a preemptive strike, the production of nuclear warheads reached insane heights, driven by the collective paranoia of the Cold War. More than 50,000 nuclear warheads were produced worldwide, a large number of them thermonuclear. The collective explosive power of these warheads was equivalent to 20,000,000,000 tons of TNT, i.e. 4 tons for every man, woman and child on the planet, or, expressed differently, a million times the explosive power of the bomb that destroyed Hiroshima.

The end of the Cold War

In 1985, Michael Gorbachev (1931-) became the General Secretary of the Communist Party of the Soviet Union. Gorbachev had become convinced by his conversations with scientists that the policy of nuclear confrontation between the United States and the USSR was far

too dangerous to be continued over a long period of time. If continued, sooner or later, through accident of miscalculation, it would result in a disaster of unprecedented proportions. Gorbachev also believed that the USSR was in need of reform, and he introduced two words to characterize what he felt was needed: *glasnost* (openness) and *perestroika* (reconstruction).

In 1986, US President Ronald Reagan met Mikhail Gorbachev in Reykjavik, Iceland. The two leaders hoped that they might find ways of reducing the danger that a thermonuclear Third World War would be fought between their two countries. Donald Reagan, the White House Chief of Staff, was present at the meeting, and he records the following conversation: “At one point in time Gorbachev said ‘I would like to do away with all nuclear weapons. And Reagan hit the table and said ‘Well why didn’t you say so in the first place! Thats exactly what I want to do! And if you want to do away with all the weapons, Ill agree to do away with all the weapons. Of course well do away with all the weapons. ‘Good, [said Gorbachev] ‘Thats great, but you must confine SDI to the laboratory. ‘No I wont, said Reagan. ‘No way. SDI continues. I told you that I am never going to give up SDI.” The SDI program, which seemingly prevented Presidents Reagan and Gorbachev from reaching an agreement to completely eliminate their nuclear weapons was Reagan’s “Star Wars” program which (in violation of the ABM Treaty) proposed to set up a system of radar, satellites and missiles to shoot down attacking missiles.

Gorbachev s reforms effectively granted self-government to the various parts of the Soviet Union, and he himself soon resigned from his post as its leader, since the office was no longer meaningful. Most of the newly-independent parts of the old USSR began to introduce market economies, and an astonished world witnessed a series of unexpected and rapid changes: On September 10, 1989 Hungarian government opened its border for East German refugees; on November 9, 1989 Berlin Wall was reopened; on December 22, 1989 Brandenburg Gate was opened; and on October 3, 1990 Germany was reunited. The Cold War was over!

The Non-Proliferation Treaty

During the Cold War, a number of international treaties attempting to reduce the global nuclear peril had been achieved after much struggle. Among these, the 1968 Nuclear Non-Proliferation Treaty (NPT) has special importance. The NPT was designed to prevent the spread of nuclear weapons beyond the five nations that already had them; to provide assurance that “peaceful” nuclear activities of non-nuclear-weapon states would not be used to produce such weapons; to promote peaceful use of nuclear energy to the greatest extent consistent with non-proliferation of nuclear weapons; and finally, to ensure that definite steps towards complete nuclear disarmament would be taken by all states, as well steps towards comprehensive control of conventional armaments (Article VI).

The non-nuclear-weapon states insisted that Article VI be included in the treaty as a price for giving up their own ambitions. The full text of Article VI is as follows: “Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating cessation of the nuclear arms race at an early date and to nuclear disarmament,

and on a Treaty on general and complete disarmament under strict international control.”

The NPT has now been signed by 187 countries and has been in force as international law since 1970. However, Israel, India, Pakistan, and Cuba have refused to sign, and North Korea, after signing the treaty, withdrew from it in 1993. Israel began producing nuclear weapons in the late 1960s (with the help of a reactor provided by France) and the country is now believed to possess 100-150 of them, including neutron bombs. Israel's policy is one of “nuclear opacity” - i.e., visibly possessing nuclear weapons while denying their existence.

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

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”. Zulfikar Ali Bhutto, who initiated Pakistan's program, first as Minister of Fuel, Power and Natural Resources, and later as President and Prime Minister, declared: “There is a Christian Bomb, a Jewish Bomb and a Hindu Bomb. There must be an Islamic Bomb! We will get it even if we have to starve - even if we have to eat grass!” 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 bombs 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 article¹ 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, and as the harbinger of a new Muslim era.” 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. However, observers considered that it was unlikely that Khan would be tried for these offenses, since a trial might implicate

¹1 February, 2004

Pakistan's army as well as two of its former prime ministers. Furthermore, Dr. Khan has the strong support of Pakistan's Islamic fundamentalists. Recent assassinations emphasize the precariousness of Pakistan's government. There is a danger that it may be overthrown by Islamic fundamentalists, who would give Pakistan's nuclear weapons to terrorist organizations. 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 subnational organizations.

Article VIII of the Non-Proliferation Treaty provides for a conference to be held every five years to make sure that the NPT is operating as intended. In the 1995 NPT Review Conference, the lifetime of the treaty was extended indefinitely, despite the general dissatisfaction with the bad faith of the nuclear weapon states: They had dismantled some of their warheads but had taken no significant steps towards complete nuclear disarmament. The 2000 NPT Review Conference made it clear that the nuclear weapons states could not postpone indefinitely their commitment to nuclear disarmament by linking it to general and complete disarmament, since these are separate and independent goals of Article VI. The Final Document of the conference also contained 13 Practical Steps for Nuclear Disarmament, including ratification of a Comprehensive Test Ban Treaty (CTBT), negotiations on a Fissile Materials Cutoff Treaty, the preservation and strengthening of the Anti-Ballistic Missile (ABM) Treaty, greater transparency with regard to nuclear arsenals, and making irreversibility a principle of nuclear reductions. Another review conference is scheduled for 2010, a year that marks the 55th anniversary of the destruction of Hiroshima and Nagasaki.

Something must be said about the concept of irreversibility mentioned in the Final Document of the 2000 NPT Review Conference. Nuclear weapons can be destroyed in a completely irreversible way by getting rid of the special isotopes which they use. In the case of highly enriched uranium (HEU), this can be done by mixing it thoroughly with ordinary unenriched uranium. In natural uranium, the rare fissile isotope U-235 is only 0.7%. The remaining 99.3% consists of the common isotope, U-238, which under ordinary circumstances cannot undergo fission. If HEU is mixed with a sufficient quantity of natural uranium, so that the concentration of U-235 falls below 20%, it can no longer be used in nuclear weapons.

Getting rid of plutonium irreversibly is more difficult, but it could be cast into large concrete blocks and dumped into extremely deep parts of the ocean (e.g. the Japan Trench) where recovery would be almost impossible. Alternatively, it could be placed in the bottom of very deep mine shafts, which could afterwards be destroyed by means of conventional explosives. None of the strategic arms reduction treaties, neither the SALT treaties nor the 2002 Moscow Treaty, incorporate irreversibility.

The recent recommendation by four distinguished German statesmen that all short-range nuclear weapons be destroyed is particularly interesting [13]. The strongest argument for the removal of US tactical nuclear weapons from Europe is the danger of collapse of the NPT. The 2005 NPT Review Conference was a disaster, and there is a danger that at the 2010 Review Conference, the NPT will collapse entirely because of the discriminatory

position of the nuclear weapon states (NWS) and their failure to honor their commitments under Article VI. NATO's present nuclear weapon policy also violates the NPT, and correcting this violation would help to save the 2010 Review Conference from failure.

At present, the air forces of the European countries in which the US nuclear weapons are stationed perform regular training exercises in which they learn how to deliver the weapons. This violates the spirit, and probably also the letter, of Article IV, which prohibits the transfer of nuclear weapons from an NWS to a non-NWS. The "nuclear sharing" proponents maintain that such transfers would only happen in an emergency; but there is nothing in the NPT saying that the treaty would not hold under all circumstances. Furthermore, NATO would be improved, rather than damaged, by giving up "nuclear sharing". If President Obama wishes to fulfill his campaign promises [14] - if he wishes to save the NPT - a logical first step would be to remove US tactical nuclear weapons from Europe.

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 Buddhism. "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 Courts 1996 advisory Opinion unquestionably also represents the opinion of the majority of the worlds 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.² 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. Grey³ expressed this concern as follows: “The problem, indeed the enduring problem, is that we are resting our future upon a nuclear deterrence system concerning which we cannot tolerate even a single malfunction.” General Curtis E. LeMay⁴ 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. Blair⁵ has remarked that “It is obvious that the rushed nature of the process, from warning to decision to action, risks causing a catastrophic mistake.”...

²Of 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.

³Chairman, National Institute for Public Policy

⁴Founder and former Commander in Chief of the United States Strategic Air Command

⁵Brookings Institute

“This system is an accident waiting to happen.”

Today, the system that is supposed to give us security is called Mutually Assured Destruction, appropriately abbreviated as MAD. It is based on the idea of deterrence, which maintains that because of the threat of massive retaliation, no sane leader would start a nuclear war.

Before discussing other defects in the concept of deterrence, it must be said very clearly that the idea of “massive nuclear retaliation” is a form of genocide and is completely unacceptable from an ethical point of view. It violates not only the principles of common human decency and common sense, but also the ethical principles of every major religion.

Having said this, we can now turn to some of the other faults 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, or by terrorism. 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 “hair-trigger 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.

Incidents in which global disaster is avoided by a hair’s breadth are constantly occurring. For example, on the night of 26 September, 1983, Lt. Col. Stanislav Petrov, a young software engineer, was on duty at a surveillance center near Moscow. Suddenly the screen in front of him turned bright red.

An alarm went off. It’s enormous piercing sound filled the room. A second alarm followed, and then a third, fourth and fifth. “The computer showed that the Americans had launched a strike against us”, Petrov remembered later. His orders were to pass the information up the chain of command to Secretary General Yuri Andropov. Within minutes, a nuclear counterattack would be launched. However, because of certain inconsistent features of the alarm, Petrov disobeyed orders and reported it as a computer error, which indeed it was.

Most of us probably owe our lives to his coolheaded decision and knowledge of software systems. The narrowness of this escape is compounded by the fact that Petrov was on duty only because of the illness of another officer with less knowledge of software, who would have accepted the alarm as real.

Narrow escapes such as this show us clearly that in the long run, the combination of space-age science and stone-age politics will destroy us. We urgently need new political structures and new ethics to match our advanced technology. Modern science has, for the first time in history, offered humankind the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of death through infectious disease. At the same time, science has given humans the power to obliterate their civilization with nuclear weapons, or to make the earth uninhabitable through overpopulation and pollution. The question of which of these paths we choose is literally a matter of life or death for ourselves and our children.

Will we use the discoveries of modern science constructively, and thus choose the path leading towards life? Or will we use science to produce more and more lethal weapons, which sooner or later, through a technical or human failure, will result in a catastrophic

nuclear war? Will we thoughtlessly destroy our beautiful planet through unlimited growth of population and industry? The choice among these alternatives is ours to make. We live at a critical moment of history, a moment of crisis for civilization.

No one alive today asked to be born at a time of crisis, but history has given each of us an enormous responsibility. Of course we have our ordinary jobs, which we need to do in order to stay alive; but besides that, each of us has a second job, the duty to devote both time and effort to solving the serious problems that face civilization during the 21st century. We cannot rely on our politicians to do this for us. Many politicians are under the influence of powerful lobbies. Others are waiting for a clear expression of popular will. It is the people of the world themselves who must choose their own future and work hard to build it.

No single person can achieve the changes that we need, but together we can do it. The problem of building a stable, just, and war-free world is difficult, but it is not impossible. The large regions of our present-day world within which war has been eliminated can serve as models. There are a number of large countries with heterogeneous populations within which it has been possible to achieve internal peace and social cohesion, and if this is possible within such extremely large regions, it must also be possible globally.

We must replace the old world of international anarchy, chronic war, and institutionalized injustice by a new world of law. The United Nations Charter, the Universal Declaration of Human Rights and the International Criminal Court are steps in the right direction. These institutions need to be greatly strengthened and reformed. We also need a new global ethic, where loyalty to one's family and nation will be supplemented by a higher loyalty to humanity as a whole. Tipping points in public opinion can occur suddenly. We can think, for example, of the Civil Rights Movement, or the rapid fall of the Berlin Wall, or the sudden change that turned public opinion against smoking, or the sudden movement for freedom and democracy in the Arab world. A similar sudden change can occur soon regarding war and nuclear weapons.

We know that war is madness. We know that it is responsible for much of the suffering that humans experience. We know that war pollutes our planet and that the almost unimaginable sums wasted on war prevent the happiness and prosperity of mankind. We know that nuclear weapons are insane, and that the precariously balanced deterrence system can break down at any time through human error or computer errors or through terrorist actions, and that it definitely will break down within our lifetimes unless we abolish it. We know that nuclear war threatens to destroy civilization and much of the biosphere.

The logic is there. We must translate into popular action which will put an end to the undemocratic, money-driven, power-lust-driven war machine. The peoples of the world must say very clearly that nuclear weapons are an absolute evil; that their possession does not increase anyone's security; that their continued existence is a threat to the life of every person on the planet; and that these genocidal and potentially omnicidal weapons have no place in a civilized society.

Modern science has abolished time and distance as factors separating nations. On our shrunken globe today, there is room for one group only: the family of humankind. We

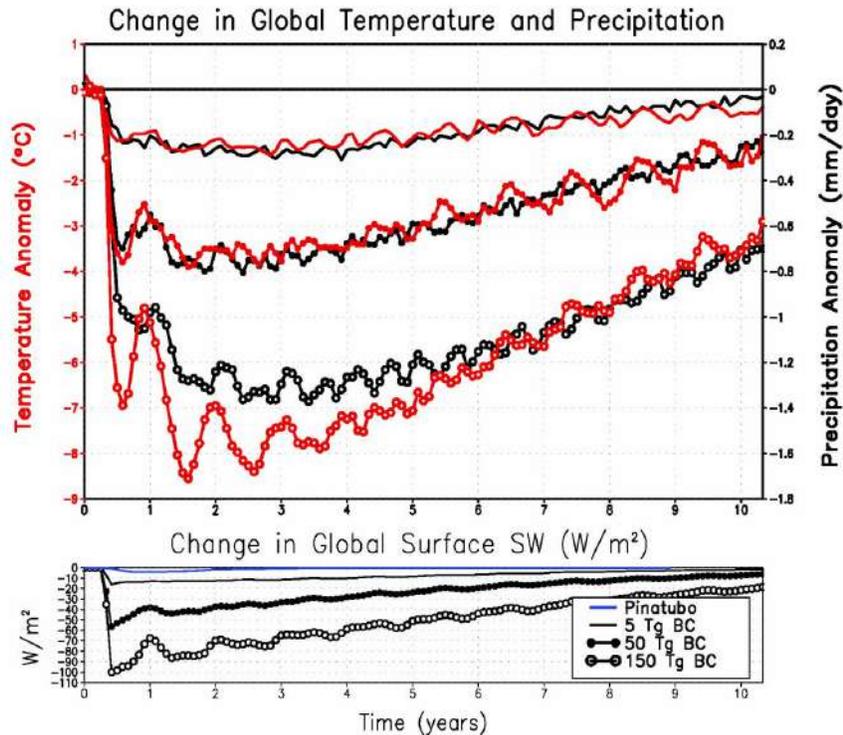


Figure 5.20: Recent studies by atmospheric scientists have shown that the smoke from burning cities produced by even a limited nuclear war would have a devastating effect on global agriculture. The studies show that the smoke would rise to the stratosphere, where it would spread globally and remain for 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. (O. Toon, A. Robock and R. Turco, “The Environmental Consequences of Nuclear War”, *Physics Today*, vol. 61, No. 12, 2008, p. 37-42)

must embrace all other humans as our brothers and sisters. More than that, we must feel that all of nature is part of the same sacred family; meadow flowers, blowing winds, rocks, trees, birds, animals, and other humans, all these are our brothers and sisters, deserving our care and protection. Only in this way can we survive together. Only in this way can we build a happy future.

“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, 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.

In this dangerous 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.

Establishment opinion shifts towards nuclear abolition

Today there are indications that the establishment is moving towards the point of view that the peace movement has always held: - that nuclear weapons are essentially genocidal, illegal and unworthy of civilization; and that they must be completely abolished as quickly as possible. There is a rapidly-growing global consensus that a nuclear-weapon-free world can and must be achieved in the very near future.

One of the first indications of the change was the famous Wall Street Journal article by Schultz, Perry, Kissinger and Nunn advocating complete abolition of nuclear arms [1]. This was followed quickly by Mikhail Gorbachev's supporting article, published in the same journal [2], and a statement by distinguished Italian statesmen [3]. Meanwhile, in October 2007, the Hoover Institution had arranged a symposium entitled "Reykjavik Revisited; Steps Towards a World Free of Nuclear Weapons" [4].

In Britain, Sir Malcolm Rifkind, Lord Hurd and Lord Owen (all former Foreign Secretaries) joined the former NATO Secretary General Lord Robertson as authors of an article in *The Times* advocating complete abolition of nuclear weapons [5]. The UK's Secretary of State for Defense, Des Brown, speaking at a disarmament conference in Geneva, proposed that the UK "host a technical conference of P5 nuclear laboratories on the verification of nuclear disarmament before the next NPT Review Conference in 2010" to enable the nuclear weapon states to work together on technical issues.

In February, 2008, the Government of Norway hosted an international conference on "Achieving the Vision of a World Free of Nuclear Weapons" [7]. A week later, Norway's Foreign Minister, Jonas Gahr Støre, reported the results of the conference to a disarmament meeting in Geneva [8]. On July 11, 2008, speaking at a Pugwash Conference in Canada, Norway's Defense Minister, Anne-Grete Strøm-Erichsen, reiterated her country's strong support for the complete abolition of nuclear weapons [9].

In July 2008, Barack Obama said in his Berlin speech, "It is time to secure all loose nuclear materials; to stop the spread of nuclear weapons; and to reduce the arsenals from another era. This is the moment to begin the work of seeking the peace of a world without nuclear weapons."

Later that year, in September, Vladimir Putin said, "Had I been told just two or three years ago I wouldn't believe that it would be possible, but I believe that it is now quite

possible to liberate humanity from nuclear weapons...”

Other highly-placed statesmen added their voices to the growing consensus: Australia’s Prime Minister, Kevin Rudd, visited the Peace Museum at Hiroshima, where he made a strong speech advocating nuclear abolition. He later set up an International Commission on Nuclear Non-Proliferation and Disarmament co-chaired by Australia and Japan [10].

On January 9, 2009, four distinguished German statesmen (Richard von Weizäcker, Helmut Schmidt, Egon Bahr and Hans-Dietrich Genscher) published an article entitled “Towards a Nuclear-Free World: a German View” in the International Herald Tribune [12]. Among the immediate steps recommended in the article are the following:

- The vision of a nuclear-weapon-free world... must be rekindled.
- Negotiations aimed at drastically reducing the number of nuclear weapons must begin...
- The Nuclear Non-Proliferation Treaty (NPT) must be greatly reinforced.
- America should ratify the Comprehensive Nuclear Test-Ban Treaty.
- All short-range nuclear weapons must be destroyed.
- The Anti-Ballistic Missile (ABM) Treaty must be restored. Outer space may only be used for peaceful purposes.

Going to zero

On December 8-9, 2008, approximately 100 international leaders met in Paris to launch the Global Zero Campaign [11]. They included Her Majesty Queen Noor of Jordan, Norway’s former Prime Minister Gro Harlem Brundtland, former UK Foreign Secretaries Sir Malcolm Rifkind, Margaret Beckett and David Owen, Ireland’s former Prime Minister Mary Robinson, UK philanthropist Sir Richard Branson, former UN Under-Secretary-General Jayantha Dhanapala, and Nobel Peace Prize winners President Jimmy Carter, President Mikhail Gorbachev, Archbishop Desmond Tutu and Prof. Muhammad Yunus. The concrete steps advocated by Global Zero include:

- Deep reductions to Russian-US arsenals, which comprise 96% of the worlds 27,000 nuclear weapons.
- Russia and the United States, joined by other nuclear weapons states, cutting arsenals to zero in phased and verified reductions.
- Establishing verification systems and international management of the fuel cycle to prevent future development of nuclear weapons.

The Global Zero website [11] contains a report on a new public opinion poll covering 21 nations, including all of the nuclear weapons states. The poll showed that public opinion overwhelmingly favors an international agreement for eliminating all nuclear weapons according to a timetable. It was specified that the agreement would include monitoring. The average in all countries of the percent favoring such an agreement was 76%. A few results of special interest mentioned in the report are Russia 69%; the United States, 77%; China, 83%; France, 86%, and Great Britain, 81%.

In his April 5, 2009 speech in Prague the newly-elected U.S. President Barack Obama said: “To reduce our warheads and stockpiles, we will negotiate a new strategic arms reduction treaty with Russia this year. President Medvedev and I will begin this process in London, and we will seek an agreement by the end of the year that is sufficiently bold. This will set the stage for further cuts, and we will seek to involve all nuclear weapon states in this endeavor... To achieve a global ban on nuclear testing, my administration will immediately and aggressively pursue U.S. ratification of the Comprehensive Test Ban Treaty.”

A few days later, on April 24, 2009, the European Parliament recommended complete nuclear disarmament by 2020. An amendment introducing the “Model Nuclear Weapons Convention” and the “Hiroshima-Nagasaki Protocol” as concrete tools to achieve a nuclear weapons free world by 2020 was approved with a majority of 177 votes against 130. The Nuclear Weapons Convention is analogous to the conventions that have successfully banned chemical and biological weapons.

The role of public opinion

Public opinion is extremely important for the actual achievement of complete nuclear abolition. In the first place, the fact that the public is overwhelmingly against the retention of nuclear weapons means that the continuation of nuclear arsenals violates democratic principles. Secondly, the weapons are small enough to be easily hidden. Therefore the help of “whistle-blowers” will be needed to help inspection teams to make sure that no country violates its agreement to irreversibly destroy every atomic bomb. What is needed is a universal recognition that nuclear weapons are an absolute evil, and that their continued existence is a threat to human civilization and to the life of every person on the planet.

Our aim must be to delegitimize nuclear weapons, in much the same way that unnecessary greenhouse gas emissions have recently been delegitimized, or cigarette smoking delegitimized, or racism delegitimized. This should be an easy task because of the essentially genocidal nature of nuclear weapons. For half a century, ordinary people have been held as hostages, never knowing from day to day whether their own lives and the lives of those they love would suddenly be sacrificed on the alter of thermonuclear nationalism and power politics. We must let the politicians know that we are no longer willing to be hostages; and we must also accept individual responsibility for reporting violations of international treaties, although our own nation might be the violator.

Most of us grew up in schools where we were taught that duty to our nation was the highest duty; but the times we live in today demand a change of heart, a higher loyalty



Figure 5.21: **Women Strike for Peace during the Cuban Missile Crisis in 1962.**(Public domain)

to humanity as a whole. If the mass media cooperate in delegitimizing nuclear weapons, if educational systems cooperate and if religions ⁶ cooperate, the change of heart that we need - the global ethic that we need - can quickly be achieved.

Complete abolition of nuclear weapons

Although the Cold War has ended, the danger of a nuclear catastrophe is greater today than ever before. There are almost 16,000 nuclear weapons in the world today, of which more than 90 percent are in the hands of Russia and the United States. About 2,000 of these weapons are on hair-trigger alert, meaning that whoever is in charge of them has only a few minutes to decide whether the signal indicating an attack is real, or an error.

⁶As an example of the role that religions can play, we can consider the Buddhist organization Soka Gakkai International (SGI), which has 12 million members throughout the world. SGI's President Daisaku Ikeda has declared nuclear weapons to be an absolute evil and for more than 50 years the organization has worked for their abolition.

The most important single step in reducing the danger of a disaster would be to take all weapons off hair-trigger alert.

Bruce G. Blair, Brookings Institute, has remarked “It is obvious that the rushed nature of the process, from warning to decision to action, risks causing a catastrophic mistake... This system is an accident waiting to happen.” Fred Ikle of the Rand Corporation has written, ‘But nobody can predict that the fatal accident or unauthorized act will never happen. Given the huge and far-flung missile forces, ready to be launched from land and sea on both sides, the scope for disaster by accident is immense... In a matter of seconds, through technical accident or human failure, mutual deterrence might thus collapse.”

Although their number has been substantially reduced from its Cold War maximum, the total explosive power of today's weapons is equivalent to roughly half a million Hiroshima bombs. To multiply the tragedy of Hiroshima and Nagasaki by a factor of half a million changes the danger qualitatively. What is threatened today is the complete breakdown of human society.

There is no defense against nuclear terrorism. 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.

As the number of nuclear weapon states grows larger, there is an increasing chance that a revolution will occur in one of them, putting nuclear weapons into the hands of terrorist groups or organized criminals. Today, for example, Pakistans less-than-stable government might be overthrown, and Pakistans nuclear weapons might end in the hands of terrorists. The weapons might then be used to destroy one of the worlds large coastal cities, having been brought into the port by one of numerous container ships that dock every day. Such an event might trigger a large-scale nuclear conflagration.

Today, the world is facing a grave danger from the reckless behavior of the government of the United States, which recently arranged a coup that overthrew the elected government of Ukraine. Although Victoria Nulands December 13, 2013 speech talks much about democracy, the people who carried out the coup in Kiev can hardly be said to be democracy's best representatives. Many belong to the Svoboda Party, which had its roots in the Social-National Party of Ukraine (SNPU). The name was an intentional reference to the Nazi Party in Germany.

It seems to be the intention of the US to establish NATO bases in Ukraine, no doubt armed with nuclear weapons. In trying to imagine how the Russians feel about this, we might think of the US reaction when a fleet of ships sailed to Cuba in 1962, bringing Soviet nuclear weapons. In the confrontation that followed, the world was bought very

close indeed to an all-destroying nuclear war. Does not Russia feel similarly threatened by the thought of hostile nuclear weapons on its very doorstep? Can we not learn from the past, and avoid the extremely high risks associated with the similar confrontation in Ukraine today?

In general, aggressive interventions, in Iran, Syria, Ukraine, the Korean Peninsula and elsewhere, all present dangers for uncontrollable escalation into large and disastrous conflicts, which might potentially threaten the survival of human civilization.

Few politicians or military figures today have any imaginative understanding of what a war with thermonuclear weapons would be like. Recent studies have shown that in a nuclear war, the smoke from firestorms in burning cities would rise to the stratosphere where it would remain for a decade, spreading throughout the world, blocking sunlight, blocking the hydrological cycle and destroying the ozone layer. The effect on global agriculture would be devastating, and the billion people who are chronically undernourished today would be at risk. Furthermore, the tragedies of Chernobyl and Fukushima remind us that a nuclear war would make large areas of the world permanently uninhabitable because of radioactive contamination. A full-scale thermonuclear war would be the ultimate ecological catastrophe. It would destroy human civilization and much of the biosphere.

One can gain a small idea of the terrible ecological consequences of a nuclear war by thinking of the radioactive contamination that has made large areas near to Chernobyl and Fukushima uninhabitable, or the testing of hydrogen bombs in the Pacific, which continues to cause cancer, leukemia and birth defects in the Marshall Islands more than half a century later.

The United States tested a hydrogen bomb at Bikini in 1954. Fallout from the bomb contaminated the island of Rongelap, one of the Marshall Islands 120 kilometers from Bikini. The islanders experienced radiation illness, and many died from cancer. Even today, half a century later, both people and animals on Rongelap and other nearby islands suffer from birth defects. The most common defects have been ‘ ‘jelly fish babies’’, born with no bones and with transparent skin. Their brains and beating hearts can be seen. The babies usually live a day or two before they stop breathing.

A girl from Rongelap describes the situation in the following words: ‘ ‘I cannot have children. I have had miscarriages on seven occasions... Our culture and religion teach us that reproductive abnormalities are a sign that women have been unfaithful. For this reason, many of my friends keep quiet about the strange births that they have had. In privacy they give birth, not to children as we like to think of them, but to things we could only describe as octopuses, apples, turtles and other things in our experience. We do not have Marshallese words for these kinds of babies, because they were never born before the radiation came.’’

The Republic of the Marshall Islands is suing the nine countries with nuclear weapons at the International Court of Justice at The Hague, arguing they have violated their legal obligation to disarm. The Guardian reports that ‘ ‘In the unprecedented legal action, comprising nine separate cases brought before the ICJ on Thursday, the Republic of the Marshall Islands accuses the nuclear weapons states of a ‘ ‘flagrant denial of human justice. It argues it is justified in taking the action because of the harm it suffered as a result of

the nuclear arms race.

The Pacific chain of islands, including Bikini Atoll and Enewetak, was the site of 67 nuclear tests from 1946 to 1958, including the Bravo shot, a 15-megaton device equivalent to a thousand Hiroshima blasts, detonated in 1954. The Marshallese islanders say they have been suffering serious health and environmental effects ever since.

The island republic is suing the five 'established nuclear weapons states recognized in the 1968 nuclear non-proliferation treaty (NPT), the US, Russia (which inherited the Soviet arsenal), China, France and the UK, as well as the three countries outside the NPT who have declared nuclear arsenals: India, Pakistan and North Korea, and the one undeclared nuclear weapons state, Israel. The Republic of the Marshall Islands is not seeking monetary compensation, but instead it seeks to make the nuclear weapon states comply with their legal obligations under Article VI of the Nuclear Nonproliferation Treaty and the 1996 ruling of the International Court of Justice.

The Nuclear Age Peace Foundation (NAPF) is a consultant to the Marshall Islands on the legal and moral issues involved in bringing this case. David Krieger, President of NAPF, upon hearing of the motion to dismiss the case by the U.S. responded, ' 'The U.S. government is sending a terrible message to the world, that is, that U.S. courts are an improper venue for resolving disputes with other countries on U.S. treaty obligations. The U.S. is, in effect, saying that whatever breaches it commits are all right if it says so. That is bad for the law, bad for relations among nations, bad for nuclear non-proliferation and disarmament, and not only bad, but extremely dangerous for U.S. citizens and all humanity.' '

The RMI has appealed the U.S. attempt to reject its suit in the U.S. Federal Court, and it will continue to sue the nine nuclear nations in the International Court of Justice. Whether or not the suits succeed in making the nuclear nations comply with international law, attention will be called to the fact the nine countries are outlaws. In vote after vote in the United Nations General Assembly, the peoples of the world have shown how deeply they long to be free from the menace of nuclear weapons. Ultimately, the tiny group of power-hungry politicians must yield to the will of the citizens whom they are at present holding as hostages.

It is a life-or-death question. We can see this most clearly when we look far ahead. Suppose that each year there is a certain finite chance of a nuclear catastrophe, let us say 2 percent. Then in a century the chance of survival will be 13.5 percent, and in two centuries, 1.8 percent, in three centuries, 0.25 percent, in 4 centuries, there would only be a 0.034 percent chance of survival and so on. Over many centuries, the chance of survival would shrink almost to zero. Thus by looking at the long-term future, we can clearly see that if nuclear weapons are not entirely eliminated, civilization will not survive.

Civil society must make its will felt. A thermonuclear war today would be not only genocidal but also omnicidal. It would kill people of all ages, babies, children, young people, mothers, fathers and grandparents, without any regard whatever for guilt or innocence. Such a war would be the ultimate ecological catastrophe, destroying not only human civilization but also much of the biosphere. Each of us has a duty to work with dedication to prevent it.

When the will of the majority of the worlds peoples is clearly expressed in an international treaty, even if the treaty functions imperfectly, the question of legality is clear. Everyone can see which states are violating international law. In time, world public opinion will force the criminal states to conform with international law.

In the case of nuclear weapons, world public opinion would have especially great force. It is generally agreed that a full-scale nuclear war would have disastrous effects, not only on belligerent nations but also on neutral countries. Mr. Javier Pérez de Cuéllar , former Secretary-General of the United Nations, emphasized this point in one of his speeches: “I feel”, he said, ‘ ‘that the question may justifiably be put to the leading nuclear powers: by what right do they decide the fate of humanity? From Scandinavia to Latin America, from Europe and Africa to the Far East, the destiny of every man and woman is affected by their actions. No one can expect to escape from the catastrophic consequences of a nuclear war on the fragile structure of this planet. ...”

‘ ‘No ideological confrontation can be allowed to jeopardize the future of humanity. Nothing less is at stake: todays decisions affect not only the present; they also put at risk succeeding generations. Like supreme arbiters, with our disputes of the moment, we threaten to cut off the future and to extinguish the lives of innocent millions yet unborn. There can be no greater arrogance. At the same time, the lives of all those who lived before us may be rendered meaningless; for we have the power to dissolve in a conflict of hours or minutes the entire work of civilization, with all the brilliant cultural heritage of humankind.

“...In a nuclear age, decisions affecting war and peace cannot be left to military strategists or even to governments. They are indeed the responsibility of every man and woman. And it is therefore the responsibility of all of us... to break the cycle of mistrust and insecurity and to respond to humanity’s yearning for peace.”

The eloquent words of Javier Pérez de Cuéllar express the situation in which we now find ourselves: Accidental nuclear war, nuclear terrorism, insanity of a person in a position of power, or unintended escalation of a conflict, could at any moment plunge our beautiful world into a catastrophic thermonuclear war which might destroy not only human civilization but also much of the biosphere.

We can expect that the adoption of a Nuclear Weapons Convention will be opposed by the states that currently possess these weapons. One reason for this is the immense profits that suppliers make by ‘ ‘modernizing” nuclear arsenals. For example, the Arms Control Association states ‘ ‘The U.S. military is in the process of modernizing all of its existing strategic delivery systems and refurbishing the warheads they carry to last for the next 30-50 years.” It adds ‘ ‘Three independent estimates put the expected total cost over the next 30 years at as much as \$1 trillion.” We should notice that these plans for long-term retention of nuclear weapons are blatant violations of Article VI of the NPT.

Money is often the motive for crimes, and in this case, a vast river of money is driving us in the direction of a catastrophic nuclear war. If we wait for the approval of the nuclear weapon states, we will have to wait forever, and the general public, whose active help we need in abolishing nuclear weapons, will feel more and more helpless and powerless. To prevent this, we need concrete progress rather than endless delay.



Figure 5.22: Fireball of the Tsar Bomba (RDS-220), the largest weapon ever detonated (1961). Fission-fusion-fission bombs of almost unlimited power can be constructed by adding a layer of inexpensive ordinary uranium outside a core containing a fission-fusion bomb. Such a bomb would completely destroy a city even if it missed the target by 50 kilometers.

5.5 The Russell-Einstein Manifesto

The year 2015 marked the 60th anniversary of the Russell-Einstein Manifesto, which contains the following words: “There lies before us, if we choose, continual progress in happiness, knowledge and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? Remember your humanity, and forget the rest. If you can do so, the way lies open to a new Paradise. If you cannot, there lies before you the risk of universal death.”

The background for the Russell-Einstein Manifesto is as follows: In March, 1954, the United States had tested a hydrogen bomb at the Bikini Atoll in the Pacific Ocean. It was 1,000 times more powerful than the Hiroshima bomb. The Japanese fishing boat, the Lucky Dragon, was 130 kilometers from the Bikini explosion, but the radioactive fallout from the test killed one crew member, and made all the others seriously ill.

In England, Professor Joseph Rotblat, a Polish scientist who had resigned from the Manhattan Project for moral reasons when it became clear that Germany would not develop nuclear weapons, was asked to appear on a BBC program to discuss the Bikini test. He was asked to discuss the technical aspects of H-bombs, while the Archbishop of Canterbury and the philosopher, Lord Bertrand Russell, were asked to discuss the moral aspects.

Rotblat had become convinced that the Bikini bomb must have involved a third stage, in which fast neutrons from the hydrogen thermonuclear reaction produced fission in an outer casing of ordinary uranium. Such a bomb would produce enormous amounts of highly

dangerous fallout, and Rotblat became extremely worried about the possibly fatal effects on all living things if large numbers of such bombs were ever used in a war. He confided his worries to Bertrand Russell, whom he had met on the BBC program.

After discussing the Bikini test and its radioactive fallout with Joseph Rotblat, Lord Russell became concerned for the future of the human gene pool. After consulting a number of leading physicists, including Albert Einstein, he wrote what came to be known as the Russell-Einstein Manifesto.

Russell was convinced that in order for the Manifesto to have maximum impact, Einstein's signature would be absolutely necessary; but as Russell was flying from Italy to France, the pilot announced to the passengers that Einstein had just died. Russell was crushed by the news, but when he arrived at his hotel in Paris, he found waiting for him a letter from Einstein and his signature on the document. Signing the Manifesto had been the last act of Einstein's life. Others who signed were Max Born, Percy W. Bridgman, Leopold Infeld, Frederic Joliot-Curie, Hermann J. Muller, Linus Pauling, Cecil F. Powell, Joseph Rotblat, Hideki Yukawa and Bertrand Russell. All of them, except Infeld and Rotblat, were Nobel Laureates.

On July 9, 1955, with Rotblat in the chair, Russell read the Manifesto to a packed press conference. The document contains the words: "Here then is the problem that we present to you, stark and dreadful and inescapable: Shall we put an end to the human race, or shall mankind renounce war?... There lies before us, if we choose, continual progress in happiness, knowledge and wisdom. Shall we, instead, choose death because we cannot forget our quarrels?..." Lord Russell devoted much of the remainder of his life to working for the abolition of nuclear weapons.⁷

In 1957, with the Russell-Einstein Manifesto as a background, a group of scientists from both sides of the Cold War met in the small village of Pugwash, Nova Scotia. The meeting was held at the summer residence of the Canadian-American financier and philanthropist Cyrus Eaton, who had given money for the conference. The aim of the assembled scientists was to reduce the danger of a catastrophic nuclear war.

From this small beginning, a series of conferences developed, in which scientists, especially physicists, attempted to work for peace, and tried to address urgent problems related to science. These conferences were called Pugwash Conferences on Science and World Affairs, taking their name from the small village in Nova Scotia where the first meeting was held. From the start, the main aim of the meetings was to reduce the danger that civilization would be destroyed in a thermonuclear war.

It can be seen from what has been said that the Pugwash Conferences began during one of the tensest periods of the Cold War, when communication between the Communist and Anti-communist blocks was difficult. During this period, the meetings served the important purpose of providing a forum for informal diplomacy. The participants met, not as representatives of their countries, but as individuals, and the discussions were confidential.

This method of operation proved to be effective, and the initial negotiations for a number of important arms control treaties were aided by Pugwash Conferences. These include

⁷ <http://www.umich.edu/pugwash/Manifesto.html>

the START treaties, the treaties prohibiting chemical and biological weapons, the Nuclear Nonproliferation Treaty (NPT), and the Comprehensive Test Ban Treaty (CTBT). Former Soviet President Gorbachev has said that discussions with Pugwash scientists helped him to conclude that the policy of nuclear confrontation was too dangerous to be continued.

Over the years, the number of participants attending the annual Pugwash Conference has grown, and the scope of the problems treated has broadened. Besides scientists, the participants now include diplomats, politicians, economists, social scientists and military experts. Normally the number attending the yearly conference is about 150.

Besides plenary sessions, the conferences have smaller working groups dealing with specific problems. There is always a working group aimed at reducing nuclear dangers, and also groups on controlling or eliminating chemical and biological weapons. In addition, there may now be groups on subjects such as climate change, poverty, United Nations reform, and so on.

Invitations to the conferences are issued by the Secretary General to participants nominated by the national groups. The host nation usually pays for the local expenses, but participants finance their own travel. Besides the large annual meeting, the Pugwash organization also arranges about ten specialized workshops per year, with 30-40 participants each. Although attendance at the conferences and workshops is by invitation, everyone is very welcome to join one of the national Pugwash groups. The international organization's website is at www.pugwash.org.

In 1995, the Nobel Peace Prize was awarded jointly to Prof. Joseph Rotblat and to Pugwash Conferences on Science and World Affairs as an organization, "...for their efforts to diminish the part played by nuclear arms in international politics and in the longer run to eliminate such arms." The award was made 50 years after the tragic destruction of Hiroshima and Nagasaki.

In his acceptance speech, Sir Joseph Rotblat (as he soon became) emphasized the same point that has been made by the Russell-Einstein Manifesto, that war itself must be eliminated in order to free civilization from the danger of nuclear destruction. The reason for this is that knowledge of how to make nuclear weapons can never be forgotten. Even if they were eliminated, these weapons could be rebuilt during a major war. Thus the final abolition of nuclear weapons is linked to a change of heart in world politics and to the abolition of war.

"The quest for a war-free world", Sir Joseph concluded, "has a basic purpose: survival. But if, in the process, we can learn to achieve it by love rather than by fear, by kindness rather than compulsion; if in the process we can learn to combine the essential with the enjoyable, the expedient with the benevolent, the practical with the beautiful, this will be an extra incentive to embark on this great task. Above all, remember your humanity"

I vividly remember the ceremony in Oslo when the 1995 Nobel Peace Prize was awarded jointly to Sir Joseph and to Pugwash Conferences. About 100 people from the Pugwash organization were invited, and I was included because I was the chairman of the Danish National Pugwash Group. After the ceremony and before the dinner, local peace groups had organized a torchlight parade. It was already dark, because we were so far to the north, and snow was falling. About 3,000 people carrying torches marched through the city and

assembled under Sir Joseph's hotel window, cheering and shouting "Rotblat! Rotblat! Rotblat!". Finally he appeared at the hotel window, waved to the crowd and tried to say a few words. This would have been the moment for a memorable speech, but the acoustics were so terrible that we could not hear a word that he said. I later tried (without success) to persuade the BBC to make a program about nuclear weapons and about Sir Joseph's life, ending with the falling snow and the torch-lit scene.

5.6 Against the Institution of War

As we start the 21st century and the new millennium, our scientific and technological civilization seems to be entering a period of crisis. Today, for the first time in history, science has given to humans the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of infectious disease. At the same time, science has given us the power to destroy civilization through thermonuclear war, as well as the power to make our planet uninhabitable through pollution and overpopulation. The question of which of these alternatives we choose is a matter of life or death to ourselves and our children.

Science and technology have shown themselves to be double-edged, capable of doing great good or of producing great harm, depending on the way in which we use the enormous power over nature, which science has given to us. For this reason, ethical thought is needed now more than ever before. The wisdom of the world's religions, the traditional wisdom of humankind, can help us as we try to insure that our overwhelming material progress will be beneficial.

The crisis of civilization, which we face today, has been produced by the rapidity with which science and technology have developed. Our institutions and ideas adjust too slowly to the change. The great challenge which history has given to our generation is the task of building new international political structures, which will be in harmony with modern technology. At the same time, we must develop a new global ethic, which will replace our narrow loyalties by loyalty to humanity as a whole.

In the long run, because of the enormously destructive weapons, which have been produced through the misuse of science, the survival of civilization can only be insured if we are able to abolish the institution of war.

While in earlier epochs it may have been possible to confine the effects of war mainly to combatants, in our own century the victims of war have increasingly been civilians, and especially children. For example, according to Quincy Wright's statistics, the First and Second World Wars together cost the lives of 26 million soldiers, but the toll in civilian lives was much larger: 64 million.

Since the Second World War, despite the best efforts of the U. N., there have been over 150 armed conflicts; and, if civil wars are included, there are on any given day an average of 12 wars somewhere in the world. In the conflicts in Indo-China, the proportion of civilian victims was between 80% and 90%, while in the Lebanese civil war some sources state that the proportion of civilian casualties was as high as 97%.



Figure 5.23: The World Health Organization could carry out its vitally important work much more effectively if it were given more money.

Civilian casualties often occur through malnutrition and through diseases, which would be preventable in normal circumstances. Because of the social disruption caused by war, normal supplies of food, safe water and medicine are interrupted, so that populations become vulnerable to famine and epidemics. In the event of a catastrophic nuclear war, starvation and disease would add greatly to the loss of life caused by the direct effects of nuclear weapons.

The indirect effects of war are also enormous. Globally, preparations for war interfere seriously with the use of tax money for constructive and peaceful purposes. Today, despite the end of the Cold War, the world spends roughly a trillion (i.e. a million million) US dollars each year on armaments. This enormous flood of money, which is almost too large to imagine, could have been used instead for urgently needed public health measures.

The World Health Organization lacks funds to carry through an anti-malarial program on as large a scale as would be desirable, but the entire program could be financed for less than the world spends on armaments in a single day. Five hours of world arms spending is equivalent to the total cost of the 20-year WHO campaign, which resulted in the eradication of smallpox. For every 100,000 people in the world, there are 556 soldiers, but only 85 doctors. Every soldier costs an average of 20,000 US dollars per year, while the average spent per year on education is only 380 US dollars per school-aged child. With a diversion of funds consumed by three weeks of military spending, the world could create a sanitary water supply for all its people, thus eliminating the cause of almost half of all human illness.

A new and drug-resistant form of tuberculosis has recently become widespread, and is increasing rapidly in the former Soviet Union. In order to combat this new form of tuberculosis, and in order to prevent its spread to Western Europe, WHO needs 450 million US dollars, an amount equivalent to 4 hours of world arms spending. By using this money to combat tuberculosis in the former Soviet Union, WHO would be making a far greater contribution to global peace and stability than is made by spending the money on

armaments.

Today's world is one in which roughly ten million children die each year from diseases related to poverty. Besides this enormous waste of young lives through malnutrition and preventable disease, there is a huge waste of opportunities through inadequate education. The rate of illiteracy in the 25 least developed countries is 80%, and the total number of illiterates in the world is estimated to be 800 million. Meanwhile every 60 seconds the world spends roughly 2 million U. S. dollars on armaments.

It is 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, but today the world spends more than 20 times as much per year on weapons as it does on development.

Because the world spends 1.7 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 a social institution, and also the reason why war persists, although everyone realizes that it is the cause of much of the suffering that inflicts humanity. We know that war is madness, but it persists. We know that it threatens the future survival of our species, but it persists, entrenched in the attitudes of historians, newspaper editors and television producers, entrenched in the methods by which politicians finance their campaigns, and entrenched in the financial power of arms manufacturers, entrenched also in the ponderous and costly hardware of war, the fleets of warships, bombers, tanks, nuclear missiles and so on.

Science cannot claim to be guiltless: In Eisenhower's farewell address, he warned of the increasing power of the industrial-military complex, a threat to democratic society. If he were making the same speech today, he might speak of the industrial-military-scientific complex. Since Hiroshima, we have known that new knowledge is not always good. There is a grave danger that nuclear weapons will soon proliferate to such an extent that they will be available to terrorists and even to the Mafia. Chemical and biological weapons also constitute a grave threat. The eradication of smallpox in 1979 was a triumph of medical science combined with international cooperation. How sad it is to think that military laboratories cultivate smallpox and that the disease may soon be reintroduced as a biological weapon!

The institution of war seems to be linked to a fault in human nature, to our tendency to exhibit altruism towards members of our own group but aggression towards other groups if we perceive them to be threatening our own community. This tendency, which might be called "tribalism", was perhaps built into human nature by evolution during the long pre-history of our species, when we lived as hunter-gatherers in small genetically homogeneous tribes, competing for territory on the grasslands of Africa. However, in an era of nerve gas and nuclear weapons, the anachronistic behavior pattern of tribal altruism and intertribal aggression now threatens our survival.

Fortunately, our behavior is only partly determined by inherited human nature. It is also, and perhaps to a larger extent, determined by education and environment; and in spite of all the difficulties just mentioned, war has been eliminated locally in several large regions of the world. Taking these regions as models, we can attempt to use the same methods

to abolish war globally. For example, war between the Scandinavian nations would be unthinkable today, although the region once was famous for its violence. Scandinavia is especially interesting as a model for what we would like to achieve globally, because it is a region in which it has been possible not only to eradicate war, but also poverty; and at the same time, death from infectious disease has become a rarity in this region.

If we consider the problem of simultaneously eliminating poverty, war and frequent death from infectious disease, we are lead inevitably to the problem of population stabilization. At the time when poverty, disease and war characterized Scandinavia, the average fertility in the region was at least 6 children per woman-life. Equilibrium was maintained at this high rate of fertility, because some of the children died from disease without leaving progeny, and because others died in war. Today, poverty and war are gone from the Nordic countries, and the rate of premature death from infectious disease is very low. The simultaneous elimination of poverty, disease and war would have been impossible in Scandinavia if the rate of fertility had not fallen to the replacement level. There would then have been no alternative except for the population to grow, which it could not have continued to do over many centuries without environmental degradation, bringing with it the recurrence of poverty, disease and war.

