



Science, Ethics and Social Responsibilityⁱ

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OPINION

I want to thank the co-conveners, Pugwash and UNESCO for the invitation to speak on the subject of “Science, Ethics and Social Responsibility” – an issue which has long been a concern of mine.

First of all though, I would like to commend Gerard Toulouse for his major sponsorship of this meeting; and congratulate him, Jaques Borde and Pierre Lallemand for their organization of this event and their success in rejuvenating Student Pugwash in France, thus breathing new life into Pugwash France. I want to congratulate Nicolas Delerue for his fine organization of the student event. I also commend the conveners and the participants for this excellent meeting, which will provide much valuable content for future work.

My concerns have been the subject of many of the discussions and excellent ideas have emerged for addressing and ameliorating the crucial nature of the critical dangers facing humanity the 21st century.

The promotion of social responsibility in science is one of the founding principles of Pugwash. This was re-affirmed in 2007, at the 57th Pugwash Conference, held in Bari, in both the Mission Statement and in the Principles. However, in this document Pugwash is viewed as a **manifestation, an exemplar** of this ideal. And though Pugwash will “promote debate and reflection on the ethical obligations of scientists in taking responsibility for their work”, the time has come to take a more

ⁱ Presentation delivered at the Pugwash Workshop: “Science and Social Responsibility: Rising Problems, Wise Initiatives”, held at the UNESCO Headquarters, Paris, France, on March 14-15th, 2012.

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activist position and work for mechanisms, guidelines and legal instruments in order to control and govern scientific research and experimentation. The convergence of Pugwash and UNESCO as co-conveners of this conference gives me hope that both will move forward – perhaps together – to address the development of necessary restraints.

We are confronted with a situation in which the realistic destiny of civilization is nuclear genocide; the death of millions through accidental or malicious release of deathly biological agents; through ecological degradation; and through climate change – causing deaths of millions from famines on grand scales - **unless** we find the ways and means to divert the course established by science, technology and its rationale in the name of progress.

The question, perhaps, could be asked whether or not science and technology have progressed to the extent where the dangers outweigh the benefits? I do not know whether it is even possible at this stage – but I certainly remain hopeful - to alter the course of science, the dictates established in the Enlightenment. During the 17th Century, scientific academies “decided that any discussion of political, religious or moral problems would not be permitted in their meetings, lest their pursuit of scientific truth be marred by dogma or human passions.”²¹

This, perhaps, was the historical driver which has enabled scientists to ignore the human dimension, and to research and develop with no responsibility for the consequences of their inventions. This may have made sense during the Greek Age, when science was merely the observation of natural phenomena; or before knowledge of how the energies of nature could be utilized - before science became “applied.”

Since the Enlightenment - when the great humane ideals of freedom, justice and equality

co-existed in harmony with scientific thought, the understanding of human progress - to paraphrase Albert Schweitzer - has dwelt more and more on the **results of science**; and **less and less on reflection on the individual, society, humanity and civilization**.

We are so psychologically “determined” by our “technological representation of reality” that the solutions to this critical situation “call for ... even greater mobilization[s] of our technology.”²²

When a technology becomes a threat, another technological device is created to counter the threat. An example of this - and an issue of serious contention between Russia, and the US and NATO, and a threat to the nuclear disarmament process and world peace - is the response to the failure to prevent proliferation of nuclear weapons and missile technology. This has resulted in the development of the United States Missile Defense system and the possibility of weapons in space, jeopardizing even further the future of civilization.

Have science and technology have become a force of destruction rather than creation? The numbers in the 1980 Brandt Report suggest that this is so, with its information that more than 50% of the world’s scientists were devoted to weapons technology and the manufacture of armaments, while less than 1% was devoted to researching the needs of the developing world. These statistics may have changed since the 1992 Earth Summit at Rio. However, it is highly likely that the ratio is close to the same number given that the United States military budget – which stands at more than half the combined military budgets of the rest of the world - is higher than during the Cold War. Moreover, the United States nuclear weapons budget is twenty per cent higher than in the 1980s.

We may be closer to extinction than we imagine! British astronomer, John D. Barrow, warns of the “prospect that scientific cultures like our own inevitably contain within themselves the seeds of their own destruction [and] will be the end of us. **Our instinctive desire for progress and discovery,**” he believes, “will stop us from reversing the tides in our affairs. **Our democratic leanings** will prevent us from regulating the activities of organizations. **Our bias towards short-term advantage,** rather than ultra-long planning, will prevent us from staving off disasters.”³

In projecting “a future of increasing technological progress”, he continues, “we may face a future that is increasingly hazardous and susceptible to irreversible disaster.”⁴ He believes that “as the world becomes an increasingly sophisticated system, it is increasingly at risk from the consequences of its own headlong rush for development,” and “our existence is precarious.”⁵

The products of technology are not benign, not neutral, and are **not outside morality**. They are created, developed and used by **moral beings**. Their invention and applications require a re-ordering of society and culture in all its aspects, and are, as well, taken into account in the creation of new devices. An example of this is the atomic bomb. The populations and sizes of cities were factored into the calculation of the impact of the bomb. To have the largest psychological impact on – for example - the Soviet Union, you need a certain number of deaths – ten million was Sir Michael Quinlan’s number. You need a sizeable city to drop a sizeable weapon and so on. These factors must surely have been in the conscious awareness of the scientists as they conducted their experiments and made their calculations when developing and constructing the bomb.

