POSTMODERNISM AND SCIENCE

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Abstract

In recent times, a criticism on the method of science has been launched in the name of postmodernism, where science is caricatured as just another ideology. In the backdrop of the postmodernist critique of science, we discuss the need to strengthen the method of science, the proper evaluation of its achievements and its appropriate dissemination.

1 Modernism and Postmodernism

The beginning of Renaissance in Europe is usually associated with the publishing of the book 'Utopia', written by Sir Thomas Moore in 1516. Its main theme was that man can understand and control the forces of nature and thereby determine his own destiny. Following the clashes between those 'modernists' who accepted it and the 'ancients' who rejected it, renaissance humanism, also known as modernism, began. Reason, which liberates mankind from the chains of obscurantism, became the leading light with the help of natural sciences initiated by Galileo and Newton. The driving force behind this was the belief that we can find the truth with the help of reason. Modernism became a great social movement since it was believed that the truth we found would help to make a new world. 'The truth shall set you free' was the slogan. Ideas such as 'freedom, equality and fraternity' propounded by thinkers such as Rousseau lit the flame of revolutions. That all men are created equals and that man can achieve happiness on the earth itself grew as powerful notions contradicting and making irrelevant the biblical concepts of life after death. In the nineteenth century Marxism added new dimensions to this libertarian programme. One may find that the French and Russian revolutions were the laboratories which tested these ideas respectively.

However, now some people seem to believe that the failures of experiments such as French and Russian revolutions have led to a 'scientific revolution' in social sciences. They question the very paradigm of 'modernism' and are called 'postmodernists'. They interpret the right extremist's attempts to wield power in America, the extremist domination in Christian-Muslim-Hindu religions, etc., as indications of the failure of modernism.

Some recent trends that can be noticed by anyone who carefully observes the present society, such as feminism, environmentalism, subaltern studies, etc. are all

viewed as the ripe fruits of postmodernism. With the end of the cold war, many feminist movements, NGOs and ethnic minority groups came up, as if the bipolar world has given way to a multipolar one. The organisers of these movements have accepted postmodernism as their philosophy, for it is against the Western and male dominations and most importantly, is against the over-exploitation of nature. Since the term 'progress' itself is anti-environmental, they want to oppose technology, science, reason and even the European enlightenment. They argue that the modernist culture is Western in its orientation, capitalist in its determining economic tendency, bourgeois in its class character, white in its racial complexion, and masculine in its dominant gender.

The term postmodernism is usually used in a confusing variety of ways. For some it means 'anti-modern' while for others it means the revision of modernist premises. The seemingly anti-modern stance involves a rejection of the basic tenets of modernism. That is to say, a rejection of the doctrine of the supremacy of reason, the notion of truth, the belief in the perfectibility of man, and the idea that we could create a better, if not perfect, society. This view has been termed deconstructive postmodernism, which seeks to overcome the modern worldview, and the assumptions that sustain it, through what appears to be an anti-worldview. It "deconstructs" the ideas and values of modernism to reveal what composes them and shows that such modernist ideas as "equality" and "liberty" are not "natural" to humankind or "true" to human nature but are ideals or intellectual constructions.

An alternative understanding, which seeks to revise the premises of Modernism, has been termed constructive postmodernism. In general, postmodernists deny essences, natures, and any other universals which place a constant meaning on existence. The renowned philosophers such as Martin Heidegger, Michael Foucault, Jacques Derrida etc. are the prominent figures in this field. Heidegger says: "....thinking begins only when we have come to know that reason, glorified for centuries, is the most stiff-necked adversary of thought." Postmodernists dissolve the distinction between fact and fiction, words and things, signifier and signified and subject and object. The philosophical position that any fact of experience is only what it is in relation to other entities or events is referred to as 'relativism'. We now see that postmodern relativism could infiltrate into most disciplines the world over. A notable exception to this is science, which has so far remained an obvious threat to relativist doctrines.

2 Postmodernism and science

But in recent years, there have been organised attempts to place science under the thorough scrutiny of postmodernism. The social science departments in some of the prestigious universities in the world, have launched an interdisciplinary research that seeks to study science in its broader social, historical, and philosophical context, with the title 'science studies'. It concerns with the history of scientific disciplines, the interrelationships between science and society, and the covert purposes that underlie

scientific knowledge claims. There are two subdivisions for it: in one, which is called the history and philosophy of science, the ideas of Thomas Kuhn, expounded in his book 'Structure of Scientific Revolutions', are pursued further. In the second, which is the sociology of scientific knowledge, the main agenda is to explore the "strong programme', based on the twin theories named as the empirical programme of relativism and the principle of symmetry, developed at the University of Edinburgh by David Bloor and his colleagues. The strong programme holds that science studies scholars should remain neutral with respect to the truth claims science makes: they should explain the success or failure of a scientific theory in the same terms. Previously, successful scientific theories were attributed to having discovered the truth of the matter, while falsified theories were attributed to subjective bias introduced by social factors, such as religious belief or racism. According to the strong programme, the outcome of all scientific controversies, successful or not, should be explained by social factors.

