

PERSPECTIVE

Beyond Scientism: Coming of the Ethics of Science*

SONG Sang-yong

Korean Academy of Science and Technology

Scientism, scientisme, Szientismus or Wissenschaftsgläubigkeit is a peculiar word with varying strength. It can denote either weaker version or stronger version. According to the Merriam-Webster Dictionary, scientism is “methods and attitudes typical of or attributed to the natural scientist.” Scientism is a term often used today as a pejorative to describe someone of holding the view that science has primacy over all other interpretations of life such as philosophical, religious, mythical, spiritual, or humanistic explanations. (Wikipedia)

History of science can be written as the story of expanding scientism. Richard Gregory, the editor of *Nature* in the 1930s, said: ‘My grandfather preached the gospel of Christ, my father preached the gospel of socialism, I preach the gospel of science’. Such a belief in science is not without reason. Science proved to be the most successful pursuit of knowledge. The spectacular civilisation today is the product of modern science, which was so successful. Scientism grew out of the development of science.

Scientism launched with the Scientific Revolution of the 16th and 17th centuries. As a result, science rose as the centre of European civilisation replacing the Christian Church. The establishment of Newtonian physics was the peak of the Scientific Revolution. It was an overwhelming victory. Newton was never challenged for more than a century in the fields where he excelled. In the Age of Reason, Newton was the hero of *philosophes* in France. They admired science, believed progress and rejected religion. It led to the attempts to explain all the social phenomena with science. They believed that mankind marched towards better stage as science developed. The simple equation that science equals progress was universally accepted. Abstract reason, mathematisation, mechanical view of nature, anti-teleology were the characteristics of the Scientific Revolution. As

* Editor's note: Invited lecture at the European Patent Office, Munich, Germany on 27 April 2007. Somewhat different versions were presented at the 3rd East Asian STS Student Workshop, Seoul on 20 November 2008 and at the International Conference on Science Education, Daegu on 13 February 2014.

science emphasised the independence of objective reality, the subjectivity of man became downgraded. Man was no longer the subject with purpose, emotion and value, but the object which was observed, measured and manipulated.

The Industrial Revolution of the 18th and 19th century was another turning point. In the beginning, the alliance between science and technology was uneven and insufficient. But the close cooperation of science and technology in the later period resulted the explosive development of industry. The shift from *scientia contemplativa* to *scientia activa et operativa*, quoting from Alexandre Koyré, was finally realised. The Baconian dream for industrial civilisation was in full bloom. At the time of the Scientific Revolution, the influence of science was confined to intellectual circle. Now science could exert impact to the general public and change the structure of society through technology. The splendid achievement of science and technology during the Industrial Revolution encouraged scientism to the great extent. There was wide - spread conviction that science would lead history to the direction of enhancing freedom for everybody. Such tendency was strengthened continuously till the 20th century.

In philosophy positivism, represented by Ernst Mach, emerged as a repulsion to the extreme speculative philosophy of 19th century Germany. There is no doubt that it also fostered scientism. The analytic style of 20th century philosophy of science was the outcome of the age when the belief in science reached its climax. The only mode of knowledge recognised in the logical positivism of the 1930s was the scientific one and its extension. The classic problems of epistemology gave its seat to observation, and metaphysics was eliminated for its unverifiability. History and ethics disappeared and we had to wait for another generation to see them reinstated.

There certainly were some resistances against scientism. In the early 17th century, John Donne, a metaphysical poet, wrote:

And new Philosophy calls all in doubt,
The Element of Fire is quite put out;
The Sun is lost, and th' earth and no man's wit
Can well direct him where to look for it.

'Tis all in pieces, all coherence gone.

It was the resentment about the disturbances brought by new science. As time went on humanists denounced the science devoid of humanistic elements in higher tone. It was the Romantic Revolt to cold Mechanical Philosophy. Herder, Goethe and Coleridge were the main figures. However, they were minorities and their voices were too weak to curb the tyranny of scientism.

The first half of the 20th century witnessed several serious abuses of science. Eugenics, despite of its good meaning (good in birth), turned out to be a dirty word.

