



Advances in life science research

Reflections on ethics in Science - a historical perspective

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"It is argued that the principal factor, which crippled science in ancient India, was political. It stemmed from the need to maintain and reproduce a society into a leisured minority and a toiling majority---."

Debiprasad Chattopadhyaya, in "Science, Philosophy & Society" Social Scientist 6 (9) 2007

Modern experimental science is alien to us

Curiosity to know ourselves and our surroundings was part of human activity in every civilization. Indeed, every living organism recognizes the environment. Philosophical traditions in every society arose after men and women organized into settled societies after the discovery of agriculture 10000 years ago. There was a division of functions among the inhabitants. A small percentage of such societies indulged in reflective thinking. The questions and problems they addressed were either real time (i.e. materialistic about Physical Nature/Environment and human behavior) or supernatural dealing with after death problems and the relationship between living and dead beings. Great religions arose out of these philosophical deliberations. It is only during the Renaissance movement; the focus was completely on the materialistic world around us. This inquiry was named Natural Science. It was to be practiced by the use of scientific method. The body of knowledge that resulted and the process of gaining information itself were together come to be known as Modern Science or western science. It was a new kind of philosophy constrained by both the phenomena that were inquired into and the methodology used for such an inquiry. Science in the modern sense had only one aim till the seventeenth century i.e. to understand the structure and functioning of Nature. Rene des Cartes, the French mathematician and the first philosopher of science added one more aim and that was that science should be useful to man in developing creature comforts. From then on fundamental science and application-oriented science (or even technology) became the twin parts of science. Hence, from then on, it was Science & Technology. Natural Science comprised three branches i.e. Physics, Chemistry and Biology. Each of these had the single aim of knowing the „TRUTH” about Nature, like in the case of any other system of Philosophy. For some reason, mathematics was excluded from this.

Mathematics also seeks „Truth” like Science and any Religion/Philosophy. In fact, mathematical truth in the form of algebraic expression has stood the test of time unlike other truths including those of Natural Science. Karl Popper goes to the extent of saying that non-falsifiable knowledge is not Science!

Science in the modern sense is alien to the South Asian community as a whole. Science in the modern sense arose in Europe as part of the Renaissance movement. The philosophy of this science has been described by many great minds especially Francis Bacon, Rene des Cartes and Karl Popper. Through colonial rule this science was introduced to the rest of the world including India.

Science and society-conflict and cooperation as a paradigm of living

This refers to, invariably, the assessment of the impact of scientific discoveries and inventions on society including daily life of individuals. To do justice to the topic, one should also discuss the influence of society in terms of economic, social and cultural ambience, on the progress registered in science. Both the aspects indicate the presence of some sort of conflict between science and society. To debate this point, one should understand the nature of science and the reasons for the perceived conflict with society. Every organized society has a set of myths or beliefs which in the form of narratives and mythological stories give rise to customs, traditions and rituals. These together are called „Culture”. Science had given rise to another culture which appeared to be in conflict with the existing culture not only in the ruled colonies but also in the land of rulers like England, France etc. In the 19th and 20th centuries, Science & Technology practically dictated the development plans for different Nations including South Asian countries. The national budget share for science & technology related activities attracted social auditing of this enterprise called science. Sociologists in particular and society in general appeared to be in conflict with Science as a Culture and Philosophy. The conflict was particularly acute in the perceived confrontation between Religion and Science. It was all due to misunderstanding of true science on one hand and true religion on the other hand. Both are spiritual pursuits in reality. Analysis of all successful animal and plant groups make us realize that conflict and cooperation is their characteristic feature. All conflicts have to be and can be resolved. Taking adversarial positions does not lead to solutions. Informed discussions alone will lead to conflict resolution and hence the survival of the societies in

question. In the words of Vannewar Bush, Science is „amoral" i.e. neither moral nor immoral. It is man who misuses science & technology and misinterprets science to general public and that aggravates this perceived conflict. South Asian countries being rich in religious traditions have witnessed this conflict much more than western countries. We have to solve this problem with native wisdom which is non-confrontational in nature, and which seeks peace and harmony in society.