In response to such science studies, renowned physicists Jean Bricmont and Alan Sokal pointed out that even though there are no extreme relativist positions taken by the official spokesmen of the strong programme, their statements are misinterpreted by many others. For instance, groups such as 'creationists' who want to wield power in America have begun to misuse the postmodernist argument that scientific theories are 'social constructs'. (Creationists, who hold that the universe is created by God, use the postmodernist premises for attacking the theory of evolution.) Since science is a human endeavour, there is nothing wrong in subjecting it to social scrutiny. Which research problems are important, how the research funds are distributed, who gets prestige and power; in what form scientific knowledge becomes embodied in technology - and for whose benefit; what types of theories can be conceived and entertained, what criteria are to be used for deciding between competing theories; these are all problems worth investigation. It is the task of historians and sociologists of science to sort out, in each specific instance, the roles played by external and internal factors in determining the course of scientific development. They even admit that there is nothing wrong with research informed by a political commitment, as long as that commitment does not blind the researcher to inconvenient facts. There is even a long and honourable tradition of socio-political critique of science. But the authors stress that social considerations come to the picture only after considering the ordinary canons of good science.

It goes without saying that social movements and activists who aim to promote science and scientific attitude among students and public at large should take note of such developments. It has now become fashionable to caricature science as just another ideology which needs to be criticised. Some writers of science like Paul Feyerabend accuse it for being no more an instrument of liberation. Karl Popper, Thomas Kuhn, Lakatos, etc. have developed their own distinctive critiques of the so-called 'method of science', which is described as the most valuable contribution of science during the past few centuries. They contend that the history of science found in textbooks is so distorted that the contribution of artisans in the development of

mechanics and optics and that of midwives and witches in medicine do not find any mention in them. Feyerabend goes so far as to argue that scientific facts are now taught in schools in the same manner as religious facts were taught a century ago and laments that there are no attempts to waken the critical abilities of the pupil in this process. However insubstantial these allegations be, does it not require us to read them along with the fact that globally there is a decline of interest among students to learn fundamental science?

In the backdrop of the postmodernist critique of science, we consider it appropriate to discuss carefully the main issues raised here, namely the need to strengthen the method of science, proper evaluation of its achievements and its appropriate dissemination.

3 Scientific method

It is generally agreed that there is a method of science, which requires scientific theories to be supported by experimental or observational data. But can the truth of a scientific theory be accepted by doing experiments? Karl Popper's notion of falsifiability is famous in this regard. Popper's argument was that a theory may become more acceptable as it succeeds in experiemnts, but it is never verified absolutely. It may fail in another experiment. Even if it has succeeded many times, a failure in just one case would be fatal for the theory. He argued that the scientific method involves not verification, but falsification of bold, risky conjectures. What made theories scientific was their falsifiability, or their possibility of being refuted. Popper's attempts to define the scientific method in this way created wide interest in academic and philosophic circles during the middle of 20th century.

However, Popper believed that scientific knowledge accumulates through succeeding generations of research and discovery. But this notion was questioned by Thomas Kuhn. According to him, it is a series of peaceful interludes punctuated by intellectually violent revolutions. He called the scientific activity in between such revolutions as 'normal science'. Kuhn observes that normal science and scientific revolutions are complementary to each other. Kuhn was responsible for popularising the term 'paradigm'. Paradigm is a collection of beliefs among scientists, a set of agreements as to how problems shall be understood. Initially a paradigm offers the promise of success. Normal science consists in the actualization of that dream. But when anomalies come up and a threshold is reached, a paradigm shift occurs. The replacement of geocentric theory in astronomy by the heliocentric theory, classical physics by quantum physics, etc. can be considered as examples of paradigm shifts. He argues that under whatever experimental or observational results, a paradigm is declared invalid only if an alternative candidate is available to take its place. This is one aspect where Kuhn strongly disagrees with Karl Popper.

As mentioned earlier, there were several attempts to carry forward the analyses made by these pioneers. Critical studies on how scientific theories fare in general, along the lines of reasoning of Popper and Kuhn, are to be encouraged. Broadly

speaking, the qualities essential for scientific theories may be summarised as follows: (1) There should be some means to judge whether they are wrong (i.e., they should be falsifiable, in the Popperian sense) and (2) their predictions should be accurate enough, in all experiments. But practically, the latter requires more careful attention. As in the argument of Kuhn, there will always be more than one theory which claims to explain a phenomenon, and hence it is deemed necessary to have some way to compare the theories using the data related to the phenomenon. That is, there should be some commonly accepted method to find which of these theories is the more correct one. An example of such a method, which uses the Bayes's theorem in statistics, is the Bayesian model comparison. This is the most dependable method, especially in situations where experiments cannot be repeated indefinitely. Similar is the case when the data available with us is limited. It is certainly a matter of concern that this method, which is popular even among social scientists, is not yet widely used by scientists to compare the performance of competing scientific theories.