National Origins Quota Law of the United States was obvious discrimination against non-Anglo-Saxons. Sterilisation laws were passed in the United States and Europe in the 1930s. It was terrible infringement of human rights. Especially in Nazi Germany 400,000 socially unsuitable and intellectually handicapped people were forcibly sterilised between 1934-1939. The most horrible abuse of science was the human experimentations by the Nazis and Japanese army during World War II. Ruthless human experimentations were carried out in Auschwitz and in the 'Factory of Death', Pingfang, China in the name of science. In the Unit 731, Japanese doctors experimented, tortured and killed more than 3,000 Chinese, Russians, Mongols, Manchus, Koreans and even Americans for the systematic studies on bacteriological warfare.

At the Nuremberg Military Tribunal 23 German physicians were prosecuted for their involvement in the Nazi human experimentations. In the case of the Unit 731, however, nobody was punished. The United States pardoned them in return to the valuable informations it got from them. No explanation has been given as to why the United States treated the Japanese and German criminals in different ways. The U.S. government has the burden to give an answer. For the crimes of Japanese doctors, there were no counterparts of the Nuremberg Trial and the Nuremberg Code. Due to Japanese denials, the relative silence of Chinese and Taiwanese governments and the American cover-up, Japanese doctors' atrocities have been much less known and explored. The governments of both Koreas have never raised the issue either. Only a handful of conscientious scholars in Japan, China and elsewhere are studying the case avidly.

Jacob Bronowski begins his book *Science and Human Values* with his vivid feeling when he stood on the ruins of Nagasaki not long after the explosion of atomic bomb. 40,000 were killed by a flash which lasted for seconds. Ironically the bomb exploded over the main Christian community in Japan. There have been controversies on the inevitability of dropping the bomb twice. But can any arguments for it be defended? The heyday of pure science, which J. R. Ravetz calls 'academic science', ended with atomic bomb. It shattered the naïve view of science. Scientists began to think about such words as conscience, responsibility and ethics sincerely. Many prominent scientists including Einstein, Pauling and Sakharov joined the anti-nuclear movement after the war.

Still science seemed to be a guarantee for progress in spite of the tragedy of Hiroshima and Nagasaki. However, the image of science became aggravated suddenly in the 1960s due to the environmental deterioration such as Minamata disease and *Torey Canyon*. Science was the target of the counter-culture movement which swept over industrialised countries in 1968. The attack on science came from within as well as from outside the scientific community. The criticism of science was not confined to intellectuals, but pervaded widely among the general public. Anti-science movement aimed at not only high technology, but also science itself. The challenge to the goal and result of science policy came to doubting the inherent norm of science and its epistemological status.

The latter half of the 20th century witnessed the rediscovery of ethics in science.

The Digital Revolution changed the world dramatically, but it also raised the unprecedented problems of privacy, alienation and inequality. The ethics of information technology was a natural outcome to deal with these issues. The accelerated dashing of biotechnology reminded concerned people of the nightmare of dystopia predicted by Aldous Huxley's *Brave New World*. Bioethics, which had been redefined from classical medical ethics, emerged as one of the most important disciplines. Research ethics appeared in the recombinant DNA controversy at the Asilomar Conference in 1975. The studies of ELSI (Ethical, Legal and Social Implications) started with the Human Genome Project.

The Universal Declaration of Human Rights (1948) contained not only civil and political rights, but also economic, social and cultural rights. Among the new items in the declaration was the right to share in scientific advancement and its benefits. Later human rights came to include the rights for environment, safety, the access to informations, etc. There are growing pressures to extend human rights to animal rights. UNESCO has been on the forefront in coping with the issues arising from science ever since its beginning. In 1993 it created the International Bioethics Committee (IBC) and la Commission Mondiale de l'Ethique des Connaissances Scientifiques et des Technologies (COMEST) was founded in 1998. IBC played a key role in making the Universal Declaration on the Human Genome and Human Rights (1997), the International Declaration on Human Genetic Data (2003) and the Universal Declaration on Bioethics and Human Rights (2005). COMEST has covered the ethics of environment, information society, nanotechnology, fresh water and outer space. It is now working on a code of ethics for scientists. In 1999 the World Conference on Science was held in Budapest with the initiative of UNESCO and ICSU (International Council for Science). The adoption of the 'Declaration on Science and the Use of Scientific Knowledge' and 'Science Agenda – Framework for Action' was a landmark in the history of science. It should be noted that poignant criticisms of science were made by scientists themselves. The follow-up of the WCS was left to UNESCO's COMEST and ICSU's SCRES (Standing Committee on Responsibility and Ethics in Science, 1996-2002).