However, “Our age”, says Albert Schweitzer, “has discovered how to divorce knowledge from thought, with the result that we have, indeed, a science which is free, but hardly any science which reflects” and this is of great danger to humanity. “We have talked for decades with ever increasing light-mindedness about war and conquest, as if these were merely operations on a chess-board.”⁶

As long as a dispassionate and unreflective science reigns supreme, and the scientific model of nature is mathematical and devoid of the human and ethical considerations, we are endangered.

Are there limits to scientific enquiry and experiment?

Oppenheimer’s **infamous** response to this question was - “When you see something that is technically sweet, you go ahead and do it.” Australian physicist, Sir Mark Oliphant, also with the Manhattan Project, also had no illusions about limits to scientific enquiry and experiment. He commented that he “learned during the war that if you pay people well and the work’s exciting, they’ll work on anything.” He went on to say that there is “no difficulty getting doctors to work on chemical warfare and physicists to work on nuclear warfare.”⁷

The limits to scientific enquiry in Barrow’s view are financial and those “imposed by the nature of humanity.” But this is not an ethical position - it is technical. “The human brain,” he says, was not evolved with science in mind.”⁸

Does one as a physicist have the moral right to work on the practical exploitation of atomic energy? - this is the question posed by Michael Frayn in his play, “Copenhagen”.

We all know of Josef Rotblat’s experience: If there is the danger of a madman, like Hitler, attempting to develop an atomic bomb, the answer

then is probably *yes*. When, in 1942, it was discovered that the Germans had dropped their atom bomb project, and Rotblat learned that the Manhattan Project would continue to develop the bomb in order to drop it on Japan as a demonstration to the Russians, Rotblat found it *morally indefensible* and left the Manhattan project, - the only one to do so.

Most of the Manhattan Project atomic scientists suffered from guilt and remorse. However, the guilt and remorse *was not* in connection with research and development. It *was not* on working “on the practical exploitation of atomic power,” but rather, on the end result - the mass killing of civilians, particularly the killing of women and children. When the bomb was dropped on Hiroshima, their first reaction was excitement, pleasure, congratulation and the urge for celebration. However, as the day wore on, Oppenheimer and his fellow scientists experienced feelings of depression, guilt, outright horror, and in one, physical illness. *Finally*, some were concerned about their “moral position” and feared that the weapon would be used again.

Three days later, the plutonium bomb was dropped on Nagasaki and the scientists, those who felt there was no justification for using this second bomb, were overwhelmed with feelings of sickness or nausea.⁹

Yet Hans Bethe - though he believed that the hydrogen bomb was evil, and hoped that it would not work - continued with other Manhattan Project scientists to work on the hydrogen bomb project. This ultimately led to the increased killing power of a thermonuclear weapon *one thousand times greater* than those dropped on Hiroshima and Nagasaki.

When Robert Oppenheimer was asked about the *responsibility of the scientist to the*

community, he struggled for many years with the question and the only answer he could come up with was “*to remain dedicated.*” He talked about the virtue of correcting error and a “commitment to the value of learning” and “therefore” he said, “the problem of finding an ethic for today is resolved.”¹⁰

There is no doubt that, though some of the scientists defended their work and felt proud of their part in the bomb’s development, they were haunted forever by feelings of guilt for the evil perpetrated through their accomplishment. And, as Pugwashians know, several of the Manhattan Project scientists - Josef Rotblat and Hans Bethe among them - turned their energies to work for international control over atomic energy and for the abolition of nuclear weapons; with Josef Rotblat, Albert Einstein and others calling for an oath for scientists and engineers similar to that of the physicians’ Hippocratic Oath and “Whistle-blowing” - to quote Rotblat - should become part of the scientist’s ethos.¹¹

What we have learned, from this history, is that *after the fact – hindsight, reconsideration, retrospection - it is too late!* Once the demon has been unleashed, it is virtually impossible to control the outcome. We have seen in the last few years that the nuclear weapons states - legally committed to elimination of their weapons – are *upgrading* their arsenals; their weapons are still poised dangerously on high-alert status; nuclear weapons are proliferating; transparency and verification measures are lacking in the biological weapons convention; dangerous technologies are being developed in defense laboratories and in corporate laboratories; Internet hackers and cyber warfare are active; dangerous information is easily available via the internet to suicide and other terrorists, or to crazed individuals.

As long as there are no limits to scientific enquiry and technological development, we are endangered.