Education through Science

The aim of education is to enable each student to attain his/her highest level of consciousness. Colonial rulers changed this to create administrators to run this country. Political independence made Jawaharlal Nehru to articulate that the aim of education is creation of responsible middle class with ideals and professional competence. Hence IITs were started. In 1990s, globalization in trade through liberal economy made us realize that each country should develop its own technology or pay for what is being imported.

Today we realize it is a mixture of all including creating poets and scholars. Education liberates mind and coupled to democratic traditions in the society leads to social conflict. This is due to a perceived conflict between individual freedom of expression and constitutional responsibilities. Education in science on the other hand leads to professionals who separate socio-cultural problems from professional practice with ethics. Pursuit of knowledge especially discovery mode science leaves no time to indulge in social conflicts. Universities should open a Centre for Human Sciences where parts of Social Anthropology, Neurobiology, Human Genetics, Sociology, Political Science and International Relations are merged to become a sort of an interdisciplinary soft science to achieve such goals in civic life of academics.

Ethics in Science-Some Aspects

The idea of ethics in behavior is a human social construct. The biological basis of ethics can be traced to many animal groups (ants, wasps, tigers etc.) who exhibit eusociality. Societal good takes precedence over individual benefit. In different periods of history, eminent sociologists and philosophers have written about and advocated expected social conduct from citizens (e.g. Manu's Smriti in Sanskrit, Thirukkural by Thiruvalluvar in Tamil, Koran by Mohammad, the great Prophet in Arabic, Confucius in China etc.). It is also to be admitted that there are no universally accepted ethical norms across different societies and across different situations within one society. Statements like “everything is fair in love and war” or that “ends do not justify means” have only added to the confusion in debates about ethics. While swabhavika dharma should dictate human behavioral norms and judgments, Science, being an organized activity in search of „TRUTH", has mandatory set of norms, summarized as scientific temper and written in the form of scientific methods, to be followed by every practicing scientist. In practice however, this is not followed by majority.

The reasons for this deviant behavior can be found in the way scientific activity is structured. Science is practiced in structured departments, centers, professional societies etc. and rarely by individual scientists in isolation. Science, especially experimental science is largely in the form of public and private funded projects. Further, scientists receive various awards and recognitions from their own scientific societies and society in general. Peer pressure is another influence on scientists. All these induce, many a time, unethical behavior in scientists, both workers and leaders, and this is for individual benefit at the cost of social good. This is, in fact, contrary to the demands of scientific temper and scientific methods. These puzzling behavioral patterns can be observed at all strata of scientific establishments, i.e. award of Nobel Prizes, selection of teaching faculty, admission of students, funding of project proposals, providing physical and material support to working scientists, practice of institutional goals etc.

I wrote in the UGC curriculum development committee report in 2001 that any ideal (correct behavior) remains so as long as an individual committed to that ideal pursues it in thought, word and deed. Whenever „ideals" (e.g. pursuit of good science) are institutionalized, all the individuals in the whole group do not exhibit the same level of commitment and conviction in the ideal. Aberrant behavior follows. When success is equated with management of activity, ideals are sacrificed. It is the society which defines success and aberrant individuals only follow the accepted pattern of behavior.

Plagiarism in Science

Human knowledge is expanding at feverish pace and indeed is becoming unmanageable to philosophers who search for Truth by seeking patterns. This whole activity of creating, consolidating, and communicating knowledge to general public is an ideal activity. Among the many approaches available, post-renaissance Europe showed a new approach called „Natural Science" to be pursued with strictly defined Scientific Method. A major part of the scientific method is reproducibility of experimental results or observations in the field. Unwritten ethical guidelines dictate the whole activity of experimental science. Pursuit of science is a source of joy for true scientists. After 17th century, largely under the influence of Rene des Cartes, the utility part of scientific knowledge was emphasized. Science was to be applied to promote human welfare by enhancing the control of Nature by Man. The logical extension of this argument was that national development was linked to Science and Technology. Political leaders want that we should have science driven societies and nations should convert themselves as Knowledge Economies. Ethics in the pursuit of science became a casualty somewhere down the line in this misplaced intellectual idea. One can recall what Lysenko did in Russia. One does not blame Genetics for that. Many claims of the ICAR scientists are neither acceptable nor reproducible.