Let me tell you briefly about what COMEST has been doing for it. The UN Inter-Agency consultative meeting in 2003 encouraged ethical codes of conduct for scientists and recalled the task given by the World Conference on Science to COMEST and ICSU. In the same year, the Executive Board of UNESCO requested the Director-General to undertake studies on the advisability of elaborating an international declaration on science ethics as a basis for an ethical code of conduct for scientists. COMEST had Expert Meeting on the code of ethics in 2005. Based on the conclusions of the meeting, 4th Ordinary Session of COMEST recommended that UNESCO should focus on a general framework of ethical principles for sciences. Since then COMEST has been carrying out feasibility study in two directions. They are analysis of existing codes of conduct including the creation of a database in the Global Ethics Observatory (GEObs) and international consultations.

For the latter, six consultative meetings were held last year in Tokyo, New Delhi, Geneva, Bangkok, Seoul and Belo Horizonte consecutively. The UNESCO “Recommendation on the Status of Scientific Researchers” of 1974 was taken as a basis of assessment at the meetings. Jun Fudano, a member of COMEST, presented papers at the meetings in Tokyo and New Delhi. In New Delhi, he reviewed codes of ethics in science and engineering in Japan with international comparison. When he asked the participants whether there was a need for a universal code, there was unanimous agreement. I was brought to Bangkok to review the Recommendation. I emphasised that a radical revision of the old concept of science in the Recommendation was inevitable. Unanimous preference for the code of conduct was confirmed at all meetings in Asia. But some member countries including the United States are negative to the further standard setting of UNESCO. This is the reason why COMEST is cautious in pushing the mandate. More consultation meetings are planned in Africa and Arab region this year. There certainly lies a long way ahead to the universal code of conduct for scientists. But we must get it in the long run.

There has been much reflection on the adverse aspects of science and technology in the West. Thus it might be said that scientism is being overcome to considerable extent. However, the situation in Asia is quite different from that of the West. Asia has a deep-rooted tradition of scientism, which lasted for more than a century. In the 19th century Asia was under the challenge of Western imperialism. Asian countries had to make desperate attempts to survive. It was believed in Japan that the only way to survival was catching up the Western science and technology. 85 percent of Tokyo University graduates in the 1890s were science and engineering majors. Japan became the first country, which succeeded in modernisation. Similar aspirations for science and technology were both in China and Korea, though there was more resistance by traditionalists. According to Yabuuti Kiyoshi, it was hard for China to attain modernisation even after the revolution in 1911. Korea lost the last chance and became a victim of Japanese imperialism in 1910. In Korea under the Japanese colonial rule, there was belief that independence could be achieved through science and technology. Nationwide science movement in the 1930s is a good example. After the liberation in 1945, “nation building with science and technology” has been the national motto of Korea.

Korea emerged as an economic giant from a poverty-stricken country in the 1960s. During the period national income per capita rose from \$60 to nearly \$20,000 this year. The amazing success in industrialisation was possible at the expense of environment, tradition and ethics. Science and technology was the handmaiden of economy. It was only since the end of last century that the Korean government began to consider science and technology as culture also. Nevertheless, scientism continues to be paramount in Korea. Both the government and oppositions are growth-oriented and they are supported by major mass media.