In Scandinavia today, democratic government, a high level of education, economic prosperity, public health, high social status for women, legal, economic and educational equality for women, a low birth rate, and friendly cooperation between the nations of the region are mutually linked in loops of cause and effect. By contrast, we can find other regions of the world where low status of women, high birth rates, rapidly increasing population, urban slums, low educational levels, high unemployment levels, poverty, ethnic conflicts and the resurgence of infectious disease are equally linked, but in a vicious circle. The three age-old causes of human suffering, poverty, infectious disease and war are bound together by complex causal relationships involving also the issues of population stabilization and woman's rights. The example of Scandinavia shows us that it is possible to cure all these diseases of society; but to do so we must address all of the problems simultaneously.

Scandinavia was once a region that was famous for its violence. Today, war within Scandinavia would be unthinkable. This fact demonstrates the malleability of human nature. Under changed circumstances, and with changed education, people who were once extremely violent have become very peaceful. Scandinavia's low birth-rate has contributed to this transition.

Abolition of the institution of war will require the construction of structures of international government and law to replace our present anarchy at the global level. Today's technology has shrunk the distances, which once separated nations; and our present system of absolutely sovereign nation-states has become both obsolete and dangerous.

Professor Elie Kedourie of the University of London has given the following definition of nationalism: "...a doctrine invented in Europe at the beginning of the 19th century. It pretends to supply a criterion for the determination of the unit of population proper to enjoy a government exclusively its own, for the legitimate exercise of power in the state, and for the right organization of a society of states. Briefly, the doctrine holds that hu-

manity is naturally divided into nations, that nations are known by certain characteristics which can be ascertained, and that the only legitimate type of government is national self-government.”

A basic problem with this doctrine is that throughout most of the world, successive waves of migration, conquest and intermarriage have left such a complicated ethnic mosaic that attempts to base political divisions on ethnic homogeneity often meet with trouble. In Eastern Europe, for example, German-speaking and Slavic-speaking peoples are mixed together so closely that the Pan-German and Pan-Slavic movements inevitably clashed over the question of who should control the regions where the two populations lived side by side. This clash was one of the main causes of the First World War.

Similarly, when India achieved independence from England, a great problem arose in the regions where Hindus and Moslems lived side by side; and even Gandhi was unable to prevent terrible violence from taking place between the two communities. This problem is still present, and it has been made extremely dangerous by the acquisition of nuclear weapons by India and Pakistan.

More recently, nationalist movements in Asia and Africa have derived their force and popularity from a reaction against the years of European political and economic domination. Thus, at first sight, they seem to deserve our sympathy and support. However, in building states, the new nationalists have often used hate for outsiders as mortar. For example, Israel is held together by hostility towards its Arab neighbors, while the Pan-Arab movement is held together by hostility towards Israel; and in this inflamed political climate of mutual fear and hatred, even clandestine nuclear weapons appear to either side to be justified.

A basic problem rooted in nationalist mythology exists in the concept of sanctions, which treat nations as if they were individuals. We punish nations as a whole by sanctions, even when only the leaders are guilty, even though the burdens of the sanctions often fall most heavily on the weakest and least guilty of the citizens, and even though sanctions often have the effect of uniting the citizens of a country behind the guilty leaders.

It is becoming increasingly clear that the concept of the absolutely sovereign nation-state is an anachronism in a world of thermonuclear weapons, instantaneous communication and economic interdependence. Probably our best hope for the future lies in developing the United Nations into a World Federation. The strengthened United Nations should have a legislature with the power to make laws which are binding on individuals, and the ability to arrest and try individual political leaders for violations of these laws. The World Federation should also have the military and legal powers necessary to guarantee the human rights of ethnic minorities within nations.

A strengthened UN would need a reliable source of income to make the organization less dependent on wealthy countries, which tend to give support only to those interventions of which they approve. A promising solution to this problem is the so-called “Tobin tax”, named after the Nobel-laureate economist James Tobin of Yale University. Tobin proposed that international currency exchanges should be taxed at a rate between 0.1 and 0.25%. He believed that even this extremely low rate of taxation would have the effect of damping speculative transactions, thus stabilizing the rates of exchange between



Figure 5.24: **Today, the existence of all-destroying modern weapons makes war prohibitively dangerous. If human civilization is to survive, the institution of war must be abolished. This will require effective governance at the global level. The United Nations must be strengthened and given many times the amount of money that it presently has. The UN must also be given the power to make laws that are binding on individuals.**

currencies. When asked what should be done with the proceeds of the tax, Tobin said, almost as an afterthought, “Let the United Nations have it”. The volume of money involved in international currency transactions is so enormous that even the tiny tax proposed by Tobin would provide the World Federation with between 100 billion and 300 billion dollars annually. By strengthening the activities of various UN agencies, such as WHO, UNESCO and FAO, the additional income would add to the prestige of the United Nations and thus make the organization more effective when it is called upon to resolve international political conflicts.

A federation is, by definition, a limited union of states, where the federal government has the power to make laws which are binding on individuals, but where the laws are confined to interstate matters, and where all powers not expressly delegated to the federal government are reserved for the several states. In other words, in a federation, each of the member states runs its own internal affairs according to its own laws and customs; but in certain agreed-on matters, where the interests of the states overlap, authority is specifically delegated to the federal government.

For example, if the nations of the world considered the control of narcotics to be a matter of mutual concern; if they agreed to set up a commission with the power to make laws preventing the growing, refinement and distribution of harmful drugs, and with the power to arrest individuals for violating those laws, then we would have a world federation in the area of narcotics control.

If, in addition, the world community considered terrorism to be a matter of mutual concern; if an international commission were also set up with the power to make global

anti-terrorist laws, and to arrest individuals violating those laws, then we would have a world federation with somewhat broader powers. If the community of nations decided to give the federal authority the additional power to make laws defining the rights and obligations of multinational corporations, and the power to arrest individuals violating those laws, then we would have a world federation with still broader powers; but these powers would still be carefully defined and limited.

In 1998, in Rome, representatives of 120 countries signed a statute establishing a Permanent International Court, with jurisdiction over war crimes and genocide. Four years were to pass before the necessary ratifications were gathered, but by Thursday, April 11, 2002, 66 nations had ratified the Rome agreement, 6 more than the 60 needed to make the court permanent. The jurisdiction of the Permanent International Court is at present limited to a very narrow class crimes. The global community will have a chance to see how the court works in practice, and in the future, the community may decide to broaden its jurisdiction.

In setting up a federation, the member states can decide which powers they wish to delegate to it; and all powers not expressly delegated are retained by the individual states. We are faced with the problem of constructing a new world order which will preserve the advantages of local self-government while granting certain carefully-chosen powers to larger regional or global authorities. Which things should be decided locally, or regionally, and which globally?

In the future, overpopulation and famine are likely to become increasingly difficult and painful problems in several parts of the world. Since various cultures take widely different attitudes towards birth control and family size, the problem of population stabilization seems to be one which should be solved locally. At the same time, aid for local family planning programs, as well as famine relief, might appropriately come from global agencies, such as WHO and FAO. With respect to large-scale migration, it would be unfair for a country which has successfully stabilized its own population, and which has eliminated poverty within its own borders, to be forced to accept a flood of migrants from regions of high fertility. Therefore the extent of immigration should be among the issues to be decided locally.

Security, and controls on the manufacture and export of armaments will require an effective authority at the global level. It should also be the responsibility of the international community to intervene to prevent gross violations of human rights. Since the end of the Cold War, the United Nations has more and more frequently been called upon to send armed forces to troubled parts of the world. In many instances, these calls for U. N. intervention have been prompted by clear and atrocious violations of human rights, for example by "ethnic cleansing" in Bosnia and by genocide in Rwanda. In the examples just named, the response of the United Nations would have been much more effective, and many lives would have been saved, if the action which was finally taken had come sooner. Long and complex diplomatic negotiations were required to muster the necessary political and physical forces needed for intervention, by which time the original problems had become much more severe. For this reason, it has been suggested that the U. N. Secretary General, the Security Council and the General Assembly ought to have at their disposal

a permanent, highly trained and highly mobile emergency force, composed of volunteers from all nations. Such an international police force would be able to act rapidly to prevent gross violations of human rights or other severe breaches of international law.

In evaluating the concept of an international police force directly responsible to the United Nations, it is helpful to examine the way in which police act to enforce laws and to prevent violence and crime at local and national levels. Within a community which is characterized by good government, police are not highly armed, nor are they very numerous. Law and order are not maintained primarily by the threat of force, but by the opinion of the vast majority of the citizens that the system of laws is both just and necessary. Traffic stops when the signal light is red and moves when it is green whether or not a policeman is present, because everyone understands why such a system is necessary. Nevertheless, although the vast majority of the citizens in a well-governed community support the system of laws and would never wish to break the law, we all know that the real world is not heaven. The total spectrum of human nature includes evil as well as a good. If there were no police at all, and if the criminal minority were completely unchecked, every citizen would be obliged to be armed. No one's life or property would be safe. Robbery, murder and rape would flourish.

Within a society with a democratic and just government, whose powers are derived from the consent of the governed, a small and lightly armed force of police is able to maintain the system of laws. One reason why this is possible has just been mentioned - the force of public opinion. A second reason is that the law acts on individuals. Since obstruction of justice and the murder of policemen both rank as serious crimes, an individual criminal is usually not able to organize massive resistance against police action.

Edith Wynner, one of the pioneers of the World Federalist movement, lists the following characteristics of police power in a well-governed society:

1. "A policeman operates within a framework of organized government having legislative, executive and judicial authority operating on individuals. His actions are guided by a clearly stated criminal code that has the legislative sanction of the community. Should he abuse the authority vested in him, he is subject to discipline and court restraint."
2. "A policeman seeing a fight between two men does not attempt to determine which of them is in the right and then help him beat up the one he considers wrong. His function is to restrain violence by both, to bring them before a judge who has authority to determine the rights of the dispute, and to see that the court's decision is carried out."
3. "In carrying out his duties, the policeman must apprehend the suspected individual without jeopardizing either the property or the lives of the community where the suspect is to be arrested. And not only is the community safeguarded against destruction of property and loss of life but the rights of the suspect are also carefully protected by an elaborate network of judicial safeguards."

Edith Wynner also discusses the original union of the thirteen American colonies, which was a confederation, analogous to the present United Nations. This confederation was found to be too weak, and after eleven years it was replaced by a federation, one of whose key powers was the power to make and enforce laws which acted on individuals. George Mason, one of the architects of the federal constitution of the United States, believed that “such a government was necessary as could directly operate on individuals, and would punish those only whose guilt required it”, while James Madison (another drafter of the U. S. federal constitution) remarked that the more he reflected on the use of force, the more he doubted “the practicability, the justice and the efficacy of it when applied to people collectively, and not individually”. Finally, Alexander Hamilton, in his “Federalist Papers”, discussed the confederation with the following words: “To coerce the states is one of the maddest projects that was ever devised... Can any reasonable man be well disposed towards a government, which makes war and carnage the only means of supporting itself - a government that can exist only by the sword? Every such war must involve the innocent with the guilty. This single consideration should be enough to dispose every peaceable citizen against such a government... What is the cure for this great evil? Nothing, but to enable the... laws to operate on individuals, in the same manner as those of states do.”

The United Nations is at present a confederation rather than a federation, and thus it acts by attempting to coerce states, a procedure which Alexander Hamilton characterized as “one of the maddest projects that was ever devised”. Whether this coercion takes the form of economic sanctions, or whether it takes the form of military intervention, the practicability, the justice and the efficacy of the UN’s efforts are hampered because they are applied to people collectively and not individually. It is obvious that the United Nations actions to stop aggression of one state against another in the Korean War and in the Gulf War fail to match the three criteria for police action listed above. What is the cure for this great evil? “Nothing”, Hamilton tells us, “but to enable the laws to act on individuals, in the same manner as those of states do.”

Historically, confederations have always proved to be too weak; but federations have on the whole been very successful, mainly because a federation has the power to make laws which act on individuals. At the same time, a federation aims at leaving as many powers as possible in the hands of local authorities. Recent examples of federations include the United States of America, the United States of Brazil, the United States of Mexico, the United States of Venezuela, the Argentine Nation, the Commonwealth of Australia, the Dominion of Canada, the Union of South Africa, Switzerland, the Union of Soviet Socialist Republics and the European Federation. Thus we are rich in historical data on the strengths and weaknesses of federations, and we can make use of this data as we attempt to construct good government at the global level.

Looking towards the future, we can perhaps foresee a time when the United Nations will have been converted to a federation and given the power to make international laws which are binding on individuals. Under such circumstances, true international law enforcement will be possible, incorporating all of the needed safeguards for lives and property of the innocent. One can hope for a future world where the institution of war will be abolished, and where public opinion will support international law to such an extent that a new

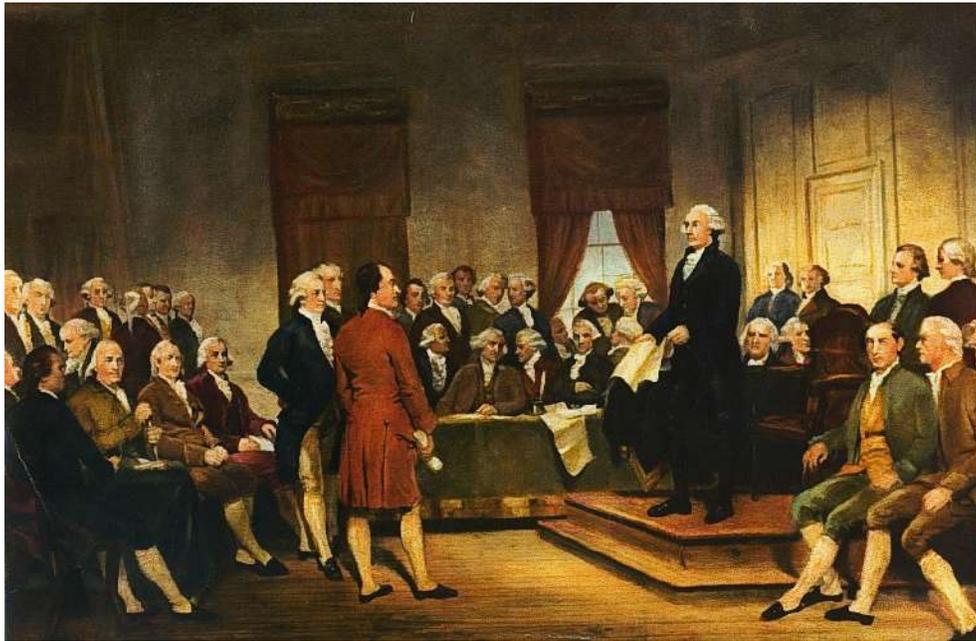


Figure 5.25: This painting shows a debate during the drafting of the Constitution of the United States. After achieving independence from England, the 13 former colonies became a confederation. However, this proved to be too weak, and in 1788, a federal constitution was ratified. Under the Federal Constitution of the United States, Congress has the power to make laws that are binding on individuals. This is the most important power of federations, and the reason why they are so successful.

Hitler or a future Melosovic will not be able to organize large-scale resistance to arrest, a world where international law will be seen by all to be just, impartial and necessary, a well-governed global community within which each person will owe his or her ultimate loyalty to humanity as a whole.

Besides a humane, democratic and just framework of international law and governance, we urgently need a new global ethic, - an ethic where loyalty to family, community and nation will be supplemented by a strong sense of the brotherhood of all humans, regardless of race, religion or nationality. Schiller expressed this feeling in his "Ode to Joy", the text of Beethoven's Ninth Symphony. Hearing Beethoven's music and Schiller's words, most of us experience an emotion of resonance and unity with its message: All humans are brothers and sisters - not just some - all! It is almost a national anthem of humanity. The feelings which the music and words provoke are similar to patriotism, but broader. It is this sense of a universal human family, which we need to cultivate in education, in the mass media, and in religion.

Educational reforms are urgently needed, particularly in the teaching of history. As it is taught today, history is a chronicle of power struggles and war, told from a biased national standpoint. Our own race or religion is superior; our own country is always heroic and in the right.

We urgently need to replace this indoctrination in chauvinism by a reformed view of history, where the slow development of human culture is described, giving adequate credit to all those who have contributed. Our modern civilization is built on the achievements of ancient cultures. China, India, Mesopotamia, ancient Egypt, Greece, the Islamic world, Christian Europe, and Jewish intellectual traditions all have contributed. Potatoes, corn and squash are gifts from the American Indians. Human culture, gradually built up over thousands of years by the patient work of millions of hands and minds, should be presented to students of history as a precious heritage - far too precious to be risked in a thermonuclear war.

In the teaching of science too, reforms are needed. Graduates in science and technology should be conscious of their responsibilities. They must resolve never to use their education in the service of war, or in any way which might be harmful to society or to the environment.

In modern societies, mass media play an extremely important role in determining behavior and attitudes. This role can be a negative one when the media show violence and enemy images, but if used constructively, the mass media can offer a powerful means for creating international understanding. If it is indeed true that tribalism is part of human nature, it is extremely important that the mass media be used to the utmost to overcome the barriers between nations and cultures. Through increased communication, the world's peoples can learn to accept each other as members of a single family.

Finally, let us turn to religion, with its enormous influence on human thought and behavior. Christianity, for example, offers a strongly stated ethic, which, if practiced, would make war impossible. In Mathew, the following passage occurs: "Ye have heard it said: Thou shalt love thy neighbor and hate thy 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 that spitefully use you and persecute you."



Figure 5.26: Beethoven's 9th symphony is almost a national anthem of humanity, All people belong to a great family. Not just some. ALL!.

This seemingly impractical advice, that we should love our enemies, is in fact of the greatest practicality, since acts of unilateral kindness and generosity can stop escalatory cycles of revenge and counter-revenge such as those which characterize the present conflict in the Middle East and the recent troubles of Northern Ireland. However, Christian nations, while claiming to adhere to the ethic of love and forgiveness, have adopted a policy of "massive retaliation", involving systems of thermonuclear missiles whose purpose is to destroy as much as possible of the country at which the retaliation is aimed. It is planned that entire populations shall be killed in a "massive retaliation", innocent children along with the guilty politicians. The startling contradiction between what the Christian nations profess and what they do was obvious even before the advent of nuclear weapons, at the time when Leo Tolstoy, during his last years, was exchanging letters with a young Indian lawyer in South Africa. In one of his letters to Gandhi, Tolstoy wrote:

"The whole life of the Christian peoples is a continuous contradiction between that which 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."

"This year, in the spring, at a Scripture examination at 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 the usual sophisms of the bishop, she answered with decided conviction that killing was always 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."

As everyone knows, Gandhi successfully applied the principle of non-violence to the civil rights struggle in South Africa, and later to the political movement, which gave India its freedom and independence. The principle of non-violence was also successfully applied by Martin Luther King, and by Nelson Mandela. It is perhaps worthwhile to consider Gandhi's comment on the question of whether the end justifies the means: "The means may be likened to a seed", Gandhi wrote, "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." In other words, a dirty method produces a dirty result; killing produces more killing; hate leads to more hate. Everyone who reads the newspapers knows that this is true. 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. Buddhists call this principle of reciprocity "the law of karma".

The religious leaders of the world have the opportunity to contribute importantly to the solution of the problem of war. They have the opportunity to powerfully support the



Figure 5.27: Count Leo Tolstoy said “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.”

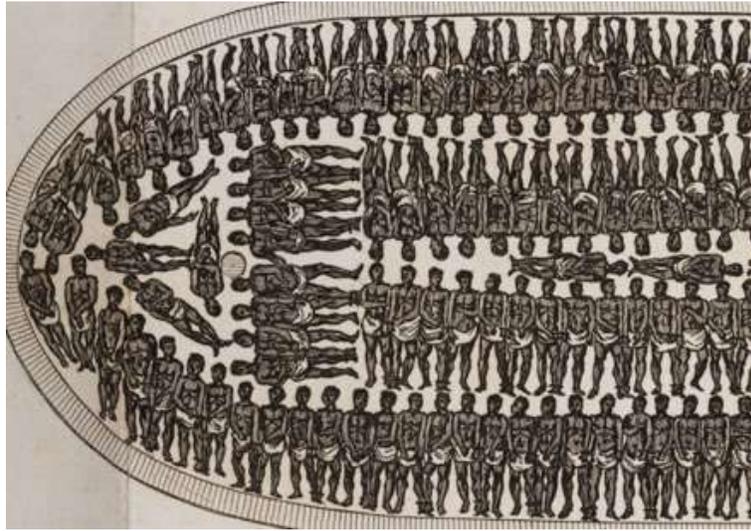


Figure 5.28: **Diagram of a slave shop. We can hope and work for a time when war, like slavery, will exist only as a dark memory, fading into the past.**

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. If they fail to do this, they will have failed humankind at a time of crisis.

It is useful to consider the analogy between the institution of war and the institution of slavery. We might be tempted to say, “There has always been war, throughout human history; and war will always continue to exist.” As an antidote for this kind of pessimism, we can think of slavery, which, like war, has existed throughout most of recorded history. The cultures of ancient Egypt, Greece and Rome were all based on slavery, and, in more recent times, 13 million Africans were captured and forced into a life of slavery in the New World. Slavery was as much an accepted and established institution as war is today. Many people made large profits from slavery, just as arms manufacturers today make enormous profits. Nevertheless, in spite of the weight of vested interests, slavery has now been abolished throughout most of the world.

5.7 Treaty on the Prohibition of Nuclear Weapons, 2017

A Treaty banning nuclear weapons was adopted by an overwhelming majority vote on the floor of the UN General Assembly, following the precedent set by the Arms Trade Treaty. The Treaty on the Prohibition of Nuclear Weapons was passed on 7 July, 2017. It prohibits the development, testing, production, stockpiling, stationing, transfer, use and threat of use of nuclear weapons, as well as assistance and encouragement to the prohibited activities. For nuclear armed states joining the treaty, it provides for a time-

bound framework for negotiations leading to the verified and irreversible elimination of its nuclear weapons programme. The International Campaign to Abolish Nuclear Weapons (ICAN) campaigned vigorously for the adoption of the Treaty, and was awarded the 2017 Nobel Peace Prize for its efforts. Although bitterly opposed by nuclear weapons states, the Treaty has great normative value, and one fervently hopes that the force of public opinion will eventually force all governments to give their citizens what the vast majority long for: a nuclear-weapon-free world.

It is generally agreed that a full-scale nuclear war would have disastrous effects, not only on belligerent nations but also on neutral countries.

5.8 Hope for the future, and responsibility for the future

Can we abolish the institution of war? Can we hope and work for a time when the terrible suffering inflicted by wars will exist only as a dark memory fading into the past? I believe that this is really possible. The problem of achieving internal peace over a large geographical area is not insoluble. It has already been solved. There exist today many nations or regions within each of which there is internal peace, and some of these are so large that they are almost worlds in themselves. One thinks of China, India, Brazil, the Russian Federation, the United States, and the European Union. Many of these enormous societies contain a variety of ethnic groups, a variety of religions and a variety of languages, as well as striking contrasts between wealth and poverty. If these great land areas have been forged into peaceful and cooperative societies, cannot the same methods of government be applied globally?

Today, there is a pressing need to enlarge the size of the political unit from the nation-state to the entire world. The need to do so results from the terrible dangers of modern weapons and from global economic interdependence. The progress of science has created this need, but science has also given us the means to enlarge the political unit: Our almost miraculous modern communications media, if properly used, have the power to weld all of humankind into a single supportive and cooperative society.

We live at a critical time for human civilization, a time of crisis. Each of us must accept his or her individual responsibility for solving the problems that are facing the world today. We cannot leave this to the politicians. That is what we have been doing until now, and the results have been disastrous. Nor can we trust the mass media to give us adequate public discussion of the challenges that we are facing. We have a responsibility towards future generations to take matters into our own hands, to join hands and make our own alternative media, to work actively and fearlessly for better government and for a better society.

We, the people of the world, not only have the facts on our side; we also have numbers on our side. The vast majority of the world's peoples long for peace. The vast majority long for abolition of nuclear weapons, and for a world of kindness and cooperation, a world

of respect for the environment. No one can make these changes alone, but together we can do it.

Together, we have the power to choose a future where international anarchy, chronic war and institutionalized injustice will be replaced by democratic and humane global governance, a future where the madness and immorality of war will be replaced by the rule of law.

We need a sense of the unity of all mankind to save the future, a new global ethic for a united world. We need politeness and kindness to save the future, politeness and kindness not only within nations but also between nations. To save the future, we need a just and democratic system of international law; for with law shall our land be built up, but with lawlessness laid waste.

Today we look with horror at drawings of slave ships, where human beings were packed together like cord-wood; and we are amazed that such cruelty could have been possible. Can we not hope for a time when our descendants, reading descriptions of the wars of the twentieth century, will be equally amazed that such cruelty could have been possible? If we use them constructively, the vast resources now wasted on war can initiate a new era of happiness and prosperity for the family of man. It is within our power to let this happen. The example of the men and women who worked to rid the world of slavery can give us courage as we strive for a time when war will exist only as a dark memory fading into the past.

Suggestions for further reading

1. Lynda Mahood, Vic Satzewich, *The Save the Children Fund and the Russian Famine of 1921-23: Claims and Counter-Claims about Feeding 'Bolshevik' Children*, *Journal of Historical Sociology*, 22,1 (2009), 55-83.
2. Clare Mulley, *The Woman Who Saved the Children: A biography of Eglantyne Jebb, Founder of Save the Children* (Oneworld Publications, 2009)
3. Rory O'Keeffe, *The Toss of a Coin: 'voices from a modern crisis'*. Hygge Media. 22 September 2015.
4. A. Robock, L. Oman, G. L. Stenchikov, O. B. Toon, C. Bardeen, and R. Turco, "Climatic consequences of regional nuclear conflicts", *Atmospheric Chemistry and Physics*, Vol. 7, p. 2003-2012, 2007.
5. M. Mills, O. Toon, R. Turco, D. Kinnison, R. Garcia, "Massive global ozone loss predicted following regional nuclear conflict", *Proceedings of the National Academy of Sciences (USA)*, vol. 105(14), pp. 5307-12, Apr 8, 2008.
6. O. Toon, A. Robock, and R. Turco, "The Environmental Consequences of Nuclear War", *Physics Today*, vol. 61, No. 12, p. 37-42, 2008.
7. R. Turco, O. Toon, T. Ackermann, J. Pollack, and C. Sagan, "Nuclear Winter: Global consequences of multiple nuclear explosions", *Science*, Vol. 222, No. 4630, pp. 1283-1292, December 1983.

8. A. Robock, L. Oman, G. Stenchikov, “Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences”, *Journal of Geophysical Research - Atmospheres*, Vol. 112, No. D13, p. 4 of 14, 2007.
9. I. Helfand, “An Assessment of the Extent of Projected Global Famine Resulting From Limited, Regional Nuclear War”, *International Physicians for the Prevention of Nuclear War, Physicians for Social Responsibility*, Leeds, MA, 2007.
10. George P. Schultz, William J. Perry, Henry A. Kissinger and Sam Nunn, “A World Free of Nuclear Weapons”, *The Wall Street Journal*, January 4, 2007, page A15 and January 15, 2008, page A15.
11. Mikhail Gorbachev, “The Nuclear Threat”, *The Wall Street Journal*, January 30, 2007, page A15.
12. Massimo DAlema, Gianfranco Fini, Giorgio La Malfa, Arturo Parisi and Francesco Calogero, “For a World Free of Nuclear Weapons”, *Corriere Della Sera*, July 24, 2008.
13. Hoover Institution, “Reykjavik Revisited; Steps Towards a World Free of Nuclear Weapons”, October, 2007.
14. Douglas Hurd, Malcolm Rifkind, David Owen and George Robertson, “Start Worrying and Learn to Ditch the Bomb”, *The Times*, June 30, 2008.
15. Des Brown, Secretary of State for Defense, UK, “Laying the Foundations for Multilateral Disarmament”, *Geneva Conference on Disarmament*, February 5, 2008.
16. Government of Norway, *International Conference on “Achieving the Vision of a World Free of Nuclear Weapons”*, Oslo, Norway, February 26-27, 2008.
17. Jonas Gahr Støre, Foreign Minister, Norway, “Statement at the Conference on Disarmament”, *Geneva*, March 4, 2008.
18. Anne-Grete Strøm-Erichsen, Defense Minister, Norway, “Emerging Opportunities for Nuclear Disarmament”, *Pugwash Conference*, Canada, July 11, 2008.
19. Kevin Rudd, Prime Minister, Australia, “International Commission on Nuclear Non-Proliferation and Disarmament”, *Media Release*, July 9, 2008.
20. Global Zero, www.globalzero.org/paris-conference
21. Helmut Schmidt, Richard von Weizäcker, Egon Bahr and Hans-Dietrich Genscher, “Towards a Nuclear-Free World: a German View”, *International Herald Tribune*, January 9, 2009.
22. Hans M. Kristensen and Elliot Negin, “Support Growing for Removal of U.S. Nuclear Weapons from Europe”, *Common Dreams Newscenter*, first posted May 6, 2005.
23. David Krieger, “President-elect Obama and a World Free of Nuclear Weapons”, *Nuclear Age Peace Foundation Website*, 2008.
24. J.L. Henderson, *Hiroshima*, Longmans (1974).
25. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
26. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
27. M. Yass, *Hiroshima*, G.P. Putnams Sons, New York (1972).
28. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
29. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).

30. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
31. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
32. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
33. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
34. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
35. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
36. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
37. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
38. H. LETang, *Fit to Lead?*, Heinemann Medical, London, (1980).
39. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
40. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
41. IAEA, *International Safeguards and the Non-proliferation of Nuclear Weapons*, International Atomic Energy Agency, Vienna, (1985).
42. J. Shear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
43. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
44. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
45. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
46. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
47. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
48. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
49. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
50. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
51. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
52. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
53. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).

54. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
55. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
56. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
57. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
58. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
59. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).
60. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
61. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
62. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
63. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
64. G.K. Bertsch and S.R. Grillot, (Eds.), *Arms on the Market: Reducing the Risks of Proliferation in the Former Soviet Union*, Routledge, New York, (1998).
65. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
66. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
67. G. Burns, *The Atomic Papers: A Citizens Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
68. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
69. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
70. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
71. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
72. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).
73. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
74. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
75. R. Forsberg et al., *Nonproliferation Primer: Preventing the Spread of Nuclear, Chemical and Biological Weapons*, MIT Press, Cambridge, (1995).
76. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).

77. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
78. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
79. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
80. R.E. Powaski, *March to Armageddon: The United States and the Nuclear Arms Race, 1939 to the Present*, Oxford University Press, (1987).
81. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
82. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).
83. U.S. Congress Office of Technology Assessment (Ed.), *Dismantling the Bomb and Managing the Nuclear Materials*, U.S. Government Printing Office, Washington D.C., (1993).
84. P. Boyer, *By the Bombs Early Light: American Thought and Culture at the Dawn of the Atomic Age*, University of North Carolina Press, (1985).
85. A. Makhijani and S. Saleska, *The Nuclear Power Deception: Nuclear Mythology From Electricity 'Too Cheap to Meter to 'Inherently Safe Reactors*, Apex Press, (1999).
86. C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, (1984).
87. P. Rogers, *The Risk of Nuclear Terrorism in Britain*, Oxford Research Group, Oxford, (2006).
88. MIT, *The Future of Nuclear Power: An Interdisciplinary MIT Study*, <http://web.mit.edu/nuclearpow> (2003).
89. Z. Mian and A. Glaser, *Life in a Nuclear Powered Crowd*, INES Newsletter No. 52, 9-13, April, (2006).
90. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).
91. Medical Associations Board of Science and Education, *The Medical Effects of Nuclear War*, Wiley, (1983).
92. Q. Wright, *A Study of War*, Chicago University Press, (1965).
93. M. Kahnert et al., editors, *Children and War*, Peace Union of Finland, (1983).
94. N.A. Guenther, *Children and the Threat of Nuclear War: An Annotated Bibliography*, Compubibs, New York, New York, (1985).
95. D.V. Babst et al, *Accidental Nuclear War: The Growing Peril*, Dundas, Ontario, Peace Research Institute, (1984).
96. J. Schear, editor, *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).

97. E. Chivian et al., editors, (International Physicians for the Prevention of Nuclear War), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Francisco, (1982).
98. H. Mahler, *World Health is Indivisible*, World Health Organization, Geneva, (1978).
99. E. Kamenka, editor, *Nationalism*, Edward Arnold, London, (1976).
100. Elie Kedourie, *Nationalism in Asia and Africa*, Frank Cass and Company Ltd., London, (1970).
101. S. Freud, *Warum Krieg? Das Bild vom Feind*, Arbeitsgem. Friedenspädagogik, (1983).
102. R. Levine and D.T. Campbell, *Ethnocentrism: Theories of Conflict, Ethnic Attitudes and Group Behavior*, Wiley, New York, (1972).
103. R.A. Hinde, *Biological Basis of Human Social Behavior*, McGraw-Hill, (1977).
104. R.A. Hinde, *Towards Understanding Human Relationships*, Academic Press, London, (1979).
105. C. Zahn-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press, (1986).
106. R. Axelrod, *The Evolution of Cooperation*, Basic Books, New York, (1984).
107. Arthur Koestler, *The Urge to Self-Destruction*, in *The Place of Values in a World of Facts*, A. Tiselius and S. Nielsson editors, Wiley, New York, (1970).
108. Edith Wynner, *World Federal Government in Maximum Terms: Proposals for United Nations Charter Revision*, Fedonat Press, Afton New York, (1954).

Chapter 6

CHILD LABOR AND SLAVERY

6.1 Economics without ethics

According to the great classical economist Adam Smith (1723-1790), self-interest (even greed) is a sufficient guide to human economic actions. The passage of time has shown that Smith was right in many respects. The free market, which he advocated, has turned out to be the optimum prescription for economic growth. However, history has also shown that there is something horribly wrong or incomplete about the idea that individual self-interest alone, uninfluenced by ethical and ecological considerations, and totally free from governmental intervention, can be the main motivating force of a happy and just society. There has also proved to be something terribly wrong with the concept of unlimited economic growth. Here is what actually happened:

Industrialism in 18th and 19th centuries

Highland Clearances and Enclosure Acts

In pre-industrial Europe, peasant farmers held a low but nevertheless secure position, protected by a web of traditional rights and duties. Their low dirt-floored and thatched cottages were humble but safe refuges. If a peasant owned a cow, it could be pastured on common land.

With the invention of the steam engine and the introduction of spinning and weaving machines towards the end of the 18th Century, the pattern changed, at first in England, and afterwards in other European countries. Land-owners in Scotland and Northern England realized that sheep were more profitable to have on the land than “crofters” (i.e., small tenant farmers), and families that had farmed land for generations were violently driven from their homes with almost no warning. The cottages were afterwards burned to prevent the return of their owners.

The following account of the Highland Clearances has been left by Donald McLeod, a crofter in the district of Sutherland: “The consternation and confusion were extreme.



Figure 6.1: A watercolor painting by Vincent van Gogh showing wives of Belgian miners carrying bags of coal. (Public domain)

Little or no time was given for the removal of persons or property; the people striving to remove the sick or helpless before the fire should reach them; next struggling to save the most valuable of their effects. The cries of the women and children; the roaring of the affrighted cattle, hunted at the same time by the yelling dogs of the shepherds amid the smoke and fire, altogether presented a scene that completely baffles description - it required to be seen to be believed... The conflagration lasted for six days, until the whole of the dwellings were reduced to ashes and smoking ruins.”

Between 1750 and 1860, the English Parliament passed a large number of “Enclosure Acts”, abolishing the rights of small farmers to pasture their animals on common land that was not under cultivation. The fabric of traditional rights and duties that once had protected the lives of small tenant farmers was torn to pieces. Driven from the land, poor families flocked to the towns and cities, hoping for employment in the textile mills that seemed to be springing up everywhere.

Working conditions in 19th century England

According to the new rules by which industrial society began to be governed, traditions were forgotten and replaced by purely economic laws. Labor was viewed as a commodity, like coal or grain, and wages were paid according to the laws of supply and demand, without regard for the needs of the workers. Wages fell to starvation levels, hours of work increased, and working conditions deteriorated.

John Fielden’s book, “The Curse of the Factory System” was written in 1836, and it describes the condition of young children working in the cotton mills. “The small nimble fingers of children being by far the most in request, the custom instantly sprang up of



Figure 6.2: **London during the industrial revolution** (Public domain)



Figure 6.3: **A girl pulling a coaltub through the narrow space left by removal of coal from a seam.** (Public domain)

procuring 'apprentices' from the different parish workhouses of London, Birmingham and elsewhere... Overseers were appointed to see to the works, whose interest it was to work the children to the utmost, because their pay was in proportion to the quantity of pay that they could exact."

"Cruelty was, of course, the consequence; and there is abundant evidence on record to show that in many of the manufacturing districts, the most heart-rending cruelties were practiced on the unoffending and friendless creatures... that they were flogged, fettered and tortured in the most exquisite refinements of cruelty, that they were in many cases starved to the bone while flogged to their work, and that they were even in some instances driven to commit suicide... The profits of manufacture were enormous, but this only whetted the appetite that it should have satisfied."

Dr. Peter Gaskell, writing in 1833, described the condition of the English mill workers as follows:

"The vast deterioration in personal form which has been brought about in the manufacturing population during the last thirty years... is singularly impressive, and fills the mind with contemplations of a very painful character... Their complexion is sallow and pallid, with a peculiar flatness of feature caused by the want of a proper quantity of adipose substance to cushion out the cheeks. Their stature is low - the average height of men being five feet, six inches... Great numbers of the girls and women walk lamely or awkwardly... Many of the men have but little beard, and that in patches of a few hairs... (They have) a spiritless and dejected air, a sprawling and wide action of the legs..."

"Rising at or before daybreak, between four and five o'clock the year round, they swallow a hasty meal or hurry to the mill without taking any food whatever... At twelve o'clock the engine stops, and an hour is given for dinner... Again they are closely immured from one o'clock till eight or nine, with the exception of twenty minutes, this being allowed for tea. During the whole of this long period, they are actively and unremittingly engaged in a crowded room at an elevated temperature."

Dr. Gaskell described the housing of the workers as follows:

"One of the circumstances in which they are especially defective is that of drainage and water-closets. Whole ranges of these houses are either totally undrained, or very partially... The whole of the washings and filth from these consequently are thrown into the front or back street, which, often being unpaved and cut into deep ruts, allows them to collect into stinking and stagnant pools; while fifty, or even more than that number, having only a single convenience common to them all, it is in a very short time choked with excrementous matter. No alternative is left to the inhabitants but adding this to the already defiled street."

"It frequently happens that one tenement is held by several families... The demoralizing effects of this utter absence of domestic privacy must be seen before they can be thoroughly appreciated. By laying bare all the wants and actions of the sexes, it strips them of outward regard for decency - modesty is annihilated - the father and the mother, the brother and the sister, the male and female lodger, do not scruple to commit acts in front of each other which even the savage keeps hid from his fellows."

Adam Smith

The invisible hand

As everyone knows, Adam Smith invented the theory that individual self-interest is, and ought to be, the main motivating force of human economic activity, and that this, in effect, serves the wider social interest. He put forward a detailed description of this concept in an immense book, “The Wealth of Nations” (1776).

Adam Smith (1723-1790) had been Professor of Logic at the University of Glasgow, but in 1764 he withdrew from his position at the university to become the tutor of the young Duke of Buccleuch. In those days a Grand Tour of Europe was considered to be an important part of the education of a young nobleman, and Smith accompanied Buccleuch to the Continent. To while away the occasional dull intervals of the tour, Adam Smith began to write an enormous book on economics which he finally completed twelve years later. He began his “Inquiry into the Nature and Causes of the Wealth of Nations” by praising division of labor. As an example of its benefits, he cited a pin factory, where ten men, each a specialist in his own set of operations, could produce 48,000 pins in a day. In the most complex civilizations, Smith stated, division of labor has the greatest utility.

The second factor in prosperity, Adam Smith maintained, is a competitive market, free from monopolies and entirely free from governmental interference. In such a system, he tells us, the natural forces of competition are able to organize even the most complex economic operations, and are able also to maximize productivity. He expressed this idea in the following words:

“As every individual, therefore, endeavors as much as he can, both to employ his capital in support of domestic industry, and so to direct that industry that its produce may be of greatest value, each individual necessarily labours to render the annual revenue of the Society as great as he can.”

“He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of greatest value, he intends only his own gain; and he is in this, as in many other cases, led by an invisible hand to promote an end that was no part of his intention. Nor is it always the worse for Society that it was no part of it. By pursuing his own interest, he frequently promotes that of Society more effectively than when he really intends to promote it.”

For example, a baker does not bake bread out of an unselfish desire to help his fellow humans; he does so in order to earn money; but if he were not performing a useful service, he would not be paid. Thus the “invisible hand” guides him to do something useful. Free competition also regulates prices: If the baker charges too much, he will be undersold. Finally, if there are too many bakers, the trade will become so unprofitable that some bakers will be forced into other trades. Thus highly complex operations are automatically regulated by the mechanisms of the free market. “Observe the accommodation of the most common artificer or day labourer in a civilized and thriving country”, Smith continues, “and



Figure 6.4: **Adam Smith (1723-1790)** (Public domain)

you will perceive that the number of people of whose industry a part, though but a small part, has been employed in securing him this accommodation, exceeds all computation. The woolen coat, which covers the day-labourer, as coarse and rough as it may seem, is the joint labour of a great multitude of workmen. The shepherd, the sorter of wool, the wool-comber, the carder, the dyer, the scribbler, the spinner, the weaver, the fuller, the dresser, with many others, must all join their different arts to complete even the most homely production. How many merchants and carriers, besides, must have been employed... how much commerce and navigation... how many ship-builders, sailors, sail-makers, rope-makers...”

Reinvestment and growth

An important feature of Adam Smith’s economic model is that it is by no means static. The virtuous manufacturer does not purchase pearl necklaces for his wife; he reinvests his profits, buying more machinery or building new factories. An industrialist who ignores the commandment to reinvest is “...like him who perverts the revenues of some pious foundation

to profane purposes; he pays the wages of idleness with those funds which the fragility of his forefathers had, as it were, consecrated to the maintenance of industry.”

The expansion of the system will not be slowed, Smith maintained, by shortages of labor, because “...the demand for men, like that for any other commodity, necessarily regulates the production of men.” Smith did not mean that more births would occur if the demand for workers became greater. He meant that if wages began to rise above the lowest level needed to maintain life, more children of the workers would survive. In those days, the rates of infant and child mortality were horrendous, particularly among the half-starved poor. “It is not uncommon”, Smith wrote, “in the Highlands of Scotland, for a mother who has borne twenty children not to have two alive.”

Adam Smith’s ideas were enthusiastically adopted by the rising class of manufacturers and by their representatives in government. The reverence shown to him can be illustrated by an event that occurred when he visited England’s Prime Minister, William Pitt, and his Cabinet. The whole gathering stood up when he entered. “Pray be seated, gentlemen”, Smith said. “Not until you first are seated Sir”, Pitt replied, “for we are all your scholars.”

History has shown that Adam Smith was right in many respects. The free market is indeed a dynamo that produces economic growth, and it is capable of organizing even the most complex economic endeavors. Through Adam Smith’s “invisible hand”, self interest is capable of guiding the economy so that it will maximize the production of wealth. However, history has also shown the shortcomings of a market that is totally free of governmental regulation.

The landowners of Scotland were unquestionably following self-interest as they burned the cottages of their crofters; and self-interest motivated overseers as they whipped half-starved child workers in England’s mills. Adam Smith’s “invisible hand” no doubt guided their actions in such a way as to maximize production. But whether a happy and just society was created in this way is questionable. Certainly it was a society with large areas of unhappiness and injustice. Self-interest alone was not enough. A society following purely economic laws - a society where selfishness is exalted as the mainspring for action - lacks both the ethical and ecological dimensions needed for social justice, widespread happiness, and sustainability¹.

6.2 The Reform Movement

The slow acceptance of birth control in England

With the gradual acceptance of birth control in England, the growth of trade unions, the passage of laws against child labor and finally minimum wage laws, conditions of workers

¹In fact, Adam Smith himself would have accepted this criticism of his enthronement of self-interest as the central principle of society. He believed that his “invisible hand” would not work for the betterment of society except within the context of a certain amount of governmental regulation. His modern Neoliberal admirers, however, forget this aspect of Smith’s philosophy, and maintain that market forces alone can achieve a desirable result.

gradually improved, and the benefits of industrialization began to spread to the whole of society.

One of the arguments which was used to justify the abuse of labor was that the alternative was starvation. The population of Europe had begun to grow rapidly for a variety of reasons: - because of the application of scientific knowledge to the prevention of disease; because the potato had been introduced into the diet of the poor; and because bubonic plague had become less frequent after the black rat had been replaced by the brown rat, accidentally imported from Asia.

It was argued that the excess population could not be supported unless workers were employed in the mills and factories to produce manufactured goods, which could be exchanged for imported food. In order for the manufactured goods to be competitive, the labor which produced them had to be cheap: hence the abuses. (At least, this is what was argued).

Industrialization benefited England, but in a very uneven way, producing great wealth for some parts of society, but also extreme misery in other social classes. For many, technical progress by no means led to an increase of happiness. The persistence of terrible poverty in 19th-century England, and the combined pessimism of Ricardo and Malthus, caused Thomas Carlyle to call economics "the Dismal Science".

Among the changes which were needed to insure that the effects of technical progress became beneficial rather than harmful, the most important were the abolition of child labor, the development of unions, the minimum wage law, and the introduction of birth control.

Francis Place (1771-1854), a close friend of William Godwin and James Mill, was one of the earliest and most courageous pioneers of these needed changes. Place had known extreme poverty as a child, but he had risen to become a successful businessman and a leader of the trade union movement.

Place and Mill were Utilitarians, and like other members of this movement they accepted the demographic studies of Malthus while disagreeing with Malthus' rejection of birth control. They reasoned that since abortion and infanticide were already widely used by the poor to limit the size of their families, it was an indication that reliable and humane methods of birth control would be welcome. If marriage could be freed from the miseries which resulted from excessive numbers of children, the Utilitarians believed, prostitution would become less common, and the health and happiness of women would be improved.

Francis Place and James Mill decided that educational efforts would be needed to make the available methods of birth control more widely known and accepted. In 1818, Mill cautiously wrote "The great problem of a real check to population growth has been miserably evaded by all those who have meddled with the subject... And yet, if the superstitions of the nursery were discarded, and the principle of utility kept steadily in view, a solution might not be very difficult to be found."

A few years later, Mill dared to be slightly more explicit: "The result to be aimed at", he wrote in his *Elements of Political Economy* (1821), "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.



Figure 6.5: **The Utilitarian philosopher and economist James Mill (1773-1836) was an early advocate of birth control. (He was the father of John Stuart Mill.)** (Public domain)

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.”

In 1822, Francis Place took the considerable risk of publishing a four-page pamphlet entitled *To the Married of Both Sexes of the Working People*, which contained 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.”

“What is to be done is this. A piece of soft sponge is tied by a bobbin or penny ribbon, and inserted just before the sexual intercourse takes place, and is withdrawn again as soon as it has taken place. Many tie a sponge to each end of the 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...”

“You cannot fail to see that this address is intended solely for your good. It is quite impossible that those who address you can receive any benefit from it, beyond the satisfaction which every benevolent person and true Christian, must feel, at seeing you comfortable, healthy and happy.”

The publication of Place’s pamphlet in 1822 was a landmark in the battle for the acceptance of birth control in England. Another important step was taken in 1832, when a small book entitled *The Fruits of Philosophy or, the Private Companion of Young Married People* was published by a Boston physician named Dr. Charles Knowlton. The book contained simple contraceptive advice. It reviewed the various methods of birth control available at the time. In order for the sponge method to be reliable, Knowlton’s book pointed out, use of a saline douching solution was necessary.

The battle for these social reforms was not easily won. For example, in 1876, “The Fruits of Philosophy” was ruled by an English court to be obscene, and a bookseller was sentenced to two years imprisonment for distributing it. The liberal politician Charles Bradlaugh and his friend, the feminist author Annie Besant then decided to provoke a new trial by selling the book themselves. They wrote polite letters to the Chief Clerk of the Magistrates, the Detective Department, and the City Solicitor announcing the time and the place at which they intended to sell the book, and they asked to be arrested. The result was a famous trial in which the two reformers were acquitted, but the jury again ruled “The Fruits of Philosophy” 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

Nor was the battle to establish trade unions easily won. 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, Emaline Pankhurst, Bertrand 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.