In recent years, surrogate criteria for recognizing quality of science like publication in high impact factor journals have replaced honest and competent peer review of the work concerned.

Publishing houses like Elsevier, Springer, and Bentham etc. have made publication of research findings a business activity purely for commercial interests. This has led to malpractices by scientists in data collection and interpretation purely to suit the journal requirement. Service rules and policies for career advancement have brought in their share of woes and consequent malpractices. To put it in a nutshell, Science has become an enterprise in all its facets like entrance examinations, career advancement, social recognition, funding priorities, power structure in the scientific community etc. Scientists are flourishing but quality and ethics in science are perishing. Systemic changes are needed to stem this rot that has set in Indian Science. Many journal editorials point out this problem of plagiarism in science.

Organization of funding for science-an ethical problem

Funding of arts and sciences is a civilized activity of all governments throughout history. In the modern era where Science & Technology has driven the national developmental programs and agenda in most developing countries, the issue of distribution of state funds to deserving individuals and institutions has to be sorted out based on well thought out guidelines. The Guidelines, in their turn, have to arise after thorough discussion among all the stakeholders. In the case of Physics and Chemistry which are highly conceptualized natural sciences, intelligence guides both the scientists and funding advisory committees. Quality is automatically assured. In the case of Biology, majority believe it is information driven science. Coupled to this is the fact that science has become an enterprise and not an ideal pursuit, at least for the „middle class” of our country. I can speak for Biology with confidence. These two perceptions have resulted in funding policies being decided through sectarian battles (geographical as well as institutional) and not based on white papers on state of development of each knowledge domain. In fact, sound and fool-proof criteria to judge the status of an area of research in terms of quality have not been developed. Scientometric analysis is only a surrogate marker of quality. Honest and competent peer review has not been nurtured on our country in the post-independent period. The quality workers (globally recognized) do not have links with the average world of science (read Universities). I recognize four issues to be addressed.

1. The problem of multiple funding for the same project/individual
2. Decisions about thrust areas.
3. Relative importance of basic and applied areas not to speak of translational research including technology development and marketing.
4. Identifying future demands in fundamental and applied sciences. Among all the funding agencies DST is the best by many criteria like transparency in operations, outcome of funded projects, identifying new areas, nurturing technology development and most important infra-structure building. Quality publications have mostly come out of DST funded projects. Notwithstanding this, it is also true that Indian science, in terms of quality has not become

an autonomous and sustainable activity. Breakthroughs are routinely coming from western science. India in particular and Asia in general have not contributed to discoveries and inventions significantly. Hence the first question to ask while deciding on funding policy is- whether we wish to sustain a vast size of third-rate scientific manpower or to support only technological achievements or build self-reliant and sustainable first-rate science. A prerequisite is a white paper on Indian Science & Technology, like the one commissioned by INSA three times.

Philosophy of biology-some reflections

Biology in particular, faces another ethical dilemma unique to this Natural science. This pertains to the resolution of conflict of interests among scientists themselves. Three particular cases are very important for our consideration in this context. One deals with the conflict of interest between animal rights societies and demands of biomedical research and the second deals with the conflict of interest between philosophical underpinnings of Biodiversity Conservation and Bio prospecting i.e. use of biodiversity derived products for human welfare. The last testing case for our discussion is of course, the conflict between the environmentalists and Industrial/Technological development. Live and let live is the only answer to all these perplexing problems of existence.

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