The government has been extraordinarily interested in developing biotechnology. In 1983, it made the Genetic Engineering Promotion Act (changed to Biotechnology Promotion Act in 1995) for the first time in the world. Though not a

great success in terms of immediate impact, the Act provided an institutional framework for Korea's future biotechnology R&D activities. But more importantly, the Act was crucial in framing biotechnology as a vehicle for the nation's economic development. By the time Kim Young-Sam came into office in 1992 as the first civilian president since 1961, national R&D expenditure in biotechnology had already shown a nearly twelve-fold increase from 1983. In 1994, the government launched an ambitious 14-year national strategic R&D programme called "Biotech 2000" and proclaimed that year the "Year of the Take-Off of Biotechnology." Under the programme, the government and industry would invest \$18 billion by 2007, aiming to catch up the biotechnological capabilities of the G-7 nations.

In 2004, Hwang Woo-Suk et al. surprised the world by publishing a paper in *Science*, in which they claimed to have established a stem cell line from a cloned blastocyst. Many Koreans were excited by the expectation that the universal cure of disease was coming soon. However, some serious ethical flaws of Hwang's research were raised by the Centre for Democracy in Science and Technology, an NGO, Lee Pil Ryul, a historian of science at Korea Open University and David Cyranoski, *Nature's* Tokyo correspondent. The Korean Bioethics Association later adopted a statement challenging Hwang to have an open discussion on the ethical problems of his research: institutional review board (IRB), authorship and acquisition of eggs. Hwang repudiated the allegations as groundless and maintained that ethicists were trying to hamper the development of technology. Unfortunately, such a distorted view was advocated by the government including President Roh Moo-Hyun.

Gerald Schatten's sudden break with Hwang Woo-Suk in November 2005 was a turning point for the decline of Hwang. It brought out the charges of oocyte donation irregularities by *Nature* anew. It was not until the "PD Notebook" of MBC (Munhwa Broadcasting Corporation) television raised questions about the research that Hwang confessed his wrong-doing in obtaining the eggs. All the ethical suspicions regarding his paper turned out to be true. The verification efforts of young scientists through BRIC (Biological Research Information Centre) and the prompt investigation by Seoul National University further concluded that Hwang's two papers were nothing but fakes. It was shocking news even to the critics of Hwang. Both papers of Hwang published in *Science* were retracted. Hwang was fired from Seoul National University after a long deliberation. The Korean Society for Molecular and Cell Biology expelled him and the Ministry of Health and Welfare removed his license to conduct embryonic stem cell research. The Ministry of Science and Technology stripped him of the title "Supreme Scientist." Intensive investigations by prosecutors followed and the trial is still going on. Investigations by the National Assembly agreed by major parties have not yet been carried out. There is no doubt that the Korean society is too magnanimous to him. The case is yet to be concluded in the midst of continuing resistance of the fanatic supporters of Hwang. In short, the Hwang scandal hasn't ended yet.

The Korean government should bear the main responsibility for the Hwang scandal. Its growth - first policy of developing biotechnology blocked any kind of regulations or criticisms. All Asian countries are keenly interested in developing biotechnology. Only Korea, however, dashed ahead recklessly and the result was a debacle. President Roh Moo-Hyun with his entourage was out in front to give huge support to Hwang, and all the leaders of political circle except Democratic Labour Party praised Hwang as a hope for the nation. Distortion and exaggeration in the reports of the irresponsible media aggravated the situation. Even the National Human Rights Commission of Korea, which had opposed the dispatch of Korean troops to Iraq, remained silent concerning the misconduct of Hwang. The situation in Korea until November 2005 was something like the United States right after the September 11.

It is held that the Hwang scandal was a confrontation between the 'Alliance of Science and Technology' and the 'Solidarity of Ethics.' The former consisted of scientists, government, business and media which were united with vested interests and ideologies. The latter was composed of NGOs, religious groups and bioethicists. A formal alliance never existed, but the *de facto* alliance was extremely powerful. An alliance with such a scale is unprecedented in Korean history. There were formal solidarities for several campaigns in different forms, but they were heterogeneous, loose and hence weak. Only the Catholic Church and some conservative Protestants among religious groups were critical of Hwang. Feminist and environmental NGOs did not cooperate actively with the Centre for Democracy in Science and Technology, which alone fought against the 'Alliance' consistently. The defeat of the 'Solidarity' by the 'Alliance' was too natural, since these two were incomparable.