There is no doubt that there is much concern and that some steps are being taken. For example, members of the U.S. National Science Advisory Board for Bio-security recently managed to halt the publication in the journals *Science* and *Nature* of avian flu experiments that have “yielded versions of the virus more contagious among humans” – information that would be of interest to terrorists. These experiments have been likened to 1940s work on the atomic bomb and to the first attempts at genetic engineering in the 1970s.¹² Dismayingly, as the Chair of the Bio-Defense panel acknowledges, the scientific data will be leaked.

The US government Science Policy Office at the National Institute of Health is now developing a draft policy of a “comprehensive framework for oversight of dual-use research.”¹³ This issue is controversial among scientists, with some arguing that it will restrict the future of research and others agreeing with the need for stronger rules and pre-authorization.

There has been a call for an Asilomar-like process along the lines of the 1975 Conference which established safety guidelines for DNA research, to enable scientists “to pursue genetic engineering under a system of self-governance.” However, this conference has, for the most part, been discredited.¹⁴ There was a refusal to address ethical and social issues. Also, the agenda was restricted by the organizers to exclude “questions of biological warfare and human genetic engineering.” There was no representation from public-interest organizations, no social scientists, no ethicists.¹⁵ Five years later, the guidelines and controls they established were dismantled.

The World Health Organization, last month, convened a meeting to discuss the publication of scientific research – specifically with regard to the decision not to publish the avian flu research. Their conclusion was that the research should be published in full. However, as with the 1975 Asilomar Conference on Genetic Engineering, the participants all had vested interests in the dissemination of the research. So the National Institutes of Health, who financed the research, has asked the Bio-Security Board to reconsider its earlier decision to remove sensitive information before publication. The World Health Organization has, subsequently, committed to convene further meetings with experts who are not stakeholders, experts with interests and concerns broader than the world of pure scientific research and its narrow benefits.

Given the dangers inherent in twenty-first century technologies, it is essential to have greater public participation and oversight in decisions on the development and use of science. It is essential to establish organizations with a mandate for ethical and social responsibility; with a mandate to develop a code of conduct with mechanisms for enforcement; and with memberships comprising of a broad representation from public interest groups, and exclusion of representation from the political and industrial realms. It is essential that these organizations are established, both at the national and international levels, so that scientists do not migrate to states with little or no restriction on the pursuit of science.

A code of conduct embracing the sanctity of the human is essential. A new model for science is necessary in which the human is viewed as a speaking subject; rather than an object for study and manipulation; in other words – to paraphrase the Einstein-Russell Manifesto - where humanness, humanity is remembered.

There needs to be more discussion of what I would call the “doctors’ dilemma” – how far do scientists, in their research, proceed in attempts to defeat disease and prolong the life of the human species. The zeal for new cures, new discoveries must not blind researchers to humanity and its survival.

It should be compulsory for all high school and university students of science - every year - to take a course in science, ethics and social responsibility, as an integral component of their studies in science.

We cannot continue to attempt to cope with unleashed demons, whether they are nuclear weapons or bird flu virus. It is essential that preventative measures are established and enforced.

Josef Rotblat in his Nobel Prize speech makes the point that “*Pugwash and other bodies, ... devote [...] Much of their time and ingenuity to averting the dangers created by science and technology.*”¹⁶ The dangers of the twenty-first century are of such magnitude that it is in the interest of humankind that Pugwash consider a **pro-active** set of Principles and Mission Statement in order to prevent rather than to **avert** – *ex post facto* – the dangers created by science and technology - dangers to life faced by humankind today.

I call on Pugwash to take up this challenge. Do we work for a radical redevelopment in the course of science? Or do we continue like lemmings on our suicidal path?

Endnotes

¹ Sehdev Kumar, “*A Snake in the Garden of Eden,*” *The Globe and Mail*, Aug.7/00.

² George Grant, *Technology & Justice*, Concord, 1986,16.

³ Barrow, *Impossibility: The Limits of Science and the Science of Limits*. Oxford 1998,112. Emphasis added.

⁴ Barrow, *ibid*, 150.

⁵ Barrow, *ibid*, 74.

⁶ Schweitzer, 44.

⁷ www.economist.com/node/7033. July 20/2000

⁸ Barrow, viii.

⁹ See Robert Jay Lifton, & Greg Mitchell, *Hiroshima in America*, N.Y., 1995,31-2

¹⁰ Schweber, 180.

¹¹ www.nobelprize.org/nobel_prizes/peace/laureates/1995/rotblat-lecture

¹² *Global Security Newswire*, Jan 31/12.

¹³ *Global Security Newswire*, Jan 12/12; Jan 17/12.

¹⁴ Susan Wright (University of Michigan), Charles Wiener (MIT), Janet Weinberg, (*Science News*), Sheldon Krimsky (Tufts), James Watson (DNA co-discoverer) *et al.*

¹⁵ Susan Wright, *Legitimizing Genetic Engineering*, www.dissentmagazine.org/article/?article+1051

¹⁶ Emphasis added.