A quite familiar example where we have competing theories is cosmology. Until the 1960s, the big bang model and the steady state model of the universe were more or less equal competing theories. Discriminating these theories was difficult at that time, owing to the lack of accurate data or evidences. But the discovery of cosmic microwave background was the beginning of a paradigm shift in favour of the big bang theory. But even now, the big bang theory cannot account for many of the data, and there are many competing models such as the dark energy models within standard big bang cosmology. The famous Indian cosmologist Prof. Jayant Narlikar and the author of this article have used the Bayesian method to compare some such models using the recent supernova data [1]. The outcome of the analysis was that even the new data is not accurate enough for discriminating such competing models within the big bang theory.

4 Scientific results

It is well-known that all branches of knowledge started with man's labour and not vice-versa. For instance, consider geometry. Euclid collated the ancient knowledge of geometry in his book 'Elements', which remained the bible of geometry for over two thousand years. But it is reasonable to guess that geometry was developed by people's contributions derived during their attempts to measure and quantify land used for agriculture or other purposes. Not only did the concepts such as area, volume etc., but also the theorems of geometry come into existence, as by-products of labour.

There are many such situations which require a re-reading of the history of science in general. It is usually accepted that technology is the result of finding applications to theoretical knowledge attained by mankind. But is this always true? We must check which of the inventions in science, that have revolutionised our life, have followed from the discovery of some fundamental law of nature made by acclaimed scientists. To elucidate an example: Is the invention of steam engine the result of

the discovery of laws of thermodynamics or is it the other way round? In most cases, one can perhaps find that the theoretical understanding or the scientific knowledge of the underlying phenomena has aided such inventions. But the question remains whether theoretical knowledge is always ahead of technology. It may only be the superiority imposed by theory over practice, induced by historical reasons that we generally feel that at least today technology trails behind science. This strongly points to the need of research exploring the inter-relationships between theory and practice in scientific inventions.

5 Dissemination of scientific knowledge

The need to revamp the process of science education can hardly be over-emphasised. Owing to an innate requirement of disciplined and thorough-going training for students aspiring to enter the field, a teacher should first cultivate a reverence to science and scientists in them. This need not be confused with the method of teaching religion to children at a young age, since science can be taught by encouraging them to ask questions and then to check the answers whereas the teaching of religion invariably discourages questions and the verification of the answers. But the problem is that in present day curricula the critical thinking of students is not very much encouraged. This is largely true in the case of science movements too. Unless this lacuna is filled, the criticism that teaching of science is similar to teaching of religion gathers some credibility.

6 Conclusion

We must note that postmodernism arose in an attempt to question certain 'scientific' form of thinking in linguistics and anthropology, called 'structuralism'. The latter aims at discovering the abstract structures behind language, cultural forms such as myths, etc. Derrida criticised structuralism for its longing towards structures, which in turn need centres. In this process, it tends to ignore, repress or marginalise others. He noted that human mind functions by forming conceptual pairs, where usually one member will be privileged and the other marginalised. For instance, in the present world, Western is central and others are marginalised; in a male-dominated society, man is central and women is marginalised. Derrida's main contention is that centres try to freeze the play of binary opposites and hence he advocated 'deconstruction', which aims to subvert all central terms, at least temporarily.

Derrida's teaching can be described as a legitimate attempt to extend and develop the concept of dialectics, but following the Hegelian path. The postmodern critique of science can generally be viewed as an attempt to deconstruct' science, but it is doubtful whether postmodernists recognise how formidable a task that would be. It may here be noted that in Marxian parlance, on the contrary, the symmetry between binary opposites can sometimes be broken. (This is to use a term from physics. Such broken symmetries are found everywhere in nature.) For Marx, the symmetry

between idealism and materialism is broken in favour of the latter, thus leading to dialectical materialism. Similarly, one can recognise that a broken symmetry exists in favour of science when compared with 'nonscience', and that can make deconstruction of science impossible.

In this short discussion, what we have attempted is to enumerate the challenges before science and science movements in the light of the postmodern critique. It is easy to dismiss postmodernism as a dead philosophy. In fact, postmodernism is no more a hot favourite in academic circles, even though literary theory etc. has become part of undergraduate syllabuses. But even in daily life one can certainly notice a lack of appeal for anything classical or modern, with fixed meanings. Many of those values which once played a central role are now marginalised. This needs not always be discouraged either. A free play of meanings and reversal of phase are necessary for one to realise that many more meanings are indeed possible. But it should also be realised that we are not stepping into the same river twice and that sometimes there is a certain breaking of symmetry between otherwise symmetric binary opposites. A clear instance is that of science and nonscience.

But if the above challenges are not addressed properly, it is possible that science can also be marginalised, or at least the thrust of science research would be subverted in future. We have noted that this possibility is indicated by the decline of interest among students towards fundamental science. if that happens, it will mark a return to the dark ages, and one can guess who of all would be the beneficiaries.

References

[1] M.V. John and J.V. Narlikar, Physical Review D 65, 043506; astro-ph/0111122