With the gradual acceptance of birth control in England, the growth of trade unions, the passage of laws against child labor and finally minimum wage laws, conditions of workers gradually improved, and the benefits of industrialization began to spread to the whole of society.

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Figure 6.6: Beatrice Webb (1858-1943). Together with her husband Sidney Webb, Graham Wallace and George Bernard Shaw, she founded the London School of Economics using money left to the Fabian Society by Henry Hutchinson. The Fabians also founded the British Labour Party, and they lobbied for a minimum wage law and National Health Service. (Public domain)



Figure 6.7: **Annie Besant (1847-1933) risked imprisonment in her battle for the acceptance of birth control. Public domain, Wikimedia Commons**

Benn and Harold Wilson. Jawaharlal Nehru, India's first Prime Minister, was greatly influenced by Fabian economic ideas.

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The reform movement's efforts, especially those of the Fabians, overcame the worst horrors of early 19th century industrialism, but today their hard-won achievements are being undermined and lost because of uncritical and unregulated globalization. Today, a factory owner or CEO, anxious to avoid high labor costs, and anxious to violate environmental regulations merely moves his factory to a country where laws against child labor and rape of the environment do not exist or are poorly enforced. In fact, he must do so or be fired, since the only thing that matters to the stockholders is the bottom line.

The movement of a factory from Europe or North America to a country with poorly enforced laws against environmental destruction, child labor, and slavery, puts workers into unfair competition. Unless they are willing to accept revival of the unspeakable conditions



Figure 6.8: Forced labor often means unpaid wages, excessively long work hours without rest days, confiscation of ID documents, little freedom of movement, deception, intimidation and physical or sexual violence. ILO/A. Khemka

of the early Industrial Revolution, they are unable to compete.

Today, child labor accounts for 22% of the workforce in Asia, 32% in Africa, and 17% in Latin America. Large-scale slavery also exists today, although there are formal laws against it in every country. There are more slaves now than ever before. Their number is estimated to be between 12 million and 27 million. Besides outright slaves, who are bought and sold for as little as 100 dollars, there many millions of workers whose lack of options and dreadful working conditions must be described as slavlike.²

²<http://www.commondreams.org/news/2015/08/04/state-dept-accused-watering-down-human-rights-ratings-advance-obama-trade-agenda>
<http://www.foodispower.org/slavery-chocolate/>
<https://www.wsws.org/en/articles/2014/10/01/modi-o01.html>
<http://www.theguardian.com/world/2007/oct/28/ethicalbusiness.retail>
<http://www.techtimes.com/articles/22530/20141221/apple-turning-blind-eye-to-miserable-working-conditions-of-workers-in-china-and-indonesia-secret-video.htm>
<http://www.waronwant.org/sweatshops-china>
<https://www.dosomething.org/facts/11-facts-about-sweatshops>
<https://sites.google.com/site/rgssenglishmsgswheatshops/conditions-of-sweatshops-in-indonesia>
<http://www.greenpeace.org/eastasia/campaigns/air-pollution/problems/>
<http://www.wired.com/2015/04/benedikt-partenheimer-particulate-matter/>



Figure 6.9: Photo source: Government of Andhra Pradesh, India.



Figure 6.10: A boy repairing a tyre in Ghana.



Figure 6.11: Young girl working on a loom in Aït Benhaddou, Morocco in May 2008.



Figure 6.12: Agriculture deploys 70% of the world's child labour. Above, child worker on a rice farm in Vietnam.

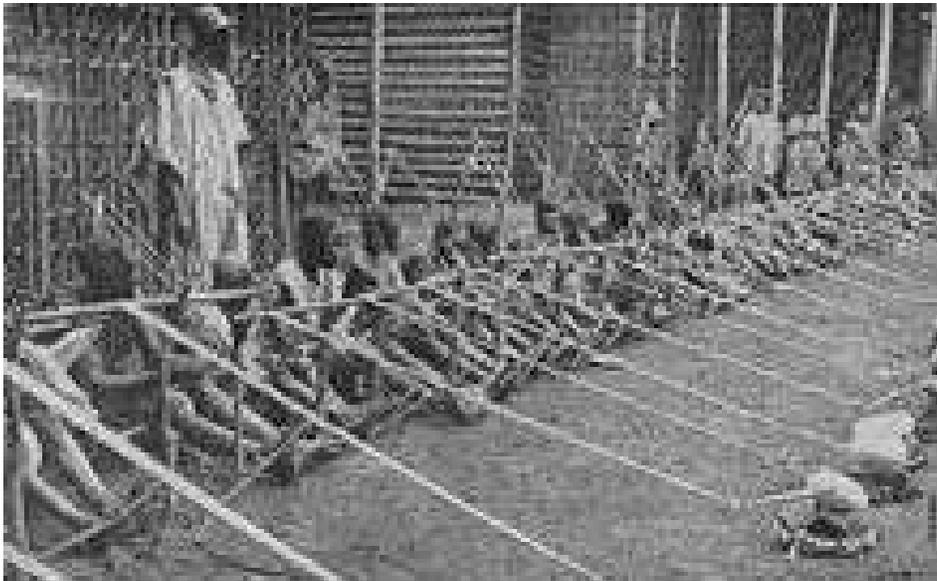


Figure 6.13: Child labour in the former German colony of Kamerun, 1919.



Figure 6.14: Child labour in Brazil, leaving after collecting recyclables from a landfill.



Figure 6.15: A little girl making money for her family by posing with a snake in a water village of Tonle Sap Lake, Cambodia.



Figure 6.16: Working girl in India.



Figure 6.17: Child labour in Bangladesh.



Figure 6.18: Nepali girls working in brick factory.



Figure 6.19: Children engaged in diamond mining in Sierra Leone.



Figure 6.20: Working child in Ooty, India.



Figure 6.21: Child labour in a coal mine, United States, c. 1912.



Figure 6.22: Different forms of child labour in Central America, 1999.

Illustration 14 – No Title

Life (1883-1936): Apr 17, 1913; 61, 1590; American Periodicals
pg. 778



**Child Labor Employer: GREAT GUNS! PLAYING! WHAT
A WASTE OF HUMAN ENERGY**

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6.3 Literary protests against child labor

William Blake's *London*

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

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

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

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

An excerpt from Blake's *Auguries of Innocence*

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

Charles Dickens and Hans Christian Andersen



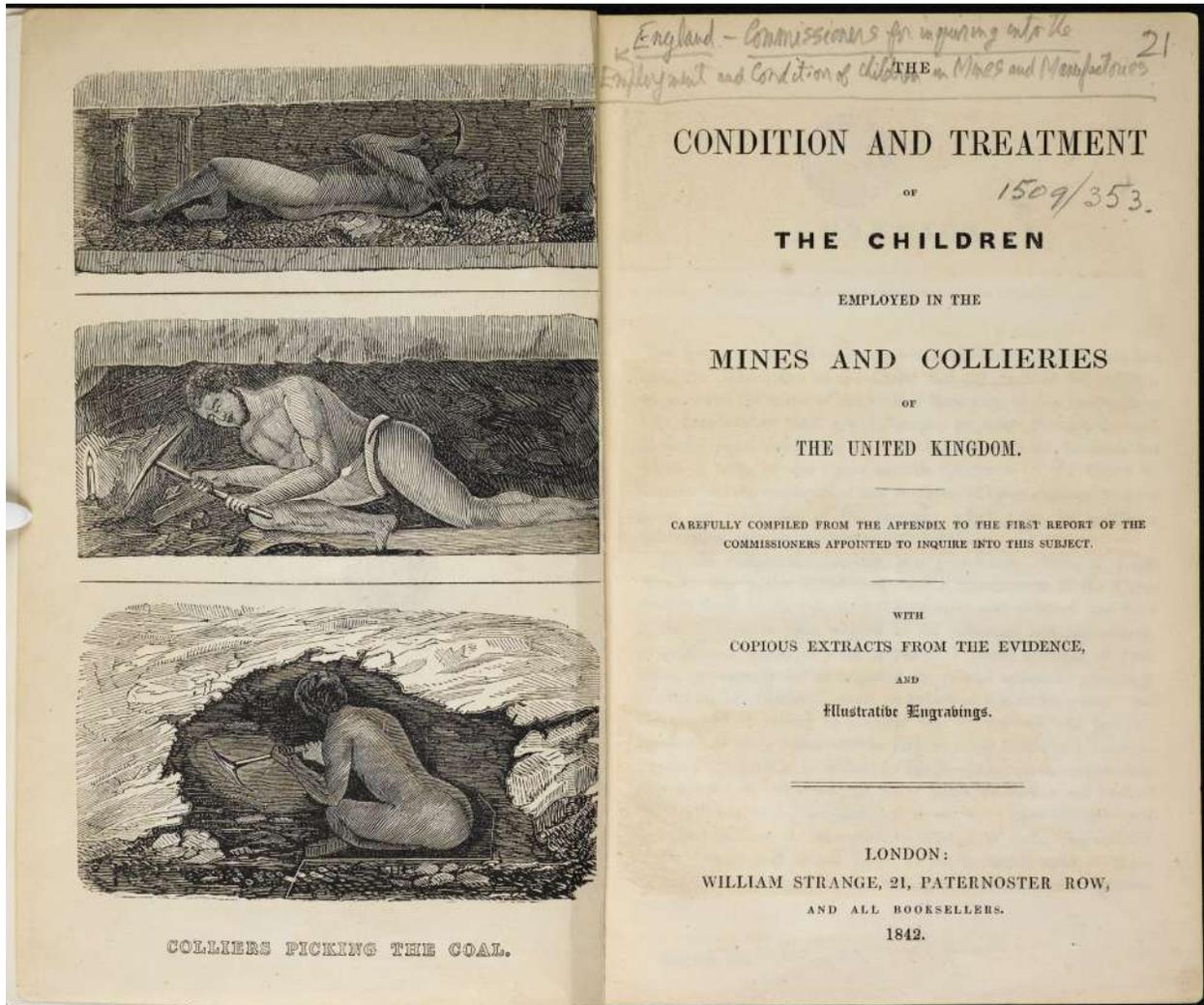
Figure 6.23: Tiny Tim, from Charles Dickens' *A Christmas Carol*. When he is informed that Tiny Tim will die unless he receives medical treatment, Scrooge remarks, "Then he had better die and reduce the surplus population!". Many of the events in Dickens' books can be viewed as protests against abuse of children.



Figure 6.24: Charles Dickens' *Oliver Twist* asks for a second portion of gruel, provoking a storm of outrage. As a boy, Dickens himself spent some time in a workhouse.

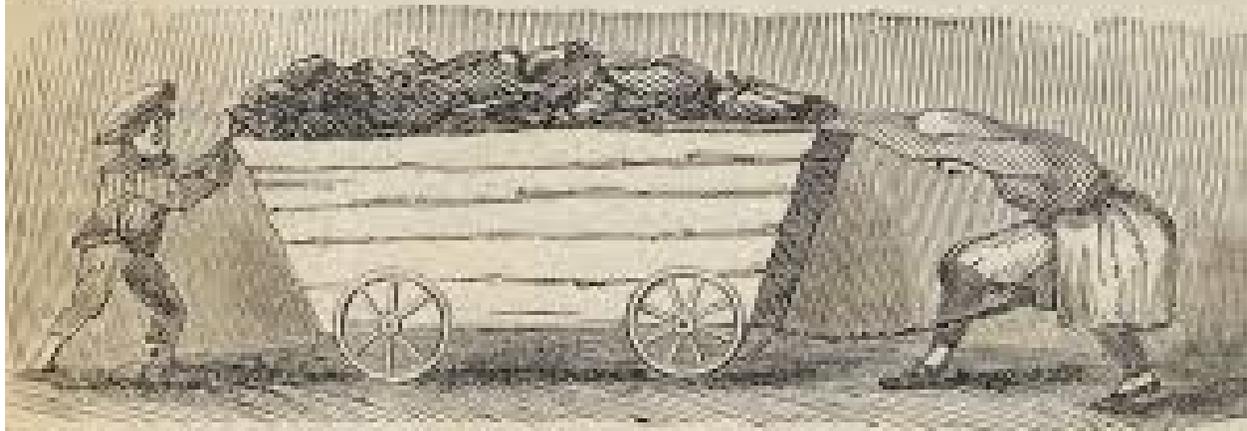


Figure 6.25: Hans Christian Andersen's heartbreaking story of *The Little Match Girl*.



the carts containing coal from the coal-walk to the pit-bottom, weighing from three to ten hundred-weight.

The following represents the mode of putting backwards with the face to the tub.



The boxes or carriages employed in putting are of two sorts, the hutch and the slung; the hutch being an oblong square-sided box with





6.4 Child slavery

Some definitions (taken from the anti-slavery website)

3

Child slavery includes

- Children used by others for profit, often through violence, abuse and threats, in prostitution or pornography, forced begging, petty crime and the drug trade.
- Forced child labour, for example in agriculture, factories, construction, brick kilns, mines, bars, the tourist industry or domestic work.
- Children forced to take part in armed conflicts.
- Children forced to marry.

Child work, child labour, child slavery?

- *Child work.* Some types of work make useful, positive contributions to a child's development, helping them learn useful skills. Often, work is a vital source of income for their families.
- *Child labour.* Child labour is not slavery, but nevertheless hinders children's education and development. Child labour tends to be undertaken when the child is in the care of their parents.

³<https://www.antislavery.org/slavery-today/child-slavery/>





- *Worst form of child labour.* “Hazardous work” is the worst form of child labour. It irreversibly damages children’s health and development through, for example, exposure to dangerous machinery or toxic substances, and may even endanger their lives.
- *Child slavery.* Child slavery is the enforced exploitation of a child for their labour for someone else’s gain.
- *Child trafficking.* Trafficking involves transporting, recruiting or harboring people for the purpose of exploitation, using violence, threats or coercion. When children are trafficked, no violence, deception or coercion needs to be involved, trafficking is merely the act of transporting or harboring them for exploitative work. When away from their families, they are at the mercy of their employers.
- *Child marriage.* Many marriages involving children will not amount to slavery, particularly between couples aged 16 to 18 years. But when a child didn’t give their consent to a marriage, is exploited within it or is not able to leave, that child is in slavery.
- *Children in armed conflicts.* Children forced to take part in armed conflicts don’t only include child soldiers but also porters or girls taken as “wives” for soldiers and militia members. Children involved in conflict are severely affected by their experiences and can suffer from long-term trauma.

Facts about child slavery

- Worldwide 10 million children are in slavery, trafficking, debt bondage and other forms of forced labour, forced recruitment for armed conflict, prostitution, pornography and other illicit activities (ILO)
- 151.6 million are estimated to be in child labour (ILO)
- 114 million child laborers are below the age of 14 (ILO)
- 72 million children are in hazardous work that directly endangers their health, safety and moral development (ILO)
- More than 700 million women alive today were married before their 18th birthday. More than one in three (about 250 million) entered into union before age 15 (UNICEF)
- 300,000 children are estimated to serve as child soldiers, some even younger than 10 years old (UNICEF)
- 15.5 million children are in domestic work worldwide - the overwhelming majority of them are girls (ILO)

Suggestions for further reading

1. John Fielden, *The Curse of the Factory System*, (1836).
2. A. Smith, *The Theory of Moral Sentiments...* (1759), ed. D.D. Raphael and A.L. MacPhie, Clarendon, Oxford, (1976).
3. A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776), Everyman edn., 2 vols., Dent, London, (1910).
4. Charles Knowlton *The Fruits of Philosophy, or The Private Companion of Young Married People*, (1832).
5. John A. Hobson, *John Ruskin, Social Reformer*, (1898).
6. E. Pease, *A History of the Fabian Society*, Dutton, New York, (1916).
7. G. Claey's, ed., *New View of Society, and other writings by Robert Owen*, Penguin Classics, (1991).
8. W. Bowden, *Industrial Society in England Towards the End of the Eighteenth Century*, MacMillan, New York, (1925).
9. G.D. Cole, *A Short History of the British Working Class Movement*, MacMillan, New York, (1927).
10. P. Deane, *The First Industrial Revolution*, Cambridge University Press, (1969).
11. Marie Boaz, *Robert Boyle and Seventeenth Century Chemistry*, Cambridge University Press (1958).
12. J.G. Crowther, *Scientists of the Industrial Revolution*, The Cresset Press, London (1962).
13. R.E. Schofield, *The Lunar Society of Birmingham*, Oxford University Press (1963).
14. L.T.C. Rolt, *Isambard Kingdom Brunel*, Arrow Books, London (1961).
15. J.D. Bernal, *Science in History*, Penguin Books Ltd. (1969).
16. Bertrand Russell, *The Impact of Science on Society*, Unwin Books, London (1952).
17. Wilbert E. Moore, *The Impact of Industry*, Prentice Hall (1965).
18. Charles Morazé, *The Nineteenth Century*, George Allen and Unwin Ltd., London (1976).
19. Carlo M. Cipolla (editor), *The Fontana Economic History of Europe*, Fontana/Collins, Glasgow (1977).
20. Martin Gerhard Geisbrecht, *The Evolution of Economic Society*, W.H. Freeman and Co. (1972).
21. P.N. Stearns, *The Industrial Revolution in World History*, Westview Press, (1998).
22. E.P. Thompson, *The Making of the English Working Class*, Penguin Books, London, (1980).
23. N.J. Smelser, *Social Change and the Industrial Revolution: An Application of Theory to the British Cotton Industry*, University of Chicago Press, (1959).
24. D.S. Landes, *The Unbound Prometheus: Technical Change and Industrial Development in Western Europe from 1750 to the Present, 2nd ed.*, Cambridge University Press, (2003).
25. S. Pollard, *Peaceful Conquest: The Industrialization of Europe, 1760-1970*, Oxford University Press, (1981).

26. M. Kranzberg and C.W. Pursell, Jr., eds., *Technology in Western Civilization*, Oxford University Press, (1981).
27. M.J. Dauntton, *Progress and Poverty: An Economic and Social History of Britain, 1700-1850*, Oxford University Press, (1990).
28. L.R. Berlanstein, *The Industrial Revolution and Work in 19th Century Europe*, Routledge, (1992).
29. J.D. Bernal, *Science and Industry in the 19th Century*, Indiana University Press, Bloomington, (1970).
30. P.A. Brown, *The French Revolution in English History*, 2nd edn., Allen and Unwin, London, (1923).
31. E. Burke, *Reflections on the Revolution in France and on the Proceedings of Certain Societies in London Relative to that Event...*, Dent, London, (1910).
32. J.B. Bury, *The Idea of Progress*, MacMillan, New York, (1932).
33. I.R. Christie, *Stress and Stability in Late Eighteenth Century Britain; Reflections on the British Avoidance of Revolution* (Ford Lectures, 1983-4), Clarendon, Oxford, (1984).
34. H.T. Dickenson, *Liberty and Property, Political Ideology in Eighteenth Century Britain*, Holmes and Meier, New York, (1977).
35. W. Eltis, *The Classical Theory of Economic Growth*, St. Martin's, New York, (1984).
36. E. Halévy, *A History of the English People in the Nineteenth Century*, (transl. E.I. Watkin), 2nd edn., Benn, London, (1949).
37. E. Halévy, *The Growth of Philosophic Radicalism*, (transl. M. Morris), new edn., reprinted with corrections, Faber, London, (1952).
38. W. Hazlitt, *The Complete Works of William Hazlitt*, ed. P.P. Howe, after the edition of A.R. Walker and A. Glover, 21 vols., J.M. Dent, London, (1932).
39. W. Hazlitt, *A Reply to the Essay on Population by the Rev. T.R. Malthus...*, Longman, Hurst, Rees and Orme, London, (1807).
40. R. Heilbroner, *The Worldly Philosophers: The Lives, Times and Ideas of the Great Economic Thinkers*, 5th edn., Simon and Schuster, New York, (1980).
41. R.K. Kanth, *Political Economy and Laissez-Faire: Economics and Ideology in the Ricardian Era*, Rowman and Littlefield, Totowa N.J., (1986).
42. J.M. Keynes, *Essays in Biography*, in *The Collected Writings of John Maynard Keynes*, MacMillan, London, (1971-82).
43. F. Knight, *University Rebel: The Life of William Frend, 1757-1841*, Gollancz, London (1971).
44. M. Lamb, and C. Lamb, *The Works of Charles and Mary Lamb*, ed. E.V. Lucas, 7 vols., Methuen, London, (1903).
45. A. Lincoln, *Some Political and Social Ideas of English Dissent, 1763-1800*, Cambridge University Press, (1938).
46. D. Locke, *A Fantasy of Reason: The Life and Thought of William Godwin*, Routledge, London, (1980).
47. J. Locke, *Two Treatises on Government. A Critical Edition with an Introduction and Apparatus Criticus*, ed. P. Laslett, Cambridge University Press, (1967).

48. J. Macintosh, *Vindicae Gallicae. Defense of the French Revolution and its English Admirers against the Accusations of the Right Hon. Edmund Burke...*, Robinson, London, (1791).
49. J. Macintosh, *A Discourse on the Study of the Law of Nature and of Nations*, Caldell, London, (1799).
50. T. Paine, *The Rights of Man: being an Answer to Mr. Burke's Attack on The French Revolution*, Jordan, London, part I (1791), part II (1792).
51. H.G. Wells, *Anticipations of the Reaction of Mechanical and Scientific Progress on Human Life and Thought*, Chapman and Hall, London, (1902).
52. B. Wiley, *The Eighteenth Century Background: Studies of the Idea of Nature in the Thought of the Period*, Chatto and Windus, London, (1940).
53. G.R. Morrow, *The Ethical and Economic Theories of Adam Smith: A Study in the Social Philosophy of the 18th Century*, Cornell Studies in Philosophy, **13**, 91-107, (1923).
54. H.W. Schneider, ed., *Adam Smith's Moral and Political Philosophy*, Harper Torchbook edition, New York, (1948).
55. F. Rosen, *Classical Utilitarianism from Hume to Mill*, Routledge, (2003).
56. J.Z. Muller, *The Mind and the Market: Capitalism in Western Thought*, Anchor Books, (2002).
57. J.Z. Muller, *Adam Smith in His Time and Ours: Designing the Decent Society*, Princeton University Press, (1995).
58. S. Hollander, *The Economics of Adam Smith*, University of Toronto Press, (19773).
59. K. Haakonssen, *The Cambridge Companion to Adam Smith*, Cambridge University Press, (2006).
60. K. Haakonssen, *The Science of a Legislator: The Natural Jurisprudence of David Hume and Adam Smith*, Cambridge University Press, (1981).
61. I. Hont and M. Ignatieff, *Wealth and Virtue: The Shaping of Political Economy in the Scottish Enlightenment*, Cambridge University Press, (1983).
62. I.S. Ross, *The Life of Adam Smith*, Clarendon Press, Oxford, (1976).
63. D. Winch, *Adam Smith's Politics: An Essay in Historiographic Revision*, Cambridge University Press, (1979).
64. Anderson, Elisabeth. *Policy Entrepreneurs and the Origins of the Regulatory Welfare State: Child Labor Reform in Nineteenth-Century Europe*. *American Sociological Review* 83.1 (2018): 173-211. comparison France and Germany, with a bibliography of primary and secondary sources
65. Anderson, Elisabeth. *Ideas in Action: The Politics of Prussian Child Labor Reform, 1817-1839*.
66. *Child Employing Industries*, *Annals of the American Academy of Political and Social Science* Vol. 35, Mar. 1910 in JSTOR, articles by experts in 1910
67. Goldberg, Ellis. *Trade, Reputation, and Child Labour in Twentieth-Century Egypt* (2004)
68. Grier, Beverly. *Invisible Hands: Child Labour and the State in Colonial Zimbabwe* (2005)

69. Hindman, Hugh D. *Child Labour: An American History* (2002)
70. Humphries, Jane; Horrell, Sara (1995). *The Exploitation of Little Children': Child Labour and the Family Economy in the Industrial Revolution*. *Explorations in Economic History*. 32 (4): 485-516.
71. Humphries, Jane. *Childhood and Child Labour in the British Industrial Revolution* (Cambridge Studies in Economic History) (2011)
72. Kirby, Peter. *Child Labour in Britain, 1750-1870* (2003)
73. McIntosh, Robert. *Boys in the pits: Child labour in coal mines* (McGill-Queen's Press-MQUP, 2000), Canadian mines
74. Meerkerk, Elise van Naderveen; Schmidt, Ariadne. *Between Wage Labor and Vocation: Child Labor in Dutch Urban Industry, 1600-1800*, *Journal of Social History* (2008) 41,3 pp 717-736 in Project MUSE
75. Mofford, Juliet. *Child Labour in America* (1970)
76. Tuttle, Carolyn. *Hard At Work In Factories And Mines: The Economics Of Child Labour During The British Industrial Revolution* (1999)

Chapter 7

STEPS NEEDED FOR POPULATION STABILIZATION

7.1 All the needed reforms are desirable in themselves

Experts agree that the following steps are needed if we are to avoid a catastrophic global famine and population crash:

1. Higher education and higher status for women throughout the world. Women need higher education to qualify for jobs outside their homes, and higher status within their families so they will not be forced into the role of baby-producing machines.
2. Primary health care for all. Children should be vaccinated against preventable diseases. Materials and information for family planning should be provided for all women who desire smaller families. Advice should be given on improving sanitation.
3. The provision of clean water supplies near to homes is needed in order to reduce the incidence of water-borne diseases. In some countries today, family members, including children, spend large amounts of time carrying water home from distant sources.
4. State provision of care for the elderly is a population-stabilization measure because in many countries, parents produce many children so that the children will provide for them in their old age.
5. In many countries child labor is common, and in some there is even child slavery. Parents who regard their children as a source of income are motivated to produce large families. Enforceable laws against child labor and slavery contribute to population stabilization.
6. General economic progress has been observed to contribute to population stabilization. However in some countries there is a danger of population growing so rapidly that it prevents the economic progress that would otherwise have stabilized population. This situation is known as the demographic trap.



Figure 7.1: **Professor Sir Partha Dasgupta of Cambridge University has pointed out that all of the steps that are needed for population stabilization are desirable in themselves.**

7.2 Higher status and higher education for women

It is only recently that women have had the right to vote. In most of the industrialized countries, this right was only granted during the early part of the 20th century. In some countries, this reform was even slower. For example, in Switzerland, it was only in 1971 that women gained the right to vote in federal elections. In Lichtenstein, women's right to vote was delayed until 1981. It was only in December, 2015 that Saudi Arabia granted the right to vote to women. Currently, the only country in the world where this right is denied is the Vatican City.

It is important that women should have equal political representation because female representation not only advances gender equality in legal matters, such as the inheritance of property, but also promotes the rights of children.

Prior to the 20th century, women were very largely barred from higher education. For example, the famous pioneer of modern educational methods, Dr. Maria Montessori, had to overcome many barriers to obtain her medical degree.

With higher education, comes the motivation and the opportunity for women to have jobs outside their homes. With lower rates of infant mortality, and the aid of machines, being a housewife and mother has become less and less a lifelong full-time occupation. Experts agree that higher education for women, and jobs for women outside their homes are vitally important measures for population stabilization; but these reforms are also very desirable for their own sake, for the sake of justice, and for the sake of the uniquely life-oriented vision that women can bring to public life.



Figure 7.2: Higher education and higher political representation for women are vitally needed reforms.

7.3 Primary health care for all

An International Conference on Primary Health Care took place at Alma-Ata, USSR, 6-12 September, 1978. Point **VII** of the Alma-Ata Declaration defines primary health care as follows:

Primary health care

- 1. reflects and evolves from the economic conditions and sociocultural and political characteristics of the country and its communities and is based on the application of the relevant results of social, biomedical and health services research and public health experience;*
- 2. addresses the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly;*
- 3. includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunization against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs;*
- 4. involves, in addition to the health sector, all related sectors and aspects of national and community development, in particular agriculture, animal husbandry, food, industry, education, housing, public works, communications and other sectors; and demands the coordinated efforts of all those sectors;*
- 5. requires and promotes maximum community and individual self-reliance and participation in the planning, organization, operation and control of primary health care,*



Figure 7.3: The provision of primary health care to all countries throughout the world should include not only measures, such as vaccination, for the prevention of diseases, but also making advice and materials for family planning available to all women who desire them.



Figure 7.4: Bill and Melinda Gates.

making fullest use of local, national and other available resources; and to this end develops through appropriate education the ability of communities to participate;

- 6. should be sustained by integrated, functional and mutually supportive referral systems, leading to the progressive improvement of comprehensive health care for all, and giving priority to those most in need;*
- 7. relies, at local and referral levels, on health workers, including physicians, nurses, midwives, auxiliaries and community workers as applicable, as well as traditional practitioners as needed, suitably trained socially and technically to work as a health team and to respond to the expressed health needs of the community.*

Provision of primary health care is high on the list of priorities of the World Health Organization. The Bill and Melinda Gates Foundation has also made great financial contributions to this goal.



Figure 7.5: Carrying water from distant sources to homes is a time-consuming burden. Often this task is performed by children.

7.4 Clean water supplies near homes

According to the World Health Organization, 842,000 deaths per year are attributable to a lack of safe drinking water supply, sanitation and hygiene. Wikipedia states that “Waterborne diseases can have a significant impact on the economy, locally as well as internationally. People who are infected by a waterborne disease are usually confronted with related costs and not seldom with a huge financial burden. This is especially the case in less developed countries. The financial losses are mostly caused by e.g. costs for medical treatment and medication, costs for transport, special food, and by the loss of manpower. Many families must even sell their land to pay for treatment in a proper hospital. On average, a family spends about 10% of the monthly households income per person infected.”

7.5 State provision of care for the elderly

In many countries, elderly parents have traditionally been cared for by their children. This is one of the motives for large family size. Parents with many children feel that they will have a secure old age. For example, in India, parents are typically cared for by their children into old age, most commonly by their sons. Thus, many parents in India continue to have children until they produce a son, and this often leads to large family sizes. State supported care for the elderly throughout the world is an important step that is needed for population stabilization.



Figure 7.6: **Government-provided care for the elderly will help to stabilize the currently-exploding global population of humans.**

7.6 Abolition of child labor and slavery

Today the hard-won achievements of reformers in the industrialized countries are being undermined and lost because of uncritical and unregulated globalization. A factory owner or CEO, anxious to avoid high labor costs, and anxious to violate environmental regulations merely moves his factory to a country where laws against child labor and rape of the environment do not exist or are poorly enforced. In fact, he must do so or be fired, since the only thing that matters to the stockholders is the bottom line. One might say (as someone has done), that Adam Smith's invisible hand is at the throat of the world's peoples and at the throat of the global environment.

The movement of a factory from Europe or North America to a country with poorly enforced laws against environmental destruction, child labor and slavery puts workers into unfair competition. Unless they are willing to accept revival of the unspeakable conditions of the early Industrial Revolution, they are unable to compete.

Today, child labor accounts for 22% of the workforce in Asia, 32% in Africa, and 17% in Latin America. Large-scale slavery also exists today, although there are formal laws against it in every country. There are more slaves now than ever before - their number is estimated to be between 12 million and 27 million. Besides outright slaves, who are bought and sold for as little as 100 dollars, there many millions of workers whose lack of options and dreadful working conditions must be described as slave-like.

We need to reform our economic system to give it both a social conscience and an ecological conscience. Perhaps some of the things that the world produces and consumes today are not really necessary.



Figure 7.7: Laws prohibiting child labor are non-existent in many countries, or poorly enforced.



Figure 7.8: More slaves exist today than ever before.

7.7 General economic progress

It has been observed that general economic progress leads to population stabilization. However, it often happens that population growth in a country is so rapid that it prevents economic progress. This phenomenon is known as the *demographic trap*. For example, if we look at the population-age structure of Egypt in 2005, shown in Figure 2.9, we see that there are very many young people approaching reproductive age, and very few old people. Thus the birth rate will not be balanced by the death rate, and the population of any country with a similar population-age structure can be expected to grow rapidly, preventing the economic development that might have slowed population growth. In such a situation, strong state-supported birth control programs are clearly needed.

Very early marriage and forced marriage must also be discouraged. We can recall that Malthus mentions late marriage as one of the preventive checks to population growth. Forced and child marriages entrap women and young girls in relationships that deprive them of their basic human rights. Forced marriage constitutes a human rights violation in and of itself.

According to the website Stop Violence Against Women, “In 2003, the International Centre for Research on Women estimated that more than 51 million girls under 18 years were married and they expected the figure to rise to over 100 million within the next ten years. Similarly, in 2006, experts estimated that thirty-eight percent of young women aged 20 to 24 in the fifty least developed countries were married before the age of 18.

“In *Early Marriage: A Harmful Traditional Practice*, UNICEF estimates that among women aged 15 to 24, 48 percent were married before the age of 18 in South Asia. In Bangladesh, 27.3 percent of women aged 15 to 19 years old were married by the age of 15, and 65.3 percent of women aged 20 to 24 were married before the age of 18.

“UNICEF estimates that in Africa 42 percent of women aged 15 to 24 were married before the age of 18. In Niger, 27.3 percent of women ages 15 to 19 were married before the age of 15, and 76.6 percent of women ages 20 to 24 were married before the age of 18. According to surveys conducted by the National Committee on Traditional Practices of Ethiopia (NCTPE), the prevalence of marriage by abduction is as high as 92 per cent in Southern Nations Nationalities and Peoples Region (SNNPR), with a national average of 69 percent.”

Today’s world is one in which the wealth of the richest 1% of the global population increased by 82% in 2017, while for the poorest half of humanity there was no increase at all. It is a world where an estimated 11 million children die every year from starvation or from diseases related to poverty. It is a world where obesity is a serious public health problem in rich nations, while at the same time, children in poorer countries scavenge among toxic wastes in garbage dumps. It is a world where almost a billion people are undernourished.

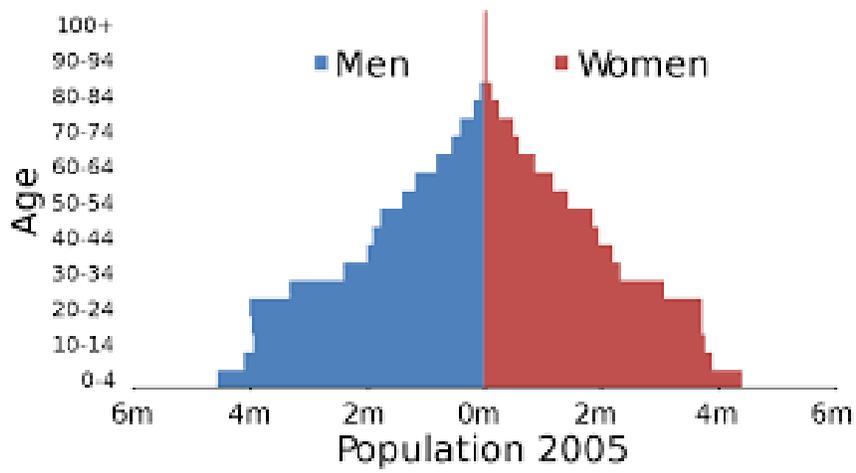


Figure 7.9: The population pyramid of Egypt in 2005.



Figure 7.10: A slum in India



Figure 7.11: Children scavenging at a garbage dump.

7.8 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 China and Saudi Arabia, the food available to the people of Africa will diminish rather than increasing. 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.

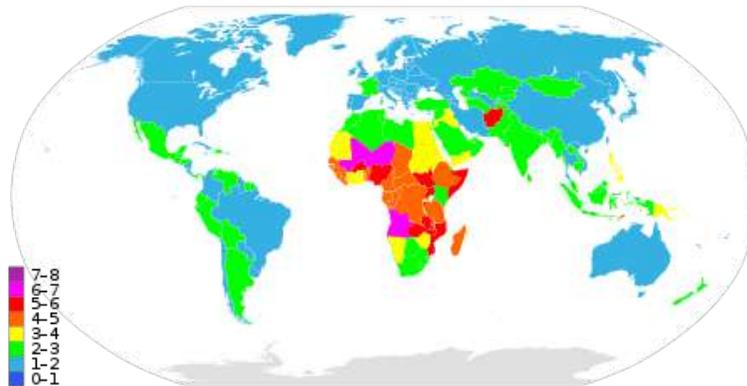


Figure 7.12: A map from the Wikipedia article showing global fertility rates in 2015. The highest fertility rates (purple, 7-8 children per woman-life) occur in Africa.

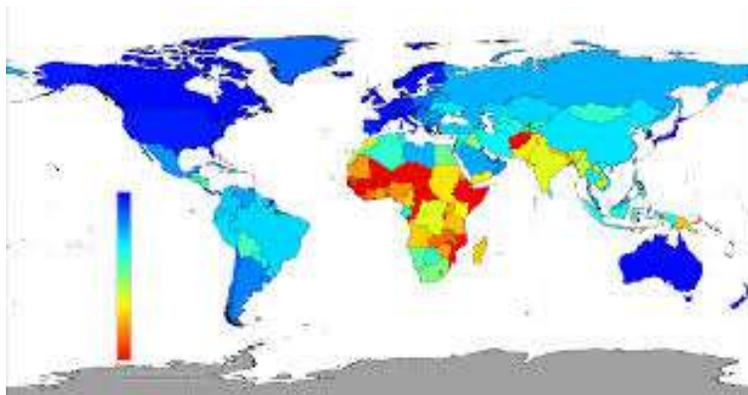


Figure 7.13: A map showing the human development index (HDI) in various parts of the world. The index is based on educational levels, life expectancy, and GDP per capita. It can be seen that regions of high fertility generally have low HDI values.

7.9 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

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 7.1: 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 Paolo	Brazil	21,242,939

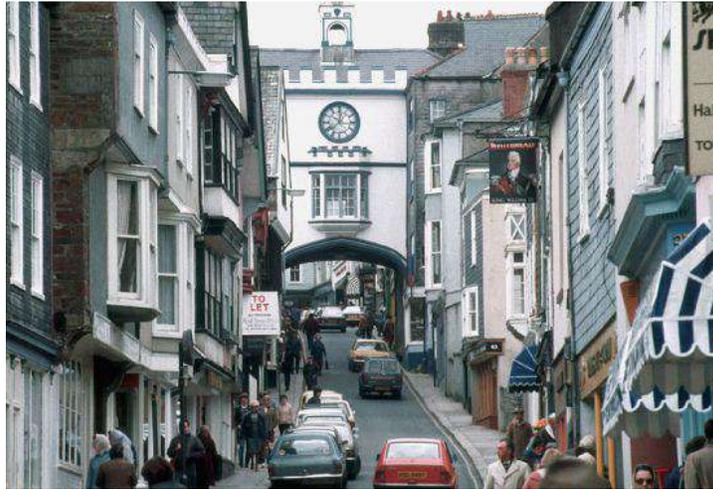


Figure 7.14: Totnes, Devon, England: a transition town.

Suggestions for further reading

1. John Fielden, *The Curse of the Factory System*, (1836).
2. A. Smith, *The Theory of Moral Sentiments...* (1759), ed. D.D. Raphael and A.L. MacPhie, Clarendon, Oxford, (1976).
3. A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776), Everyman edn., 2 vols., Dent, London, (1910).
4. Charles Knowlton *The Fruits of Philosophy, or The Private Companion of Young Married People*, (1832).
5. John A. Hobson, *John Ruskin, Social Reformer*, (1898).
6. E. Pease, *A History of the Fabian Society*, Dutton, New York, (1916).
7. G. Claeys, ed., *New View of Society, and other writings by Robert Owen*, Penguin Classics, (1991).
8. W. Bowden, *Industrial Society in England Towards the End of the Eighteenth Century*, MacMillan, New York, (1925).
9. G.D. Cole, *A Short History of the British Working Class Movement*, MacMillan, New York, (1927).
10. P. Deane, *The First Industrial Revolution*, Cambridge University Press, (1969).
11. Marie Boaz, *Robert Boyle and Seventeenth Century Chemistry*, Cambridge University Press (1958).
12. J.G. Crowther, *Scientists of the Industrial Revolution*, The Cresset Press, London (1962).
13. R.E. Schofield, *The Lunar Society of Birmingham*, Oxford University Press (1963).
14. L.T.C. Rolt, *Isambard Kingdom Brunel*, Arrow Books, London (1961).
15. J.D. Bernal, *Science in History*, Penguin Books Ltd. (1969).
16. Bertrand Russell, *The Impact of Science on Society*, Unwin Books, London (1952).
17. Wilbert E. Moore, *The Impact of Industry*, Prentice Hall (1965).

18. Charles Morazé, *The Nineteenth Century*, George Allen and Unwin Ltd., London (1976).
19. Carlo M. Cipolla (editor), *The Fontana Economic History of Europe*, Fontana/Collins, Glasgow (1977).
20. Martin Gerhard Geisbrecht, *The Evolution of Economic Society*, W.H. Freeman and Co. (1972).
21. P.N. Stearns, *The Industrial Revolution in World History*, Westview Press, (1998).
22. E.P. Thompson, *The Making of the English Working Class*, Penguin Books, London, (1980).
23. N.J. Smelser, *Social Change and the Industrial Revolution: An Application of Theory to the British Cotton Industry*, University of Chicago Press, (1959).
24. D.S. Landes, *The Unbound Prometheus: Technical Change and Industrial Development in Western Europe from 1750 to the Present, 2nd ed.*, Cambridge University Press, (2003).
25. S. Pollard, *Peaceful Conquest: The Industrialization of Europe, 1760-1970*, Oxford University Press, (1981).
26. M. Kranzberg and C.W. Pursell, Jr., eds., *Technology in Western Civilization*, Oxford University Press, (1981).
27. M.J. Daunton, *Progress and Poverty: An Economic and Social History of Britain, 1700-1850*, Oxford University Press, (1990).
28. L.R. Berlanstein, *The Industrial Revolution and Work in 19th Century Europe*, Routledge, (1992).
29. J.D. Bernal, *Science and Industry in the 19th Century*, Indiana University Press, Bloomington, (1970).
30. P.A. Brown, *The French Revolution in English History*, 2nd edn., Allen and Unwin, London, (1923).
31. E. Burke, *Reflections on the Revolution in France and on the Proceedings of Certain Societies in London Relative to that Event...*, Dent, London, (1910).
32. J.B. Bury, *The Idea of Progress*, MacMillan, New York, (1932).
33. I.R. Christie, *Stress and Stability in Late Eighteenth Century Britain; Reflections on the British Avoidance of Revolution* (Ford Lectures, 1983-4), Clarendon, Oxford, (1984).
34. H.T. Dickenson, *Liberty and Property, Political Ideology in Eighteenth Century Britain*, Holmes and Meier, New York, (1977).
35. W. Eltis, *The Classical Theory of Economic Growth*, St. Martin's, New York, (1984).
36. E. Halévy, *A History of the English People in the Nineteenth Century*, (transl. E.I. Watkin), 2nd edn., Benn, London, (1949).
37. E. Halévy, *The Growth of Philosophic Radicalism*, (transl. M. Morris), new edn., reprinted with corrections, Faber, London, (1952).
38. W. Hazlitt, *The Complete Works of William Hazlitt*, ed. P.P. Howe, after the edition of A.R. Walker and A. Glover, 21 vols., J.M. Dent, London, (1932).
39. W. Hazlitt, *A Reply to the Essay on Population by the Rev. T.R. Malthus...*, Longman, Hurst, Rees and Orme, London, (1807).

40. R. Heilbroner, *The Worldly Philosophers: The Lives, Times and Ideas of the Great Economic Thinkers*, 5th edn., Simon and Schuster, New York, (1980).
41. R.K. Kanth, *Political Economy and Laissez-Faire: Economics and Ideology in the Ricardian Era*, Rowman and Littlefield, Totowa N.J., (1986).
42. J.M. Keynes, *Essays in Biography*, in *The Collected Writings of John Maynard Keynes*, MacMillan, London, (1971-82).
43. F. Knight, *University Rebel: The Life of William Frend, 1757-1841*, Gollancz, London (1971).
44. M. Lamb, and C. Lamb, *The Works of Charles and Mary Lamb*, ed. E.V. Lucas, 7 vols., Methuen, London, (1903).
45. A. Lincoln, *Some Political and Social Ideas of English Dissent, 1763-1800*, Cambridge University Press, (1938).
46. D. Locke, *A Fantasy of Reason: The Life and Thought of William Godwin*, Routledge, London, (1980).
47. J. Locke, *Two Treatises on Government. A Critical Edition with an Introduction and Apparatus Criticus*, ed. P. Laslett, Cambridge University Press, (1967).
48. J. Macintosh, *Vindicae Gallicae. Defense of the French Revolution and its English Admirers against the Accusations of the Right Hon. Edmund Burke...*, Robinson, London, (1791).
49. J. Macintosh, *A Discourse on the Study of the Law of Nature and of Nations*, Caldell, London, (1799).
50. T. Paine, *The Rights of Man: being an Answer to Mr. Burke's Attack on The French Revolution*, Jordan, London, part I (1791), part II (1792).
51. H.G. Wells, *Anticipations of the Reaction of Mechanical and Scientific Progress on Human Life and Thought*, Chapman and Hall, London, (1902).
52. B. Wiley, *The Eighteenth Century Background: Studies of the Idea of Nature in the Thought of the Period*, Chatto and Windus, London, (1940).
53. G.R. Morrow, *The Ethical and Economic Theories of Adam Smith: A Study in the Social Philosophy of the 18th Century*, Cornell Studies in Philosophy, **13**, 91-107, (1923).
54. H.W. Schneider, ed., *Adam Smith's Moral and Political Philosophy*, Harper Torchbook edition, New York, (1948).
55. F. Rosen, *Classical Utilitarianism from Hume to Mill*, Routledge, (2003).
56. J.Z. Muller, *The Mind and the Market: Capitalism in Western Thought*, Anchor Books, (2002).
57. J.Z. Muller, *Adam Smith in His Time and Ours: Designing the Decent Society*, Princeton University Press, (1995).
58. S. Hollander, *The Economics of Adam Smith*, University of Toronto Press, (19773).
59. K. Haakonssen, *The Cambridge Companion to Adam Smith*, Cambridge University Press, (2006).
60. K. Haakonssen, *The Science of a Legeslator: The Natural Jurisprudence of David Hume and Adam Smith*, Cambridge University Press, (1981).

61. I. Hont and M. Ignatieff, *Wealth and Virtue: The Shaping of Political Economy in the Scottish Enlightenment*, Cambridge University Press, (1983).
62. I.S. Ross, *The Life of Adam Smith*, Clarendon Press, Oxford, (1976).
63. D. Winch, *Adam Smith's Politics: An Essay in Historiographic Revision*, Cambridge University Press, (1979).
64. King, M., and Elliott, C. (1993). *Legitimate Double-Think*. *Lancet* 341:669-672.
65. Sen, A. (1989). *On Ethics and Economics*. Oxford, UK: Blackwell.
66. Worldwatch Institute (1987). *State of the World 1987*. Washington, DC: Worldwatch Institute.
67. United Nations, Department of Economic and Social Affairs, Population Division (2013) *World Population Prospects: The 2012 Revision*. (United Nations, New York).
68. Campbell, M., Cleland, J., Ezech, A. and Prata, N. (2007) *Return of the Population Growth Factor*. *Science* 315: 1501-1502
69. Coale, A.J. and Hoover, E.M. 1958. *Population growth and economic development in low-income countries*. Princeton University Press, New Jersey USA.
70. Friedman, T.L. (2013) *Tell me how this ends*. *New York Times*, 21 May 2013.
71. George, S. (2010) *Whose crisis, whose future?*, Polity Press, Cambridge.
72. Kirk, D. (1996) *Demographic Transition Theory*. *Population Studies* 50(3): 361-387.
73. Lagi, M., Bertrand, K.Z., Bar-Yam, Y. (2011) *The food crises and political instability in North Africa and the Middle East*. New England Complex Systems Institute
74. P.R. Ehrlich and A.H. Ehrlich, *One With Nineveh: Politics, Consumption and the Human Future*, Island Press, (2004).
75. D.H. Meadows, D.L. Meadows, J. Randers, and W.W. Behrens III, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*, Universe Books, New York, (1972).
76. D.H. Meadows et al., *Beyond the Limits. Confronting Global Collapse and Envisioning a Sustainable Future*, Chelsea Green Publishing, Post Mills, Vermont, (1992).
77. D.H. Meadows, J. Randers and D.L. Meadows, *Limits to Growth: the 30-Year Update*, Chelsea Green Publishing, White River Jct., VT 05001, (2004).
78. A. Peccei and D. Ikeda, *Before it is Too Late*, Kodansha International, Tokyo, (1984).
79. V.K. Smith, ed., *Scarcity and Growth Reconsidered*, Johns Hopkins University Press, Baltimore, (1979).
80. British Petroleum, *BP Statistical Review of World Energy*, (published yearly).
81. R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*, Columbia University Press, New York, (1991).
82. J. Darmstadter, *A Global Energy Perspective*, Sustainable Development Issue Backgrounder, Resources for the Future, (2002).
83. D.C. Hall and J.V. Hall, *Concepts and Measures of Natural Resource Scarcity*, *Journal of Environmental Economics and Management*, **11**, 363-379, (1984).
84. M.K. Hubbert, *Energy Resources*, in *Resources and Man: A Study and Recommendations*, Committee on Resources and Man, National Academy of Sciences, National Research Council, W.H. Freeman, San Francisco, (1969).