The Korean government did very well in the follow up of the Budapest Conference. In an effort to respond to the recommendations raised by the "Science Agenda – Frame for Action," the Korean Academy of Science and Technology (KAST) was given a project: "A Study on the Charter for Scientists and Engineers" by the Ministry of Science and Technology in 2002. Having been asked to take the project, I organised an interdisciplinary team of 17 researchers. The report containing a draft of the Charter for Scientists and Engineers was submitted after six months. In the midst of the debate on stem cell research in 2004, an ad hoc task force team was formed in the Korean Federation of Science and Technology Societies (KOFST) to make the Charter for Scientists and Engineers at the request of the Presidential Office.

At the outset, we all agreed that the Charter should be for neither scientism nor anti-scientism. It meant that well-balanced views were essential. In reality, however, there were fierce fights between scientists and non-scientists. While scientists defended pure science, ethical neutrality of science and freedom of research, humanists and social scientists emphasised adverse aspects of science and technology, social responsibility and ethics. The result of discussions for three months was destined to be a compromise. The Charter turned out a mediocre and dull one.

After Hwang was dishonoured, the main issue now became research ethics. The Ministry of Science and Technology, with the help of the Science and Technology Policy Institute, hurriedly made a guideline for research ethics. The Ministry of Education and Human Resources Development had the Korea Research Foundation publish a source book in research ethics. Its Committee for Establishing Research Ethics advised universities and academic societies to make their guidelines for research ethics. KOFST and KAST were making their own codes of research ethics respectively. At the last stage, KOFST invited KAST, KAE (The Korean Academy of Engineering) and Korean NatCom for UNESCO to make a single draft. It was issued as the 'Code of Ethics for Scientists and Engineers' in the name of four institutions on the Science Day last week. Of course research integrity is important, but due to the over-emphasis on it, other ethical problems tend to be blurred. Korea badly needs a full-fledged 'Code of Conduct for Scientists and Engineers.' Last year I proposed a joint project to make it by three institutions: Korean NatCom for UNESCO, KOFST and KAST to the Ministry of Science and Technology. However, it is to be regretted that the government has not shown interest in it.

Korea might be an extreme case. However, I am afraid that the neglect of human rights and ethics prevails all over Asia except a few countries. Confucianism has exerted formidable influence on East Asian countries and it is a profoundly ethical philosophy. Buddhism, another influential religion in this area, is well known for its reverence for life. It is baffling to explain the current situation. I believe that scientism is to be blamed. It is an irony that the scientism, which the West is discarding, became a malignance for Asians. It is a great task for us to weaken scientism to achieve the science with human dignity.

References

- Aronowitz, Stanley, *Science as Power* (Houndmills: Macmillan, 1988)
- Annas, George J. & Michael A. Grodin, *The Nazi Doctors and the Nuremberg Code* (New York: Oxford University Press, 1992)
- Arditti, Rita, Pat Brennan, Steve Cavrak, eds., *Science and Liberation* (Montreal: Black Rose Books, 1980)
- Bronowski, J., *Science and Human Values* (New York: Harper, 1956)
- Dixon, Bernard, *What Is Science for* (New York: Harper, 1973)
- Drenth, Pieter J.D., Jens E. Fenstad, Jan D. Schiereck, eds., *European Science and Scientists between Freedom and Responsibility* (Luxembourg: Office for Official Publications of the European Communities, 1997)
- Ernst, R.R., "The Responsibility of Scientists, a European View," *Angewandte Chemie*. International Edition, 42: 37 (2003), 4434-4439.
- "Ethics and the Responsibility of Science," Background Paper for the World Conference on Science, Science and Engineering Ethics, 6 (2000), 131-142.
- Evers, Kathinka, *Standards for Ethics and Responsibility in Science: An analysis*