85. J.A. Krautkraemer, *Nonrenewable Resource Scarcity*, *Journal of Economic Literature*, bf 36, 2065-2107, (1998).
86. C.J. Cleveland, *Physical and Economic Aspects of Natural Resource Scarcity: The Cost of Oil Supply in the Lower 48 United States 1936-1987*, *Resources and Energy* **13**, 163-188, (1991).
87. C.J. Cleveland, *Yield Per Effort for Additions to Crude Oil Reserves in the Lower 48 States, 1946-1989*, *American Association of Petroleum Geologists Bulletin*, **76**, 948-958, (1992).
88. M.K. Hubbert, *Technique of Prediction as Applied to the Production of Oil and Gas*, in *NBS Special Publication 631*, US Department of Commerce, National Bureau of Standards, (1982).
89. L.F. Ivanhoe, *Oil Discovery Indices and Projected Discoveries*, *Oil and Gas Journal*, **11**, 19, (1984).
90. L.F. Ivanhoe, *Future Crude Oil Supplies and Prices*, *Oil and Gas Journal*, July 25, 111-112, (1988).
91. L.F. Ivanhoe, *Updated Hubbert Curves Analyze World Oil Supply*, *World Oil*, November, 91-94, (1996).
92. L.F. Ivanhoe, *Get Ready for Another Oil Shock!*, *The Futurist*, January-February, 20-23, (1997).
93. Energy Information Administration, *International Energy Outlook, 2001*, US Department of Energy, (2001).
94. Energy Information Administration, *Caspian Sea Region*, US Department of Energy, (2001).
95. National Energy Policy Development Group, *National Energy Policy*, The White House, (2004). (<http://www.whitehouse.gov/energy/>)
96. IEA, *CO2 from Fuel Combustion Fact-Sheet*, International Energy Agency, (2005).
97. H. Youguo, *China's Coal Demand Outlook for 2020 and Analysis of Coal Supply Capacity*, International Energy Agency, (2003).
98. R.H. Williams, *Advanced Energy Supply Technologies*, in *World Energy Assessment: Energy and the Challenge of Sustainability*, UNDP, (2000).
99. H. Lehmann, *Energy Rich Japan*, Institute for Sustainable Solutions and Innovations, Aachen, (2003).
100. W.V. Chandler, *Materials Recycling: The Virtue of Necessity*, Worldwatch Paper 56, Worldwatch Institute, Washington D.C, (1983).
101. W.C. Clark and others, *Managing Planet Earth*, Special Issue, *Scientific American*, September, (1989).
102. B. Commoner, *The Closing Circle: Nature, Man and Technology*, Bantam Books, New York, (1972).
103. J.R. Frisch, *Energy 2000-2020: World Prospects and Regional Stresses*, World Energy Conference, Graham and Trotman, (1983).
104. J. Holdren and P. Herrera, *Energy*, Sierra Club Books, New York, (1971).
105. National Academy of Sciences, *Energy and Climate*, NAS, Washington D.C., (1977).

106. W. Ophuls, *Ecology and the Politics of Scarcity*, W.H. Freeman, San Francisco, (1977).
107. C. Pollock, *Mining Urban Wastes: The Potential for Recycling*, Worldwatch Paper 76, Worldwatch Institute, Washington D.C., (1987).
108. World Resources Institute, *World Resources*, Oxford University Press, New York, (published annually).
109. World Resources Institute, *World Resources 2000-2001: People and Ecosystems: The Fraying Web of Life*, WRI, Washington D.C., (2000).
110. J.E. Young, John E., *Mining the Earth*, Worldwatch Paper 109, Worldwatch Institute, Washington D.C., (1992).
111. J.R. Craig, D.J. Vaughan and B.J. Skinner, *Resources of the Earth: Origin, Use and Environmental Impact, Third Edition*, Prentice Hall, (2001).
112. W. Youngquist, *Geodesinies: The Inevitable Control of Earth Resources Over Nations and Individuals*, National Book Company, Portland Oregon, (1997).
113. M. Tanzer, *The Race for Resources. Continuing Struggles Over Minerals and Fuels*, Monthly Review Press, New York, (1980).
114. C.B. Reed, *Fuels, Minerals and Human Survival*, Ann Arbor Science Publishers Inc., Ann Arbor Michigan, (1975).
115. M.K. Hubbert, *Energy Resources*, in *Resources and Man: A Study and Recommendations*, Committee on Resources and Man, National Academy of Sciences, National Research Council, W.H. Freeman, San Francisco, (1969).
116. J.A. Krautkraemer, *Nonrenewable Resource Scarcity*, *Journal of Economic Literature*, bf 36, 2065-2107, (1998).
117. C.J. Cleveland, *Physical and Economic Aspects of Natural Resource Scarcity: The Cost of Oil Supply in the Lower 48 United States 1936-1987*, *Resources and Energy* **13**, 163-188, (1991).
118. C.J. Cleveland, *Yield Per Effort for Additions to Crude Oil Reserves in the Lower 48 States, 1946-1989*, *American Association of Petroleum Geologists Bulletin*, **76**, 948-958, (1992).
119. M.K. Hubbert, *Technique of Prediction as Applied to the Production of Oil and Gas*, in *NBS Special Publication 631*, US Department of Commerce, National Bureau of Standards, (1982).
120. Energy Information Administration, *International Energy Outlook, 2001*, US Department of Energy, (2001).
121. Energy Information Administration, *Caspian Sea Region*, US Department of Energy, (2001).
122. National Energy Policy Development Group, *National Energy Policy*, The White House, (2004). (<http://www.whitehouse.gov/energy/>)
123. M. Klare, *Bush-Cheney Energy Strategy: Procuring the Rest of the World's Oil*, Foreign Policy in Focus, (Interhemispheric Resource Center/Institute for Policy Studies/SEEN), Washington DC and Silver City NM, January, (2004).
124. IEA, *CO2 from Fuel Combustion Fact-Sheet*, International Energy Agency, (2005).

125. H. Youguo, *China's Coal Demand Outlook for 2020 and Analysis of Coal Supply Capacity*, International Energy Agency, (2003).
126. R.H. Williams, *Advanced Energy Supply Technologies*, in *World Energy Assessment: Energy and the Challenge of Sustainability*, UNDP, (2000).
127. H. Lehmann, *Energy Rich Japan*, Institute for Sustainable Solutions and Innovations, Achen, (2003).
128. W.V. Chandler, *Materials Recycling: The Virtue of Necessity*, Worldwatch Paper 56, Worldwatch Institute, Washington D.C, (1983).
129. J.R. Frisch, *Energy 2000-2020: World Prospects and Regional Stresses*, World Energy Conference, Graham and Trotman, (1983).
130. J. Gever, R. Kaufmann, D. Skole and C. Vorosmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Ballinger, Cambridge MA, (1986).
131. J. Holdren and P. Herrera, *Energy*, Sierra Club Books, New York, (1971).
132. National Academy of Sciences, *Energy and Climate*, NAS, Washington D.C., (1977).
133. W. Ophuls, *Ecology and the Politics of Scarcity*, W.H. Freeman, San Francisco, (1977).
134. P.B. Smith, J.D. Schilling and A.P. Haines, *Introduction and Summary*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
135. World Resources Institute, *World Resources*, Oxford University Press, New York, (published annually).
136. J.R. Craig, D.J. Vaughan and B.J. Skinner, *Resources of the Earth: Origin, Use and Environmental Impact, Third Edition*, Prentice Hall, (2001).
137. W. Youngquist, *Ge Destinies: The Inevitable Control of Earth Resources Over Nations and Individuals*, National Book Company, Portland Oregon, (1997).
138. M. Tanzer, *The Race for Resources. Continuing Struggles Over Minerals and Fuels*, Monthly Review Press, New York, (1980).
139. C.B. Reed, *Fuels, Minerals and Human Survival*, Ann Arbor Science Publishers Inc., Ann Arbor Michigan, (1975).
140. A.A. Bartlett, *Forgotten Fundamentals of the Energy Crisis*, American Journal of Physics, **46**, 876-888, (1978).

Chapter 8

OUR WORLD IS BURNING

8.1 We must create a livable future world

We give our children loving care, but it makes no sense to do so unless we do everything in our power to give them a future world in which they can survive. We also have a duty to our grandchildren, and to all future generations.

The amazingly rapid growth of science, technology, agriculture and industry has given the world many benefits, but indefinite growth on a finite planet is a logical impossibility, and we have now reached the point where the human success story has become a threat. Today we are faced with the threat of an environmental megacatastrophe, of which the danger of catastrophic climate change is a part. Human ingenuity also produced nuclear weapons, but the development of international law, governance and ethics has not kept pace, and we face the threat of an all-destroying nuclear war. Finally, because of population growth, the effect of climate change on agriculture, and the end of the fossil fuel era, there is a danger that by the middle of the present century a very large-scale famine could take the lives of as many as a billion people.

We owe it to future generations to take urgent action to prevent these threatened catastrophes. In the present chapter, we will focus on the climate emergency, while the dangers of nuclear war and famine will be discussed in chapters 3 and 5.

A United Nations report released Wednesday , 20 November, 2019, warned that worldwide projections for fossil fuel production over the next decade indicate that the international community is on track to fail to rein in planet-heating emissions and prevent climate catastrophe.

*The Production Gap*¹ is an 80 page report produced by a collaboration between the UN Environmental Programme and a number of academic institutions. It examines the discrepancy between countries' planned fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C, and concludes that the necessary policy changes are currently not being made.

The famous economist Nicholas Stern has stated that “This important report shows

¹<http://productiongap.org/wp-content/uploads/2019/11/Production-Gap-Report-2019.pdf>



Figure 8.1: “Ensuring a livable planet for future generations means getting serious about phasing out coal, oil, and gas,” said Christiana Figueres, former executive secretary of the UNFCCC, “Countries such as Costa Rica, Spain, and New Zealand are already showing the way forward, with policies to constrain exploration and extraction and ensure a just transition away from fossil fuels. Others must now follow their lead.”

that governments' projected and planned levels of coal, oil, and gas production are dangerously out of step with the goals of the Paris agreement on climate change. It illustrates the many ways in which governments subsidize and otherwise support the expansion of such production. Instead, governments should implement policies that ensure existing production peaks soon and then falls very rapidly."

In an article published in *Common Dreams* on Wednesday, November 20, 2019, Hoda Baraka, the Chief Communications Officer for 350.org wrote: "The disconnect between Paris temperature goals and countries' plans and policies for coal, oil, and gas production is massive, worrying and unacceptable..."

"The *production gap* is a term used to refer to the difference between a countries' planned levels of fossil fuel production, and what is needed to achieve international climate goals. This is the first time a UN report has looked directly and specifically at fossil fuel production as a key driver of climate breakdown. It shows that countries are planning to produce fossil fuels far in excess of the levels needed to fulfil their climate pledges under the Paris Agreement, which themselves are far from adequate. This over investment in coal, oil, and gas supply locks in fossil fuel infrastructure that will make emissions reductions harder to achieve.

"The science is clear, to stay below 1.5 degrees we must stop the expansion of the fossil fuel industry immediately. That means that not a single new mine can be dug, not another pipeline built, not one more emitting powerplant fired up. And we have to get to work transitioning to sustainable renewable energy powered energy systems.

"Across the globe resistance to fossil fuels is rising, the climate strikes have shown the world that we are prepared to take action. Going forward our job is to keep up a steady drumbeat of actions, strikes and protests that gets louder and louder throughout 2020. Governments need to follow through, to act at the source of the flames that are engulfing our planet and phase out coal, oil, and gas production."



Figure 8.2: Today the beautiful city of Venice is flooded. Tomorrow unless urgent climate action is taken, all coastal cities will be under water.



Figure 8.3: On Friday, November 15, 2019, in a speech at the Vatican, Pope Francis issued a warning against the rise of fascist forces worldwide that remind him of the Nazis of the 20th Century as he also railed against corporate crimes and announced consideration of adding “sins against ecology” to the church’s official teachings. “The principle of profit maximization, isolated from any other consideration, leads to a model of exclusion which violently attacks those who now suffer its social and economic costs, while future generations are condemned to pay the environmental costs”, he said. In his speech, Francis condemned global corporations that are responsible for “countries’ over-indebtedness and the plunder of our planet’s natural resources.” He said that their activities have the “gravity of crimes against humanity,” especially when they lead to hunger, poverty and the eradication of indigenous peoples.



Figure 8.4: A new report indicates that half of all insects may have been lost since 1970 as a result of the destruction of nature and heavy use of pesticides. The report said 40% of the 1million known species of insect are facing extinction. Unless steps are taken to correct the excessive use of pesticides and loss of habitat, there will be profound consequences for humans and all life on Earth. “We can’t be sure, but in terms of numbers, we may have lost 50% or more of our insects since 1970 - it could be much more,” said Prof Dave Goulson, at the University of Sussex, UK, who wrote the report for the Wildlife Trusts. Since most crops depend on insect pollination, the insect apocalypse will make it difficult to feed the Earth’s growing population unless urgent corrective steps are taken.



Figure 8.5: Swedish teen environmental activist Greta Thunberg speaks at a climate change rally in Charlotte, North Carolina, on 8 November, 2019. Returning to Europe by boat to attend climate talks in Spain, Greta said “My message to the Americans is the same as to everyone - that is to unite behind the science and to act on the science. We must realize this is a crisis, and we must do what we can now to spread awareness about this and to put pressure on the people in power. And especially, the US has an election coming up soon, and it’s very important that for everyone who can vote, vote. Even if the politics needed doesn’t exist today, we still need to use our voices to make sure that the people in power are focused on the right things. Because this is a democracy, and in a democracy, people are the ones who run the country. I know it doesn’t seem that way, but if enough people were to decide they have had enough, then that could change everything. So don’t underestimate that power.”



Figure 8.6: Senator Bernie Sanders and Representative Alexandria Ocasio-Cortez field questions from audience members at the Climate Crisis Summit at Drake University on November 9, 2019, in Des Moines, Iowa. “Faced with the global crisis of climate change, the United States must lead the world in transforming our energy system away from fossil fuel to sustainable energy. The Green New Deal is not just about climate change,” Sanders said, “It is an economic plan to create millions of good-paying jobs, strengthen our infrastructure, and invest in our country’s frontline and vulnerable communities.” The Green New Deal, which is strongly advocated by Sanders and Ocasio-Cortez in the United States, and also currently debated in many other countries, is inspired by the set of programs that Franklin D. Roosevelt used to end the Great Depression. It aims at maintaining full employment by substituting jobs in creating renewable energy infrastructure for jobs lost in the fossil fuel sector.



Figure 8.7: The *World Scientists' Warning of a Climate Emergency* was published in *Bioscience* on 5 November, 2019. The article states that “Scientists have a moral obligation to clearly warn humanity of any catastrophic threat and to ‘tell it like it is.’ On the basis of this obligation and the graphical indicators presented below, we declare, with more than 11,000 scientist signatories from around the world, clearly and unequivocally that planet Earth is facing a climate emergency...Despite 40 years of global climate negotiations... we have generally conducted business as usual and have largely failed to address this predicament.”



Figure 8.8: Bush fires in Australia are threatening Sydney and have caused the Australian government to declare a state of emergency. But Australia’s politicians continue the policies that have made their nation a climate change criminal, exporting vast quantities of coal and beef. The Deputy Prime Minister Michael McCormack said, of the fire victims: “They don’t need the ravings of some pure enlightened and woke capital city greenies at this time when they are trying to save their homes.” In other words, let’s not talk about climate change.



Figure 8.9: A Peoples' Climate March in Amsterdam, calling for an ambitious climate policy. The *World Scientists' Warning of a Climate Emergency* called attention to a number of indicators: "The basic scientific data of these changes is presented simply and with great clarity: a 5 percent rise every 10 years in carbon emissions; a 3.65 percent rise of another powerful greenhouse gas, methane, every 10 years; a global surface temperature rise of .183 degrees Celsius every 10 years; a decline of Arctic sea ice at a rate of 11.7 percent every 10 years; significant drops in the ice mass of Greenland, Antarctica and world glaciers; an increase in ocean acidity and temperatures; an increase of 44 percent in the amount of area burned by wildfires in the U.S. every 10 years; and an 88 percent rise in extreme weather events per 10 years."

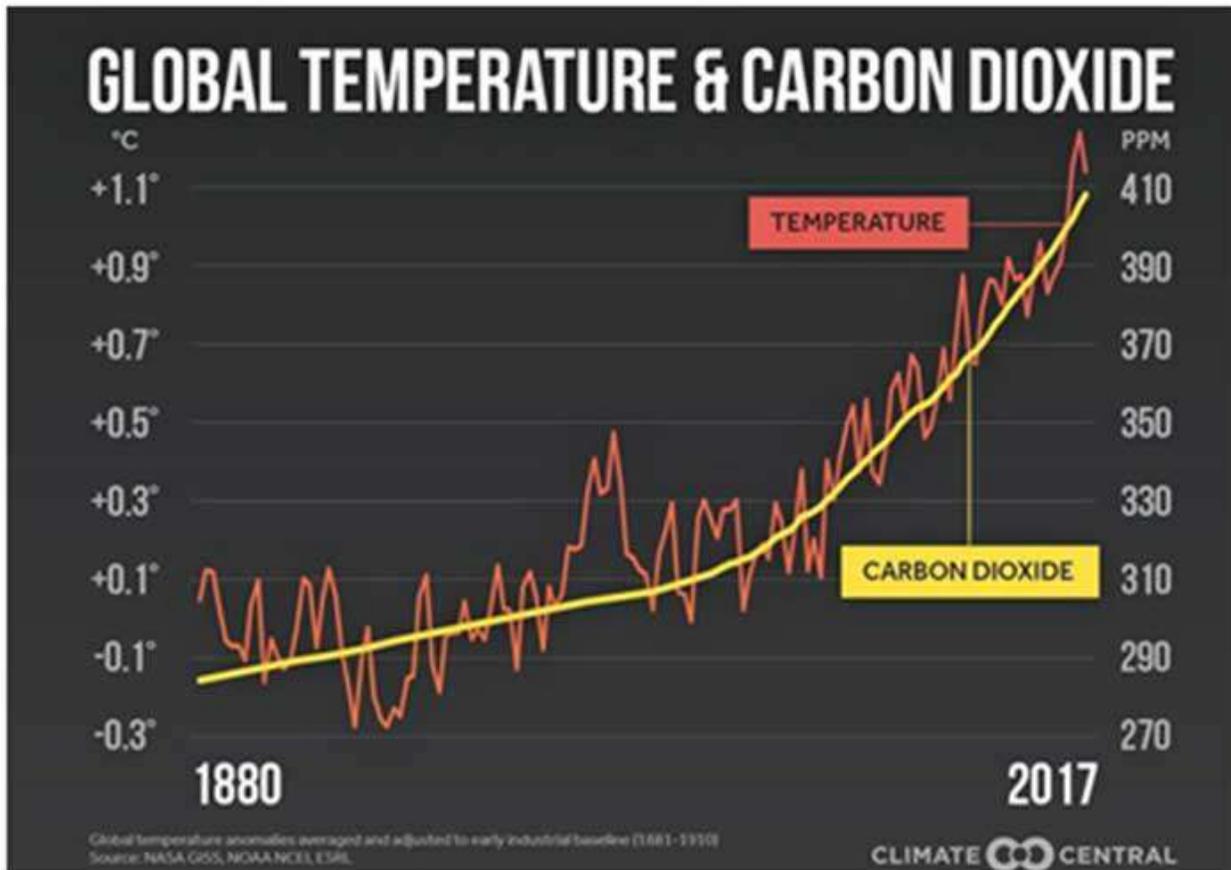


Figure 8.10: The graphs showing increase in global temperatures and carbon dioxide follow each other closely. In an article published in *Countercurrents* on November 6, 2019, Dr. Andrew Glickson wrote: “As the concentration of atmospheric CO₂ has risen to 408 ppm and the total greenhouse gas level, including methane and nitrous oxide, combine to near 500 parts per million CO₂-equivalent, the stability threshold of the Greenland and Antarctic ice sheets, currently melting at an accelerated rate, has been exceeded. The consequent expansion of tropics and the shift of climate zones toward the shrinking poles lead to increasingly warm and dry conditions under which fire storms, currently engulfing large parts of South America, California, Alaska, Siberia, Sweden, Spain, Portugal, Greece, Angola, Australia and elsewhere have become a dominant factor in the destruction of terrestrial habitats.”



Figure 8.11: The Royal Society of the United Kingdom documented ExxonMobil's funding of 39 organizations that promoted "inaccurate and misleading" views of climate science. In an article published by TomDispatch on November 11, 2019, Professor Naomi Oreskes of Harvard University wrote: "Much focus has been put on ExxonMobil's history of disseminating disinformation, partly because of the documented discrepancies between what that company said in public about climate change and what its officials said (and funded) in private. Recently, a trial began in New York City accusing the company of misleading its investors, while Massachusetts is prosecuting ExxonMobil for misleading consumers as well. If only it had just been that one company, but for more than 30 years, the fossil-fuel industry and its allies have denied the truth about anthropogenic global warming. They have systematically misled the American people and so purposely contributed to endless delays in dealing with the issue by, among other things, discounting and disparaging climate science, misrepresenting scientific findings, and attempting to discredit climate scientists. These activities are documented in great detail in *How Americans Were Deliberately Misled about Climate Change*, a report I recently co-authored, as well as in my 2010 book and 2014 film, *Merchants of Doubt*."



Figure 8.12: We can repair the Earth's ruptured carbon cycle by recarbonizing it with the living carbon of biodiversity. In an article published in the 11 November, 2019. edition of TMS Weekly Digest, Professor Vandana Shiva wrote: "All the coal, petroleum and natural gas we are burning and extracting to run our contemporary oil-based economy was formed over 600 million years. We are burning up millions of years of nature's work annually. This is why the carbon cycle is broken. A few centuries of fossil fuel-based civilization have brought our very survival under threat by rupturing the Earth's carbon cycle, disrupting key climate systems and self-regulatory capacity, and pushing diverse species to extinction at 1000 times the normal rate. The connection between biodiversity and climate change is intimate. Extinction is a certainty if we continue a little longer on the fossil fuel path. A shift to a biodiversity-based civilization is now a survival imperative."



Figure 8.13: A fire burns a tract of the Amazon jungle in Agua Boa, Mato Grosso state, Brazil September 4, 2019. According to a report published by teleSUR on 7 November, 2019, “Deforestation in Brazil’s Amazon region increased by 80 percent in September compared to the same month last year, according to a private study released on Wednesday stating that 802 square kilometers of forest was lost in the zone... Environmental and human rights organizations have confirmed that criminal networks are behind the indiscriminate cutting of trees in the region, and that after the illegal lumbering, those deforested zones are burned to make the land suitable for livestock raising and agriculture. In August, fires in the Brazilian Amazon were the worst in a decade, a situation that was denounced worldwide, especially the anti-ecological policies of President Jair Bolsonaro and his poor response to stop the fires.”



Figure 8.14: In her testimony to the US Congress, Greta Thunberg did not prepare a statement for submission to the record. Instead, she submitted the most recent scientific report, issued by the IPCC three weeks earlier. She said simply, “I am submitting this report as my testimony because I don’t want you to listen to me, I want you to listen to the scientists, and I want you to unite behind the science. And then I want you to take real action. Thank you.” Here is what the scientists recommend: “Excessive extraction of materials and overexploitation of ecosystems, driven by economic growth, must be quickly curtailed to maintain the long-term sustainability of the biosphere. We need a carbon-free economy that explicitly addresses human dependence on the biosphere and policies that guide economic decisions accordingly. Our goals need to shift from GDP growth and the pursuit of affluence toward sustaining ecosystems and improving human well-being by prioritizing basic needs and reducing inequality.”



Figure 8.15: According to an article in the September, 2019 issue of *The National Geographic*, “Across 9 million square miles at the top of the planet, climate change is writing a new chapter. Arctic permafrost isn’t thawing gradually, as scientists once predicted. Geologically speaking, it’s thawing almost overnight.” World leadership is sacrificing their constituencies on the altar of fossil fuel profits and a brand of capitalism that recklessly consumes everything in sight. Therefore the public must become aware of the consequences. Alaska’s North Slope has seen temperatures spike 11°F in 30 years as temperatures hit 90°F 240 miles above the Arctic Circle, temperatures that remind us of Florida’s balmy weather. Arctic sea ice is also melting rapidly, and there is a danger that a powerful albedo feedback loop will be initiated, since ice strongly reflects sunlight, but dark seawater absorbs much more energy, further increasing Arctic temperatures.



Figure 8.16: In an article published in *Countercurrents* on November 8, 2019, Sydney Ghazarian wrote: “We can leverage our power as workers through high-impact, disruptive labor strikes that halt the economy’s gears until politicians can no longer ignore us, and are forced to cede to demands that will save the world.” He had in mind the Global Climate Strikes of September, 2019, in which 7 million people participated. Swedish climate activist Greta Thunberg summarized the need for such action in a speech at the World Economic Forum in Davos in January, 2019. “Some say that we should not engage in activism, instead we should leave everything to our politicians and just vote for change instead,” she said. “But what do we do when there is no political will? What do we do when the politics needed are nowhere in sight?”



Figure 8.17: Together, blazes in California, Oregon and Washington have burned more than 5.8 million acres, a spokesman and a report from the NIFC say. At least 34 people have died. California Gov. Gavin Newsom says climate change is to blame. “The fundamental facts cannot be denied,” the governor said. “The trendlines are not going in the right direction.”

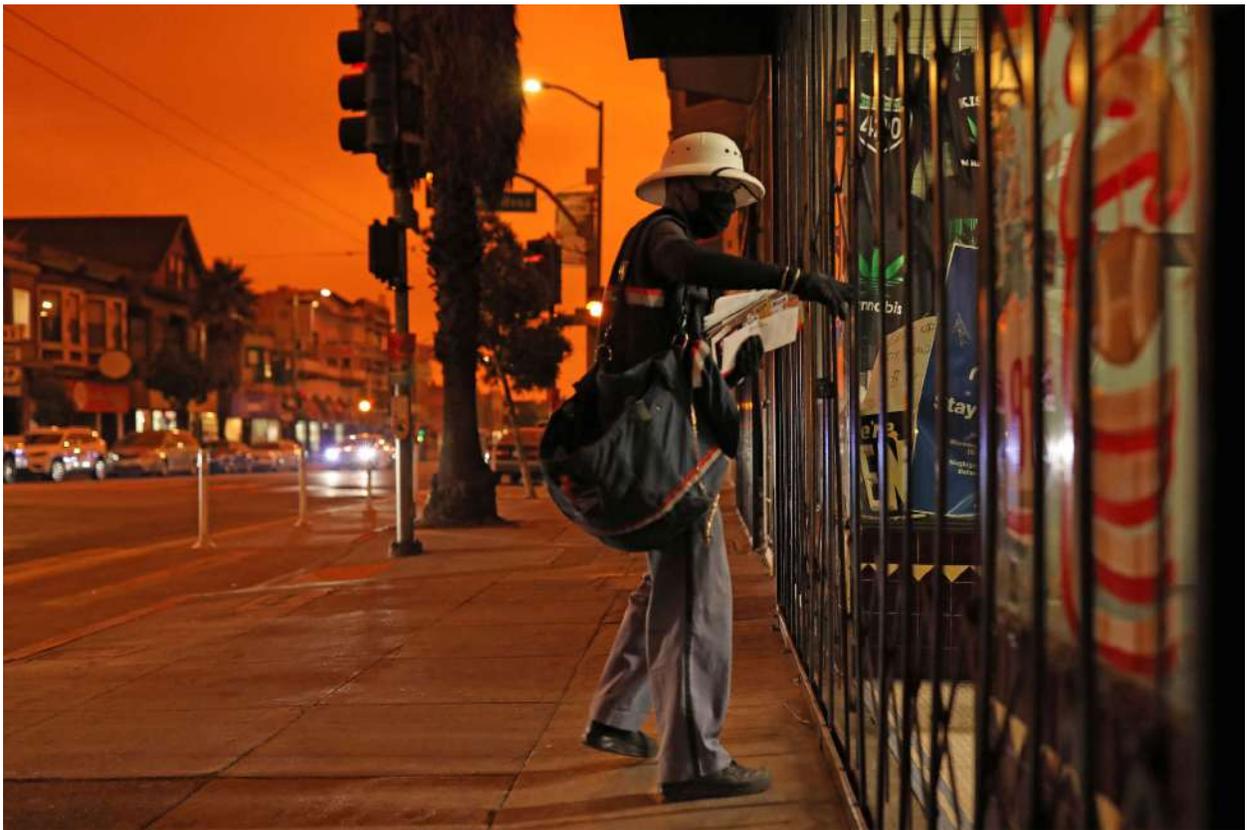


Figure 8.18: A mailman makes a delivery on September 9, 2020, in San Francisco, California.

8.2 Two time-scales

Why did Prof. Noam Chomsky call the US Republican Party “The most dangerous organization in the history of the world”? He did so because the party is characterized by climate change denial and by support for giant fossil fuel corporations. According to the 2018 IPCC Report, the world has only a very short time left in which to stop the extraction and use of fossil fuels. If we collectively fail to do this within a decade or so, feedback loops may be initiated which will make human efforts to avoid catastrophic climate change useless. Much of the world could become uninhabitable, and a very large-scale mass extinction could be initiated. Although the worst effects of global warming lie in the long-term future, children alive today are at risk. We give our children loving care, but it makes no sense to do so unless we also do everything in our power to ensure that they, and all future generations, will inherit a world in which they can survive.

8.3 The world is on fire

Although the worst threats from catastrophic climate change lie in the long-term future, we are starting to see the effects of climate change today. California is burning! As of August 28, 2020, 7175 fires have burned 1,660,332 acres, according to the California Department of Forestry and Fire Protection.

The Arctic is burning! A northeastern Siberian town, north of the Arctic Circle, is likely to have set a record for the highest temperature documented in the Arctic Circle, with a reading of 100.4 degrees (38 Celsius) recorded in June, 2020. The dangerous greenhouse gas methane is bubbling up from melting permafrost in the Arctic and from the shallow seas north of Siberia. Furthermore, wildfires in the Arctic are emitting an unprecedented amount of CO₂. Around 600 active fires have been observed in the region in late July, 2020, compared with 400 in 2019 and about 100 on average between 2003-2018.

The 2020 hurricane season has started early, notably with Laura, and it is predicted to be unusually severe. Greenland’s ice sheet is melting. Ice shelves are collapsing in the Antarctic. But despite these obvious signs of danger, the climate emergency is hardly mentioned in the 2020 political campaigns, or in U.S. mass media. It ought to be a central issue.

With Global Heating, Expect Inferno Seasons in the American West

Here are some quotations from an article by Peter Kalmus and Natasia Stavros, published in *LA times* on September 14, 2020²:

“More than 3.1 million acres have burned in California this year - some 3% of the state - with many wildfires still at zero containment and months of fire

²<https://popularresistance.org/with-global-heating-expect-inferno-seasons-in-the-american-west/>

season left to go. This far exceeds the previous record set in 2018, when 1.7 million acres burned, including the town of Paradise.

“These raging fires, some exacerbated by the blistering heat last weekend, are the direct result of climate change. The planet is currently 1.0°C to 1.2°C (about 2°F) hotter than it ought to be. This excess heat is entirely due to humans, mainly from burning fossil fuels and destroying forests. These activities release carbon dioxide into the atmosphere, which blocks some of the infrared heat photons that otherwise would radiate away into space.

“Global heating now makes heat waves more extreme and more than three times as frequent as they were in the 1960s. Heat records are being shattered everywhere. Even talking about records is starting to feel pointless when every year is practically guaranteed to be hotter than the last.

“Attribution studies now routinely connect individual heat waves to human activity. For example, Siberia’s searing 2020 heat wave was made 600 times more likely because of climate change, and Europe’s record 2019 heat wave was made up to 100 times more likely. These blasts of intense heat create hot and dry conditions that are ideal for fires, especially in ecosystems that thrived under cooler, damper conditions.

“Global heating also causes earlier spring snow melt and increases the likelihood of drought, making extremely dry soil and fuel conditions more likely. Drought and heat, in turn, stress trees, making them susceptible to attacks from beetles whose populations are less suppressed by warmer winters. Hundreds of millions of dead, dried-out trees throughout the western United States don’t just burn more easily, they explode.

“We may be experiencing an irreversible ecological tipping point, with forests in the West dying, to be replaced by scrub and grass.

“Tragically, even this year’s disasters are not the worst we can expect. In fact, heat waves and fires like what we are seeing in California, Oregon and Washington will continue to worsen as long as humanity continues to burn fossil fuels...”

Climate crisis: An emerging new Arctic

Here are some quotations from an article by the Countercurrents Collective, published on September 16, 2020³:

³<https://countercurrents.org/2020/09/climate-crisis-an-emerging-new-arctic/>

“A new Arctic is emerging. The regions landscape is changing rapidly. Temperatures are skyrocketing, sea ice is dwindling and many experts believe the far north is quickly transforming into something unrecognizable.

“This week, new research confirms that a new Arctic climate system is emerging.

“A new Arctic will be warmer, rainier and substantially less frozen. Animals that used to be common may disappear, while new species may move in to take their place. Opportunities for hunting and fishing by sea ice could dwindle. Shipping in the Arctic Ocean may significantly increase as the ice disappears...

“The scientists have found: Sea ice has already declined beyond the bounds of anything that would have been seen even a few decades ago. In other words, at least one signal of the new Arctic - driven by climate change - has already emerged.

“And sea ice declines will only get worse as time goes on. Under the extreme climate scenario, summer sea ice extent will fall below 1 million square kilometers - a threshold so low most scientists consider the Arctic Ocean ‘ice free’ at that point - by the 2070s at the latest, and potentially decades earlier...

“Sea ice can have a profound effect on Arctic temperatures. Ice has a bright, reflective surface that helps beam sunlight away from the Earth. Thick sea ice also helps insulate the ocean, trapping heat below the surface in the winter and preventing it from escaping into the cold Arctic air.

What happens in the Arctic and the Antarctic will have a profound effect on temperatures and sea levels throughout the world.

8.4 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.”

8.5 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. 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-



Figure 8.19: A firefighter battles fire in California. The world is currently 1 degree Centigrade warmer than preindustrial levels.



Figure 8.20: A new study from the NGO Oxfam International found that the world's richest 1% are responsible for more than twice as much CO₂ pollution as the poorest half of humanity. (Photo: isciencetimes.com)



Figure 8.21: A law enforcement officer watches flames launch into the air as fire continues to spread at the Bear fire in Oroville, California on September 9, 2020. (Photo: Josh Edelson/AFP via Getty Images). The giant fossil fuel corporations are committing terrible crimes against ordinary citizens and against the biosphere, but, like untouchable Mafia bosses, they are seldom brought to justice.



Figure 8.22: A MacGillivray's Warbler found dead in Fairplay, Colorado on Sept. 1, 2020. "It's just terrible," said Martha Desmond, a professor at the New Mexico State University's department of fish, wildlife and conservation ecology, to CNN. "The number is in the six figures. Just by looking at the scope of what we're seeing, we know this is a very large event, hundreds of thousands and maybe even millions of dead birds, and we're looking at the higher end of that." The die-off of birds is probable a result of the 2020 wildfires that have been devastating America's west coast.



Figure 8.23: Satellite images show that two important glaciers in the Antarctic are sustaining rapid damage at their most vulnerable points, leading to the breaking up of vital ice shelves with major consequences for global sea level rise. Human-induced warming of our oceans and atmosphere because of the increasing release of heat-trapping greenhouse gases is weakening the planet's ice shelves.



Figure 8.24: Donald Trump speaks during a briefing on wildfires with local and federal fire and emergency officials at Sacramento McClellan Airport in McClellan Park, California on September 14, 2020. (Photo: Brendan Smialowski / AFP via Getty Images). “It’ll start getting cooler, you just watch.” That is what President Donald Trump said during a televised summit in California focused on the catastrophic wildfires ripping through the state and other regions of the western United States. Climate activist Kristin Urquiza commented: “Trump is offering only conspiracy theories and weak excuses at a time when the planet desperately needs coherent American leadership on climate. He is unfit to lead.”



Figure 8.25: Then-Republican presidential nominee Donald Trump holds a sign supporting coal during a rally at Mohegan Sun Arena in Wilkes-Barre, Pa., on Oct. 10, 2016.

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.

Suggestions for further reading

1. A. Gore, *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*, Rodale Books, New York, (2006).
2. A. Gore, *Earth in the Balance: Forging a New Common Purpose*, Earthscan, (1992).
3. A.H. Ehrlich and P.R. Ehrlich, *Earth*, Thames and Methuen, (1987).
4. P.R. Ehrlich and A.H. Ehrlich, *The Population Explosion*, Simon and Schuster, (1990).
5. P.R. Ehrlich and A.H. Ehrlich, *Healing the Planet: Strategies for Resolving the Environmental Crisis*, Addison-Wesley, (1991).
6. P.R. Ehrlich and A.H. Ehrlich, *Betrayal of Science and Reason: How Anti-Environmental Rhetoric Threatens our Future*, Island Press, (1998).
7. P.R. Ehrlich and A.H. Ehrlich, *One With Nineveh: Politics, Consumption and the Human Future*, Island Press, (2004).
8. D.H. Meadows, D.L. Meadows, J. Randers, and W.W. Behrens III, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*, Universe Books, New York, (1972).
9. D.H. Meadows et al., *Beyond the Limits. Confronting Global Collapse and Envisioning a Sustainable Future*, Chelsea Green Publishing, Post Mills, Vermont, (1992).
10. D.H. Meadows, J. Randers and D.L. Meadows, *Limits to Growth: the 30-Year Update*, Chelsea Green Publishing, White River Jct., VT 05001, (2004).
11. A. Peccei and D. Ikeda, *Before it is Too Late*, Kodansha International, Tokyo, (1984).
12. V.K. Smith, ed., *Scarcity and Growth Reconsidered*, Johns Hopkins University Press, Baltimore, (1979).
13. British Petroleum, *BP Statistical Review of World Energy*, (published yearly).
14. R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*, Colombia University Press, New York, (1991).
15. J. Darmstadter, *A Global Energy Perspective*, Sustainable Development Issue Backgrounder, Resources for the Future, (2002).
16. D.C. Hall and J.V. Hall, *Concepts and Measures of Natural Resource Scarcity*, *Journal of Environmental Economics and Management*, **11**, 363-379, (1984).
17. M.K. Hubbert, *Energy Resources*, in *Resources and Man: A Study and Recommendations*, Committee on Resources and Man, National Academy of Sciences, National Research Council, W.H. Freeman, San Francisco, (1969).

18. Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis*, IPCC, (2001).
19. J.A. Krautkraemer, *Nonrenewable Resource Scarcity*, *Journal of Economic Literature*, **36**, 2065-2107, (1998).
20. N. Stern et al., *The Stern Review*, www.sternreview.org.uk, (2006).
21. T.M. Swanson, ed., *The Economics and Ecology of Biodiversity Decline: The Forces Driving Global Change*, Cambridge University Press, (1995).
22. P.M. Vitousek, H.A. Mooney, J. Lubchenco and J.M. Melillo, *Human Domination of Earth's Ecosystems*, *Science*, **277**, 494-499, (1997).
23. World Resources Institute, *World Resources 200-2001: People and Ecosystems: The Fraying Web of Life*, WRI, Washington D.C., (2000).
24. A. Sampson, *The Seven Sisters: The Great Oil Companies of the World and How They Were Made*, Hodder and Staughton, London, (1988).
25. D. Yergin, *The Prize*, Simon and Schuster, New York, (1991).
26. M.B. Stoff, *Oil, War and American Security: The Search for a National Policy on Oil, 1941-1947*, Yale University Press, New Haven, (1980).
27. J. Stork, *Middle East Oil and the Energy Crisis*, *Monthly Review*, New York, (1976).
28. F. Benn, *Oil Diplomacy in the Twentieth Century*, St. Martin's Press, New York, (1986).
29. K. Roosevelt, *Countercoup: The Struggle for the Control of Iran*, McGraw-Hill, New York, (1979).
30. E. Abrahamian, *Iran Between Two Revolutions*, Princeton University Press, Princeton, (1982).
31. J.M. Blair, *The Control of Oil*, Random House, New York, (1976).
32. M.T. Klare, *Resource Wars: The New Landscape of Global Conflict*, Owl Books reprint edition, New York, (2002).
33. H. Mejcher, *Imperial Quest for Oil: Iraq, 1910-1928*, Ithaca Books, London, (1976).
34. P. Sluglett, *Britain in Iraq, 1914-1932*, Ithaca Press, London, (1976).
35. D.E. Omissi, *British Air Power and Colonial Control in Iraq, 1920-1925*, Manchester University Press, Manchester, (1990).
36. V.G. Kiernan, *Colonial Empires and Armies, 1815-1960*, Sutton, Stroud, (1998).
37. R. Solh, *Britain's 2 Wars With Iraq*, Ithaca Press, Reading, (1996).
38. D. Morgan and D.B. Ottaway, *In Iraqi War Scenario, Oil is Key Issue as U.S. Drillers Eye Huge petroleum Pool*, *Washington Post*, September 15, (2002).
39. C.J. Cleveland, *Physical and Economic Aspects of Natural Resource Scarcity: The Cost of Oil Supply in the Lower 48 United States 1936-1987*, *Resources and Energy* **13**, 163-188, (1991).
40. C.J. Cleveland, *Yield Per Effort for Additions to Crude Oil Reserves in the Lower 48 States, 1946-1989*, *American Association of Petroleum Geologists Bulletin*, **76**, 948-958, (1992).
41. M.K. Hubbert, *Technique of Prediction as Applied to the Production of Oil and Gas*, in *NBS Special Publication 631*, US Department of Commerce, National Bureau of Standards, (1982).

42. L.F. Ivanhoe, *Oil Discovery Indices and Projected Discoveries*, Oil and Gas Journal, **11**, 19, (1984).
43. L.F. Ivanhoe, *Future Crude Oil Supplies and Prices*, Oil and Gas Journal, July 25, 111-112, (1988).
44. L.F. Ivanhoe, *Updated Hubbert Curves Analyze World Oil Supply*, World Oil, November, 91-94, (1996).
45. L.F. Ivanhoe, *Get Ready for Another Oil Shock!*, The Futurist, January-February, 20-23, (1997).
46. Energy Information Administration, *International Energy Outlook, 2001*, US Department of Energy, (2001).
47. Energy Information Administration, *Caspian Sea Region*, US Department of Energy, (2001).
48. National Energy Policy Development Group, *National Energy Policy*, The White House, (<http://www.whitehouse.gov/energy/>), (2004).
49. M. Klare, *Bush-Cheney Energy Strategy: Procuring the Rest of the World's Oil*, Foreign Policy in Focus, (Interhemispheric Resource Center/Institute for Policy Studies/SEEN), Washington DC and Silver City NM, January, (2004).
50. IEA, *CO2 from Fuel Combustion Fact-Sheet*, International Energy Agency, (2005).
51. H. Youguo, *China's Coal Demand Outlook for 2020 and Analysis of Coal Supply Capacity*, International Energy Agency, (2003).
52. R.H. Williams, *Advanced Energy Supply Technologies*, in **World Energy Assessment: Energy and the Challenge of Sustainability**, UNDP, (2000).
53. H. Lehmann, *Energy Rich Japan*, Institute for Sustainable Solutions and Innovations, Aachen, (2003).
54. D. King, *Climate Change Science: Adapt, Mitigate or Ignore*, Science, **303** (5655), pp. 176-177, (2004).
55. S. Connor, *Global Warming Past Point of No Return*, The Independent, (116 September, 2005).
56. D. Rind, *Drying Out the Tropics*, New Scientist (6 May, 1995).
57. J. Patz et al., *Impact of Regional Climate Change on Human Health*, Nature, (17 November, 2005).
58. M. McCarthy, *China Crisis: Threat to the Global Environment*, The Independent, (19 October, 2005).
59. L.R. Brown, *The Twenty-Ninth Day*, W.W. Norton, New York, (1978).
60. W.V. Chandler, *Materials Recycling: The Virtue of Necessity*, Worldwatch Paper 56, Worldwatch Institute, Washington D.C, (1983).
61. W.C. Clark and others, *Managing Planet Earth*, Special Issue, *Scientific American*, September, (1989).
62. B. Commoner, *The Closing Circle: Nature, Man and Technology*, Bantam Books, New York, (1972).
63. C. Flavin, *Slowing Global Warming: A Worldwide Strategy*, Worldwatch Paper 91, Worldwatch Institute, Washington D.C., (1989).

64. J.R. Frisch, *Energy 2000-2020: World Prospects and Regional Stresses*, World Energy Conference, Graham and Trotman, (1983).
65. J. Gever, R. Kaufmann, D. Skole and C. Vorosmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Ballinger, Cambridge MA, (1986).
66. J. Holdren and P. Herrera, *Energy*, Sierra Club Books, New York, (1971).
67. N. Myers, *The Sinking Ark*, Pergamon, New York, (1972).
68. National Academy of Sciences, *Energy and Climate*, NAS, Washington D.C., (1977).
69. W. Ophuls, *Ecology and the Politics of Scarcity*, W.H. Freeman, San Francisco, (1977).
70. A. Peccei, *The Human Quality*, Pergamon Press, Oxford, (1977).
71. A. Peccei, *One Hundred Pages for the Future*, Pergamon Press, New York, (1977).
72. E. Pestel, *Beyond the Limits to Growth*, Universe Books, New York, (1989).
73. C. Pollock, *Mining Urban Wastes: The Potential for Recycling*, Worldwatch Paper 76, Worldwatch Institute, Washington D.C., (1987).
74. S.H. Schneider, *The Genesis Strategy: Climate and Global Survival*, Plenum Press, (1976).
75. P.B. Smith, J.D. Schilling and A.P. Haines, *Introduction and Summary*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
76. World Resources Institute, *World Resources*, Oxford University Press, New York, (published annually).
77. J.E. Young, John E., *Mining the Earth*, Worldwatch Paper 109, Worldwatch Institute, Washington D.C., (1992).
78. J.R. Craig, D.J. Vaughan and B.J. Skinner, *Resources of the Earth: Origin, Use and Environmental Impact, Third Edition*, Prentice Hall, (2001).
79. W. Youngquist, *Geodesinies: The Inevitable Control of Earth Resources Over Nations and Individuals*, National Book Company, Portland Oregon, (1997).
80. M. Tanzer, *The Race for Resources. Continuing Struggles Over Minerals and Fuels*, Monthly Review Press, New York, (1980).
81. C.B. Reed, *Fuels, Minerals and Human Survival*, Ann Arbor Science Publishers Inc., Ann Arbor Michigan, (1975).
82. A.A. Bartlett, *Forgotten Fundamentals of the Energy Crisis*, American Journal of Physics, **46**, 876-888, (1978).
83. N. Gall, *We are Living Off Our Capital*, Forbes, September, (1986).
84. M. Anklin et al., *Climate instability during the last interglacial period recorded in the GRIP ice core*. Nature **364**, 15 July: 203-207, (1993).
85. O. J. Blanchard and S. Fischer, *Lectures on Macroeconomics*. Cambridge, Mass.: MIT Press. (1989).

Chapter 9

A NEW SOCIAL CONTRACT

9.1 Caring for the future of our children

Our present situation is this:

The future looks extremely dark because of human folly, especially the long-term future. The greatest threats are catastrophic climate change and thermonuclear war, but a large-scale global famine also has to be considered.

We give our children loving care, but it makes no sense do so and at the same time to neglect to do all that is within our power to ensure that they and their descendants will inherit an earth in which they can survive. We also have a responsibility to all the other living organisms with which we share the gift of life.

Inaction is not an option. We have to act with courage and dedication, even if the odds are against success, because the stakes are so high. The mass media could mobilize us to action, but they have failed in their duty. Our educational system could also wake us up and make us act, but it too has failed us. The battle to save the earth from human greed and folly has to be fought in the alternative media. Hence this book, and hence urgent the tone of this final chapter.

We need a new economic system, a new society, a new social contract, a new way of life. Here are the great tasks that history has given to our generation: We must achieve a steady-state economic system. We must restore democracy. We must decrease economic inequality. We must break the power of corporate greed. We must leave fossil fuels in the ground. We must stabilize and ultimately reduce the global population. We must eliminate the institution of war. And finally, we must develop a more mature ethical system to match our new technology.

9.2 We must achieve a steady-state economic system

A steady-state economic system is necessary because neither population growth nor economic growth can continue indefinitely on a finite earth. No one can maintain that exponential industrial growth is sustainable in the long run except by refusing to look more



Figure 9.1: Nicholas Georgescu-Roegen: He showed that our present economic system is not cyclic but unidirectional, since it involves the irreversible degradation of non-renewable resources.

than a short distance into the future.

Of course, it is necessary to distinguish between industrial growth, and growth of culture and knowledge, which can and should continue to grow. Qualitative improvements in human society are possible and desirable, but resource-using and pollution-producing industrial growth is reaching its limits, both because of ecological constraints and because of the exhaustion of petroleum, natural gas and other non-renewable resources, such as metals. The threat of catastrophic climate change makes it imperative for us to stop using fossil fuels within very few decades.

Our present economic system as unidirectional and entropic: Low-entropy resources are converted into high-entropy waste, a unidirectional process. By contrast, to be sustainable in the long run, a process must be cyclic, like the growth and regeneration of a forest.

Georgescu-Roegen's list of desiderata remains valid today: We need drastic cuts in weapons production, thereby releasing productive forces for more constructive purposes. We need immediate aid to underdeveloped countries and gradual decrease in population to a level that can be maintained by organic agriculture. We also need avoidance, and strict regulation if necessary, of wasteful energy use. Finally, we need to abandon our attachment to extravagant gadgetry and fashion, and we must cure ourselves of workaholic habits by re-balancing the time spent on work and leisure.

Today, the distinguished economist Herman Daly (a student of Georgescu-Roegen) continues to write perceptive articles and books documenting the need for a steady-state economy. Among his books, the following are noteworthy: "Steady-State Economics" (1977); "For the Common Good" (1989, with John B. Cobb, Jr.); "Valuing the Earth" (1993, with Kenneth Townsend); "Beyond Growth" (1996); "Ecological Economics and the Ecology of Economics" (1999); "Local Politics of Global Sustainability" (2000, with Thomas Prugh and Robert Costanza), and "Ecological Economics: Principles and Applications" (2003,



Figure 9.2: Herman E. Daly: A student of Georgescu-Roegen the distinguished economist, Prof. H.E. Daly calls for a transition to a steady-state economic system, in which processes would be cyclic and sustainable.

with Joshua Farley.¹

¹<http://steadystate.org/category/herman-daly/>
https://en.wikipedia.org/wiki/Herman_Daly
<http://grist.org/article/bank/>
<http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf>
<http://www.clubofrome.org/?p=326>

9.3 We must restore democracy

It is obvious, almost by definition, that excessive governmental secrecy and true democracy are incompatible. If the people of a country have no idea what their government is doing, they cannot possibly have the influence on decisions that the word “democracy” implies.

Governmental secrecy is not something new. Secret diplomacy contributed to the outbreak of World War I, and the secret Sykes-Picot Agreement later contributed to the bitterness of conflicts in the Middle East. However, in recent years, governmental secrecy has grown enormously.

The revelations of Edward Snowden have shown that the number of people involved in secret operations of the United States government is now as large as the entire population of Norway: roughly 5 million. The influence of this dark side of government has become so great that no president is able to resist it.

Many modern governments have become very expert in manipulating public opinion through mass media. They only allow the public to hear a version of the “news” that has been handed down by powerholders. Of course, people can turn to the alternative media that are available on the Internet. But on the whole, the vision of the world presented on television screens and in major newspapers is the “truth” that is accepted by the majority of the public, and it is this picture of events that influences political decisions. Censorship of the news by the power elite is a form of secrecy, since it withholds information that is needed for a democracy to function properly.

Snowden has already said most of what he has to say. Nevertheless, Washington was willing to break international law and the rules of diplomatic immunity by forcing its European allies to ground the plane of Bolivian President Evo Morales following a rumor that Snowden was on board. This was not done to prevent Snowden from saying more, but with the intention of making a gruesome example of him, as a warning to other whistleblowers.

In a democracy, the power of judging and controlling governmental policy is supposed to be in the hands of the people. It is completely clear that if the people do not know what their government is doing, then they cannot judge or control governmental policy, and democracy has been abolished. There has always been a glaring contradiction between democracy and secret branches of the government, such as the CIA, which conducts its assassinations and its dirty wars in South America and elsewhere without any public knowledge or control.

The gross, wholesale electronic spying on citizens revealed by Snowden seems to be specifically aimed at eliminating democracy. It is aimed at instilling universal fear and conformity, fear of blackmail and fear of being out of step, so that the public will not dare to oppose whatever the government does, no matter how criminal or unconstitutional.

We must restore democracy wherever it has been replaced by oligarchy. When we do so, we will free ourselves from many evils, including excessive economic inequality, violation of civil rights, and the suffering produced by perpetual wars.



Figure 9.3: Edward Snowden.

9.4 We must decrease economic inequality

In his Apostolic Exhortation, “*Evangelii Gaudium*”, Pope Francis said: “In our time humanity is experiencing a turning-point in its history, as we can see from the advances being made in so many fields. We can only praise the steps being taken to improve people’s welfare in areas such as health care, education and communications. At the same time we have to remember that the majority of our contemporaries are barely living from day to day, with dire consequences. A number of diseases are spreading. The hearts of many people are gripped by fear and desperation, even in the so-called rich countries. The joy of living frequently fades, lack of respect for others and violence are on the rise, and inequality is increasingly evident. It is a struggle to live and, often, to live with precious little dignity.”

“This epochal change has been set in motion by the enormous qualitative, quantitative, rapid and cumulative advances occurring in the sciences and in technology, and by their instant application in different areas of nature and of life. We are in an age of knowledge and information, which has led to new and often anonymous kinds of power.”



Figure 9.4: We must decrease economic inequality.

“Just as the commandment ‘Thou shalt not kill’ sets a clear limit in order to safeguard the value of human life, today we also have to say ‘thou shalt not’ to an economy of exclusion and inequality. Such an economy kills. How can it be that it is not a news item when an elderly homeless person dies of exposure, but it is news when the stock market loses two points? This is a case of exclusion. Can we continue to stand by when food is thrown away while people are starving? This is a case of inequality. Today everything comes under the laws of competition and the survival of the fittest, where the powerful feed upon the powerless. As a consequence, masses of people find themselves excluded and marginalized: without work, without possibilities, without any means of escape.”

“In this context, some people continue to defend trickle-down theories which assume that economic growth, encouraged by a free market, will inevitably succeed in bringing about greater justice and inclusiveness in the world. This opinion, which has never been confirmed by the facts, expresses a crude and naive trust in the goodness of those wielding economic power and in the sacralized workings of the prevailing economic system. Meanwhile, the excluded are still waiting.”

In a recent speech, Senator Bernie Sanders quoted Pope Francis extensively and added: “We have a situation today, Mr. President, incredible as it may sound, where the wealthiest 85 people in the world own more wealth than the bottom half of the world’s population.”²

The social epidemiologist Prof. Richard Wilkinson, has documented the ways in which societies with less economic inequality do better than more unequal societies in a number of areas, including increased rates of life expectancy, mathematical performance, literacy, trust, social mobility, together with decreased rates of infant mortality, homicides, imprisonment, teenage births, obesity and mental illness, including drug and alcohol addiction.³ We must also remember that according to the economist John A. Hobson, the basic problem that led to imperialism was an excessively unequal distribution of incomes in the industrialized countries. The result of this unequal distribution was that neither the rich nor the poor could buy back the total output of their society. The incomes of the poor were insufficient, and rich were too few in number.

9.5 We must break the power of corporate greed

When the United Nations was established in 1945, the purpose of the organization was to abolish the institution of war. This goal was built into many of the articles of the UN Charter. Accordingly, throughout the world, many War Departments were renamed and became Departments of Defense. But the very name is a lie. In an age of nuclear threats

²https://www.youtube.com/watch?v=9_LJpN893Vg
<https://www.oxfam.org/en/tags/inequality>
https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/cr-even-it-up-extreme-inequality-291014-en.pdf

³<https://www.youtube.com/watch?v=cZ7LzE3u7Bw>
https://en.wikipedia.org/wiki/Richard_G._Wilkinson



Figure 9.5: We must break the power of corporate greed.



Figure 9.6: Greed is driving us towards disaster.

and counter-threats, populations are by no means protected. Ordinary citizens are just hostages in a game for power and money. It is all about greed.

Why is war continually threatened? Why is Russia threatened? Why is war with Iran threatened? Why fan the flames of conflict with China? Is it to “protect” civilians? Absolutely not! In a thermonuclear war, hundreds of millions of civilians would die horribly everywhere in the world, also in neutral countries. What is really being protected are the profits of arms manufacturers. As long as there are tensions; as long as there is a threat of war, military budgets are safe; and the profits of arms makers are safe. The people in several “democracies”, for example the United States, do not rule at the moment. Greed rules.

As Institute Professor Noam Chomsky of MIT has pointed out, greed and lack of ethics are built into the structure of corporations. By law, the Chief Executive Officer of a corporation must be entirely motivated by the collective greed of the stockholders. He

must maximize profits. If the CEO abandons this single-minded chase after corporate profits for ethical reasons, or for the sake of humanity or the biosphere or the future, he (or she) must, by law, be fired and replaced.

Occasionally, for the sake of their public image, corporations seem to do something for other motives than their own bottom line, but it is usually window dressing. For example, Shell claims to be supporting research on renewable energy. Perhaps there is indeed a small renewable energy laboratory somewhere in that vast corporation; but the real interest of the organization is somewhere else. Shell is sending equipment on a large scale to drill for more and more environment-destroying oil in the Arctic.⁴

9.6 We must leave fossil fuels in the ground

The threat of catastrophic climate change requires prompt and dedicated action by the global community. Unless we very quickly make the transition from fossil fuels to 100% renewable energy, we will reach a tipping point after which uncontrollable feedback loops could take over, leading to a human-caused 6th geological extinction event. This might even be comparable to the Permian-Triassic event, during which 96% of all marine species and 70% of terrestrial vertebrates became extinct.

New hope that such a catastrophe for human civilization and the biosphere can be avoided comes from two recently-released documents: The Encyclical “Laudato Si’ ” by Pope Francis, and the statistics on the rate of growth of renewable energy newly released by the Earth Policy Institute.

Arctic sea-ice is melting at an increasingly rapid rate, because of several feedback loops. One of these feedback loops, called the albedo effect, is due to the fact that white snow-covered sea-ice in the Arctic reflects sunlight, while dark water absorbs it, raising the temperature and leading to more melting.

Another feedback loop is due to the fact that rising temperatures mean that more water is evaporated. The water vapor in the atmosphere acts like a greenhouse gas, and raises the temperature still further.

If we consider long-term effects, by far the most dangerous of the feedback loops is the melting of methane hydrate crystals and the release of methane into the atmosphere, where its effects as a greenhouse gas are roughly twenty times great as those of CO₂.

When organic matter is carried into the oceans by rivers, it decays to form methane. The methane then combines with water to form hydrate crystals, which are stable at the temperatures which currently exist on ocean floors. However, if the temperature rises, the crystals become unstable, and methane gas bubbles up to the surface.

The worrying thing about methane hydrate deposits on ocean floors is the enormous amount of carbon involved: roughly 10,000 gigatons. To put this huge amount into perspective, we can remember that the total amount in world CO₂ emissions since 1751 has

⁴<http://www.countercurrents.org/avery170715.htm>
<http://human-wrongs-watch.net/2015/06/25/militarisms-hostages/>
<https://www.youtube.com/watch?v=FJUA4cm0Rck>



Figure 9.7: **We must leave fossil fuels in the ground.**

been only 337 gigatons.

Despite the worrying nature of the threats that we are facing, there are reasons for hope. One of the greatest of these is the beautiful, profound and powerful encyclical that has just been released by Pope Francis.⁵

Pope Francis tells us that the dictates of today's economists are not sacred: In the future, if we are to survive, economics must be given both a social conscience and an ecological conscience. Nor are private property and profits sacred. They must be subordinated to the common good, and the preservation of our global commons. Less focus on material goods need not make us less happy. The quality of our lives can be increased, not decreased, if we give up our restless chase after power and wealth, and derive more of our pleasures from art, music and literature, and from conversations with our families and friends.

Another reason for hope can be found in the extremely high present rate of growth of renewable energy, and in the remarkable properties of exponential growth. According to figures recently released by the Earth Policy Institute,⁶ the global installed photovoltaic capacity is currently able to deliver 242,000 megawatts, and it is increasing at the rate of 27.8% per year. Wind energy can now deliver 370,000 megawatts, and it is increasing at the rate of roughly 20% per year.

Because of the astonishing properties of exponential growth, we can calculate that if these growth rates are maintained, renewable energy can give us 24.8 terawatts within only 15 years! This is far more than the world's present use of all forms of energy.

All of us must still work with dedication to provide the political will needed to avoid catastrophic climate change. However, the strong and friendly voice of Pope Francis, and the remarkable rate of growth of renewable energy can guide our work, and can give us hope and courage.

⁵http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

⁶<http://www.earth-policy.org/books/tgt>

The award-winning author and activist Naomi Klein has emphasized that the climate crisis changes everything. Environmentalists and antiwar activists must unite! We need a new economic system! The people of the world don't want climate change; they want system change!⁷

9.7 We must stabilize, and ultimately reduce, global population

According to the World Resources Institute and the United Nations Environment Programme, "It is estimated that since World War II, 1.2 billion hectares...[of agricultural land] has suffered at least moderate degradation as a result of human activity. This is a vast area, roughly the size of China and India combined." This area is 27% of the total area currently devoted to agriculture 5 . The report goes on to say that the degradation is greatest in Africa.

David Pimental and his associates at Cornell University pointed out in 1995 that "Because of erosion-associated loss of productivity and population growth, the per capita food supply has been reduced over the past 10 years and continues to fall. The Food and Agricultural Organization reports that the per capita production of grains which make up 80% of the world's food supply, has been declining since 1984."

Pimental et al. add that "Not only is the availability of cropland per capita decreasing as the world population grows, but arable land is being lost due to excessive pressure on the environment. For instance, during the past 40 years nearly one-third of the world's cropland (1.5 billion hectares) has been abandoned because of soil erosion and degradation. Most of the replacement has come from marginal land made available by removing forests. Agriculture accounts for 80% of the annual deforestation."

The phrase "developing countries" is more than a euphemism; it expresses the hope that with the help of a transfer of technology from the industrialized nations, all parts of the world can achieve prosperity. An important factor that prevents the achievement of worldwide prosperity is population growth.

In the words of Dr. Halfdan Mahler, former Director General of the World Health Organization, "Country after country has seen painfully achieved increases in total output,

⁷<https://www.transcend.org/tms/2015/03/naomi-klein-the-economic-system-we-have-created-global-warming/>

<http://thischangeseverything.org/naomi-klein/>

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

<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>

<https://www.youtube.com/watch?v=sRGVTK-AAvw>

<https://www.youtube.com/watch?v=MVwmi7HCmSI>

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

<https://www.youtube.com/watch?v=m6pFDu7ILV4>

<https://www.youtube.com/watch?v=MVwmi7HCmSI>

<http://therightsofnature.org/universal-declaration/>

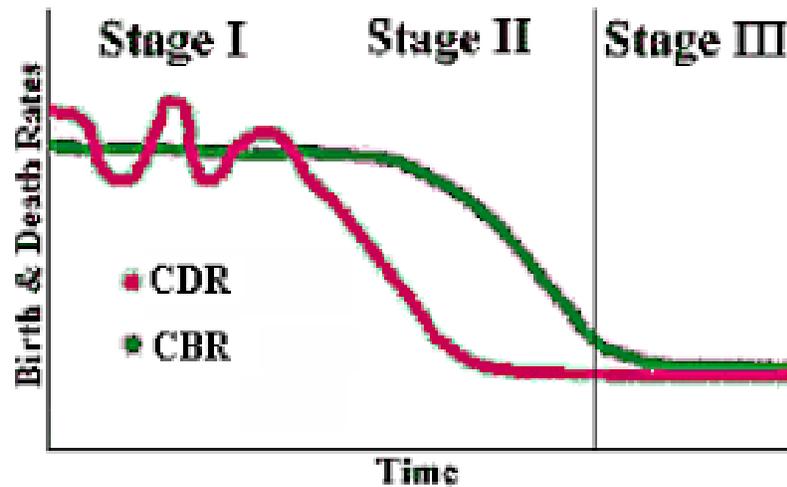


Figure 9.8: **We must stabilize, and ultimately reduce, global population. If we are to avoid a large-scale famine, all countries must pass through the demographic transition.**

food production, health and educational facilities and employment opportunities reduced or nullified by excessive population growth.”

The growth of population is linked to excessive urbanization, infrastructure failures and unemployment. In rural districts in the developing countries, family farms are often divided among a growing number of heirs until they can no longer be subdivided. Those family members who are no longer needed on the land have no alternative except migration to overcrowded cities, where the infrastructure is unable to cope so many new arrivals. Often the new migrants are forced to live in excrement-filled makeshift slums, where dysentery, hepatitis and typhoid are endemic, and where the conditions for human life sink to the lowest imaginable level. In Brazil, such shanty towns are called “favelas”.

If modern farming methods are introduced in rural areas while population growth continues, the exodus to cities is aggravated, since modern techniques are less labor-intensive and favor large farms. In cities, the development of adequate infrastructure requires time, and it becomes a hopeless task if populations are growing rapidly. Thus, population stabilization is a necessary first step for development.

It can be observed that birth rates fall as countries develop. However, development is sometimes blocked by the same high birth rates that economic progress might have prevented. In this situation (known as the “demographic trap”), economic gains disappear immediately because of the demands of an exploding population.

For countries caught in the demographic trap, government birth control programs are especially important, because one cannot rely on improved social conditions to slow birth rates. Since health and lowered birth rates should be linked, it is appropriate that family-planning should be an important part of programs for public health and economic development.

A recent study conducted by Robert F. Lapham of Demographic Health Surveys and W. Parker Maudlin of the Rockefeller Foundation has shown that the use of birth control is correlated both with socio-economic setting and with the existence of strong family-planning programs. The implication of this study is that even in the absence of increased living standards, family planning programs can be successful, provided they have strong government support.

Education of women and higher status for women are vitally important measures, not only for their own sake, but also because in many countries these social reforms have proved to be the key to lower birth rates. As Sir Partha Dasgupta of Cambridge University has pointed out, the changes needed to break the cycle of overpopulation and poverty are all desirable in themselves. Besides education and higher status for women, they include state-provided social security for old people, provision of water supplies near to dwellings, provision of health services to all, abolition of child labor and general economic development. The money required to make these desirable changes is a tiny fraction of the amount that is currently wasted on war.

In order to avoid a catastrophic future famine, it is vitally important that all of the countries of the world should quickly pass through a demographic transition from a situation characterized by high birth rates and high death rates to a new equilibrium, where low death rates are balanced by low birth rates.

9.8 We must eliminate the institution of war

The problem of achieving internal peace over a large geographical area is not insoluble. It has already been solved. There exist today many nations or regions within each of which there is internal peace, and some of these are so large that they are almost worlds in themselves. One thinks of China, India, Brazil, Australia, the Russian Federation, the United States, and the European Union. Many of these enormous societies contain a variety of ethnic groups, a variety of religions and a variety of languages, as well as striking contrasts between wealth and poverty. If these great land areas have been forged into peaceful and cooperative societies, cannot the same methods of government be applied globally?

But what are the methods that nations use to achieve internal peace? Firstly, every true government needs to have the power to make and enforce laws that are binding on individual citizens. Secondly the power of taxation is a necessity. Thirdly, within their own territories, almost all nations have more military power than any of their subunits. For example, the US Army is more powerful than the State Militia of Illinois.

This unbalance of power contributes to the stability of the Federal Government of the United States. When the FBI wanted to arrest Al Capone, it did not have to bomb Chicago. Agents just went into the city and arrested the gangster. Even if Capone had been enormously popular in Illinois, the the government of the state would have realized in advance that it had no chance of resisting the US Federal Government, and it still would have allowed the "Feds" to make their arrest. Similar considerations hold for almost all

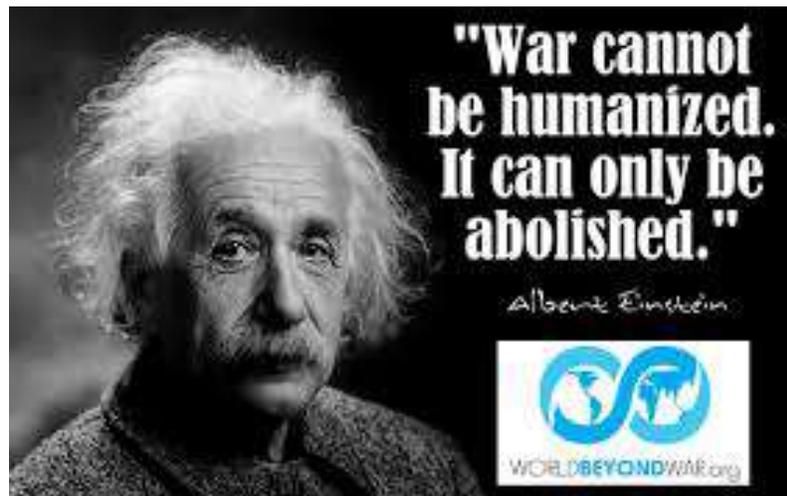


Figure 9.9: **We must abolish the institution of war.**

nations within which there is internal peace. It is true that there are some nations within which subnational groups have more power than the national government, but these are frequently characterized by civil wars.

Of the large land areas within which internal peace has been achieved, the European Union differs from the others because its member states still maintain powerful armies. The EU forms a realistic model for what can be achieved globally in the near future by reforming and strengthening the United Nations. In the distant future, however, we can imagine a time when a world federal authority will have much more power than any of its member states, and when national armies will have only the size needed to maintain local order.

Today there is a pressing need to enlarge the size of the political unit from the nation-state to the entire world. The need to do so results from the terrible dangers of modern weapons and from global economic interdependence. The progress of science has created this need, but science has also given us the means to enlarge the political unit: Our almost miraculous modern communications media, if properly used, have the power to weld all of humankind into a single supportive and cooperative society.

9.9 Educational reforms

Educational reforms are urgently needed, particularly in the teaching of history. As it is taught today, history is a chronicle of power struggles and war, told from a biased national standpoint. Our own race or religion is superior; our own country is always heroic and in the right.

We urgently need to replace this indoctrination in chauvinism by a reformed view of history, where the slow development of human culture is described, giving adequate credit to all those who have contributed. Our modern civilization is built on the achievements

of ancient cultures. China, India, Mesopotamia, ancient Egypt, Greece, the Islamic world, Christian Europe, and Jewish intellectual traditions all have contributed. Potatoes, corn and squash are gifts from the American Indians. Human culture, gradually built up over thousands of years by the patient work of millions of hands and minds, should be presented to students of history as a precious heritage - far too precious to be risked in a thermonuclear war.

In the teaching of science too, reforms are needed. Graduates in science and technology should be conscious of their responsibilities. They must resolve never to use their education in the service of war, or in any way which might be harmful to society or to the environment.

In modern societies, mass media play an extremely important role in determining behavior and attitudes. This role can be a negative one when the media show violence and enemy images, but if used constructively, the mass media can offer a powerful means for creating international understanding. If it is indeed true that tribalism is part of human nature, it is extremely important that the mass media be used to the utmost to overcome the barriers between nations and cultures. Through increased communication, the world's peoples can learn to accept each other as members of a single family.

Finally, let us turn to religion, with its enormous influence on human thought and behavior. Christianity, for example, offers a strongly stated ethic, which, if practiced, would make war impossible. In Mathew, the following passage occurs: "Ye have heard it said: Thou shalt love thy neighbor and hate thy 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 that spitefully use you and persecute you."

This seemingly impractical advice, that we should love our enemies, is in fact of the greatest practicality, since acts of unilateral kindness and generosity can stop escalatory cycles of revenge and counter-revenge such as those which characterize the present conflict in the Middle East and the recent troubles of Northern Ireland. However, Christian nations, while claiming to adhere to the ethic of love and forgiveness, have adopted a policy of "massive retaliation", involving systems of thermonuclear missiles whose purpose is to destroy as much as possible of the country at which the retaliation is aimed. It is planned that entire populations shall be killed in a "massive retaliation", innocent children along with the guilty politicians. The startling contradiction between what the Christian nations profess and what they do was obvious even before the advent of nuclear weapons, at the time when Leo Tolstoy, during his last years, was exchanging letters with a young Indian lawyer in South Africa. In one of his letters to Gandhi, Tolstoy wrote:

"...The whole life of the Christian peoples is a continuous contradiction between that which 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..."

"This year, in the spring, at a Scripture examination at 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 the usual sophisms of the bishop, she answered with decided conviction that killing was always 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."

As everyone knows, Gandhi successfully applied the principle of non-violence to the civil rights struggle in South Africa, and later to the political movement, which gave India its freedom and independence. The principle of non-violence was also successfully applied by Martin Luther King, and by Nelson Mandela. It is perhaps worthwhile to consider Gandhi's comment on the question of whether the end justifies the means: "The means may be likened to a seed", Gandhi wrote, "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." In other words, a dirty method produces a dirty result; killing produces more killing; hate leads to more hate. Everyone who reads the newspapers knows that this is true. 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. Buddhists call this principle of reciprocity "the law of karma".

The religious leaders of the 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. If they fail to do this, they will have failed humankind at a time of crisis.

It is useful to consider the analogy between the institution of war and the institution of slavery. We might be tempted to say, "There has always been war, throughout human history; and war will always continue to exist." As an antidote for this kind of pessimism, we can think of slavery, which, like war, has existed throughout most of recorded history. The cultures of ancient Egypt, Greece and Rome were all based on slavery, and, in more recent times, 13 million Africans were captured and forced into a life of slavery in the New World. Slavery was as much an accepted and established institution as war is today. Many people made large profits from slavery, just as arms manufacturers today make enormous profits. Nevertheless, in spite of the weight of vested interests, slavery has now been abolished throughout most of the world.

Today we look with horror at drawings of slave ships, where human beings were packed together like cord-wood; and we are amazed that such cruelty could have been possible. Can we not hope for a time when our descendants, reading descriptions of the wars of the twentieth century, will be equally amazed that such cruelty could have been possible? If we use them constructively, the vast resources now wasted on war can initiate a new era of happiness and prosperity for the Family of man. It is within our power to let this happen. The example of the men and women who worked to rid the world of slavery can give us

courage as we strive for a time when war will exist only as a dark memory fading into the past.

9.10 Culture, education and human solidarity

Cultural and educational activities have a small ecological footprint, and therefore are more sustainable than pollution-producing, fossil-fuel-using jobs in industry. Furthermore, since culture and knowledge are shared among all nations, work in culture and education leads societies naturally towards internationalism and peace.

Economies based on a high level of consumption of material goods are unsustainable and will have to be abandoned by a future world that renounces the use of fossil fuels in order to avoid catastrophic climate change, a world where non-renewable resources such as metals will become increasingly rare and expensive. How then can full employment be maintained?

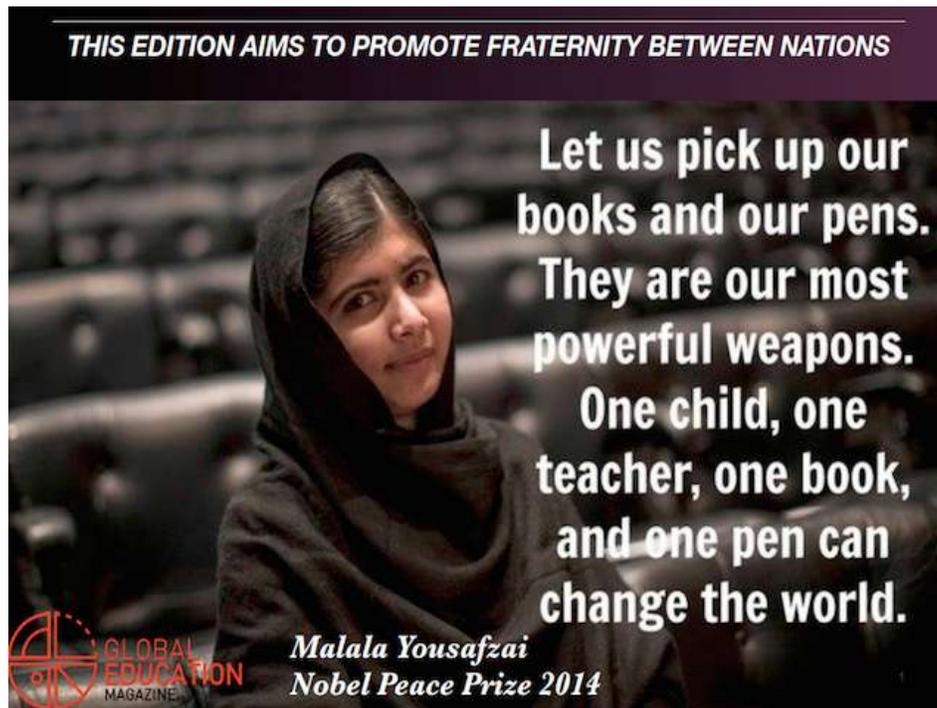
The creation of renewable energy infrastructure will provide work for a large number of people; but in addition, sustainable economies of the future will need to shift many workers from jobs in industry to jobs in the service sector. Within the service sector, jobs in culture and education are particularly valuable because they will help to avoid the disastrous wars that are currently producing enormous human suffering and millions of refugees, wars that threaten to escalate into an all-destroying global thermonuclear war.⁸

Human nature has two sides: It has a dark side, to which nationalism and militarism appeal; but our species also has a genius for cooperation, which we can see in the growth of culture. 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, chilli peppers, and quinine are gifts from the American Indians.⁹

We need to reform our educational systems, particularly the teaching of history. As it is taught today, history is a chronicle of power struggles and war, told from a biased national standpoint. We are taught that our own country is always heroic and in the right. We urgently need to replace this indoctrination in chauvinism by a reformed view of history, where the slow development of human culture is described, giving credit to all who have contributed. When we teach history, it should not be about power struggles. It should be about how human culture was gradually built up over thousands of years by the patient work of millions of hands and minds. Our common global culture, the music, science, literature and art that all of us share, should be presented as a precious heritage - far too precious to be risked in a thermonuclear war.

We have to extend our loyalty to the whole of the human race, and to work for a world not only free from nuclear weapons, but free from war. A war-free world is not utopian but

⁸<http://www.fredsakademiet.dk/library/need.pdf>
<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>
⁹<http://eruditio.worldacademy.org/article/evolution-cooperation>



very practical, and not only practical but necessary. It is something that we can achieve and must achieve. Today there are large regions, such as the European Union, where war would be inconceivable. What is needed is to extend these.

Nor is a truly sustainable economic system utopian or impossible. To achieve it, we should begin by shifting jobs to the creation of renewable energy infrastructure, and to the fields of culture and education. By so doing we will support human solidarity and avoid the twin disasters of catastrophic war and climate change.

9.11 Construction versus destruction

It is often said that ethical principles cannot be derived from science, that they must come from somewhere else. Nevertheless, when nature is viewed through the eyes of modern science, we obtain some insights which seem almost ethical in character. Biology at the molecular level has shown us the complexity and beauty of even the most humble living organisms, and the interrelatedness of all life on earth. Looking through the eyes of contemporary biochemistry, we can see that even the single cell of an amoeba is a structure of miraculous complexity and precision, worthy of our respect and wonder.

Knowledge of the second law of thermodynamics, the statistical law favoring disorder over order, reminds us that life is always balanced like a tight-rope walker over an abyss of chaos and destruction. Living organisms distill their order and complexity from the flood of thermodynamic information which reaches the earth from the sun. In this way, they create local order; but life remains a fugitive from the second law of thermodynamics.

Disorder, chaos, and destruction remain statistically favored over order, construction, and complexity.

It is easier to burn down a house than to build one, easier to kill a human than to raise and educate one, easier to force a species into extinction than to replace it once it is gone, easier to burn the Great Library of Alexandria than to accumulate the knowledge that once filled it, and easier to destroy a civilization in a thermonuclear war than to rebuild it from the radioactive ashes. Knowing this, we can form an almost ethical insight: To be on the side of order, construction, and complexity, is to be on the side of life. To be on the side of destruction, disorder, chaos and war is to be against life, a traitor to life, an ally of death. Knowing the precariousness of life, knowing the statistical laws that favor disorder and chaos, we should resolve to be loyal to the principle of long continued construction upon which life depends.

War is based on destruction, destruction of living persons, destruction of homes, destruction of infrastructure, and destruction of the biosphere. If we are on the side of life, if we are not traitors to life and allies of death, we must oppose the institution of war. We must oppose the military-industrial complex. We must oppose the mass media when they whip up war-fever. We must oppose politicians who vote for obscenely enormous military budgets at a time of financial crisis. We must oppose the planned illegal and insane Israeli attack of Iran, which threatens to lead to a world-destroying conflict. We must oppose these things by working with dedication, as though our lives depended on it. In fact, they do.



Figure 9.10: The second law of thermodynamics tells us that disorder is statistically favored over order, and that life is always balancing above a sea of chaos. It is easier to burn down a house than to build one, easier to burn down the Great Library at Alexandria than to accumulate the knowledge that once filled it, and easier to start a thermonuclear war than to rebuild civilization from the radioactive ashes.

9.12 New ethics to match new technology

Modern science has, for the first time in history, offered humankind the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of death through infectious disease. At the same time, science has given humans the power to obliterate their civilization with nuclear weapons, or to make the earth uninhabitable through overpopulation and pollution.

The question of which of these paths we choose is literally a matter of life or death for ourselves and our children. Will we use the discoveries of modern science constructively, and thus choose the path leading towards life? Or will we use science to produce more and more lethal weapons, which sooner or later, through a technical or human failure, may result in a catastrophic nuclear war? Will we thoughtlessly destroy our beautiful planet through unlimited growth of population and industry? The choice among these alternatives is ours to make. We live at a critical moment of history, a moment of crisis for civilization.

No one living today asked to be born at such a moment, but by an accident of birth, history has given us an enormous responsibility, and two daunting tasks: If civilization is to survive, we must not only stabilize the global population but also, even more importantly, we must eliminate the institution of war. We face these difficult tasks with an inherited emotional nature that has not changed much during the last 40,000 years. Furthermore, we



Figure 9.11: We must develop a new system of ethics to match our advanced technology.

face the challenges of the 21st century with an international political system based on the anachronistic concept of the absolutely sovereign nation-state. However, the human brain has shown itself to be capable of solving even the most profound and complex problems. The mind that has seen into the heart of the atom must not fail when confronted with paradoxes of the human heart.

We must replace the old world of international anarchy, chronic war and institutionalized injustice, by a new world of law. The United Nations Charter, the Universal Declaration of Human Rights and the International Criminal Court are steps in the right direction, but these institutions need to be greatly strengthened and reformed.¹⁰

¹⁰<http://www.countercurrents.org/zuesse050815.htm>
<https://www.youtube.com/watch?t=16&v=hDsPWmioSHg>
<http://www.commondreams.org/views/2014/04/14/us-oligarchy-not-democracy-says-scientific-study>
<http://www.treehugger.com/renewable-energy/striking-chart-showing-solar-power-will-take-over-world.html>
<http://www.countercurrents.org/richard120815.htm>
http://priceofoil.org/content/uploads/2015/08/OCI-Untouchable_Arctic_FINAL.pdf
<http://priceofoil.org/2015/08/13/untouchable-the-climate-case-against-arctic-drilling/>
<http://www.commondreams.org/views/2015/08/14/untouchable-climate-case-against-arctic-drilling>
https://www.youtube.com/watch?t=124&v=9_LJpN893Vg
<http://americamagazine.org/content/all-things/which-candidate-quotes-pope-most>
<http://www.truth-out.org/news/item/32336-our-united-states-of-indebtedness>
<http://www.commondreams.org/news/2015/08/17/ahead-australia-visit-naomi-klein-brands-pm-abbott-climate-villain>
http://www.footprintnetwork.org/ecological_footprint_nations/
<http://ecowatch.com/2015/08/16/earth-overshoot-day/2/>
<http://www.commondreams.org/news/2015/08/18/islamic-declaration-blasts-short-sighted-capitalism->

We also need a new global ethic, where loyalty to one's family and nation is supplemented by a higher loyalty to humanity as a whole. The Nobel laureate biochemist Albert Szent-Györgyi once wrote:

"The story of man consists of two parts, divided by the appearance of modern science.... In the first period, man lived in the world in which his species was born and to which his senses were adapted. In the second, man stepped into a new, cosmic world to which he was a complete stranger.... The forces at man's disposal were no longer terrestrial forces, of human dimension, but were cosmic forces, the forces which shaped the universe. The few hundred Fahrenheit degrees of our flimsy terrestrial fires were exchanged for the ten million degrees of the atomic reactions which heat the sun."

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

"...Modern science has abolished time and distance as factors separating nations. On our shrunken globe today, there is room for one group only: the Family of man."

Suggestions for further reading

1. Herman Daly, *Steady-State Economics: Second Edition with New Essays*, Island Press, (1991).
2. Herman Daly, *Economics in a Full World*, Scientific American, Vol. 293, Issue 3, September, (2005).
3. Herman Daly and John Cobb, *For the Common Good*, Beacon Press, Boston, (1989).
4. E.O. Wilson, *The Diversity of Life*, Allen Lane, The Penguin Press, (1992).
5. Lester R. Brown et. al., *Saving the Planet. How to Shape an Environmentally Sustainable Global Economy*, W.W. Norton, New York, (1991).
6. Muhammad Yunus, *Banker to the Poor; Microcredit and the Battle Against World Poverty*, (2003).
7. UN Global Compact, <http://www.unglobalcompact.org> (2007).
8. UN Millennium Development Goals <http://www.un.org/millenniumgoals/> (2007).
9. Amartya Sen, *Poverty and Famine; An Essay on Entitlement and Deprivation*, Oxford University Press, (1981).
10. Amartya Sen, *Development as Freedom*, Oxford University Press, (1999).
11. Amartya Sen, *Inequality Reexamined*, Harvard University Press, (1992).

demands-action-climate

<http://islamicclimatedeclaration.org/islamic-declaration-on-global-climate-change/>

<http://ecowatch.com/2015/06/29/dalai-lama-pope-encyclical/>

<http://www.theguardian.com/music/2015/jun/28/dalai-lama-glastonbury-verdict-isis-unthinkable>

<http://ecowatch.com/2015/07/02/naomi-klein-people-planet-first/>

12. Paul F. Knitter and Chandra Muzaffar, editors, *Subverting Greed; Religious Perspectives on the Global Economy*, Orbis Books, Maryknoll, New York, (2002).
13. Edy Korthals Altes, *The Contribution of Religions to a Just and Sustainable Economic Development*, in F. David Peat, editor, *The Pari Dialogues, Volume 1*, Pari Publishing, (2007).
14. Hendrik Opdebeeck, *Globalization Between Market and Democracy*, in F. David Peat, editor, *The Pari Dialogues, Volume 1*, Pari Publishing, (2007).
15. Paul Hawken *The Ecology of Commerce; A Declaration of Sustainability*, Collins Business, (2005).
16. Luther Standing Bear, *Land of the Spotted Eagle*, Houghton Mifflin, (1933).
17. T. Gyatso, HH the Dalai Lama, *Ancient Wisdom, Modern World: Ethics for the New Millennium*, Abacus, London, (1999).
18. T. Gyatso, HH the Dalai Lama, *How to Expand Love: Widening the Circle of Loving Relationships*, Atria Books, (2005).
19. J. Rotblat and D. Ikeda, *A Quest for Global Peace*, I.B. Tauris, London, (2007).
20. M. Gorbachev and D. Ikeda, *Moral Lessons of the Twentieth Century*, I.B. Tauris, London, (2005).
21. D. Krieger and D. Ikeda, *Choose Hope*, Middleway Press, Santa Monica CA 90401, (2002).
22. P.F. Knitter and C. Muzaffar, eds., *Subverting Greed: Religious Perspectives on the Global Economy*, Orbis Books, Maryknoll, New York, (2002).
23. S. du Boulay, *Tutu: Voice of the Voiceless*, Eerdmans, (1988).
24. Earth Charter Initiative, www.earthcharter.org, *The Earth Charter*
25. P.B. Corcoran, ed., *The Earth Charter in Action*, KIT Publishers, Amsterdam, (2005).
26. R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*, Colombia University Press, New York, (1991).
27. A. Peccei, *The Human Quality*, Pergamon Press, Oxford, (1977).
28. A. Peccei, *One Hundred Pages for the Future*, Pergamon Press, New York, (1977).
29. E. Pestel, *Beyond the Limits to Growth*, Universe Books, New York, (1989).
30. B. Broms, *United Nations*, Suomalainen Tiedeakatemia, Helsinki, (1990).
31. S. Rosenne, *The Law and Practice at the International Court*, Dordrecht, (1985).
32. S. Rosenne, *The World Court - What It Is and How It Works*, Dordrecht, (1995).
33. J. D'Arcy and D. Harris, *The Procedural Aspects of International Law (Book Series), Volume 25*, Transnational Publishers, Ardsley, New York, (2001).
34. H. Cullen, *The Collective Complaints Mechanism Under the European Social Charter*, European Law Review, Human Rights Survey, p. 18-30, (2000).
35. S.D. Bailey, *The Procedure of the Security Council*, Oxford, (1988).
36. R.A. Akindale, *The Organization and Promotion of World Peace: A Study of Universal-Regional Relationships*, Univ. Toronto Press, Toronto, Ont., (1976).
37. J.S. Applegate, *The UN Peace Imperative*, Vantage Press, New York, (1992).
38. S.E. Atkins, *Arms Control, Disarmament, International Security and Peace: An Annotated Guide to Sources, 1980-1987*, Clio Press, Santa Barbara, CA, (1988).

39. N. Ball and T. Halevy, *Making Peace Work: The Role of the International Development Community*, Overseas Development Council, Washington DC, (1996).
40. F. Barnaby, Ed., *The Gaia Peace Atlas: Survival into the Third Millennium*, Doubleday, New York, (1988)
41. J.H. Barton, *The Politics of Peace: An Evaluation of Arms Control*, Stanford Univ. Press, Stanford, CA, (1981).
42. W. Bello, *Visions of a Warless World*, Friends Committee on National Education Fund, Washington DC, (1986).
43. A. Boserup and A. Mack, *Abolishing War: Cultures and Institutions; Dialogue with Peace Scholars Elise Boulding and Randall Forsberg*, Boston Research Center for the Twenty-first Century, Cambridge, MA, (1998).
44. E. Boulding et al., *Bibliography on World Conflict and Peace*, Westview Press, Boulder, CO, (1979).
45. E. Boulding et al., Eds., *Peace, Culture and Society: Transnational Research Dialogue*, Westview Press, Boulder, CO, (1991).
46. A.T. Bryan et al., Eds., *Peace, Development and Security in the Caribbean*, St. Martins Press, New York, (1988).
47. A.L. Burns and N. Heathcote, *Peace-Keeping by UN Forces from Suez to Congo*, Praeger, New York, (1963).
48. F. Capra and C. Spretnak, *Green Politics: The Global Promise*, E.P. Dutton, New York, (1986).
49. N. Carstarphen, *Annotated Bibliography of Conflict Analysis and Resolution*, Inst. for Conflict Analysis and Resolution, George Mason Univ., Fairfax, VA, (1997).
50. N. Chomsky, *Peace in the Middle East? Reflections on Justice and Nationhood*, Vintage Books, New York, (1974).
51. G. Clark and L. Sohn, *World Peace Through World Law*, World Without War Pubs., Chicago, IL, (1984).
52. K. Coates, *Think Globally, Act Locally: The United Nations and the Peace Movements*, Spokesman Books, Philadelphia, PA, (1988).
53. G. De Marco and M. Bartolo, *A Second Generation United Nations: For Peace and Freedom in the 20th Century*, Colombia Univ. Press, New York, (1997).
54. F.M. Deng and I.W. Zartman, Eds., *Conflict Resolution in Africa*, Brookings Institution, Washington, DC, (1991).
55. W. Desan, *Let the Future Come: Perspectives for a Planetary Peace*, Georgetown Univ. Press, Washington, DC, (1987).
56. D. Deudney, *Whole Earth Security. A Geopolitics of Peace*, Worldwatch paper 55. Worldwatch Institute, Washington, DC, (1983).
57. A.J. Donovan, *World Peace? A Work Based on Interviews with Foreign Diplomats*, A.J. Donovan, New York, (1986).
58. R. Duffey, *International Law of Peace*, Oceania Pubs., Dobbs Ferry, NY, (1990).
59. L.J. Dumas, *The Socio-Economics of Conversion From War to Peace*, M.E. Sharpe, Armonk, NY, (1995).

60. W. Durland, *The Illegality of War*, National Center on Law and Pacifism, Colorado Springs, CO, (1982).
61. F. Esack, *Qur'an, Liberation and Pluralism: An Islamic Perspective on Interreligious Solidarity Against Oppression*, Oxford Univ. Press, London, (1997).
62. I. Hauchler and P.M. Kennedy, Eds., *Global Trends: The World Almanac of Development and Peace*, Continuum Pubs., New York, (1995).
63. H.B. Hollins et al., *The Conquest of War: Alternative Strategies for Global Security*, Westview Press, Boulder, CO, (1989).
64. H.J. Morgenthau, *Peace, Security and the United Nations*, Ayer Pubs., Salem, NH, (1973).
65. C.C. Moskos, *Peace Soldiers: The Sociology of a United Nations Military Force*, Univ. of Chicago Press, Chicago, IL, (1976).
66. L. Pauling, *Science and World Peace*, India Council for Cultural Relations, New Delhi, India, (1967).
67. C. Peck, *The United Nations as a Dispute Resolution System: Improving Mechanisms for the Prevention and Resolution of Conflict*, Kluwer, Law and Tax, Cambridge, MA, (1996).
68. D. Pepper and A. Jenkins, *The Geography of Peace and War*, Basil Blackwell, New York, (1985).
69. J. Perez de Cuellar, *Pilgrimage for Peace: A Secretary General's Memoir*, St. Martin's Press, New York, (1997).
70. R. Pickus and R. Woito, *To End War: An Introduction to the Ideas, Books, Organizations and Work That Can Help*, World Without War Council, Berkeley, CA, (1970).
71. S.R. Ratner, *The New UN Peacekeeping: Building Peace in Lands of Conflict after the Cold War*, St. Martins Press, New York, (1995).
72. I.J. Rikhye and K. Skjelsbaek, Eds., *The United Nations and Peacekeeping: Results, Limitations and Prospects: The Lessons of 40 Years of Experience*, St. Martins Press, New York, (1991).
73. J. Rotblat, Ed., *Scientists in Quest for Peace: A History of the Pugwash Conferences*, MIT Press, Cambridge, MA, (1972).
74. J. Rotblat, Ed., *Scientists, The Arms Race, and Disarmament*, Taylor and Francis, Bristol, PA, (1982).
75. J. Rotblat, Ed., *Striving for Peace, Security and Development in the World*, World Scientific, River Edge, NJ, (1991).
76. J. Rotblat, Ed., *Towards a War-Free World*, World Scientific, River Edge, NJ, (1995).
77. J. Rotblat, Ed., *Nuclear Weapons: The Road to Zero*, Westview, Boulder, CO, (1998).
78. J. Rotblat and L. Valki, Eds., *Coexistence, Cooperation and Common Security*, St. Martins Press, New York, (1988).
79. United Nations, *Peaceful Settlement of Disputes between States: A Select Bibliography*, United Nations, New York, (1991).

80. United States Arms Control and Disarmament Agency, *Arms Control and Disarmament Agreements: Texts and Histories of Negotiations*, USACDA, Washington, DC, (updated annually)
81. D. Fahrni, *An Outline History of Switzerland - From the Origins to the Present Day*, Pro Helvetia Arts Council of Switzerland, Zurich, (1994).

Chapter 10

ETHICS FROM MANY CULTURES

10.1 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 enforceable 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.