- and evaluation of their content, background and function* (ICSU, 2001)
- Fenstad, Jens Erik, "Science between freedom and responsibility," *European Review*, Vol. 11, No. 3 (2003), 407-416.
- Hamano, Kenzo, "Human Rights and Japanese Bioethics," *Bioethics*, Vol. 11, No. 3/4 (July 1997), 328-335.
- Harris, Sheldon H., *Factories of Death. Japanese Biological Warfare, 1932-45 and the American Cover-up*, Revised Edition (London: Routledge, 2002)
- Holton, Gerald, *Science and Anti-Science* (Cambridge, Mass.: Harvard University Press, 1993)
- ICSU, *ICSU Strategic Review of Science and Society: Rights and Responsibilities* (ICSU, 2005)
- Jonsen, Albert R., *The Birth of Bioethics* (New York: Oxford University Press, 1998)
- Johnson, M. Glen & Janusz Symonides, *The Universal Declaration of Human Rights: A History of Its Creation and Implementation 1948-1998* (Paris: UNESCO, 1998)
- Korean National Commission for UNESCO and Science & Technology Policy Institute, *A Review of Science and Technology in Korea: Towards a New Contract between Science and Society* (A Follow-up to the 1999 World Conference on Science), 2002.
- Koyré, A., *From the Closed World to the Infinite Universe* (Baltimore: The Johns Hopkins University Press, 1968)
- Lipscornbe, Joan & Bill Williams, *Are Science and Technology Neutral?* (London: Butterworths, 1979)
- Nakayama, Shigeru, *Science Technology and Society in Postwar Japan* (London: Kegan Paul International, 1991)
- Nie, Jing-Bao, et al., "A Call for Further Studies on the Ethical Lessons of Japanese Doctors' Experimentation in Wartime China for Asian and International Bioethics Today," *Eubios Journal of Asian and International Bioethics*, Vol. 13 (3) (May 2003), 106-107.
- Nowotny, Helga & Hilary Rose, eds., *Counter-movements in the Sciences* (Dordrecht: D. Reidel, 1979)
- Passmore, John, *Science and Its Critics* (London: Duckworth, 1978)
- Ravetz, Jerome R., *Scientific Knowledge and its Social Problems* (Oxford: Oxford University Press, 1979)
- Regan, Tom, *The Case For Animal Rights* (Berkeley: University of California Press, 1983)
- Resnik, David B., *The Ethics of Science. An Introduction* (London: Routledge, 1998)
- Rhodes, Richard, *The Making of the Atomic Bomb* (New York: Simon Schuster, 1986)
- Rose, Hilary & Steven Rose, *Science and Society* (Harmondsworth: Penguin, 1970)
- Shamoo, Adil E. and David B. Resnik, *Responsible Conduct of Research* (Oxford: Oxford University Press, 2003)

- Singer, Peter, *Animal Liberation* (London: Pimlico, 1975)
- Song Sang-yong, "Origins and development of Antiscience," *Tao and Human Science* (Seoul: Samildang, 1981), pp. 385-394.
- Song Sang-yong et al., *A Study on the Charter for Scientists and Engineers*, Ministry of Science and Technology, (Korea , 2002), in Korean.
- Song Sang-yong, "Human Rights, Science and Ethics," COMEST Ordinary Session, COMEST, (2006), in Korean.
- Song Sang-yong, "Reflections on the UNESCO Recommendation of 1974," Background Paper for the UNESCO Consultation Meetings, 2006.
- Song, Sang-yong, "The Rise and Fall of Embryonic Stem Cell Research in Korea," *Asian Biotechnology and Development Review*, Vol. 9 No. 1 (2006), 65-73.
- Ten Have, Henk, "Die Allgemeine Erklärung über Bioethik und Menschenrechte der UNESCO - Entstehungsprozess und Bedeutung," Allgemeine Erklärung über Bioethik und Menschenrechte - Wegweiser für die Internationalisierung der Bioethik, Deutsche UNESCO Kommission, (2006), 27-36.
- Weeramantry, C.G., ed., *Human Rights and Scientific and Technological Development* (New York: United Nations University Press, 1990)
- Weeramantry, C.G., ed., *The Impact of Technology on Human Rights – Global Case-Studies* (New York: United Nations University Press, 1993)