Figure 10.1: **Hammurabi's code**

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 10.2: Hammurabi's code

10.2 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.



Figure 10.3: The Ten Commandments

Neither shalt thou go up by steps unto mine altar, that thy nakedness be not discovered thereon.

10.3 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.

Figure 10.4: **Buddha**

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 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.

10.4 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.

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.

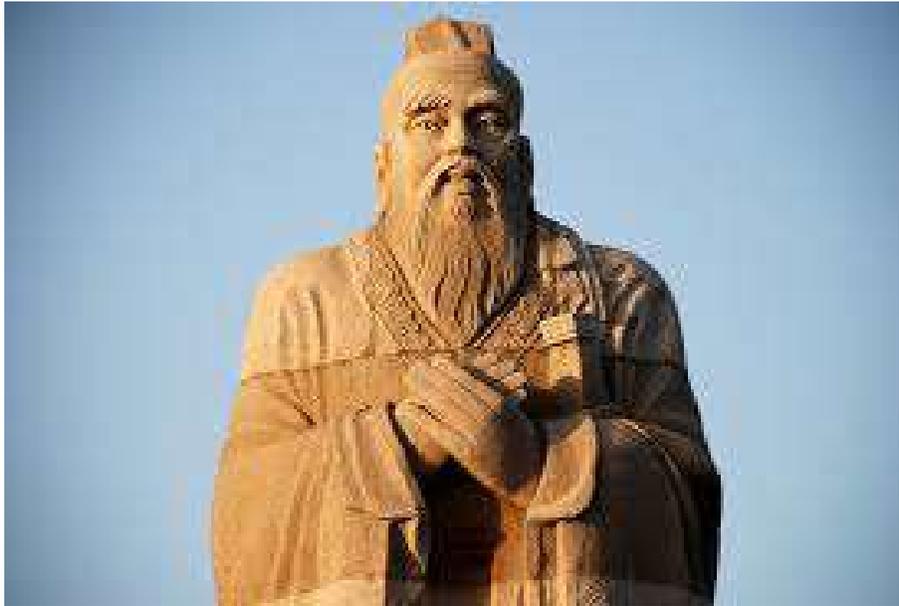


Figure 10.5: Confucius

10.5 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.

Respond intelligently even to unintelligent treatment.

Act without expectation.



Figure 10.6: Lao Tzu

10.6 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 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.



Figure 10.7: **Socrates**



Figure 10.8: **Plato**

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.

10.7 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.

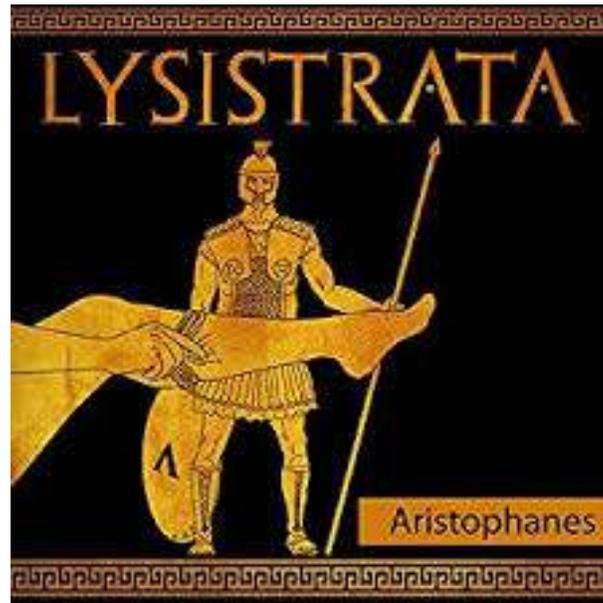


Figure 10.9: *Lysistrata*

10.8 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

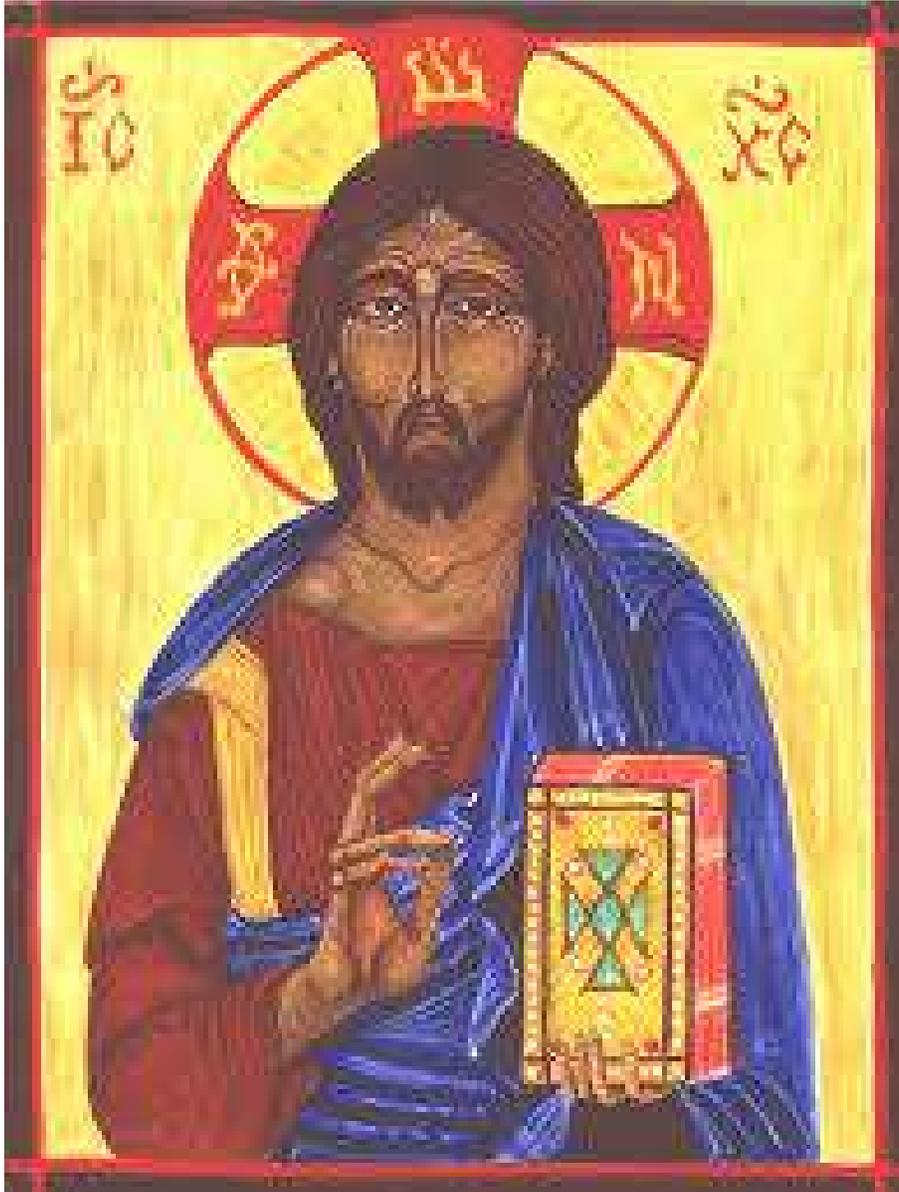


Figure 10.10: An ikon depicting Jesus

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,

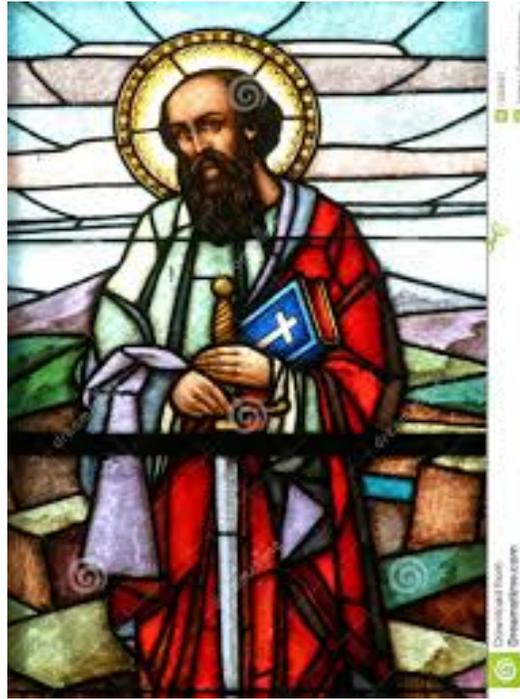


Figure 10.11: **Saint Paul**

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 10.12: 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.

10.9 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 10.13: Mosaics at the Alhambra

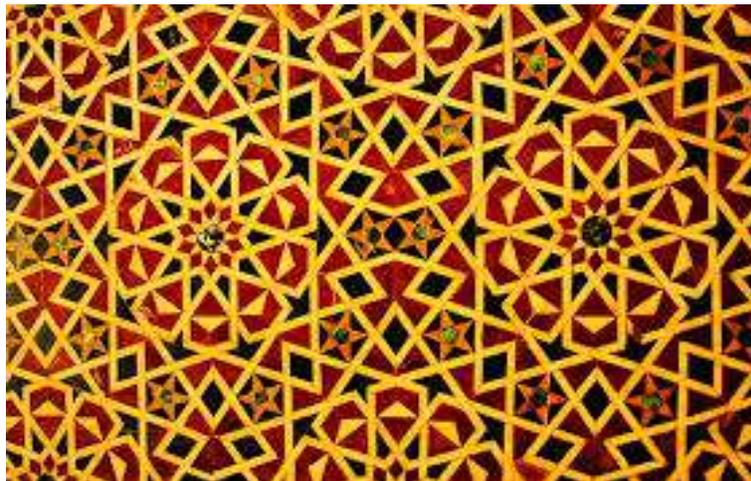


Figure 10.14: Mosaics at the Alhambra



Figure 10.15: The interior of the great mosque at Isfahan

10.10 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 10.16: A view of Toledo

10.11 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, Natasia, 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 10.17: Count Leo Tolstoy



Figure 10.18: 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.”

Suggestions for further reading

1. Tamera Bryant, **The Life and Times of Hammurabi**, Mitchell Lane Publishers, (2005).
2. Mark Rooker, **The Ten Commandments: Ethics for the Twenty-First Century**. Nashville, Tennessee: B&H Publishing Group, (2010).
3. Hugh George Rawlinson, **A Concise History of the Indian People**, Oxford University Press, (1950).
4. Patrick Olivelle, **Life of the Buddha by Ashva-ghosha (1st ed.)**. New York: New York University Press, (2008).
5. Daniel Bonevac and Stephen Phillips, **Introduction to world philosophy**. New York: Oxford University Press, (2009).
6. Herrlee Glessner Creel, **Confucius: The man and the myth**. New York: John Day Company, (1949).
7. Max Kaltenmark, **Lao Tzu and Taoism**, (Translated by Roger Greaves), Stanford, Calif: Stanford University Press, (1969)
8. F. L. Cross, ed., **The Oxford Dictionary of the Christian Church**, Oxford University Press, (2005).
9. E. P. Sanders, **The Historical Figure of Jesus**. Penguin, (1993).
10. I. Howard Marshall, **The Gospel of Luke: A Commentary on the Greek text**, Eerdmans, (1978).
11. Klyne Snodgrass, **Stories with Intent: A Comprehensive Guide to the Parables of Jesus**, Eerdmans, (2008).
12. James W. Aageson, **Paul, the Pastoral Epistles, and the Early Church**, Hendrickson Publishers, (2008).
13. Vartan Gregorian, **Islam: A Mosaic, Not a Monolith**, Brookings Institution Press, (2003).
14. Charles Burnett, *The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth Century*, *Science in Context*, **14**, (2001).
15. Donald Campbell, **Arabian Medicine and Its Influence on the Middle Ages**. Routledge, (2001). (Reprint of the London, 1926 edition).
16. Donna Tussing Orwin, **The Cambridge Companion to Tolstoy** Cambridge University Press, (2002).
17. Alexandre Christoyannopoulos, **Christian Anarchism: A Political Commentary on the Gospel**. Exeter: Imprint Academic, (2010).
18. Anthony J. Parel, *Gandhi and Tolstoy*, in M. P. Mathai, M. S. John, Siby K. Joseph, **Meditations on Gandhi : a Ravindra Varma festschrift**, New Delhi: Concept, (2002).
19. Leo Tolstoy, **The Kingdom of God is Within You**, <https://theanarchistlibrary.org/library/leo-tolstoy-the-kingdom-of-god-is-within-you.pdf>
20. Mohandas K. Gandhi, **The Story of My Experiment With Truth**, available on Amazon, Taschenbuch, (2006).

Chapter 11

SOME ETHICAL VOICES

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

11.1 Some goals for the future

History has given all of us living today an enormous responsibility, and several daunting tasks: If civilization is to survive, we must not only stabilize the global population and avoid catastrophic climate, but also, even more importantly, we must eliminate the institution of war.

We face these difficult tasks with an inherited emotional nature that has not changed much during the last 40,000 years. Furthermore, we face the challenges of the 21st century with an international political system based on the anachronistic concept of the absolutely sovereign nation-state. However, the human brain has shown itself to be capable of solving even the most profound and complex problems. The mind that has seen into the heart of the atom must not fail when confronted with paradoxes of the human heart.

We must replace the old world of international anarchy, chronic war and institutionalized injustice, by a new world of law. The United Nations Charter, the Universal Declaration of Human Rights and the International Criminal Court are steps in the right direction, but these institutions need to be greatly strengthened and reformed.

We also need a new global ethic, where loyalty to one's family and nation will be supplemented by a higher loyalty to humanity as a whole.

In the words of the great Hungarian-American biochemist Albert Szent-Györgyi, "Man lives in a new cosmic world for which he was not made. His survival depends on how well and how fast he can adapt himself to it, rebuilding all his ideas, all his social and political institutions. ...Modern science has abolished time and distance as factors separating nations. On our shrunken globe today, there is room for one group only - the family of man."

The Russell-Einstein Manifesto of 1955, which led to the founding of Pugwash Conferences on Science and World Affairs, contains the following words: “There lies before us, if we choose, continual progress in happiness, knowledge, and wisdom. Shall we, instead, choose death, because we cannot forget our quarrels? We appeal as human beings to human beings: Remember your humanity, and forget the rest.”

Strengthening the United Nations

The problem of building a stable, just, and war-free world is difficult, but it is not impossible. The large regions of our present-day world within which war has been eliminated can serve as models. There are a number of large countries with heterogeneous populations within which it has been possible to achieve internal peace and social cohesion, and if this is possible within such extremely large regions, it must also be possible globally.

When we ask how very large and heterogeneous states achieve internal peace and security, we find that they do so by means of laws that act directly on individual citizens. Thus, the International Criminal Court is an extremely important first step towards the globalization of the methods of governance used by large states. The power to make and enforce laws which act directly on individuals is one of the key powers of successful federations.

An extremely important first step towards strengthening the United Nations would be to give the U.N. a greatly enlarged and reliable source of income. The amount of money available to the U.N., and its member organizations such as UNESCO, WHO and FAO, should be increased by a factor of at least 50. The beneficial services rendered by expanded agencies such as WHO would give the U.N. *de facto* power and prestige that could be used in situations where conflict resolution is needed.

Various sources of increased income have been proposed:

- Dues paid to the U.N. by member states. These should be compulsory in the sense that member states would lose their voting rights if they did not pay their dues.
- Revenues from resources belonging to the international community, for example seabed resources.
- A tax on multinational corporations for the service of regulating international agreements.
- The Tobin tax, i.e. a tax of between 0.1% and 1% on international currency transactions.

12 European countries favor the Tobin tax. These include France and Germany, although not the U.K.

Tobin taxes are in place in some of the world’s fastest-growing financial centers - Hong Kong, Mumbai, Seoul, Johannesburg and Taipei - where they are said to collectively raise 12 billion U.K. pounds a year.

The volume of international currency transactions is so enormous that a universally imposed Tobin tax of only 0.5% would raise between \$100 billion and \$300 billion per year. In 2015 the total UN budget was only \$5.6 billion, an absurdly small sum, considering the enormous importance of global governance, or the fact that the world spends \$1.7 trillion each year on armaments..

11.2 The ethics of Mahatma Gandhi

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

Avoiding escalation of conflicts

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

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

Gandhi's advocacy of non-violence is closely connected to his attitude towards ends and means. He believed that violent methods for achieving a desired social result would inevitably result in an escalation of violence. The end achieved would always be contaminated by the methods used. He was influenced by Leo Tolstoy with whom he exchanged many letters, and he in turn influenced Martin Luther King and Nelson Mandela.

The power of truth

Gandhi was trained as a lawyer, and when he began to practice in South Africa, in his first case, he was able to solve a conflict by proposing a compromise that satisfied both parties. Of this result he said, "My joy was boundless. I had learnt the true practice of law. I had learnt to find out the better side of human nature and to enter men's hearts. I realized that the true function of a lawyer was to unite parties riven asunder." When Gandhi became involved with the struggle for civil rights of the Indian minority in South Africa, his background as a lawyer once more helped him. This time his jury was public



Figure 11.1: Mahatma Gandhi firmly rejected the insidious doctrine that “the end justifies the means”.

opinion in England. When Gandhi led the struggle for reform, he insisted that the means of protest used by his followers should be non-violent, even though violence was frequently used against them. In this way they won their case in the court of public opinion. Gandhi called this method of protest “satyagraha”, a Sanskrit word meaning “the power of truth”. In today’s struggles for justice and peace, the moral force of truth and nonviolence can win victories in the court of world public opinion.

Harmony between religious groups

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

Solidarity with the poor

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

Voluntary reduction of consumption

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

Gandhian economics

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

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

During the next few years, Gandhi worked to reshape the Congress Party into an organization which represented not only India's Anglicized upper middle class but also the millions of uneducated villagers who were suffering under an almost intolerable burden of

poverty and disease. In order to identify himself with the poorest of India's people, Gandhi began to wear only a white loincloth made of rough homespun cotton. He traveled to the remotest villages, recruiting new members for the Congress Party, preaching non-violence and "firmness in the truth", and becoming known for his voluntary poverty and humility. The villagers who flocked to see him began to call him "Mahatma" (Great Soul).

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

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

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

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

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

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

Mahatma Gandhi was assassinated by a Hindu extremist on January 30, 1948. After

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

11.3 The ethics of Albert Einstein

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

Einstein's letter to Freud: Why war?

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

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

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

In 1931, the International Institute for Intellectual Cooperation invited Albert Einstein to enter correspondence with a prominent person of his own choosing on a subject of importance to society. The Institute planned to publish a collection of such dialogues. Einstein accepted at once, and decided to write to Sigmund Freud to ask his opinion about

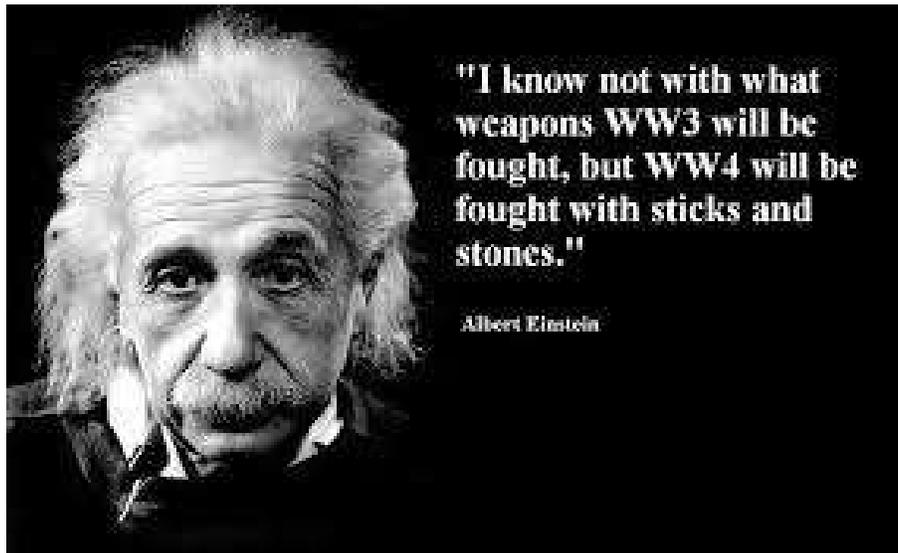


Figure 11.2:

how humanity could free itself from the curse of war. A translation from German of part of the long letter that he wrote to Freud is as follows:

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

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

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

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

A few more things that Einstein said about peace:

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

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

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

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

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

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

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

You cannot simultaneously prevent and prepare for war.

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

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

Without ethical culture, there is no salvation for humanity.

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



Figure 11.3: **Saint Francis**

11.4 The ethics of Saint Francis

The life of Saint Francis

Saint Francis of Assisi was born in 1181 in the Italian hilltop town of Assisi. His father, Pietro di Bernardone, was a prosperous silk merchant, and his mother Pica de Bourlemont, was a noblewoman from Provence. Saint Francis was originally called Giovanni, but his father later renamed him Francesco because of his successful business dealings in France and his admiration for all things French.

After leading the ordinary (somewhat dissolute) life of a wealthy young man of that period, Saint Francis underwent a religious conversion, following which he renounced his inheritance and embraced a life of poverty. Although not ordained as a priest, he began teaching what he believed to be the true Christian message. He soon acquired a small group of followers, and he traveled with them to Rome to ask Pope Innocent III for permission to found a new religious order. During his life, Saint Francis founded three religious orders.

Saint Francis continued to preach, and is even said to have preached to birds and animals, whom he regarded as his sisters and brothers. His attitude towards nature can be seen in his “Canticle of the Sun”:

Canticle of the Sun

*Most High, all powerful, good Lord,
Yours are the praises, the glory, the honor,
and all blessing.*

*To You alone, Most High, do they belong,
and no man is worthy to mention Your name.*

*Be praised, my Lord, through all your creatures,
especially through my lord Brother Sun,
who brings the day; and you give light through him.
And he is beautiful and radiant in all his splendor!
Of you, Most High, he bears the likeness.*

*Praise be You, my Lord, through Sister Moon
and the stars, in heaven you formed them
clear and precious and beautiful.*

*Praised be You, my Lord, through Brother Wind,
and through the air, cloudy and serene,
and every kind of weather through which
You give sustenance to Your creatures.*

*Praised be You, my Lord, through Sister Water,
which is very useful and humble and precious and chaste.*

*Praised be You, my Lord, through Brother Fire,
through whom you light the night and he is beautiful
and playful and robust and strong.*

*Praised be You, my Lord, through Sister Mother Earth,
who sustains us and governs us and who produces
varied fruits with colored flowers and herbs.*

*Praised be You, my Lord,
through those who give pardon for Your love,
and bear infirmity and tribulation.*

*Blessed are those who endure in peace
for by You, Most High, they shall be crowned.*

Praised be You, my Lord,

*through our Sister Bodily Death,
from whom no living man can escape.*

*Woe to those who die in mortal sin.
Blessed are those whom death will
find in Your most holy will,
for the second death shall do them no harm.*

*Praise and bless my Lord,
and give Him thanks
and serve Him with great humility.*

Canonization

Pope Gregory IX canonized Francis on 16 July 1228. Along with Saint Catherine of Sienna, he was designated Patron Saint of Italy. He later became associated with patronage of animals and the natural environment, and it became customary for Catholic and Anglican churches to hold ceremonies blessing animals on his feast day of 4 October.

A prayer of Saint Francis

*Blessed is he who loves and does not therefore desire to be loved;
Blessed is he who fears and does not therefore desire to be feared;
Blessed is he who serves and does not therefore desire to be served;
Blessed is he who behaves well toward others and does not desire that others behave well
toward him;*

11.5 The ethics of Pope Francis

Despite the worrying nature of the threats that we are facing, there are reasons for hope. One of the greatest of these is the beautiful, profound and powerful encyclical that has just been released by Pope Francis.

When he accepted the responsibility for leading the world's 1.2-billion-strong Catholic Church, Cardinal Bergoglio of Argentina adopted the name Francis, after the universally loved Saint Francis of Assisi, whose life of simplicity, love for the poor, and love of nature he chose as the model for his Papacy. The Pope's inspiring encyclical letter "Laudato Si'" takes its name from a canticle of Saint Francis, that begins with the words "Praise be to you, my Lord, through our sister, mother Earth, who sustains and governs us..."

We can remember that Saint Francis regarded birds and animals as his brothers and sisters. He even thought of the sun, moon, clouds, rain and water as brothers and sisters.



Figure 11.4: Pope Francis reminds us that Christian ethics require both respect and care for the earth and elimination of the institution of war.

Like his chosen namesake, Pope Francis stresses the unity of all of nature, and our kinship with all of creation. Francis appeals to love. We can be saved through love.

His encyclical is addressed not only to Catholics, but also to all men and women of good will, and almost all of its 102 pages appeal to moral sensibilities and rational arguments that can be shared by all of us. Pope Francis stresses that the natural world that sustains us is in grave danger from our ruthless exploitation and greed-driven destruction of all the beauty and life that it contains: animals, forests, soil, and air.

Pope Francis tells us that the dictates of today's economists are not sacred: In the future, if we are to survive, economics must be given both a social conscience and an ecological conscience. Nor are private property and profits sacred. They must be subordinated to the common good, and the preservation of our global commons.

Less focus on material goods need not make us less happy. The quality of our lives can be increased, not decreased, if we give up our restless chase after power and wealth, and derive more of our pleasures from art, music and literature, and from conversations with our families and friends, Please read this great encyclical in its entirety. It can give us hope and courage as we strive to make the changes that are needed to avert an ecological mega-catastrophe.

Don Joao Mamede Filho is the Bishop of the Diocese of Umuarama, commented: " 'Laudato Si', considered by environmentalists all around the world as the Green Encyclical, has become a work read by Christians and non-Christians alike in all corners of the world.

In it, Pope Francis calls on us all to take care of our ‘Common Home’ and all that exists in it.

“In his call, the Pope reaffirms that the planet is a common good that must be preserved and guarded. Therefore, it is our duty to refrain from any human activity that may degrade, pollute or pose any kind of threat or risk to our planet and those who inhabit it.

“*Laudato Si*’ also presents a strong and persisting plea for a shift towards a new energy and development model, leaving fossil fuels behind. Since these energy sources are responsible for the highest emissions of greenhouse gases, they pollute, render climate changes more intense, bring on diseases, and kill.

“It is important to remember that, at the beginning of Creation, an organic relationship between all living beings was established. All that exists is connected and coexists in a sustainable and wholesome manner. However, by choosing dirty energy sources such as fossil fuels, which leave trails of destruction behind them, we disconnect ourselves from our surroundings and ignore the harm they may cause us and to our fellow creatures.”

11.6 All humans are brothers and sisters!

Besides a humane, democratic and just framework of international law and governance, we urgently need a new global ethic, - an ethic where loyalty to family, community and nation will be supplemented by a strong sense of the brotherhood of all humans, regardless of race, religion or nationality. Schiller expressed this feeling in his “Ode to Joy”, a part of which is the text of Beethoven’s Ninth Symphony. Hearing Beethoven’s music and Schiller’s words, most of us experience an emotion of resonance and unity with the message: All humans are brothers and sisters - not just some - all! It is almost a national anthem of humanity. The feelings that the music and words provoke are similar to patriotism, but broader. It is this sense of a universal human family that we need to cultivate in education, in the mass media, and in religion. We already appreciate music, art and literature from the entire world, and scientific achievements are shared by all, regardless of their country of origin. We need to develop this principle of universal humanism so that it will become the cornerstone of a new ethic.



Figure 11.5: The message of Beethoven's Choral 9th: All humans are brothers and sisters! Not just some - All!

11.7 The ethics of Henry David Thoreau

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

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

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

Nonviolent civil disobedience

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



Figure 11.6: **Thoreau, with his cabin at Walden Pond in the background.**

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

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

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

Harmony with nature

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

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

Walden, an experiment in simple living

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

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

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

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

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

Thoreau's views on religion

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

In an essay published by the *Atlantic Monthly* in 1853, Thoreau described a pine tree in Maine with the words: "It is as immortal as I am, and perchance will go to as high a heaven, there to tower above me still." However, the editor (James Russell Lowell) considered the

sentence to be blasphemous, and removed it from Thoreau's essay.

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

A few more things that Thoreau said

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

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

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

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

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

The mass of men lead lives of quiet desperation.

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

Be not simply good, be good for something,

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

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

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

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

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

11.8 The message of Bertha von Suttner

Early life and marriage

Baroness Bertha von Suttner (1843-1914) was born in Prague as Countess Kinsky. She was the posthumous daughter of a Field Marshall, and during the first part of her life, she accepted the military traditions of her family. Later she vigorously opposed militarism, and she became a leader of the peace movement. It was her arguments that persuaded Alfred Nobel to establish the Nobel Peace Prize, and in 1905 she became the first woman to receive the prize.

After serving as Alfred Nobel's secretary (and close friend) in Paris (1876), Bertha married Baron Arthur von Suttner. However, the von Suttner family was strongly opposed to the marriage, and the young couple left for the Caucasus where for nine years they earned a living by giving lessons in languages and music. During this period, Bertha von Suttner became a highly successful writer.

In 1885 the von Suttner family relented, and welcomed the couple back to Austria. Here Bertha von Suttner wrote most of her books, including her many novels. The couple's life was oriented almost solely toward the literary until, through a friend, they learned about the International Arbitration and Peace Association¹ in London and about similar groups on the Continent, organizations that had as an actual working objective what they had now both accepted as an ideal: arbitration and peace in place of armed force.

Bertha von Suttner immediately added material on this to her second serious book, *Das Maschinenzeitalter (The Machine Age)* which, when published early in 1889. Her book was much discussed and reviewed. It criticizing many aspects of the times, and it was among the first to foretell the results of exaggerated nationalism and armaments. Her novel *Lay Down Your Arms*, published in the same year, had a huge impact.

The 1905 Nobel Peace Prize

Here are some excerpts from Bertha von Suttner's acceptance speech:

One of the eternal truths is that happiness is created and developed in peace, and one of the eternal rights is the individual's right to live. The strongest of all instincts, that



Figure 11.7: **Bertha von Suttner**

of self-preservation, is an assertion of this right, affirmed and sanctified by the ancient commandment "Thou shalt not kill."

It is unnecessary for me to point out how little this right and this commandment are respected in the present state of civilization. Up to the present time, the military organization of our society has been founded upon a denial of the possibility of peace, a contempt for the value of human life, and an acceptance of the urge to kill...

It is erroneous to believe that the future will of necessity continue the trends of the past and the present. The past and present move away from us in the stream of time like the passing landscape of the riverbanks, as the vessel carrying mankind is borne inexorably by the current toward new shores...

"If you keep me in touch with developments, and if I hear that the Peace Movement is moving along the road of practical activity, then I will help it on with money." These words were spoken by that eminent Scandinavian to whom I owe this opportunity of appearing before you today, Ladies and Gentlemen. Alfred Nobel said them when my husband and I visited with him in 1892 in Bern, where a peace congress was in progress...

..although the supporters of the existing structure of society, which accepts war, come to a peace conference prepared to modify the nature of war, they are basically trying to keep the present system intact. The advocates of pacifism, inside and outside the Conference, will, however, defend their objectives and press forward... to "bring nearer the time when the sword shall not be the arbiter among nations".

A few more things the Bertha von Suttner said about peace

Strange how blind people are! They are horrified by the torture chambers of the Middle Ages, but their arsenals fill them with pride!

After the verb 'to Love', 'to Help' is the most beautiful verb in the world.

11.9 Helen Keller's message

Childhood

Helen was a normal child until the age of 19 months, when she contracted an illness which may have been scarlet fever or meningitis. It left her both deaf and blind. When Helen was 6 years old, her parents followed the advice of Alexander Graham Bell and contacted the Perkins Institute for the Blind. The Perkins Institute recommended their recent graduate Annie Sullivan, who became Helen's teacher.

Annie Sullivan, who was 20 years old at that time and also blind, began to work with Helen, spelling out words on the palm of Helen's hand. This method was unsuccessful at first, but one day, when Annie Sullivan was spelling out "water" on one of Helen's hands while water was running over the other, Helen suddenly realized that the letters were a



Figure 11.8: **Helen Keller: Although blind, she could see injustice. Although deaf, she could hear the cries of the oppressed, and the voices of victims of war.**

symbol for water. For the next many days, the child almost wore her teacher out by demanding the spelling of hundreds of other things within her experience. Annie Sullivan later became Helen's lifelong friend and companion.

Victory over a triple handicap

Starting in 1888, Helen Keller began her formal education, at first at the Perkins Institute, then at a succession of other schools. Finally, at the age of 24, with financial help from a wealthy friend of Mark Twain. Helen graduated from Radcliffe College. She was the first blind and deaf person to obtain a BA degree. On the way to this triumph, Helen had taught herself to speak normally, and she could understand what other people were saying by placing her hand on their lips.

Helen Keller quickly developed into a popular lecturer and author. She spoke and wrote to advocate many social reforms, including woman's suffrage, labour rights, socialism and antimilitarism.

The story of Helen Keller and Annie Sullivan, as told in Helen's *Autobiography*, became known to a very wide public through the drama *The Miracle Worker*, which was first produced as a radio broadcast, then as a television drama, then as a Broadway play and finally as a succession of films.

Here is a newspaper account of one of Helen Keller's lectures:

"The wonderful girl who has so brilliantly triumphed over the triple afflictions of blindness, dumbness and deafness, gave a talk with her own lips on 'Happiness,' and it will be remembered always as a piece of inspired teaching by those who heard it.

“According to those who attended, Helen Keller spoke of the joy that life gave her. She was thankful for the faculties and abilities that she did possess and stated that the most productive pleasures she had were curiosity and imagination. Keller also spoke of the joy of service and the happiness that came from doing things for others ... Keller imparted that ‘helping your fellow men is one’s only excuse for being in this world and in the doing of things to help one’s fellows lay the secret of lasting happiness.’ She also told of the joys of loving work and accomplishment and the happiness of achievement. Although the entire lecture lasted only a little over an hour, the lecture had a profound impact on the audience.”

A few things that Helen Keller said

Strike against war, for without you no battles can be fought! Strike against manufacturing shrapnel and gas bombs and all other tools of murder! Strike against preparedness that means death and misery to millions of human beings! Be not dumb, obedient slaves in an army of destruction! Be heroes in an army of construction.

The best and most beautiful things in the world cannot be seen or even touched - they must be felt with the heart.

Believe. No pessimist ever discovered the secrets of the stars or sailed to an uncharted land or opened a new heaven to the human spirit

Alone we can do so little. Together we can do so much!

It is for us to pray not for tasks equal to our powers, but for powers equal to our tasks, to go forward with a great desire forever beating at the door of our hearts as we travel toward our distant goal

When one door of happiness closes, another opens; but often we look so long at the closed door that we do not see the one which has been opened for us.

To keep our faces toward change, and behave like free spirits in the presence of fate, is strength undefeatable.

Self-pity is our worst enemy and if we yield to it, we can never do anything wise in the world.

Security is mostly a superstition. It does not exist in nature, nor do the children of men as a whole experience it. Avoiding danger is no safer in the long run than outright exposure. Life is either a daring adventure or nothing

I do not want the peace that passeth understanding. I want the understanding which bringeth peace.

11.10 The Universal Declaration of Human Rights

On December 10, 1948, the General Assembly of the United Nations adopted a Universal Declaration of Human Rights. 48 nations voted for adoption, while 8 nations abstained from voting. Not a single state voted against the Declaration. In addition, the General Assembly decided to continue work on the problem of implementing human rights. The preamble of the Declaration stated that it was intended “as a common standard of achievement for all peoples and nations, to the end that every individual and every organ of society, keeping this Declaration constantly in mind, shall strive by teaching and education to promote respect for these rights and freedoms.”

Articles 1 and 2 of the Declaration state that “all human beings are born free and equal in dignity and in rights”, and that everyone is entitled to the rights and freedoms mentioned in the Declaration without distinctions of any kind. Neither race color, sex, language, religion, political or other opinion, national or social origin, property or social origin must make a difference.

The Declaration states that everyone has a right to life, liberty and security of person and property. Slavery and the slave trade are prohibited, as well as torture and cruel, inhuman or degrading punishments. All people must be equal before the law, and no person must be subject to arbitrary arrest, detention or exile. In criminal proceedings an accused person must be presumed innocent until proven guilty by an impartial public hearing where all necessary provisions have been made for the defense of the accused.

No one shall be subjected to interference with his privacy, family, home or correspondence. Attacks on an individual’s honor are also forbidden. Everyone has the right of freedom of movement and residence within the borders of a state, the right to leave any country, including his own, as well as the right to return to his own country. Every person has the right to a nationality and cannot be arbitrarily deprived of his or her nationality.

All people of full age have a right to marry and to establish a family. Men and women have equal rights within a marriage and at its dissolution, if this takes place. Marriage must require the full consent of both parties.

The Declaration also guarantees freedom of religion, of conscience, and of opinion and expression, as well as freedom of peaceful assembly and association. Everyone is entitled to participate in his or her own government, either directly or through democratically chosen representatives. Governments must be based on the will of the people, expressed in periodic and genuine elections with universal and equal suffrage. Voting must be secret.

Everyone has the right to the economic, social and cultural conditions needed for dignity and free development of personality. The right to work is affirmed. The job shall be of a person’s own choosing, with favorable conditions of work, and remuneration consistent with human dignity, supplemented if necessary with social support. All workers have the

right to form and to join trade unions.

Article 25 of the Declaration states that everyone has the right to an adequate standard of living, including food, clothing, housing and medical care, together with social services. All people have the right to security in the event of unemployment, sickness, disability, widowhood or old age. Expectant mothers are promised special care and assistance, and children, whether born in or out of wedlock, shall enjoy the same social protection. Everyone has the right to education, which shall be free in the elementary stages. Higher education shall be accessible to all on the basis of merit. Education must be directed towards the full development of the human personality and to strengthening respect for human rights and fundamental freedoms. Education must promote understanding, tolerance, and friendship among all nations, racial and religious groups, and it must further the activities of the United Nations for the maintenance of peace.

A supplementary document, the Convention on the Rights of the Child, was adopted by the United Nations General Assembly on the 12th of December, 1989. Furthermore, in July 2010, the General Assembly passed a resolution affirming that everyone has the right to clean drinking water and proper sanitation.

Many provisions of the Universal Declaration of Human Rights, for example Article 25, might be accused of being wishful thinking. In fact, Jean Kirkpatrick, former US Ambassador to the UN, called the Declaration “a letter to Santa Claus”. Nevertheless, like the Millennium Development Goals, the Universal Declaration of Human Rights has great value in defining the norms towards which the world ought to be striving.

It is easy to find many examples of gross violations of basic human rights that have taken place in recent years. Apart from human rights violations connected with interventions of powerful industrial states in the internal affairs of third world countries, there are many cases where governmental forces in the less developed countries have violated the human rights of their own citizens. Often minority groups have been killed or driven off their land by those who coveted the land, as was the case in Guatemala in 1979, when 1.5 million poor Indian farmers were forced to abandon their villages and farms and to flee to the mountains of Mexico in order to escape murderous attacks by government soldiers. The blockade of Gaza and the use of drones to kill individuals illegally must also be regarded as gross human rights violations, and there are many recent examples of genocide.

Wars in general, and in particular, the use of nuclear weapons, must be regarded as gross violations of human rights. The most basic human right is the right to life; but this is right routinely violated in wars. Most of the victims of recent wars have been civilians, very often children and women. The use of nuclear weapons must be regarded as a form of genocide, since they kill people indiscriminately, babies, children, young adults in their prime, and old people, without any regard for guilt or innocence.

Furthermore, recent research shows that a war fought with nuclear weapons would be an ecological disaster. Smoke from burning cities would rise to the stratosphere, where it would spread globally and remain for a period of 10 years, blocking sunlight, destroying the ozone layer, and blocking the hydrological cycle. An all-out war with thermonuclear weapons would essentially destroy all agriculture for such a long period that most humans would die from starvation. The damage to the biosphere would also be enormous. We

may ask: by what right do the nuclear nations threaten the world with a disaster of these proportions? Would not a war fought with nuclear weapons be the greatest imaginable violation of human rights? We should remember that both war in general and the use of nuclear weapons in particular violate democratic principles: The vast majority of ordinary citizens prefer peace to war, and the vast majority also long for a world without nuclear weapons.

It is plain that if the almost unbelievable sums now wasted on armaments were used constructively, most of the pressing problems facing the world today could be solved; but today the world spends more than 20 times as much on armaments as it does on development.

Today's world is one in which roughly 10 million children die every year from diseases related to poverty. Besides this enormous waste of young lives through malnutrition and preventable disease, there is a huge waste of opportunities through inadequate education. The rate of illiteracy in the 25 least developed countries is 80 percent, and the total number of illiterates in the world is estimated to be 800 million. Meanwhile every 60 seconds the world spends roughly 3 million dollars on armaments. The millions who are starving have a right to food. The millions of illiterates have a right to education. By preferring armaments to development, we deny them these rights.

It is time for civil society to make its voice heard. Politicians are easily influenced by lobbies and by money, but in the last analysis they have to listen to the voice of the people. We have seen this recently in Tunisia, Egypt, Libya, Bahrain and Yemen. We should try to learn from the courage of the people of these countries who have defied guns and tanks to demand their human rights. No single person can achieve the changes that we need, but together we can do it: together we can build the world that we choose.

No one living today asked to be born in a time of crisis, but the global crisis of the 21st century has given each of us an enormous responsibility: We cannot merely leave things up to the politicians, as we have been doing. The future is in our own hands: the hands of the people, the hands of civil society. This is not a time for building private utopias or cultivating our own gardens. Today everyone has two jobs: Of course we have to earn a living, but in addition, all of us have the duty to work actively, to the best of our abilities, to save humanity's future and the biosphere.



Figure 11.9: Eleanor Roosevelt and the Universal Declaration of Human Rights, which she helped to draft.

11.11 The voice of Martin Luther King, Jr.

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

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

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

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

Victory in the court of public opinion

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

Welcomed to India by Nehru

In 1959, while recovering from an almost-fatal stabbing, Martin Luther King Jr. visited India at the invitation of Prime Minister Jawaharlal Nehru. Dr. King and his wife Coretta

were warmly welcomed by Nehru, who changed his schedule in order to meet them. They had an opportunity to visit a religious community or “ashram” that Gandhi had founded, and they discussed non-violence with many of Gandhi’s disciples.

King is awarded the Nobel Peace Prize

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

Opposition to the Viet Nam War

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

Opposition to nuclear weapons

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

Assassination

On April 4, 1968, Dr. King was shot and killed. A number of people, including members of his own family, believe that he was killed because of his opposition to the Viet Nam



Figure 11.10: Dr. Martin Luther King Jr. speaks in Washington: “I have a dream!”

War. This conclusion is supported by the result of a 1999 trial initiated by members of the King family. Summing up the arguments to the jury, the family’s lawyer said “We are dealing in conspiracy with agents of the City of Memphis and the governments of the State of Tennessee and the United States of America. We ask that you find that a conspiracy existed.” After two and a half hour’s deliberation, the jury found that Lloyd Jowers and “others, including governmental agencies, were parties to this conspiracy”. The verdict of the jury remains judicially valid today, and it has never been overturned in a court of law, although massive efforts have been made to discredit it.

Redemptive love

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

To a large extent, the black civil rights movement of the ’50’s and ’60’s succeeded in ending legalized racial discrimination in America. If the methods used had been violent, the movement could easily have degenerated into a nightmare of interracial hatred; but by remembering the Christian message, “Love your enemy; do good to them that spitefully

use you”, Martin Luther King Jr. raised the ethical level of the civil rights movement; and the final result was harmony and understanding between the black and white communities. Later the nonviolent methods of Gandhi and King were successfully applied to the South African struggle against Apartheid by Nelson Mandela and his followers.

Here are a few more things that Martin Luther King said

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

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

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

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

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

Only in the darkness can you see the stars.

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

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

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

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

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

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

Intelligence plus character - that is the goal of true education

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

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

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

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

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

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

The time is always right to do what is right.

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

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

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

11.12 Compassion versus greed

Humans are capable of great compassion and unselfishness. Mothers and fathers make many sacrifices for the sake of their families. Kind teachers help us through childhood, and show us the right path. Doctors and nurses devote themselves to the welfare of their

patients.

Sadly there is another, side to human nature, a darker side. Human history is stained with the blood of wars and genocides. Today, this dark, aggressive side of human nature threatens to plunge our civilization into an all-destroying thermonuclear war.

Humans often exhibit kindness to those who are closest to themselves, to their families and friends, to their own social group or nation. By contrast, the terrible aggression seen in wars and genocides is directed towards outsiders. Human nature seems to exhibit what might be called “tribalism”: altruism towards one’s own group; aggression towards outsiders. Today this tendency towards tribalism threatens both human civilization and the biosphere.

Greed, in particular the greed of corporations and billionaire oligarchs, is driving human civilization and the biosphere towards disaster.

The greed of giant fossil fuel corporations is driving us towards a tipping point after which human efforts to control climate change will be futile because feedback loops will have taken over. The greed of the military industrial complex is driving us towards a Third World War that might develop into a catastrophic thermonuclear war. The greed of our financial institutions is also driving us towards economic collapse, as we see in the case of Greece.

Until the start of the Industrial Revolution in the 18th and 19th centuries, human society maintained a more or less sustainable relationship with nature. However, with the beginning of the industrial era, traditional ways of life, containing elements of both social and environmental ethics, were replaced by the money-centered, growth-oriented life of today, from which these vital elements are missing.

According to the followers of Adam Smith (1723-1790), self-interest (even greed) is a sufficient guide to human economic actions. The passage of time has shown that Smith was right in many respects. The free market, which he advocated, has turned out to be the optimum prescription for economic growth. However, history has also shown that there is something horribly wrong or incomplete about the idea that self-interest alone, uninfluenced by ethical and ecological considerations, and totally free from governmental intervention, can be the main motivating force of a happy and just society. There has also proved to be something terribly wrong with the concept of unlimited economic growth.

The Industrial Revolution marked the start of massive human use of fossil fuels. The stored energy from several hundred million years of plant growth began to be used at roughly a million times the rate at which it had been formed. The effect on human society was like that of a narcotic. There was a euphoric (and totally unsustainable) surge of growth of both population and industrial production. Meanwhile, the carbon released into the atmosphere from the burning of fossil fuels began to duplicate the conditions which led to the 5 geologically-observed mass extinctions, during each of which more than half of all living species disappeared forever.

The Stern Review Discussion Paper of 2006 stated that “Melting of permafrost in the Arctic could lead to the release of huge quantities of methane. Dieback of the Amazon forest could mean that the region starts to emit rather than to absorb greenhouse gases. These feedbacks could lead to warming that is at least twice as fast as current high-emission

projections, leading to temperatures higher than seen in the last 50 million years.”

The greed of giant fossil fuel corporations has recently led them to conduct large-scale advertising campaigns to convince the public that anthropogenic climate change is not real. These corporations own vast oil, coal and gas reserves that must be kept in the ground if we are to avoid catastrophic global warming. It does not seem to bother the fossil fuel giants that if the earth is made uninhabitable, future generations of both humans and animals will perish.

When the United Nations was established in 1945, the purpose of the organization was to abolish the institution of war. This goal was built into many of the articles of the UN Charter. Accordingly, throughout the world, many War Departments were renamed and became Departments of Defense. But the very name is a lie. In an age of nuclear threats and counter-threats, populations are by no means protected. Ordinary citizens are just hostages in a game for power and money. It is all about greed.

Why is war continually threatened? Why is Russia threatened? Why is war with Iran threatened? Why fan the flames of conflict with China? Is it to “protect” civilians? Absolutely not! In a thermonuclear war, hundreds of millions of civilians would die horribly everywhere in the world, also in neutral countries. What is really being protected are the profits of arms manufacturers. As long as there are tensions; as long as there is a threat of war, military budgets are safe; and the profits of arms makers are safe. The people in several “democracies”, for example the United States, do not rule at the moment. Greed rules.

Greed and lack of ethics are built into the structure of corporations. By law, the Chief Executive Officer of a corporation must be entirely motivated by the collective greed of the stockholders. He must maximize profits. Nothing must count except the bottom line. If the CEO abandons this single-minded chase after corporate profits for ethical reasons, or for the sake of humanity or the biosphere or the future, he (or she) must, by law, be fired and replaced.

Occasionally, for the sake of their public image, corporations seem to do something for other motives than their own bottom line, but it is usually window dressing. For example, Shell claims to be supporting research on renewable energy. Perhaps there is indeed a small renewable energy laboratory somewhere in that vast corporation; but the real interest of the organization is somewhere else. Shell is sending equipment on a large scale to drill for more and more environment-destroying oil in the Arctic.

What does Christianity say about greed? Wikipedia states that “The seven deadly sins, also known as capital vices or cardinal sins, is a classification of vices (part of Christian ethics) that has been used since early Christian times to educate and instruct Christians concerning fallen humanity’s tendency to sin. In the currently recognized version, the sins are usually given as wrath, greed, sloth, pride, lust, envy and gluttony. Each is a form of Idolatry-of-Self wherein the subjective reigns over the objective.”

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

“Lay not up for yourselves treasures upon earth, where moth and rust doth corrupt, and where thieves break through and steal.” Mathew 6:19

In his encyclical *Laudato Si'*, and on his recent visit to South America, Pope Francis has spoken strongly against economic activity that lacks both social and environmental ethics.

Much depends on whether we are able to break the power that corporations and extremely rich oligarchs now hold over our governments and our mass media. Pope Francis has shown by example what a world leader of courage and honesty can do. Most of us are not in such a position, but each person can do his or her best to restore democracy where it has been lost to corporate money and greed. If the mass media have sold themselves to the highest bidder, we can make our own media. If most politicians are corrupt, we can make our own political movements. As Shelly said, “We are many, they are few”.

We need your voice today

Saint Francis said:

“Blessed is he who loves and does not therefore desire to be loved;
Blessed is he who fears and does not therefore desire to be feared;
Blessed is he who serves and does not therefore desire to be served;
Blessed is he who behaves well toward others and does not desire that others
behave well toward him.”

William Blake said:

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

Thomas Paine said:

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

have a right to exist.”

Thomas Jefferson said:

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

Mary Wollstonecraft said:

“I entreat (men) to assist to emancipate their companion, to make her a help meet for them! Would men but generously snap our chains, and be content with rational fellowship instead of slavish obedience, they would find us more observant daughters, more affectionate sisters, more faithful wives, more reasonable mothers: in a word, better citizens.”

William Godwin said:

“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?”

The Marquis de Condorcet said:

“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.”

Thomas Robert Malthus said:

“That population cannot increase without the means of subsistence 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. (He later modified this opinion and made it less pessimistic by allowing for the effect of preventive checks such as late marriage. Malthus considered birth control to

be a form of vice, but today it is accepted as the most humane method of avoiding the grim Malthusian forces, famine, disease and war.”)

Percy Bysshe Shelley said:

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

Robert Owen said:

“I know that society may be formed so as to exist without crime, without poverty, with health greatly improved, with little, if any, misery. and with intelligence and happiness increased a hundredfold; and no obstacle whatsoever intervenes at this moment except ignorance to prevent such a state of society from becoming universal.”

John Stuart Mill said:

“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.”

Henry David Thoreau said:

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

Count Leo Tolstoy said:

“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.”

Mahatma Gandhi said:

“They say that ‘means are after all means’. I would say that ‘means are after all everything’. As the means, so the end. Indeed, the Creator has given us limited power over means, none over end... The means may be likened to a

seed, and the end to a tree; and there is the same inviolable connection between the means and the end as there is between the seed and the tree. Means and end are convertible terms in my philosophy of life.”

Martin Luther King said:

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

Wilfred Owen said:

“If in some smothering dream, you too could pace
 Behind the wagon that we flung him in,
 And watch the white eyes writhing in his face,
 His hanging face, like a devil’s sick of sin,
 If you could hear, at every jolt, the blood
 Come gargling from the froth-corrupted lungs
 Obscene as cancer, bitter as the cud
 Of vile, incurable sores on innocent tongues,
 My friend, you would not tell with such high zest
 To children ardent for some desperate glory,
 The old Lie: Dulce et decorum est
 Pro patria mori”.

Albert Einstein said:

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

Edna St. Vincent Millay said:

“Man, doughty Man, what power has brought you low,
 That heaven itself in arms could not persuade
 To lay aside the lever and the spade
 And be as dust among the dusts that blow?
 Whence, whence the broadside? Whose the heavy blade?...
 Strive not to speak, poor scattered mouth; I know.”

Bertha von Suttner said:

“Strange how blind people are! They are horrified by the torture chambers of the Middle Ages, but their arsenals fill them with pride!”

George Orwell said:

“In a time of deceit telling the truth is a revolutionary act.”

Helen Keller said:

“Strike against war, for without you no battles can be fought! Strike against manufacturing shrapnel and gas bombs and all other tools of murder! Strike against preparedness that means death and misery to millions of human beings! Be not dumb, obedient slaves in an army of destruction! Be heroes in an army of construction.”

Today, human civilization and the biosphere are facing a crisis. Here are the tasks which history has given to our generation:

- We must abolish the institution of war before modern weapons destroy us.
- We must replace institutionalized violence by a just, democratic and enforceable system of global governance and international law.
- We must stabilize and ultimately reduce global population to a level that can be supported by sustainable agriculture.
- We must leave fossil fuels in the ground.
- We must avoid the large-scale global famine which threatens us because of the combined effects of climate change, population growth and the end of the fossil fuel era.
- We must achieve a steady-state economic system. Limitless growth on a finite planet is a logical absurdity.
- We must decrease economic inequality, both between nations and within nations,
- We must strive for governments that are true democracies rather than oligarchies.
- And finally, we must develop a mature ethical system to match our new technology.

These are difficult tasks, but together we can overcome the difficulties. As Helen Keller said, *Alone we can do so little! Together we can do so much!*

At a time of crisis, with the future at stake, please don't be silent. We urgently need your voice today!

11.13 The fragility of our complex civilization

The rapid growth of knowledge

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.



Figure 11.11: The earth at night, seen from space: The thin layer of atmosphere covering the earth is vulnerable to the greenhouse gases that can cause catastrophic climate change. At night we can see the massive energy use that produces these greenhouse gases.

11.14 Looking towards the future

Tensions created by the rapidity of technological change

In human cultural evolution, information transfer and storage through the language of molecular complementarity is supplemented by new forms of biological information flow and conservation - spoken language, writing, printing, and more recently electronic communication. The result has been a shift into a much higher evolutionary gear.

Because of new, self-reinforcing mechanisms of information flow and accumulation, the rate of evolutionary change has increased enormously: It took 3 billion years for the first autocatalytic systems to develop into multicellular organisms. Five hundred million years were required for multicellular organisms to rise from the level of sponges and slime molds to the degree of complexity and organization that characterizes primates and other mammals; but when a branch of the primate family developed a tool-using culture, spoken language, and an enlarged brain, only 40,000 years were required for our ancestors to change from animal-like hunter-gatherers into engineers, poets and astronomers.

During the initial stages of human cultural evolution, the rate of change was slow enough for genetic adaptation to keep pace. The co-evolution of speech, tool use, and an enlarged brain in hominids took place over a period of several million years, and there was ample time for genetic adaptation. The prolonged childhood which characterizes our species, and the behavior patterns of familial and tribal solidarity, were built into the genomes of our ancestors during the era of slow change, when cultural and genetic evolution moved together in equilibrium. However, as the pace of cultural information accumulation quickened,

genetic change could no longer keep up.

Genetically we are almost identical with our neolithic ancestors; but their world has been replaced by a world of quantum theory, relativity, supercomputers, antibiotics, genetic engineering and space telescopes - unfortunately also a world of nuclear weapons and nerve gas. Because of the slowness of genetic evolution in comparison to the rapid and constantly-accelerating rate of cultural change, our bodies and minds are not perfectly adapted to our new way of life. They reflect more accurately the way of life of our hunter-gatherer ancestors.

In addition to the contrast between the slow pace of genetic evolution when compared with the rapid and constantly-accelerating rate of cultural evolution, we can also notice a contrast between rapidly- and slowly-moving aspects of cultural change: Social institutions and structures seem to change slowly when compared with the lightning-like pace of scientific and technological innovation. Thus, tensions and instability characterize information-driven society, not only because science and technology change so much more rapidly than institutions, laws, and attitudes, but also because human nature is not completely appropriate to our present way of life. In particular, human nature seems to contain an element of what might be called “tribalism”, because our emotions evolved during an era when our ancestors lived in small, mutually hostile tribes, competing with one another for territory on the grasslands of Africa.

Looking towards the future, what can we predict? Detailed predictions are very difficult, but it seems likely that information technology and biotechnology will for some time continue to be the most rapidly-developing branches of science, and that these two fields will merge. We can guess with reasonable certainty that much progress will be made in understanding the mechanism of the brain, and in duplicating its functions artificially. Scientists of the future will undoubtedly achieve greatly increased control over the process of evolution. Thus it seems probable that the rapidity of scientific and technological change will produce ethical dilemmas and social tensions even more acute than those which we experience today. It is likely that the fate of our species (and the fate of the biosphere) will be made precarious by the astonishing speed of scientific and technological change unless this progress is matched by the achievement of far greater ethical and political maturity than we have yet attained.

Science has proved to be double-edged - capable of great good, but also of great harm. Information-driven human cultural evolution is a spectacular success - but can it become stable? Terrestrial life can look back on almost four billion years of unbroken evolutionary progress. Can we say with confidence that an equal period stretches ahead of us?

Can information-driven society achieve stability?

“We are living in a very special time”, Murray Gell-Mann¹ remarked in a recent interview, “Historians hate to hear this, because they have heard it so many times before, but we *are*

¹ Gell-Mann is an American physicist who was awarded a Nobel Prize in 1969 for his contributions to the theory of elementary particles.

living in a very special time. One symptom of this is the fact that human population has for a long time been increasing according to a hyperbolic curve - a constant divided by 2020 minus the year.”

The hyperbola has the form $P = C/(2020 - y)$, P being the population, y , the year, and C a constant. This form is at first surprising. One might have expected it to be an exponential, if the rate of increase were proportional to the population already present. The fact that the curve is instead a hyperbola can be understood in terms of the accumulation of cultural information. New techniques (for example the initial invention of agriculture, the importation of potatoes to Europe, or the introduction of high-yield wheat and rice varieties) make population growth possible. In the absence of new techniques, population is usually held in check by the painful Malthusian forces - famine, disease, and war.

Gell Mann’s curve shows an explosive growth of human population, driven by an equally explosive growth of stored cultural information - especially agricultural and medical information, and the information needed for opening new land to agriculture. As Gell-Mann remarks, population cannot continue to increase in this way, because we are rapidly approaching the limits of the earth’s carrying capacity. Will human numbers overshoot these limits and afterwards crash disastrously? There is certainly a danger that this will happen.

Besides the challenge of stabilizing global population, the information-driven human society of the future will face another daunting task: Because of the enormously destructive weapons that have already been produced through the misuse of science, and because of the even worse weapons that may be invented in the future, the long-term survival of civilization can only be insured if society is able to eliminate the institution of war. This task will be made more difficult by the fact that human nature seems to contain an element of tribalism.

Humans tend to show great kindness towards close relatives and members of their own group, and are even willing to sacrifice their lives in battle in defense of their own family, tribe or nation. This tribal altruism is often accompanied by inter-tribal aggression - great cruelty towards the “enemy”, i.e. towards members of a foreign group which is perceived to be threatening ones own. The fact that human nature seems to contain a genetically-programmed tendency towards tribalism is the reason why we find football matches entertaining, and the reason why Arthur Koestler once remarked: “We can control the movements of a space-craft orbiting about a distant planet, but we cannot control the situation in Northern Ireland.”

How could evolutionary forces have acted to make the pattern of tribal altruism and inter-tribal aggression a part of human nature? To put the same question differently, how could our ancestors have increased the chances for survival of their own genes by dying in battle? The statistician R.A. Fisher and the evolutionary biologist J.B.S. Haldane considered this question in the 1920’s.² Their solution was the concept of population genetics, in which the genetically homogeneous group as a whole - now sometimes called the “deme” - is taken to be the unit upon which evolutionary forces act.

² More recently the evolution of tribal altruism and inter-tribal aggression has also been discussed by W.D. Hamilton and Richard Dawkins.

Haldane and Fisher postulated that the small tribes in which our ancestors lived were genetically homogeneous, since marriage within the tribe was more probable than marriage outside it. This being the case, a patriotic individual who died for the tribe, killing many members of a competing tribe in the process, increased the chance of survival for his or her own genes, which were carried into the future by the surviving members of the hero's group. The tribe as a whole either lived or died; and those with the best "team spirit" survived most frequently.

Because of the extraordinarily bitter and cruel conflicts between ethnic groups which can be found in both ancient and modern history, it is necessary to take the ideas of Haldane and Fischer seriously. This does not mean that the elimination of the institution of war is impossible, but it means that the task will require the full resources and full cooperation of the world's educational systems, religions, and mass media. It will be necessary to educate children throughout the world in such a way that they will think of humanity as a single group - a large family to which all humans belong, and to which they owe their ultimate loyalty.

In addition to educational reform, and reform of the images presented by the mass media, the elimination of war will require the construction of a democratic, just, and humane system of international governance, whose laws will act on individuals rather than on states. The problems involved are very difficult, but they must be solved if the information-driven society of the future is to achieve stability.

Respect for natural evolution

The avalanche of new techniques in biotechnology and information technology will soon give scientists so much power over evolution that evolutionary ethical problems will become much more acute than they are today. It is already possible to produce chimeras, i.e. transgenic animals and plants incorporating genetic information from two or more species. Will we soon produce hybrids which are partly machines and partly living organisms? What about artificial life? Will humans make themselves obsolete by allowing far more intelligent beings to evolve in cyberspace, as Thomas Ray proposes? What about modification and improvement of our own species? Is there a limit beyond which we ought not to go in constructing new organisms to suit human purposes?

Perhaps one answer to these questions can be found by thinking of the way in which evolution has operated to produce the biosphere. Driven by the flood of Gibbs free energy which the earth receives from the sun, living organisms are generated and tested by life. New generations are randomly modified by the genetic lottery, sometimes for the worse, and sometimes for the better; and the instances of improvement are kept. It would be hard to overestimate the value of this mechanism of design by random modification and empirical testing, with the preservation of what works. The organisms which are living today are all champions! They are distillations of vast quantities of experience, end products of four billion years of solar energy income.

The beautiful and complex living organisms of our planet are exquisitely adapted to survive, to live with each other, and to form harmonious ecological systems. Whatever

we do in biotechnology ought to be guided by caution and by profound respect for what evolution has already achieved. We need a sense of evolutionary responsibility, and a non-anthropocentric component in our system of ethics.

Construction versus destruction

It is often said that ethical principles cannot be derived from science - that they must come from somewhere else. Nevertheless, when nature is viewed through the eyes of modern science, we obtain some insights which seem almost ethical in character. Biology at the molecular level has shown us the complexity and beauty of even the most humble living organisms, and the interrelatedness of all life on earth. Looking through the eyes of contemporary biochemistry, we can see that even the single cell of an amoeba is a structure of miraculous complexity and precision, worthy of our respect and wonder.

Knowledge of the second law of thermodynamics - the statistical law favoring disorder over order - reminds us that life is always balanced like a tight-rope walker over an abyss of chaos and destruction. Living organisms distill their order and complexity from the flood of thermodynamic information which reaches the earth from the sun. In this way, they create local order; but life remains a fugitive from the second law of thermodynamics. Disorder, chaos, and destruction remain statistically favored over order, construction, and complexity.

It is easier to burn down a house than to build one, easier to kill a human than to raise and educate one, easier to force a species into extinction than to replace it once it is gone, easier to burn the Great Library of Alexandria than to accumulate the knowledge that once filled it, and easier to destroy a civilization in a thermonuclear war than to rebuild it from the radioactive ashes. Knowing this, scientists can form an almost ethical insight: To be on the side of order, construction, and complexity, is to be on the side of life. To be on the side of destruction, disorder, chaos and war is to be against life, a traitor to life, an ally of death. Knowing the precariousness of life - knowing the statistical laws that favor disorder and chaos, we should resolve to be loyal to the principle of long continued construction upon which life depends.

What kind of future world do we want?

Our political and educational systems must reflect the kind of world that we want for the future - and what kind of world do we want? We want a world where war is abolished as an institution, and where the enormous resources now wasted on war are used constructively. We want a world where a stable population of moderate size lives in comfort and security, free from fear of hunger or unemployment. We want a world where peoples of all countries have equal access to resources, and an equal quality of life. We want a world with a new economic system, not designed to produce unlimited growth, but aiming instead at meeting the real needs of the human community in equilibrium with the global environment. We want a world of changed values, where extravagance and waste are regarded as morally

wrong; where kindness, wisdom and beauty are admired; and where the survival of other species than our own is regarded as an end in itself, not just a means to our own ends.

In our reverence for the intricate beauty and majesty of nature, and our respect for the dignity and rights of other humans, we can feel united with the great religious and philosophical traditions of mankind, and with the traditional wisdom of our ancestors.

Pictures sent back by the astronauts show the earth as it really is - a small, fragile, beautiful planet, drifting on through the dark immensity of space - our home, where we must learn to live in harmony with nature and with each other.

11.15 Chaplin's speech: Hope

At the end of his 1940 film, **The Great Dictator**, Charlie Chaplin suddenly abandons satire and speaks to us directly with his own voice, his own idealism. In the film, the speech is given by a small Jewish barber, who looks very much like the dictator, Adenoid Henkel (Adolf Hitler). Mistaken for Henkel, the barber must address a huge expectant crowd. Here is the speech:

Hynkel: I'm sorry, but I don't want to be an Emperor - that's not my business. I don't want to rule or conquer anyone. I should like to help everyone, if possible - Jew, gentile, black man, white. We all want to help one another; human beings are like that. We want to live by each other's happiness, not by each other's misery. We don't want to hate and despise one another. In this world there's room for everyone and the good earth is rich and can provide for everyone.

The way of life can be free and beautiful.

But we have lost the way.

Greed has poisoned men's souls, has barricaded the world with hate, has goose-stepped us into misery and bloodshed. We have developed speed but we have shut ourselves in. Machinery that gives abundance has left us in want. Our knowledge has made us cynical, our cleverness hard and unkind. We think too much and feel too little. More than machinery, we need humanity. More than cleverness, we need kindness and gentleness. Without these qualities, life will be violent and all will be lost.

The aeroplane and the radio have brought us closer together. The very nature of these inventions cries out for the goodness in men, cries out for universal brotherhood for the unity of us all. Even now my voice is reaching millions throughout the world, millions of despairing men, women, and little children, victims of a system that makes men torture and imprison innocent people.

To those who can hear me I say, "Do not despair." The misery that is now upon us is but the passing of greed, the bitterness of men who fear the way of human progress. The hate of men will pass and dictators die; and the power they took from the people will return to the people and so long as men die, liberty will never perish.

Soldiers: Don't give yourselves to brutes, men who despise you, enslave you, who regiment your lives, tell you what to do, what to think and what to feel; who drill you, diet you, treat



Figure 11.12: **Look up, Hannah!**

you like cattle, use you as cannon fodder. Don't give yourselves to these unnatural men, machine men, with machine minds and machine hearts! You are not machines! You are not cattle! You are men! You have the love of humanity in your hearts. You don't hate; only the unloved hate, the unloved and the unnatural.

Soldiers: Don't fight for slavery! Fight for liberty! In the seventeenth chapter of Saint Luke it is written, "the kingdom of God is within man" - not one man, nor a group of men, but in all men, in you, you the people have the power, the power to create machines, the power to create happiness. You the people have the power to make this life free and beautiful, to make this life a wonderful adventure.

Then, in the name of democracy, let us use that power! Let us all unite!! Let us fight for a new world, a decent world that will give men a chance to work, that will give you the future and old age a security. By the promise of these things, brutes have risen to power, but they lie! They do not fulfill their promise; they never will. Dictators free themselves, but they enslave the people!! Now, let us fight to fulfill that promise!! Let us fight to free the world, to do away with national barriers, to do away with greed, with hate and intolerance. Let us fight for a world of reason, a world where science and progress will lead to all men's happiness.

Soldiers: In the name of democracy, let us all unite!!!

In Chaplin's film, Hannah is the sweetheart of the Jewish barber, and she is listening (as he hopes) to a radio broadcast of the speech. He continues his speech, talking to her:

Hannah, can you hear me? Wherever you are, look up, Hannah. The clouds are lifting. The sun is breaking through. We are coming out of the darkness into the light. We are coming into a new world, a kindlier world, where men will rise above their hate, their greed and brutality.

Look up, Hannah. The soul of man has been given wings, and at last he is beginning to fly. He is flying into the rainbow - into the light of hope, into the future, the glorious future that belongs to you, to me, and to all of us.

Look up, Hannah. Look up!



Figure 11.13: *Alone we can do so little; together, we can do so much!*

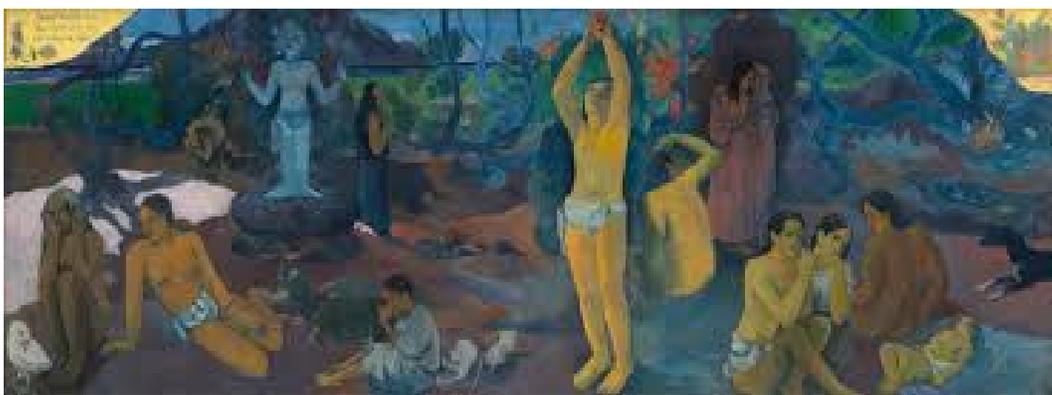


Figure 11.14: *Where do we come from? What are we? Where are we going?*

Suggestions for further reading

1. Jacob Bronowski *Science and Human Values*, Harper and Row (1958).
2. Jacob Bronowski *The Identity of Man* Natural History Press, (1965).
3. Paul R. Ehrlich, Anne H. Ehrlich and John Holdren, *Human Ecology*, W.H. Freeman, (1977).
4. World Commission on Environment and Development, *Our Common Future*, Oxford University Press, (1987).
5. R. Goodland, H. Daly, S. El Serafy and B. von Droste, editors, *Environmentally Sustainable Development: Building on Brundtland*, UNESCO, Paris, (1991).
6. D.H. Meadows, D.L. Meadows and J. Randers, *Beyond the Limits*, Chelsea Green Publishing Co., Vermont, (1992).
7. P.M. Vitousek, P.R. Ehrlich, A.H. Ehrlich and P.A. Matson, *Human Appropriation of the Products of Photosynthesis*, *Bioscience*, 34, 368-373, (1986).
8. E.O. Wilson, editor, *Biodiversity*, National Academy Press, Washington D.C., (1988).
9. World Resources Institute (WRI), *Global Biodiversity Strategy*, The World Conservation Union (IUCN), and United Nations Environment Programme (UNEP), (1992).
10. Lester R. Brown, *Building a Sustainable Society*, W.W. Norton, (1981).
11. Lester R. Brown and J.L. Jacobson, *Our Demographically Divided World*, Worldwatch Paper 74, Worldwatch Institute, Washington D.C., (1986).
12. Worldwatch Institute, Washington, D.C., *The State of the World*, (published annually).
13. John Avery, *Progress, Poverty and Population; Rereading Condorcet, Godwin and Malthus*, Frank Cass, London, (1997).
14. Herman E. Daly, *Steady-State Economics*, Island Press, Washington D.C., (1991).
15. Paul R. Ehrlich and Anne H. Ehrlich, *Healing the Planet*, Addison Wesley, Reading Mass., (1991).
16. E. Chivian et al., editors, (International Physicians for the Prevention of Nuclear War), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, (1982).
17. Robert Jay Lifton and Eric Markusen, *Genocidal Mentality: Nazi Holocaust and Nuclear Threat*, Basic Books, New York, (1990).
18. Joseph Rotblat and Sven Hellman, editors, *A World at the Crossroads: New Conflicts, New Solutions*, World Scientific, (1994).
19. Jack Steinberger, Bhalchandra Udgaonkar and Joseph Rotblat, editors, *A Nuclear-Weapon-Free-World*, Westview Press, Boulder, Colorado, (1994).
20. Joseph Rotblat, editor, *Nuclear Weapons: The Road to Zero*, Westview Press, Boulder, Colorado, (1998).
21. Kofi Annan, *In Larger Freedom: Towards Development, Security and Human Rights for All*, United Nations, New York, (2005).
22. Herman Daly, *Steady-State Economics: Second Edition with New Essays*, Island Press, (1991).
23. Herman Daly, *Economics in a Full World*, *Scientific American*, Vol. 293, Issue 3, September, (2005).

24. Herman Daly and John Cobb, *For the Common Good*, Beacon Press, Boston, (1989).
25. E.O. Wilson, *The Diversity of Life*, Allen Lane, The Penguin Press, (1992).
26. Lester R. Brown et. al., *Saving the Planet. How to Shape an Environmentally Sustainable Global Economy*, W.W. Norton, New York, (1991).
27. Muhammad Yunus, *Banker to the Poor; Microcredit and the Battle Against World Poverty*, (2003).
28. Amartya Sen, *Development as Freedom*, Oxford University Press, (1999).
29. Amartya Sen, *Inequality Reexamined*, Harvard University Press, (1992).
30. Paul F. Knitter and Chandra Muzaffar, editors, *Subverting Greed; Religious Perspectives on the Global Economy*, Orbis Books, Maryknoll, New York, (2002).
31. Edy Korthals Altes, *The Contribution of Religions to a Just and Sustainable Economic Development*, in F. David Peat, editor, *The Pari Dialogues, Volume 1*, Pari Publishing, (2007).
32. Hendrik Opdebeeck, *Globalization Between Market and Democracy*, in F. David Peat, editor, *The Pari Dialogues, Volume 1*, Pari Publishing, (2007).
33. Paul Hawken *The Ecology of Commerce; A Declaration of Sustainability*, Collins Business, (2005).
34. Luther Standing Bear, *Land of the Spotted Eagle*, Houghton Mifflin, (1933).
35. T. Gyatso, HH the Dalai Lama, *Ancient Wisdom, Modern World: Ethics for the New Millennium*, Abacus, London, (1999).
36. T. Gyatso, HH the Dalai Lama, *How to Expand Love: Widening the Circle of Loving Relationships*, Atria Books, (2005).
37. J. Rotblat and D. Ikeda, *A Quest for Global Peace*, I.B. Tauris, London, (2007).
38. M. Gorbachev and D. Ikeda, *Moral Lessons of the Twentieth Century*, I.B. Tauris, London, (2005).
39. D. Krieger and D. Ikeda, *Choose Hope*, Middleway Press, Santa Monica CA 90401, (2002).
40. P.F. Knitter and C. Muzaffar, eds., *Subverting Greed: Religious Perspectives on the Global Economy*, Orbis Books, Maryknoll, New York, (2002).
41. S. du Boulay, *Tutu: Voice of the Voiceless*, Eerdmans, (1988).
42. Earth Charter Initiative *The Earth Charter*, www.earthcharter.org
43. P.B. Corcoran, ed., *The Earth Charter in Action*, KIT Publishers, Amsterdam, (2005).
44. R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*, Colombia University Press, New York, (1991).
45. A. Peccei, *The Human Quality*, Pergamon Press, Oxford, (1977).
46. A. Peccei, *One Hundred Pages for the Future*, Pergamon Press, New York, (1977).
47. E. Pestel, *Beyond the Limits to Growth*, Universe Books, New York, (1989).
48. Pope Francis I, *Laudato si'*, <https://laudatosi.com/watch>
49. John Scales Avery, *The Need for a New Economic System*, Irene Publishing, Sparsnäs Sweden, (2016).
50. John Scales Avery, *Collected Essays, Volumes 1-3*, Irene Publishing, Sparsnäs Sweden, (2016).

51. John Scales Avery, *Space-Age Science and Stone-Age Politics*, Irene Publishing, Sparsnäs Sweden, (2016).
52. John Scales Avery, *Science and Society*, World Scientific, (2016).
53. John Scales Avery, *Civilization's Crisis: A Set of Linked Challenges*, World Scientific, (2017).
54. Stockholm International Peace Research Institute, *SIPRI Military Expenditure Database*, (2017).
55. United States Census Bureau, *International Database, World Population*, (2016).
56. Stockholm International Peace Research Institute, *SIPRI Arms Transfers Database*, (2017).
57. R.E. Black, et al., *Maternal and child undernutrition and overweight in low-income and middle-income countries.*, *The Lancet*, 382 (9890), pp. 427-451, doi:10.1016/S0140-6736(13)60937-X, (2013).
58. L. Lui, et al., *Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000*, *The Lancet*, 379 (9832), pp. 2151-2161 doi:10.1016/S0140-6736(12)60560-1, (2012).
59. A. Fenwick, *The global burden of neglected tropical diseases*, *Public Health*, 126 (3), pp. 233-236, 10.1016/j.puhe.2011.11.015, (2012).
60. UN-OHRLLS Representatives for the Least Developed Countries, *UN LDC fact sheet*, <http://unohrlls.org/custom-content/uploads/2013/09/LDC-Factsheet-2013.pdf>.
61. Unesco Institute of Statistics, Literacy: <http://uis.unesco.org/en/topic/literacy>
62. Critchley and Bruinjeel, Unesco, *Environmental Impacts of Converting Moist Tropical Forest to Agriculture and Plantations*, IHP Humid Tropics Programme Series no. 10, (1996).
63. J. Buxton, *Drug Crop Production, Poverty, and Development*, Open Society Foundations (2016).
64. United Nations Office on Drugs and Crime, *World Drug Report*, (2014).
65. R.A. Akindale, *The Organization and Promotion of World Peace: A Study of Universal-Regional Relationships*, Univ. Toronto Press, Toronto, Ont., (1976).
66. N. Ball and T. Halevy, *Making Peace Work: The Role of the International Development Community*, Overseas Development Council, Washington DC, (1996).
67. Alexander.Hamilton, James Madison and John Jay, *The Federalist Papers*, (1787-1788), Project Gutenberg.
68. Edith Wynner, *World Federal Government in Maximum Terms: Proposals for United Nations Charter Revision*, New York: Fedonat Press, (1954).
69. Grenville Clark and Louis B. Sohn (1958). *World Peace Through World Law*, Cambridge: Harvard University Press.
70. Bertrand Russell, *Has Man A Future?*, Hammondsworth: Penguin, (1961).
71. United Nations General Assembly, *Principles of International Law Recognized in the Charter of the Nuremberg Tribunal and in the Judgment of the Tribunal*, (1950).
72. Sydney Bailey, *The Procedure of the Security Council*, Oxford: Clarendon Press, (1998).

73. R.A. Akindale, *The Organization and Promotion of World Peace: A Study of Universal-Regional Relationships*, Toronto: University of Toronto Press, (1976).
74. J.S. Applegate, (1992). *The UN Peace Imperative*, New York: Vantage Press, (1988).
75. S.E. Atkins, *Arms Control, Disarmament, International Security and Peace: An Annotated Guide to Sources*, Santa Barbara: Clio Press, (1980-1987).
76. N. Ball, and T. Halevy, *Making Peace Work: The Role of the International Development Community*, Washington D.C.: Overseas Development Council, (1996).
77. J.H. Barton, *The Politics of Peace: An Evaluation of Arms Control*, Stanford: Stanford University Press, (1981).
78. A. Boserup and A. Mack, *Abolishing War: Cultures and Institutions; Dialogue with Peace Scholars Elise Boulding and Randall Forsberg*, Cambridge: Boston Research Center for the Twenty first Century, (1998).
79. Elise Boulding et al. Eds., *Peace, Culture and Society: Transnational Research Dialogue*, Boulder: Westview Press, (1991).
80. J. D'Arcy and D. Harris, *The Procedural Aspects of International Law (Book Series), Volume 25*, Transnational Publishers, Ardsley, New York, (2001).
81. Shabtai Rosenne, *The Law and Practice at the International Court*, Leiden:Dordrecht, (1985).
82. Shabtai Rosenne, *The World Court - What It Is and How It Works*, Leiden: Dordrecht, (1995).
83. J. D'Arcy and D. Harris, *The Procedural Aspects of International Law Volume 25 (Book Series)*, New York: Transnational Publishers, (2001).
84. H. Cullen, *The Collective Complaints Mechanism Under the European Social Charter*, European Law Review, Human Rights Survey no.25: 18-30, (2000).
85. United Nations, *Conference to Negotiate a Legally Binding Instrument to Prohibit Nuclear Weapons*, (Treaty adopted on 7 July, 2017).
86. J. Tobin, *A Proposal for International Monetary Reform*. Eastern Economic Journal. Eastern Economic Association: pp. 153-159, (1978).
87. OXFAM, *Working for the Few: Political capture and economic inequality*, <http://www.oxfam.org/en/few>
88. UN Millennium Development Goals <http://www.un.org/millenniumgoals/> (2007).
89. Amartya Sen, *Poverty and Famine; An Essay on Entitlement and Deprivation*, Oxford University Press, (1981).
90. Amartya Sen, *Development as Freedom*, Oxford University Press, (1999).
91. Amartya Sen, *Inequality Reexamined*, Harvard University Press, (1992).
92. Paul F. Knitter and Chandra Muzaffar, editors, *Subverting Greed; Religious Perspectives on the Global Economy*, Orbis Books, Maryknoll, New York, (2002).
93. International Commission on Peace and Food. *Uncommon Opportunities: An Agenda for Peace and Equitable Development 2nd Edition*, New Jersey: Zed Books, (2004).
94. Michael Klare, *Resource Wars: The New Landscape of Global Conflict*, New York: Owl Books, (2002).
95. Michael Klare, *Rising Powers, Shrinking Planet: The New Geopolitics of Energy*, New York: Henry Holt and Company, (2008).

96. Michael Klare, *The Race for What's Left: The Global Scramble for the World's Last Resources*, New York: Metropolitan Books, (2012).
97. D. Feldman, et al., *Photovoltaic System Pricing Trends: Historical, Recent, and Near-Term Projections*, U.S. Department of Energy, NREL/PR-6A20-64898, (2015).
98. A. Baranus and D. Grionyte, *Measuring Fossil Fuel Subsidies*, ECFIN Economic Brief, Issue 40, doi:10.2765/85991, European Commission (2015).
99. British Petroleum Company, *B.P. Statistical Review of World Energy*, London: British Petroleum Company, (1991).
100. David Wasdell, *Arctic Dynamics*, Envisionation <http://www.envisionation.co.uk/index.php/videos/arctic-dynamics>
101. A. Gore, *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*, Rodale Books, New York, (2006).
102. A. Gore, *Earth in the Balance: Forging a New Common Purpose*, Earthscan, (1992).
103. M.K. Hubbert, *Energy Resources*, in *Resources and Man: A Study and Recommendations*, Committee on Resources and Man, National Academy of Sciences, National Research Council, W.H. Freeman, San Francisco, (1969).
104. G. Boyle (editor), *Renewable Energy: Power for a Sustainable Future, Second Edition*, Oxford University Press, (2004).
105. G. Boyle, B. Everett and J. Ramage (editors), *Energy Systems and Sustainability*, Oxford University Press, (2003).
106. United Nations Development Programme, *World Energy Assessment*, United Nations, New York, (2002).
107. P. Smith et al., *Meeting Europe's Climate Change Commitments: Quantitative Estimates of the Potential for Carbon Mitigation by Agriculture*, *Global Change Biology*, 6, 525-39, (2000).
108. IPCC, Intergovernmental Panel on Climate Change, *Climate Change 2001: The Scientific Basis*, (1001).
109. D. King, *Climate Change Science: Adapt, Mitigate or Ignore*, *Science*, 303 (5655), pp. 176-177, (2004).
110. S. Connor, *Global Warming Past Point of No Return*, *The Independent*, (116 September, 2005).
111. D. Rind, *Drying Out the Tropics*, *New Scientist* 6 May, (1995).
112. J. Patz et al., *Impact of Regional Climate Change on Human Health*, *Nature*, 17 November, (2005).
113. L.R. Brown, *The Twenty-Ninth Day*, W.W. Norton, New York, (1978).
114. L.R. Brown et al., *The Great Transition*, Earth Policy Institute, (2016).
115. World Bank, *Climate Change Report Warns of Dramatically Warmer World This Century*, <http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>
116. Food and Agriculture Organization of the United Nations (FAO), *The State of Food Insecurity in the World*, (2015).

117. T.R. Malthus, *An Essay on the Principle of Population, or, A View of its Past and Present Effects on Human Happiness, with an Inquiry into our Prospects Respecting its Future Removal or Mitigation of the Evils which it Occasions* 2nd edn. (London: Johnsons, (1803). (Obtainable from Everyman's University Library, J.M. Dent, London).
118. M. Giampietro and D. Pimental, *The Tightening Conflict: Population, Energy Use and the Ecology of Agriculture*, in *Negative Population Forum* L. Grant ed., Negative Population Growth, Inc. New Jersey: Teaneck, (1993).
119. L.R. Brown, *Full Planet, Empty Plates*, New York: W.W. Norton, (2012).
120. Michael Rowbotham, *The Grip of Death: A Study of Modern Money, Debt Slavery and Destructive Economics*, Oxfordshire: Jon Carpenter Publishing, (1998).
121. Herman Daly and Joshua Farley, *Ecological Economics: Principles and Applications*, Washington, D.C: Island Press, (2004).
122. Herman Daly, *Beyond Growth: The Economics of Sustainable Development*, Boston: Beacon Press, (1997).
123. Herman Daly, *Valuing the Earth: Economics, Ecology, Ethics* Cambridge: The MIT Press, (1993).
124. Herman Daly and John Cobb, Jr., *For The Common Good: Redirecting the Economy toward Community, the Environment, and a Sustainable Future*, Boston: Beacon Press, (1994).
125. Robert Goodland, Herman Daly and Salah El Serafy, *Population, Technology, and Lifestyle: The Transition To Sustainability*, Washington, D.C: Island Press, (1992).
126. Richard Heinberg, *The End of Growth*, Gabriola Island BC: New Society Publishers, (2011).
127. Richard Florida, *The Rise of the Creative Class*, New York: Basic Books, (2002).
128. Robert Goodland et al., eds., *Environmentally Sustainable Economic Development: Building on Brundtland*, Paris: UNESCO, (1991).
129. Donella Meadows, Dennis Meadows and Jorgen Randers, *Beyond the Limits*, Vermont: Chelsea Green Publishing Co., (1992).
130. Peter Vitousek et al., *Human Appropriation of the Products of Photosynthesis*, *Bio-science* 34, no.6 (1986): 368-373.
131. World Resources Institute (WRI), *Global Biodiversity Strategy, The World Conservation Union (IUCN), United Nations Environment Programme (UNEP)*, Washington D.C.: WRI, (1992).
132. Joseph Rotblat, *Nobel Peace Prize Lecture 1996*, Norwegian Nobel Institute, (1995).
133. Pope Francis I, *Laudato si'*, <https://laudatosi.com/watch>
134. László Szombatfalvy, *The Greatest Challenges of Our Time*, Stockholm, Ekerlids Forlag, (2010).
135. Lester R. Brown et. al., *Saving the Planet. How to Shape an Environmentally Sustainable Global Economy*, W.W. Norton, New York, (1991).
136. Luther Standing Bear, *Land of the Spotted Eagle*, Houghton Mifflin, (1933).
137. T. Gyatso, HH the Dalai Lama, *Ancient Wisdom, Modern World: Ethics for the New Millennium*, Abacus, London, (1999).

138. T. Gyatso, HH the Dalai Lama, *How to Expand Love: Widening the Circle of Loving Relationships*, Atria Books, (2005).
139. J. Rotblat and D. Ikeda, *A Quest for Global Peace*, I.B. Tauris, London, (2007).
140. M. Gorbachev and D. Ikeda, *Moral Lessons of the Twentieth Century*, I.B. Tauris, London, (2005).
141. D. Krieger and D. Ikeda, *Choose Hope*, Middleway Press, Santa Monica CA 90401, (2002).
142. S. du Boulay, *Tutu: Voice of the Voiceless*, Eerdmans, (1988).
143. Earth Charter Initiative *The Earth Charter*, www.earthcharter.org
144. P.B. Corcoran, ed., *The Earth Charter in Action*, KIT Publishers, Amsterdam, (2005).
145. E.O. Wilson, *The Diversity of Life*, Allen Lane, The Penguin Press, (1992).
146. Paul Hawken *The Ecology of Commerce; A Declaration of Sustainability*, Collins Business, (2005).
147. R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*, Columbia University Press, New York, (1991).
148. Edy Korthals Altes, *The Contribution of Religions to a Just and Sustainable Economic Development*, in F. David Peat, editor, *The Pari Dialogues, Volume 1*, Pari Publishing, (2007).
149. Edward Wilson, ed., *Biodiversity* Washington D.C., National Academy Press, (1988).

Chapter 12

WE NEED GLOBAL ETHICS

12.1 Education for world citizenship

Besides a humane, democratic and just framework of international law and governance, we urgently need a new global ethic, - an ethic where loyalty to family, community and nation will be supplemented by a strong sense of the brotherhood of all humans, regardless of race, religion or nationality. Schiller expressed this feeling in his “Ode to Joy”, a part of which is the text of Beethoven’s Ninth Symphony. Hearing Beethoven’s music and Schiller’s words, most of us experience an emotion of resonance and unity with the message: All humans are brothers and sisters - not just some - all! It is almost a national anthem of humanity. The feelings that the music and words provoke are similar to patriotism, but broader. It is this higher loyalty to humanity as a whole, this sense of a universal human family, that we need to cultivate in education, in the mass media, and in religion.

Educational reforms are urgently needed, particularly in the teaching of history. As it is taught today, history is a chronicle of power struggles and war, told from a biased national standpoint. Our own race or religion is superior; our own country is always heroic and in the right.

We urgently need to replace this indoctrination in chauvinism by a reformed view of history, where the slow development of human culture is described, giving adequate credit to all who have contributed. Our modern civilization 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, pineapples, quinine, etc. are gifts from the American Indians. Human culture, gradually built up over thousands of years by the patient work of millions of hands and minds, should be presented as a precious heritage - far too precious to be risked in a thermonuclear war.

Reform is also urgently needed in the teaching of economics and business. The economics of growth must be replaced by equilibrium economics, where considerations of ecology, carrying capacity, and sustainability are given their proper weight, and where the quality of life of future generations has as much importance as present profits.

Secondly, the education of economists and businessmen needs to face the problems of global poverty - the painful contrast between the affluence and wastefulness of the industrial North and the malnutrition, disease and illiteracy endemic in the South. Students of economics and business must look for the roots of poverty not only in population growth and war, but also in the history of colonialism and neocolonialism, and in defects in global financial institutions and trade agreements. They must be encouraged to formulate proposals for the correction of North-South economic inequality.

The economic impact of war and preparation for war should be included in the training of economists. Both the direct and indirect costs of war should be studied, for example the effect of unimaginably enormous military budgets in reducing the money available to solve pressing problems posed by the resurgence of infectious disease (e.g. AIDS, and drug-resistant forms of malaria and tuberculosis); the problem of population stabilization; food problems; loss of arable land; future energy problems; the problem of finding substitutes for vanishing nonrenewable resources, and so on.

Finally, economics curricula should include the problems of converting war-related industries to peaceful ones - the problem of beating swords into plowshares. It is often said that our economies are dependent on arms industries. If this is so, it is an unhealthy dependence, analogous to drug addiction, since arms industries do not contribute to future-oriented infrastructure. The problem of conversion is an important one. It is the economic analog of the problem of ending a narcotics addiction, and it ought to be given proper weight in the education of economists.

Law students should be made aware of the importance of international law. They should be familiar with its history, starting with Grotius and the Law of the Sea. They should know the histories of the International Court of Justice and the Nüremberg Principles. They should study the United Nations Charter (especially the articles making war illegal) and the Universal Declaration of Human Rights, as well as the Rome Treaty and the foundation of the International Criminal Court. They should be made aware of a deficiency in the present United Nations - the lack of a legislature with the power to make laws that are binding on individuals.

Students of law should be familiar with all of the details of the World Court's historic Advisory Opinion on Nuclear Weapons, a decision that make the use or threat of use of nuclear weapons illegal. They should also study the Hague and Geneva Conventions, and the various international treaties related to nuclear, chemical and biological weapons. The relationship between the laws of the European Union and those of its member states should be given high importance. The decision by the British Parliament that the laws of the EU take precedence over British law should be a part of the curriculum.

In teaching science too, reforms are needed. Graduates in science and engineering should be conscious of their responsibilities. They must resolve never to use their education in the service of war, nor for the production of weapons, nor in any way that might be harmful to society or to the environment.

Science and engineering students ought to have some knowledge of the history and social impact of science. They could be given a course on the history of scientific ideas, and in connection with modern historical developments such as the industrial revolution, the

global population explosion, the development of nuclear weapons, genetic engineering, and information technology, some discussion of social impact could be introduced. One might hope to build up in science and engineering students an understanding of the way in which their own work is related to the general welfare of humankind, and a sense of individual social and ethical responsibility. These elements are needed in science education if rapid technological progress is to be beneficial to society rather than harmful.

12.2 The role of the mass media

In the mid-1950's, television became cheap enough so that ordinary people in the industrialized countries could afford to own sets. During the infancy of television, its power was underestimated. The great power of television is due to the fact that it grips two senses simultaneously, both vision and hearing. The viewer becomes an almost-hypnotized captive of the broadcast. In the 1950's, this enormous power, which can be used both for good and for ill, was not yet fully apparent. Thus insufficient attention was given to the role of television in education, in setting norms, and in establishing values. Television was not seen as an integral part of the total educational system.

Although the intergenerational transmission of values, norms, and culture is much less important in industrial societies than it is in traditional ones, modern young people of the west and north are by no means at a loss over where to find their values, fashions and role models. With every breath they inhale the values and norms of the mass media. Totally surrounded by a world of television and film images, they accept this world as their own. Unfortunately the culture of television, films and computer games is more often a culture of violence than a culture of peace.

Computer games designed for young boys often give the strongest imaginable support to our present 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).

If entertainment is evaluated only on the basis of popularity, what might be called "the pornography of violence" gets high marks. However, there is another way of looking at entertainment. It is a part, and a very important part, of our total educational system. In modern industrial societies, this important educational function has been given by default to commercial interests. We would not want Coca Cola to run our schools, but entertainment is just as important as the school or home environment in forming values and norms, and entertainment is in the hands of commerce.

Today we are faced with the task of creating a new global ethic in which loyalty to family,

religion and nation will be supplemented by a higher loyalty to humanity as a whole. In addition, our present culture of violence must be replaced by a culture of peace. To achieve these essential goals, we urgently need the cooperation of the mass media.

One is faced with a dilemma, because on the one hand artistic freedom is desirable and censorship undesirable, but on the other hand some degree of responsibility ought to be exercised by the mass media because of their enormous influence in creating norms and values.

Of course we cannot say to the entertainment industry, "From now on you must not show anything but David Attenborough and the life of Gandhi". However, it would be enormously helpful if every film or broadcast or computer game could be evaluated not only for its popularity and artistic merit, but also in terms of the good or harm that it does in the task of building a peaceful world.

Why doesn't the United Nations have its own global television and radio network? Such a network could produce an unbiased version of the news. It could broadcast documentary programs on global problems. It could produce programs showing viewers the music, art and literature of other cultures than their own. It could broadcast programs on the history of ideas, in which the contributions of many societies were adequately recognized. At New Year, when people are in the mood to think of the past and the future, the Secretary General of the United Nations could broadcast a "State of the World" message, summarizing the events of the past year and looking forward to the new year, with its problems, and with his recommendations for their solution. A United Nations television and radio network would at least give viewers and listeners a choice between programs supporting militarism, and programs supporting a global culture of peace. At present they have little choice.

12.3 The role of religion

Finally, let us turn to religion, with its enormous influence on human thought and behavior.

In the 6th century B.C., Prince Gautama Buddha founded a new religion in India, with a universal (non-tribal) code of ethics. Among the sayings of the Buddha are as follows:

"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."

Similarly, Christianity offers a strongly-stated ethic, which, if practiced, would make war impossible. In Mathew, the following passage occurs:

"Ye have heard it said: Thou shalt love thy neighbor and hate thy 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 that spitefully use you and persecute you."

This seemingly impractical advice - that we should love our enemies - is in fact of the greatest practicality, since acts of unilateral kindness and generosity can stop escalatory cycles of revenge and counter-revenge such as those that characterize the present conflicts in the Middle East and the recent troubles in Northern Ireland. However, Christian nations,

while claiming to adhere to the ethic of love and forgiveness, have adopted a policy of “massive retaliation”. involving systems of thermonuclear missiles whose purpose is to destroy as much as possible of the country at which the retaliation is aimed. It is planned that whole populations should be killed in a “massive retaliation”, innocent children along with guilty politicians.

The startling contradiction between what Christian nations profess and what they do was obvious even before the advent of nuclear weapons, at the time when Leo Tolstoy, during his last years, was exchanging letters with a young Indian lawyer in South Africa. In one of his letters to Gandhi, Tolstoy wrote:

“...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...”

As everyone knows, Gandhi successfully applied the principle of non-violence to the civil rights struggle in South Africa, and later to the political movement which gave India its freedom and independence. Later, non-violence was successfully applied by Martin Luther King, and by Nelson Mandela. Gandhi was firm in pointing out that the ends do not justify the means, since violent methods inevitably contaminate the result achieved. The same theme can be seen in the following quotation from Martin Luther King.

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

In 1967, a year before his assassination, Dr. King forcefully condemned the Viet Nam war in an address at a massive peace rally in New York City. He felt that opposition to



Figure 12.1: Sir Joseph Rotblat (1908-2005).

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

12.4 Reformed teaching of history

“We have to extend our loyalty to the whole of the human race.... A war-free world will be seen by many as Utopian. It is not Utopian. There already exist in the world large regions, for example the European Union, within which war is inconceivable. What is needed is to extend these...” , Sir Joseph Rotblat, Nobel Peace Prize Acceptance Speech, 1995.

Since modern war has become prohibitively dangerous, there is an urgent need for peace education. Why do we pay colossal sums for war, which we know is the source of so much human suffering, and which threatens to destroy human civilization? Why not instead support peace and peace education?

The growth of global consciousness

Besides a humane, democratic and just framework of international law and governance, we urgently need a new global ethic, - an ethic where loyalty to family, community and nation will be supplemented by a strong sense of the brotherhood of all humans, regardless of race, religion or nationality. Schiller expressed this feeling in his “Ode to Joy”, a part of which is the text of Beethoven’s Ninth Symphony. Hearing Beethoven’s music and Schiller’s words, most of us experience an emotion of resonance and unity with the message: All humans are brothers and sisters - not just some - all! It is almost a national anthem of humanity.

The feelings that the music and words provoke are similar to patriotism, but broader. It is this sense of a universal human family that we need to cultivate in education, in the mass media, and in religion. We already appreciate music, art and literature from the entire world, and scientific achievements are shared by all, regardless of their country of origin. We need to develop this principle of universal humanism so that it will become the cornerstone of a new ethic.

Educational reforms are urgently needed, particularly in the teaching of history. As it is taught today, history is a chronicle of power struggles and war, told from a biased national standpoint. Our own race or religion is superior; our own country is always heroic and in the right.

We urgently need to replace this indoctrination in chauvinism by a reformed view of history, where the slow development of human culture is described, giving adequate credit to all who have contributed. Our modern civilization 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, pineapples, quinine, etc. are gifts from the American Indians. Human culture, gradually built up over thousands of years by the patient work of millions of hands and minds, should be presented as a precious heritage - far too precious to be risked in a thermonuclear war.

The teaching of history should also focus on the times and places where good government and internal peace have been achieved, and the methods by which this has been accomplished. Students should be encouraged to think about what is needed if we are to apply the same methods to the world as a whole. In particular, the histories of successful federations should be studied, for example the Hanseatic League, the Universal Postal Union, the federal governments of Australia, Brazil, Germany, Switzerland, the United States, Canada, and so on. The recent history of the European Union provides another extremely important example. Not only the successes, but also the problems of federations should be studied in the light of the principle of subsidiarity¹. The essential features of federations should be clarified², as well as the reasons why weaker forms of union have proved to be unsuccessful.

12.5 Reformed education of economists and businessmen

The education of economists and businessmen needs to face the problems of global poverty - the painful contrast between the affluence and wastefulness of the industrial North and

¹The principle of subsidiarity states that within a federation, decisions should be taken at the lowest level at which there are no important externalities. Thus, for example, decisions affecting air quality within Europe should be taken in Bruxelles because winds blow freely across national boundaries, but decisions affecting only the local environment should be taken locally.

²One of the most important of these features is that federations have the power to make and enforce laws that are binding on individuals, rather than trying to coerce their member states.

the malnutrition, disease and illiteracy endemic in the South. Students of economics and business must look for the roots of poverty not only in population growth and war, but also in the history of colonialism and neocolonialism, and in defects in global financial institutions and trade agreements. They must be encouraged to formulate proposals for the correction of North-South economic inequality.

The economic impact of war and preparation for war should be included in the training of economists. Both direct and indirect costs should be studied. An example of an indirect cost of war is the effect of unimaginably enormous military budgets in reducing the amount of money available for solving the serious problems facing the world today.

12.6 Law for a united world

Law students should be made aware of the importance of international law. They should be familiar with its history, starting with Grotius and the Law of the Sea. They should know the histories of the International Court of Justice and the Nuremberg Principles. They should study the United Nations Charter (especially the articles making war illegal) and the Universal Declaration of Human Rights, as well as the Rome Treaty and the foundation of the International Criminal Court. They should be made aware of a deficiency in the present United Nations - the lack of a legislature with the power to make laws that are binding on individuals.

Students of law should be familiar with all of the details of the World Court's historic Advisory Opinion on Nuclear Weapons, a decision that make the use or threat of use of nuclear weapons illegal. They should also study the Hague and Geneva Conventions, and the various international treaties related to nuclear, chemical and biological weapons. The relationship between the laws of the European Union and those of its member states should be given high importance. The decision by the British Parliament that the laws of the EU take precedence over British law should be a part of the curriculum.

12.7 Teaching global ethics

Professors of theology should emphasize three absolutely central components of religious ethics: the duty to love and forgive one's enemies, the prohibition against killing, and the concept of universal human brotherhood. They should make their students conscious of a responsibility to give sermons that are relevant to the major political problems of the modern world, and especially to relate the three ethical principles just mentioned to the problem of war. Students of theology should be made conscious of their responsibility to soften the boundaries between ethnic groups, to contribute to interreligious understanding, and to make marriage across racial and religious boundaries more easy and frequent.

12.8 The social responsibility of scientists

In teaching science too, reforms are needed. Graduates in science and engineering should be conscious of their responsibilities. They must resolve never to use their education in the service of war, nor for the production of weapons, nor in any way that might be harmful to society or to the environment.

Science and engineering students ought to have some knowledge of the history and social impact of science. They could be given a course on the history of scientific ideas; but in connection with modern historical developments such as the industrial revolution, the global population explosion, the development of nuclear weapons, genetic engineering, and information technology, some discussion of social impact of science could be introduced. One might hope to build up in science and engineering students an understanding of the way in which their own work is related to the general welfare of humankind, and a sense of individual social and ethical responsibility. These elements are needed in science education if rapid technological progress is to be beneficial to society rather than harmful.

The changes just mentioned in the specialized lawyers, theologians, scientists and engineers should have a counterpart in elementary education. The basic facts about peace and war should be communicated to children in simple language, and related to the everyday experiences of children. Teachers' training colleges ought to discuss with their student-teachers the methods that can be used to make peace education a part of the curriculum at various levels, and how it can be related to familiar concepts. They should also discuss the degree to which the painful realities of war can be explained to children of various ages without creating an undesirable amount of anxiety.

Peace education can be made a part of the curriculum of elementary schools through (for example) theme days or theme weeks in which the whole school participates. This method has been used successfully in many European schools. During the theme days the children have been encouraged to produce essays, poems and drawings illustrating the difference between peace and war, and between negative peace and positive peace³. Another activity has been to list words inspired by the concept "peace", rapidly and by free association, and to do the same for the concept "war". Drama has also been used successfully in elementary school peace education, and films have proved to be another useful teaching aid.

The problems of reducing global inequalities, of protecting human rights, and of achieving a war-free world can be introduced into grade school courses in history, geography, religion and civics. The curriculum of these courses is frequently revised, and advocates of peace education can take curriculum revisions as opportunities to introduce much-needed reforms that will make the students more international in their outlook. The argument (a true one) should be that changes in the direction of peace education will make students better prepared for a future in which peace will be a central issue and in which they will interact with people of other nations to a much greater extent than was the case in previous generations. The same can be said for curriculum revisions at the university level.

³Negative peace is merely the absence of war. In positive peace, neighboring nations are actively engaged in common projects of mutual benefit, in cultural exchanges, in trade, in exchanges of students and so on.

12.9 Large nations compared with global government

The problem of achieving internal peace over a large geographical area is not insoluble. It has already been solved. There exist today many nations or regions within each of which there is internal peace, and some of these are so large that they are almost worlds in themselves. One thinks of China, India, Brazil, Australia, the Russian Federation, the United States, and the European Union. Many of these enormous societies contain a variety of ethnic groups, a variety of religions and a variety of languages, as well as striking contrasts between wealth and poverty. If these great land areas have been forged into peaceful and cooperative societies, cannot the same methods of government be applied globally?

But what are the methods that nations use to achieve internal peace? Firstly, every true government needs to have the power to make and enforce laws that are binding on individual citizens. Secondly the power of taxation is a necessity. These two requirements of every true government have already been mentioned; but there is a third point that still remains to be discussed:

Within their own territories, almost all nations have more military power than any of their subunits. For example, the US Army is more powerful than the State Militia of Illinois. This unbalance of power contributes to the stability of the Federal Government of the United States. When the FBI wanted to arrest Al Capone, it did not have to bomb Chicago. Agents just went into the city and arrested the gangster. Even if Capone had been enormously popular in Illinois, the government of the state would have realized in advance that it had no chance of resisting the US Federal Government, and it still would have allowed the “Feds” to make their arrest. Similar considerations hold for almost all nations within which there is internal peace. It is true that there are some nations within which subnational groups have more power than the national government, but these are frequently characterized by civil wars.

Of the large land areas within which internal peace has been achieved, the European Union differs from the others because its member states still maintain powerful armies. The EU forms a realistic model for what can be achieved globally in the near future by reforming and strengthening the United Nations. In the distant future, however, we can imagine a time when a world federal authority will have much more power than any of its member states, and when national armies will have only the size needed to maintain local order.

Today there is a pressing need to enlarge the size of the political unit from the nation-state to the entire world. The need to do so results from the terrible dangers of modern weapons and from global economic interdependence. The progress of science has created this need, but science has also given us the means to enlarge the political unit: Our almost miraculous modern communications media, if properly used, have the power to weld all of humankind into a single supportive and cooperative society.



Figure 12.2: Malala Yousefzai, winner of the 2014 Nobel Peace Prize, says: “One child, one teacher, one book and one pen can change the world!”

12.10 Culture, education and human solidarity

Cultural and educational activities have a small ecological footprint, and therefore are more sustainable than pollution-producing, fossil-fuel-using jobs in industry. Furthermore, since culture and knowledge are shared among all nations, work in culture and education leads societies naturally towards internationalism and peace.

Economies based on a high level of consumption of material goods are unsustainable and will have to be abandoned by a future world that renounces the use of fossil fuels in order to avoid catastrophic climate change, a world where non-renewable resources such as metals will become increasingly rare and expensive. How then can full employment be maintained?

The creation of renewable energy infrastructure will provide work for a large number of people; but in addition, sustainable economies of the future will need to shift many workers from jobs in industry to jobs in the service sector. Within the service sector, jobs in culture and education are particularly valuable because they will help to avoid the disastrous wars that are currently producing enormous human suffering and millions of refugees, wars that threaten to escalate into an all-destroying global thermonuclear war.⁴

⁴<http://www.fredsakademiet.dk/library/need.pdf>
<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>



Figure 12.3: Cultural exchanges lead to human solidarity (Public domain)

UNESCO and peace education

Advocates of education for peace can obtain important guidance and encouragement from UNESCO - the United Nations Educational, Scientific and Cultural Organization⁵. The Constitution of UNESCO, was written immediately after the end of the Second World War, during which education had been misused (especially in Hitler's Germany) to indoctrinate students in such a way that they became uncritical and fanatical supporters of military dictatorships. The founders of the United Nations were anxious to correct this misuse, and to make education instead one of the foundations of a peaceful world. One can see this hope in the following paragraph from UNESCO's Constitution:

"The purpose of the Organization is to contribute to peace and security by promoting collaboration among nations through education, science and culture in order to further universal respect for justice, for the rule of law and for the human rights and fundamental freedoms which are affirmed for the peoples of the world, without distinction of race, sex, language or religion, by the Charter of the United Nations."

In other words, UNESCO was given the task of promoting education for peace, and of promoting peace through international cooperation in education.

In 1946 the General Conference of UNESCO adopted a nine-point resolution concerning the improvement of textbooks in such a way as to make them support international understanding, paying particular attention to history teaching and civic education. During the next decade, UNESCO produced publications and hosted seminars to promote improvements in the teaching of history, geography and modern languages, so that these

⁵<http://www.unicef.org/education/files/PeaceEducation.pdf>

subjects could be more instrumental in developing mutual understanding between nations and between cultures. A meeting of French, German, British and American teachers was organized in 1952, with the goal of removing national prejudices from textbooks. Every two years after this date bilateral and multilateral consultations of history teachers have taken place under the auspices of UNESCO.

Here are a few voices that express the aims and ideals of UNESCO over the years:

- Ellen Wilkinson (United Kingdom) (Former UK Minister of Education, Chairwoman of the conference establishing UNESCO in 1945): *What can this organization do? Can we replace nationalist teaching by a conception of humanity that trains children to have a sense of mankind as well as of national citizenship? That means working for international understanding*
- Maria Montessori (Italy), pioneer of modern education and education for peace, Fourth Session of the General Conference of UNESCO, Florence 1950: *If one day UNESCO resolved to involve children in the reconstruction of the world and building peace, if it chose to call on them, to discuss with them, and recognize the value of all the revelations they have for us, it would find them of immense help in infusing new life into this society which must be founded on the cooperation of all.*
- Jamie Torres Bodet (Mexico), Director-General of UNESCO, 1948-1952, (The UNESCO Courier, 1951): *Knowledge and understanding of the principles of the Universal Declaration of Human Rights and their practical application must begin during childhood. Efforts to make known the rights and duties they imply will never be fully effective unless schools in all countries make teaching about the declaration a regular part of their curriculum...*
- Lionel Elvin (United Kingdom), Director of the Department of Education of UNESCO, 1950-1956 (UNESCO Courier, 1953): *If UNESCO were only an office in Paris, its task would be impossible. It is more than that: it is an association of some sixty-five countries which have pledged themselves to do all they can, not only internationally but within their own boundaries, to advance the common aim of educating for peace. The international side comes in because we shall obviously do this faster and better and with more mutual trust if we do it together.*
- Jawaharlal Nehru (India) Prime Minister, 1947-1964 (Address on a visit to UNESCO, 1962): *It is then the minds and hearts of men that have to be approached for mutual understanding, knowledge and appreciation of each other and through the proper kind of education... But we have seen that education by itself does not lead to a conversion of minds towards peaceful purposes. Something more is necessary, new standards, new values and perhaps a kind of spiritual background and a feeling of commonness of mankind.*
- James P. Grant (United States). Executive Director of UNICEF, 1980-1995, (International Conference on Education, Geneva, 1994): *Education for peace must be*

global, for as the communications revolution transforms the world into a single community, everyone must come to understand that they are affected by what happens elsewhere, and that their lives, too, have an impact. Solidarity is a survival strategy in the global village.

During the time when he was Secretary-General of UNESCO, Federico Mayor Zaragoza of Spain introduced the concept of a *Culture of Peace*. He felt, as many did, that civilization was entering a period of crisis. Federico Mayor believed this crisis to be as much spiritual as it was economic and political. It was necessary, he felt, to counteract our present power-worshipping culture of violence with a Culture of Peace, a set of ethical and aesthetic values, habits and customs, attitudes towards others, forms of behavior and ways of life that express

- Respect for life and for the dignity and human rights of individuals.
- Rejection of violence.
- Recognition of equal rights for men and women.
- Upholding the principles of democracy, freedom, justice, solidarity, tolerance and the acceptance of differences.
- Understanding between nations and countries and between ethnic, religious, cultural and social groups.

Mayor and UNESCO implemented this idea by designating the year 2000 as the International Year of the Culture of Peace. In preparation for this year, a meeting of Nobel Peace Prize Laureates launched *Manifesto 2000*, a campaign in which the following pledge of the Culture of Peace was widely circulated and signed:

Recognizing my share of responsibility for the future of humanity, especially for today's children and those of future generations, I pledge - in my daily life, in my family, my work, my community, my country and my region - to:

1. *respect the life and dignity of every person without discrimination or prejudice;*
2. *practice active non-violence, rejecting violence in all its forms: physical, sexual, psychological, economical and social, in particular towards the most deprived and vulnerable such as children and adolescents;*
3. *share my time and material resources in a spirit of generosity to put an end to exclusion, injustice and political and economic oppression;*
4. *defend freedom of expression and cultural diversity, giving preference always to dialogue and listening without engaging in fanaticism, defamation and the rejection of others;*

5. *promote consumer behavior that is responsible and development practices that respect all forms of life and preserve the balance of nature on the planet;*
6. *contribute to the development of my community, with the full participation of women and respect for democratic principles, in order to create together new forms of solidarity.*

In addition, Federico Mayor and UNESCO initiated a Campaign for the Children of the World, and this eventually developed into the International Decade for a Culture of Peace and Non-Violence for the Children of the World (2001-2010). In support of this work, the UN General Assembly drafted a Program of Action on a Culture of Peace (53rd Session, 2000). The Program of Action obliges its signatories to “ensure that children, from an early age, benefit from education on the values, attitudes, modes of behavior and ways of life to enable them to resolve any dispute peacefully and in a spirit of respect for human dignity and of tolerance and non-discrimination”, and to “encourage the revision of educational curricula, including textbooks...”

Just as this program was starting, the September 11 terrorist attacks gave an enormous present to the culture of violence and war, and almost silenced the voices speaking for a Culture of Peace. However, military solutions have never provided true security, even for the strongest countries. Expensive and technologically advanced weapons systems may enrich arms manufacturers and military lobbies, but they do not provide security - only an unbelievably expensive case of the jitters. By contrast, the Culture of Peace can give us hope for the future.

12.11 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.

12.12 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.

12.13 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)

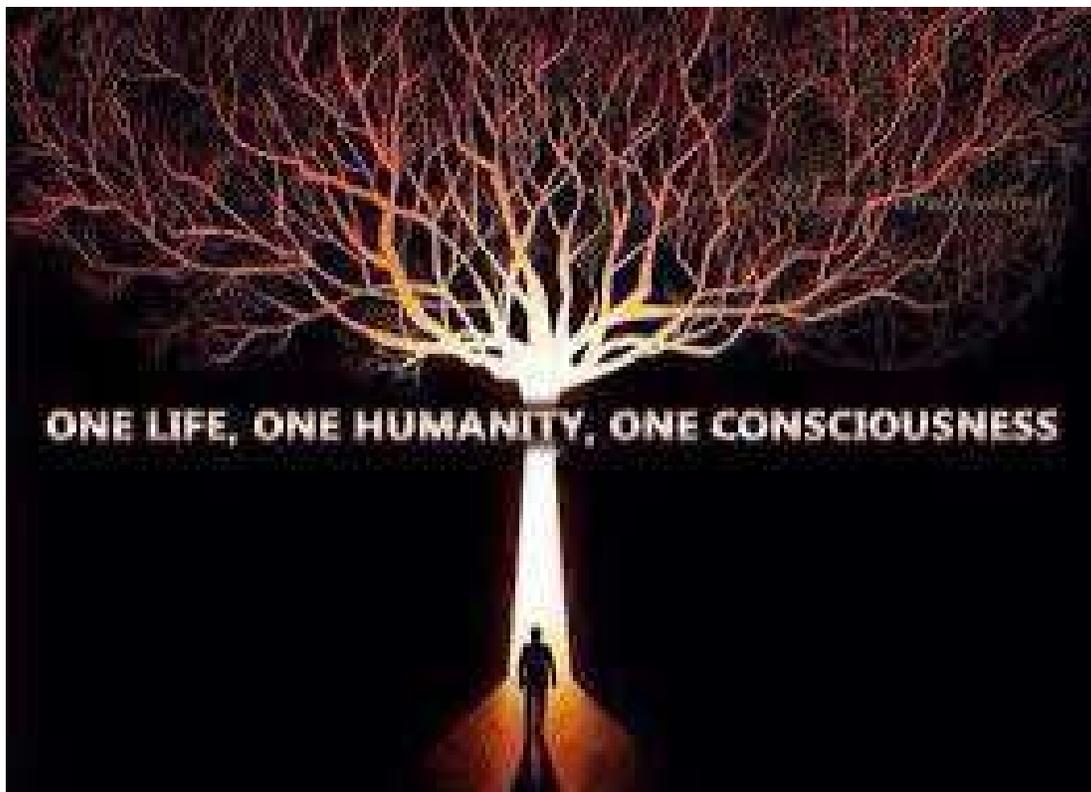
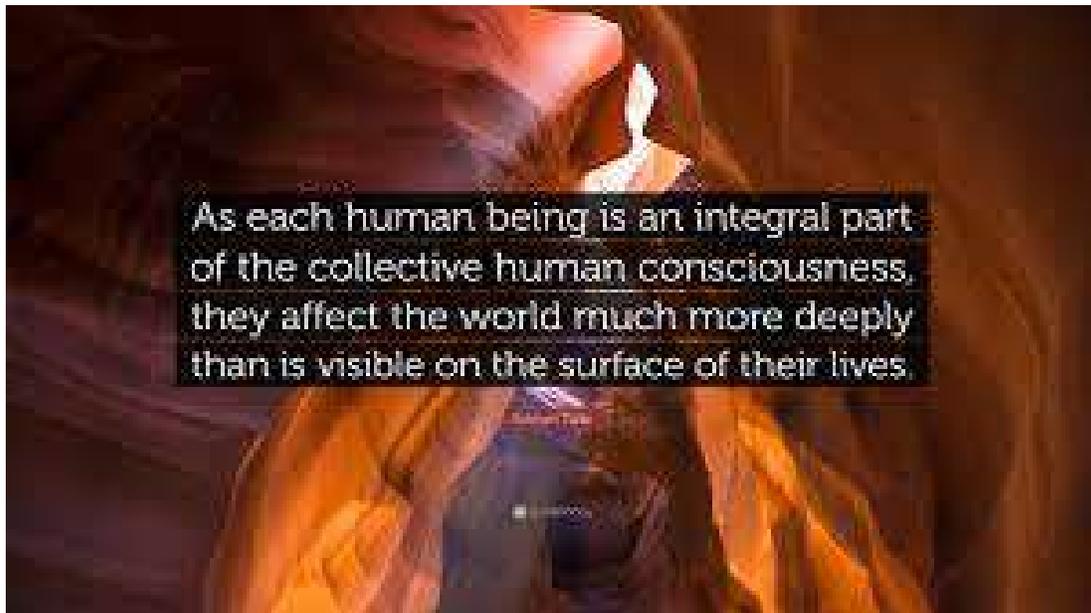
The Open Access Movement has fought valiantly to ensure that scientists do not sign their copyrights away but instead ensure their work is published on the Internet, under terms that allow anyone to access it., Aaron Schwartz (1986-2013)

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.







Suggestions for further reading

1. R. Axelrod, *The Evolution of Cooperation*, Basic Books, New York, (1984).
2. W. Brandt, *World Armament and World Hunger: A Call for Action*, Victor Gollanz Ltd., London, (1982).
3. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).
4. I. Eibl-Eibesfeldt, *The Biology of War and Peace*, Thames and Hudson, New York, (1979).
5. R.A. Hinde, *Biological Basis for Human Social Behaviour*, McGraw-Hill, New York, (1977).
6. R.A. Hinde, *Towards Understanding Relationships*, Academic Press, London, (1979).
7. M. Khanert and others (eds.), *Children and War*, Peace Union of Finland, Helsinki, (1983).
8. K. Lorentz, *On Aggression*, Bantam Books, New York, (1977).
9. Medical Association's Board of Science and Education, *The Medical Effects of Nuclear War*, Wiley, (1983).
10. M. Renner, *Swords into Plowshares: Converting to a Peace Economy*, Worldwatch Paper 96, Worldwatch Institute, Washington D.C., (1990).
11. J. Rotblat (ed.), *Shaping Our Common Future: Dangers and Opportunities (Proceedings of the Forty-Second Pugwash Conference on Science and World Affairs)*, World Scientific, London, (1994).
12. R.L. Sivard, *World Military and Social Expenditures*, World Priorities, Box 25140, Washington, D.C. 20007, (published annually).
13. J.E. Slater, *Governance*, Aspen Institute for Humanistic Studies, New York, (1976).
14. P.B. Smith, J.D. Schilling and A.P. Haines, *Introduction and Summary*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
15. A. Szent-Györgyi, *The Crazy Ape*, Philosophical Library, New York, (1970).
16. J. Tinbergen (coordinator), *Reshaping the International Order*, Dutton, New York, (1976).
17. C. Zahn-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press, (1986).
18. J.L. Henderson, *Hiroshima*, Longmans (1974).
19. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
20. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
21. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).
22. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
23. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
24. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
25. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)

26. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
27. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
28. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
29. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
30. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
31. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
32. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).
33. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
34. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
35. IAEA, *International Safeguards and the Non-proliferation of Nuclear Weapons*, International Atomic Energy Agency, Vienna, (1985).
36. J. Shear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
37. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
38. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
39. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
40. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
41. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
42. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
43. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
44. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
45. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
46. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
47. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
48. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).

49. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
50. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
51. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
52. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
53. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).
54. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
55. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
56. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
57. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
58. G.K. Bertsch and S.R. Grillot, (Eds.), *Arms on the Market: Reducing the Risks of Proliferation in the Former Soviet Union*, Routledge, New York, (1998).
59. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
60. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
61. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
62. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
63. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
64. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
65. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
66. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).
67. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
68. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
69. R. Forsberg et al., *Nonproliferation Primer: Preventing the Spread of Nuclear, Chemical and Biological Weapons*, MIT Press, Cambridge, (1995).
70. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).

71. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
72. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
73. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
74. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
75. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).
76. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
77. C. Langley, *Soldiers in the Laboratory: Military Involvement in Science and Technology and Some Alternatives*, Scientists for Global Responsibility, (2005).
78. M.T. Klare, *Blood and Oil: The Dangers and Consequences of America's Growing Dependency on Imported Petroleum*, Metropolitan Books, New York, (2004); paperback, Owl Books, (2005).
79. M.T. Klare, *Resource Wars: The New Landscape of Global Conflict*, reprint edition, Owl Books, New York, (2002).
80. M. Renner, *The Anatomy of Resource Wars*, Worldwatch Paper #162, Worldwatch Institute, (2002).
81. W.B. Gallie, *Understanding War: Points of Conflict*, Routledge, London, (1991).
82. R. Falk and S.S. Kim, eds., *The War System: An Interdisciplinary Approach*, Westview, Boulder, CO, (1980).
83. J.D. Clarkson and T.C. Cochran, eds., *War as a Social Institution*, Columbia University Press, New York, (1941).
84. S. Melman, *The Permanent War Economy*, Simon and Schuster, (1974).
85. B. Broms, *United Nations*, Suomalainen Tiedeakatemia, Helsinki, (1990).
86. S. Rosenne, *The Law and Practice at the International Court*, Dordrecht, (1985).
87. S. Rosenne, *The World Court - What It Is and How It Works*, Dordrecht, (1995).
88. J. D'Arcy and D. Harris, *The Procedural Aspects of International Law (Book Series), Volume 25*, Transnational Publishers, Ardsley, New York, (2001).
89. H. Cullen, *The Collective Complaints Mechanism Under the European Social Charter*, European Law Review, Human Rights Survey, p. 18-30, (2000).
90. S.D. Bailey, *The Procedure of the Security Council*, Oxford, (1988).
91. R.A. Akindale, *The Organization and Promotion of World Peace: A Study of Universal-Regional Relationships*, Univ. Toronto Press, Toronto, Ont., (1976).
92. J.S. Applegate, *The UN Peace Imperative*, Vantage Press, New York, (1992).
93. S.E. Atkins, *Arms Control, Disarmament, International Security and Peace: An Annotated Guide to Sources, 1980-1987*, Clio Press, Santa Barbara, CA, (1988).
94. N. Ball and T. Halevy, *Making Peace Work: The Role of the International Development Community*, Overseas Development Council, Washington DC, (1996).

95. F. Barnaby, Ed., *The Gaia Peace Atlas: Survival into the Third Millennium*, Doubleday, New York, (1988)
96. J.H. Barton, *The Politics of Peace: An Evaluation of Arms Control*, Stanford Univ. Press, Stanford, CA, (1981).
97. W. Bello, *Visions of a Warless World*, Friends Committee on National Education Fund, Washington DC, (1986).
98. A. Boserup and A. Mack, *Abolishing War: Cultures and Institutions; Dialogue with Peace Scholars Elise Boulding and Randall Forsberg*, Boston Research Center for the Twenty-first Century, Cambridge, MA, (1998).
99. E. Boulding et al., *Bibliography on World Conflict and Peace*, Westview Press, Boulder, CO, (1979).
100. E. Boulding et al., Eds., *Peace, Culture and Society: Transnational Research Dialogue*, Westview Press, Boulder, CO, (1991).
101. A.T. Bryan et al., Eds., *Peace, Development and Security in the Caribbean*, St. Martins Press, New York, (1988).
102. A.L. Burns and N. Heathcote, *Peace-Keeping by UN Forces from Suez to Congo*, Praeger, New York, (1963).
103. F. Capra and C. Spretnak, *Green Politics: The Global Promise*, E.P. Dutton, New York, (1986).
104. N. Carstarphen, *Annotated Bibliography of Conflict Analysis and Resolution*, Inst. for Conflict Analysis and Resolution, George Mason Univ., Fairfax, VA, (1997).
105. N. Chomsky, *Peace in the Middle East? Reflections on Justice and Nationhood*, Vintage Books, New York, (1974).
106. G. Clark and L. Sohn, *World Peace Through World Law*, World Without War Pubs., Chicago, IL, (1984).
107. K. Coates, *Think Globally, Act Locally: The United Nations and the Peace Movements*, Spokesman Books, Philadelphia, PA, (1988).
108. G. De Marco and M. Bartolo, *A Second Generation United Nations: For Peace and Freedom in the 20th Century*, Columbia Univ. Press, New York, (1997).
109. F.M. Deng and I.W. Zartman, Eds., *Conflict Resolution in Africa*, Brookings Institution, Washington, DC, (1991).
110. W. Desan, *Let the Future Come: Perspectives for a Planetary Peace*, Georgetown Univ. Press, Washington, DC, (1987).
111. D. Deudney, *Whole Earth Security. A Geopolitics of Peace*, Worldwatch paper 55. Worldwatch Institute, Washington, DC, (1983).
112. A.J. Donovan, *World Peace? A Work Based on Interviews with Foreign Diplomats*, A.J. Donovan, New York, (1986).
113. R. Duffey, *International Law of Peace*, Oceania Pubs., Dobbs Ferry, NY, (1990).
114. L.J. Dumas, *The Socio-Economics of Conversion From War to Peace*, M.E. Sharpe, Armonk, NY, (1995).
115. W. Durland, *The Illegality of War*, National Center on Law and Pacifism, Colorado Springs, CO, (1982).

116. F. Esack, *Qur'an, Liberation and Pluralism: An Islamic Perspective on Interreligious Solidarity Against Oppression*, Oxford Univ. Press, London, (1997).
117. I. Hauchler and P.M. Kennedy, Eds., *Global Trends: The World Almanac of Development and Peace*, Continuum Pubs., New York, (1995).
118. H.B. Hollins et al., *The Conquest of War: Alternative Strategies for Global Security*, Westview Press, Boulder, CO, (1989).
119. H.J. Morgenthau, *Peace, Security and the United Nations*, Ayer Pubs., Salem, NH, (1973).
120. C.C. Moskos, *Peace Soldiers: The Sociology of a United Nations Military Force*, Univ. of Chicago Press, Chicago, IL, (1976).
121. L. Pauling, *Science and World Peace*, India Council for Cultural Relations, New Delhi, India, (1967).
122. C. Peck, *The United Nations as a Dispute Resolution System: Improving Mechanisms for the Prevention and Resolution of Conflict*, Kluwer, Law and Tax, Cambridge, MA, (1996).
123. D. Pepper and A. Jenkins, *The Geography of Peace and War*, Basil Blackwell, New York, (1985).
124. J. Perez de Cuellar, *Pilgrimage for Peace: A Secretary General's Memoir*, St. Martin's Press, New York, (1997).
125. R. Pickus and R. Woito, *To End War: An Introduction to the Ideas, Books, Organizations and Work That Can Help*, World Without War Council, Berkeley, CA, (1970).
126. S.R. Ratner, *The New UN Peacekeeping: Building Peace in Lands of Conflict after the Cold War*, St. Martins Press, New York, (1995).
127. I.J. Rikhye and K. Skjelsbaek, Eds., *The United Nations and Peacekeeping: Results, Limitations and Prospects: The Lessons of 40 Years of Experience*, St. Martins Press, New York, (1991).
128. J. Rotblat, Ed., *Scientists in Quest for Peace: A History of the Pugwash Conferences*, MIT Press, Cambridge, MA, (1972).
129. J. Rotblat, Ed., *Scientists, The Arms Race, and Disarmament*, Taylor and Francis, Bristol, PA, (1982).
130. J. Rotblat, Ed., *Striving for Peace, Security and Development in the World*, World Scientific, River Edge, NJ, (1991).
131. J. Rotblat, Ed., *Towards a War-Free World*, World Scientific, River Edge, NJ, (1995).
132. J. Rotblat, Ed., *Nuclear Weapons: The Road to Zero*, Westview, Boulder, CO, (1998).
133. J. Rotblat and L. Valki, Eds., *Coexistence, Cooperation and Common Security*, St. Martins Press, New York, (1988).
134. United Nations, *Peaceful Settlement of Disputes between States: A Select Bibliography*, United Nations, New York, (1991).
135. United States Arms Control and Disarmament Agency, *Arms Control and Disarmament Agreements: Texts and Histories of Negotiations*, USACDA, Washington, DC, (updated annually)

136. D. Fahrni, *An Outline History of Switzerland - From the Origins to the Present Day*, Pro Helvetia Arts Council of Switzerland, Zurich, (1994).
137. J.M. Luck, *A History of Switzerland*, Sposs, Palo Alto, CA, (1985).
138. T. Jackson, *Material Concerns: Pollution, Profit and the Quality of Life*, Routledge, (2004).
139. T. Jackson, *Motivating Sustainable Consumption*, Report to the Sustainable Development Research Network, January (2005).
140. T. Jackson, *The Earthscan Reader in Sustainable Consumption*, Earthscan, (2006).
141. J.S. Avery, *Information Theory and Evolution, 2nd Edition*, World Scientific, (2012).
142. A.J. Lotka, *Elements of Mathematical Biology*, Dover, (1956).
143. E.O. Wilson *Sociobiology: The New Synthesis*, Harvard University Press, (1975).
144. E.O. Wilson, *The Superorganism: The Beauty, Elegance, and Strangeness of Insect Societies*, W.W. Norton, (2009).
145. F. Soddy, *Wealth, Virtual Wealth and Debt. The solution of the economic paradox*, George Allen and Unwin, (1926).
146. F. Soddy, *The Role of Money*, George Routledge and Sons, London, (1934)
147. N. Georgescu-Roegen, *Energy and Economic Myths : Institutional and Analytical Economic Essays*, Pergamon Press, (1976).
148. N. Georgescu-Roegen, *The Entropy Law and the Economic Process*, Harvard University Press, (1971).
149. J. Rifkin and T. Howard, *Entropy: A New World View* The Viking Press, New York (1980).
150. P. Bartelmus, *Environment, Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, New York, (1994).
151. H.E. Daly and K.N. Townsend, (editors), *Valuing the Earth. Economics, Ecology, Ethics*, MIT Press, Cambridge, Massachusetts, (1993)
152. C. Flavin, *Slowing Global Warming: A Worldwide Strategy*, Worldwatch Paper 91, Worldwatch Institute, Washington D.C., (1989).
153. S.H. Schneider, *The Genesis Strategy: Climate and Global Survival*, Plenum Press, (1976).
154. WHO/UNFPA/UNICEF, *The Reproductive Health of Adolescents: A Strategy for Action*, World Health Organization, Geneva, (1989).
155. World Commission on Environment and Development, *Our Common Future*, Oxford University Press, (1987).
156. W. Jackson, *Man and the Environment*, W.C. Brown, Dubuque, Iowa, (1971).
157. T. Berry, *The Dream of the Earth*, Sierra Club Books, San Francisco, (1988).
158. T.M. Swanson, ed., *The Economics and Ecology of Biodiversity Decline: The Forces Driving Global Change*, Cambridge University Press, (1995).
159. F.H. Bormann, *Unlimited Growth: Growing, Growing, and Gone?*, BioScience 22: 706-9, (1972).
160. L.G. Brookes, *A Low-Energy Strategy for the United Kingdom*, Atom 269: 73-8, (1979).

161. J. Cherfas, *Skeptics and Visionaries Examine Energy Saving*, Science 251: 154-6, (1991).
162. C.J. Cleveland, *Energy Quality and Energy Surplus in the Extraction of Fossil Fuels in the US*, Ecological Economics 6: 139-62, (1992).
163. C.J. Cleveland, Robert Costanza, Charlie A.S. Hall and Robert Kaufmann, *Energy and the US Economy: A Biophysical Perspective*, Science 225 (4665): 890-7, (1984).
164. P. Cloud, *Entropy, Materials, and Prosperity*, Geologische Rundschau 66: 678-96, (1978).
165. H.E. Daly, *From Empty-World Economics to Full-World Economics: Recognizing a Historical Turning Point in Economic Development*, in R. Goodland, H. E. Daly and S. Serafy (eds) Population, Technology, and Lifestyle, pp. 23-37. Washington, DC: Island Press, (1992).
166. H.E. Daly, *On Nicholas Georgescu-Roegen's Contributions to Economics: An Obituary Essay*, Ecological Economics 13: 149-54, (1995).
167. H.E. Daly, *Georgescu-Roegen versus Solow/Stiglitz*, Ecological Economics 22: 267-8, (1997).
168. M. Eigen, *Selforganization of Matter and the Evolution of Biological Macro- molecules*, Naturwissenschaften 58(10): 465-523, (1971).
169. S.O. Funtowicz and Jerry R. Ravetz, *Post Normal Science: A New Science for New Times*, Scientific European 266: 20-2, (1990).
170. N. Georgescu-Roegen, *Fixed Coefficients of Production and the Marginal Productivity Theory*, Review of Economic Studies 3: 40-9, (1935a).
171. N. Georgescu-Roegen, (1935b) *Note on a Proposition of Pareto*, Quarterly Journal of Economics 49: 706-14.
172. N. Georgescu-Roegen, *Marginal Utility of Money and Elasticities of Demand*, Quarterly Journal of Economics 50: 533-9, (1936a).
173. N. Georgescu-Roegen, *The Pure Theory of Consumer's Behavior*, Quarterly Journal of Economics 50: 545-93, (1936b).
174. N. Georgescu-Roegen, *Process in Farming versus Process in Manufacturing: A Problem of Balanced Development*, in U. Papi and C. Nunn (eds) Economic Problems of Agriculture in Industrial Societies, pp. 497-528. London: Macmillan, (1969).
175. N. Georgescu-Roegen, *The Entropy Law and the Economic Process*, Cambridge, MA: Harvard University Press, (1971).
176. N. Georgescu-Roegen, *Energy and Economic Myths*, Southern Economic Journal 41: 347-81, (1975).
177. N. Georgescu-Roegen, *Energy and Economic Myths*. New York: Pergamon Press, (1976).
178. N. Georgescu-Roegen, *Inequality, Limits and Growth from a Bioeconomic Viewpoint*, Review of Social Economy 35: 361-75, (1977a).
179. N. Georgescu-Roegen, *The Steady State and Ecological Salvation: A Thermodynamic Analysis*, BioScience 27: 266-70, (1977b).
180. N. Georgescu-Roegen, *Energy Analysis and Economic Valuation*, Southern Economic Journal 45: 1023-58, (1979a).

181. N. Georgescu-Roegen, *Methods in Economic Science*, Journal of Economic Issues 13 (2): 317-28, (1979b).
182. N. Georgescu-Roegen, *Methods in Economic Science: A Rejoinder*, Economic Issues 15: 188-93, (1981).
183. N. Georgescu-Roegen, *The Promethean Condition of Viable Technologies*, Materials and Society 7: 425-35, (1983).
184. Georgescu-Roegen, Nicholas, *Man and Production*, in M. Baranzini and R. Scazzieri (eds) Foundations of Economics: Structures of Inquiry and Economic Theory, pp. 247-80. Oxford: Basil Blackwell, (1986).
185. N. Georgescu-Roegen, *An Emigrant from a Developing Country: Autobiographical Notes-I*, Banca Nazionale del Lavoro Quarterly Review 164: 3-31, (1988a).
186. N. Georgescu-Roegen, *The Interplay between Institutional and Material Factors: The Problem and Its Status*, in J.A. Kregel, E. Matzner and A. Roncaglia (eds) Barriers to Employment, pp. 297-326. London: Macmillan, (1988b).
187. N. Georgescu-Roegen, *Production Process and Dynamic Economics*, in M. Baranzini and R. Scazzieri (eds) The Economic Theory of Structure and Change, pp. 198-226. Cambridge: Cambridge University Press, (1990).
188. N. Georgescu-Roegen, *Nicholas Georgescu-Roegen about Himself*, in M. Szenberg (ed.) Eminent Economists: Their Life Philosophies, pp. 128-59. Cambridge: Cambridge University Press, (1992).
189. J. Gever, Robert Kaufmann, David Skole and Charles Vörösmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Niwot, CO: University Press of Colorado, (1991).
190. M. Giampietro, *Sustainability and Technological Development in Agriculture: A Critical Appraisal of Genetic Engineering*, BioScience 44(10): 677-89, (1994).
191. M. Giampietro and Kozo Mayumi, *Another View of Development, Ecological Degradation and North-South Trade*, Review of Social Economy 56: 21-37, (1998).
192. M. Giampietro and Kozo Mayumi, *The Biofuel Delusion: The Fallacy of Large Scale Agro-biofuel Production*, London: Earthscan, (2009).
193. R. Goldschmidt, *Some Aspects of Evolution*, Science 78: 539-47, (1933).
194. S.J. Gould, *The Return to Hopeful Monsters*, Natural History 86: 22-30, (1977).
195. S.J. Gould and Niles Eldredge, *Punctuated Equilibria: The Tempo and Mode of Evolution Reconsidered*, Paleobiology 3: 115-51, (1977).
196. J. Gowdy, *The Value of Biodiversity: Markets, Society and Ecosystems*, Land Economics 73(1): 25-41, (1997).
197. J. Gribbin, *The Death of the Sun* New York: Delacorte Press, (1980).
198. C.A.S. Hall, Cutler J. Cleveland and Robert Kaufman, *Energy and Resource Quality* New York: John Wiley and Sons, (1986).
199. S.R. Ichtiaque and Stephen H. Schneider, *Atmospheric Carbon Dioxide and Aerosols: Effects of Large Increases on Global Climate*, Science 173: 138-41, (1971).
200. K. Ito, *Setting Goals and Action Plan for Energy Efficiency Improvement*. Paper presented at the EAS Energy Efficiency and Conservation Conference, Tokyo (19 June), (2007).

201. F. Jevons, *Greenhouse: A Paradox*, Search 21: 171-2, (1990).
202. W.S. Jevons, *The Coal Question* (reprint of 3rd edn, 1906). New York: Augustus M. Kelley, (1965).
203. N. Kawamiya, *Entropii to Kougyoushakai no Sentaku (Entropy and Future Choices for the Industrial Society)*, Tokyo: Kaimei, (1983).
204. J.D. Khazzoom, *Economic Implications of Mandated Efficiency Standards for Household Appliances*, Energy Journal 1: 21-39, (1980).
205. J.D. Khazzoom, *Energy Saving Resulting from the Adoption of More Efficient Appliances*, Energy Journal 8: 85-9, (1987).
206. T.C. Koopmans, *Three Essays on the State of Economic Science*, New York: McGraw-Hill Book Company, (1957).
207. T.S. Kuhn, *The Structure of Scientific Revolutions*, Chicago, IL: The University of Chicago Press, (1962).
208. J. von Liebig, *Letters on Modern Agriculture* (J. Blyth ed.). New York: John Wiley, (1959).
209. A.J. Lotka, *Elements of Mathematical Biology*, New York: Dover Publications, (1956).
210. G. Luft, *Fueling the Dragon: China's Race Into the Oil Market*. <http://www.iags.org/china.htm>, (2007).
211. K. Mayumi, *The Origins of Ecological Economics: The Bioeconomics of Georgescu-Roegen*, London: Routledge, (2001).
212. K. Mayumi, *An Epistemological Critique of the Open Leontief Dynamic Model: Balanced and Sustained Growth, Delays, and Anticipatory Systems Theory*, Structural Change and Economic Dynamics 16: 540-56m (2005).
213. K. Mayumi, Mario Giampietro and John Gowdy, *Georgescu-Roegen/Daly versus Solow/Stiglitz Revisited*, Ecological Economics 27: 115-17. Legacies: Nicholas Georgescu-Roegen 1253, (1998).
214. W.H. Miernyk, *Economic Growth Theory and the Georgescu-Roegen Paradigm*, in K. Mayumi and J. Gowdy (eds) *Bioeconomics and Sustainability: Essays in Honour of Nicholas Georgescu-Roegen*, pp. 69-81. Cheltenham: Edward Elgar, (1999).
215. Newman, Peter, *Greenhouse, Oil and Cities*, Futures May: 335-48, (1991).
216. D. Pearce, *Substitution and Sustainability: Some Reflections on Georgescu-Roegen*, Ecological Economics 22: 295-7, (1997).
217. D. Pearce, Edward Barbier and Anil Markandya, *Sustainable Development*, Hampshire: Edward Elgar, (1990).
218. J. Polimeni, Kozo Mayumi, Mario Giampietro and Blake Alcott, *The Jevons Paradox and the Myth of Resource Efficiency Improvements*, London: Earthscan, (2008).
219. J.F. Randolph, *Basic Real and Abstract Analysis*, New York: Academic Press, (1968).
220. D. Ricardo, *On the Principles of Political Economy and Taxation*, in P. Sraffa (ed.) *The Works and Correspondence of David Ricardo*, Vol. 1. Cambridge: Cambridge University Press, (1951).
221. E. Schrödinger, *What is Life? With Mind and Matter and Autobiographical Sketches*, Cambridge: Cambridge University Press, (1967).

222. J.A. Schumpeter, *The Theory of Economic Development*, Cambridge, MA: Harvard Economic Press, (1951).
223. G.T. Seaborg, *The Erehwon Machine: Possibilities for Reconciling Goals by Way of New Technology*, in S.H. Schurr (ed.) *Energy, Economic Growth, and the Environment*, pp. 125-38. Baltimore, MD: Johns Hopkins University Press, (1972).
224. M.R. Simmons, *Twilight in the Desert: The Coming Saudi Oil Shock and the World Economy* New Jersey: John Wiley and Sons, Inc., (2005).
225. B.J. Skinner, *Earth Resource (3rd edn)*, New Jersey: Prentice Hall, (1986).
226. V. Smil, *Global Catastrophes and Trends: The Next Fifty Years* Cambridge, MA: MIT Press, (2008).
227. R. Solow, *Technical Change and the Aggregate Production Function*, *Review of Economics and Statistics* 39: 312-20, (1957).
228. R. Solow, *The Economics of Resources or the Resources of Economics*, *American Economic Review* 64: 1-14, (1974).
229. R.E. Ulanowicz, *Growth and Development: Ecosystem Phenomenology* New York: Springer-Verlag, (1986).
230. US Geological Survey, *Commodity Statistics and Information*, (2005).
231. G.K. Zipf, *National Unity and Disunity: The Nation as a Bio-social Organism*. Bloomington, IN: Principia Press, (1941).

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