The Growth of Science in Developing Nations: A Discourse in Intercultural Philosophy

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The Asian Conference on Psychology and the Behavioral Sciences 2014
Official Conference Proceedings 2014

0210

Abstract

Conceiving science in national contexts seems a conceptual absurdity. This sense of absurdity derives from the positivists idea of scientific objectivity. Scientific objectivity has two components: intersubjectivity and epistemic reliability. Intersubjectivity means that scientists achieve consensus about the conclusions they reach. Epistemic reliability means that scientists get it right about the world. In sum, scientific objectivity means "that scientific knowledge should be justifiable independent of anybody's whim" (Popper, 1975, p.44). It means that the element of the person of the scientist does not enter into scientific investigation. There is no bias in science. This implicates the internationalism and universalism of science. But Feyerabend's (2000,p.493-502) "theoretical pluralism", "methodological opportunism", "anarchism" or "anything goes", constitutes a denial of the positivists' objectivitistic conception of the scientific method. Against the backdrop of Feyerabend's conception, we can discuss science in national contexts – in developing nations, for instance. This is the objective of this paper. For clarity and brevity, the tool applied for this discourse is the center-periphery dichotomy intellectual construct. This construct reveals that the growth of science in developing nations is imperialistically tied to the development of science in developed nations.

Introduction

Science has been conceived in a wide range of senses. Close analysis, however, reveals that the use of the word is sometimes so empty that it really signifies nothing in the intellect. When a fan, for instance, says that his team plays scientific soccer; no real meaning is conveyed by this assertion. Some other times the use of the word is merely honorific, that is, science is used to confer dignity on the activity qualified. This appears to be the case of a barber who says he gives scientific haircut. In both cases one is misled about the real definition of science. There are many other instances of misleading use of the term.

In the history of the march of civilization, two main senses of science are decipherable. One sense is loose. Science in this sense is the systematic pursuit of knowledge. This sense of science is inclusive of all the academic disciplines: philosophy, theology, history, physics, chemistry, and biology. Science and knowledge are in this regard co-terminus.

Another sense of science is as significant as it is strict. This sense became current with the 17th century revolution in science. Against the backdrop of this revolution, science becomes the institutionalized (scientifically methodic) system of inquiry. "The discovery of explanations built into the logical structure of nature" (Burth, E.A. 1945, p.15). The empirical or experimental natural sciences become paradigmatic of science (Holton, 1986, p.283); that is, the microphysics of atomic theory and quantum theory, the chemistry of hydrogen, molecular biology (genetics) become the models of science. Science becomes those activities associated with scientific communities and scientists such as Robert Boyle, Galilei Galileo, Isaac Newton, Albert Einstein. Science in this sense becomes restricted to those disciplines that try to explain the "perceptible phenomena of this world. In this sense, philosophy, theology, history, and such disciplines their subject-matter are not amenable to experimental treatment and their body of knowledge cannot be couched in mathematical language are expelled from the domain of science. In this sense, science and philosophy, *prima facie,* embark on journeys in opposite directions. This is the sense of science adopted for the purpose of this paper.

Features of Science

Conceived in this sense, science has striking and significant features. One such defining feature is that science is universal. According to the universalist ethos of science "the acceptance or rejection of knowledge claims is totally independent of the personal attributes – sex, race, nationality, religion, or social class – of those who make them" (Crawford, 1992, p.29). This has aptly been called by Ziman (1974, p.11) "the public and consensible" feature of scientific knowledge. This means that what goes by the name science must be published and tested by other competent and disinterested individuals and found universally acceptable. Scientists work cooperatively checking and cross-checking each other's contributions to ensure agreement, generalizability, and reproducibility of results. Science aims to achieve a consensus of rational opinion across the widest possible spectrum of experts. It aims to achieve inter-subjective agreement among relevant experts regarding scientific knowledge-claim. Science is therefore, essentially or inherently, international or

supranational. That is, it is not encumbered by the conflict of values as obtains in cultural expressions. Science is a social and corporate enterprise. There is and can only be one scientific community.

The universality of science derives from the scientific method. According to this essentially logico-inductive or the positivists' conception of scientific method; "science proceeds in a series of well-defined and clearly separated steps. First we find the facts (or phenomena). Then we derive laws. Finally we devise hypotheses for explaining of the laws" (Feyerabend, 1999, p.212). This implies that there is a logic of scientific discovery; a system of rules that must be adhered to uncompromisingly if one hopes to achieve successful result in a scientific investigation. It also means that science proceeds in objective standards independent of history, circumstances, politics, military, psychology, idiosyncrasies, religion or prejudices. The positivists' view suggests that the scientific method is a perfect method rigidly applied come what come may. Experiment becomes the hallmark of science. Non-rationalistic forms such as speculation and imagination are expelled from the foundation of the Universalist ethos of science as mentioned earlier.

It is consequently absurd, obviously a conceptual contradiction, to talk of science in the context of nationalities. To talk of Nigerian biology, American physics, German chemistry, British astronomy, is to deny the so much vaunted universalism of science and scientific internationalism.

Scientific Relativism

The crux of this paper is to talk about science in national contexts, an approach rendered tenuous by our conception of the scientific method and the feature of scientific universalism. The question then is, how is it possible to talk about science in the context of nationalities? How can we discuss the development of science in a developing nation such as Nigeria? Is the idea of national scientific community not a contradiction of the conception of science as essentially international? Can science be relative?

One way of making it possible to talk about science in relative terms is to deny the positivists cannon of a unique and universally applicable scientific method. This is exactly what they do those who conceive science as socially constructed. One of the most vocal in this camp is Paul K. Feyerabend (1999, p.126). According to him, the history of the development of science shows that "there is no method, and there is no authority." He thus means, he explains, that the only thing constant about scientific method which every scientist adheres to is "anything goes." Contrary to the position of the positivists, the scientific method seldom proceeds in accordance with any logical demands; that is, the so-called steps in the scientific method has each occasionally been violated in the history of scientific research. Anarchism rather than steadfastness appears to be the rule in scientific research. Against this backdrop, Feyerabend suggests his own "positive methodology for the empirical sciences." He calls this positive methodology "theoretical pluralism." According to Feyerabend's theoretical pluralism, we should apply in scientific research a plurality of mutually inconsistent theories, playing them off one against another so as to uncover their weakness. This method is based on the recognition of the human origin of explanatory

systems and that theories can only be fallible guesses that ought to be improved through critical comparison one with another.

Theoretical pluralism means to show that there are no generally valid rules, that no general methodology which is independent of historical circumstances, psychological dispositions, and religious orientations, guide our scientific steps uncompromisingly.

Theoretical pluralism means to assimilate science and art (Newton-Smith, 1981, p.125). It means to demonstrate that science is merely one of the many traditions. Their subject-matter is generally agreed to be ineffable. They have no rules, no method, and no logic. Art is the expression of the private opinion of the artist. If the artist strikes a note in a wide and broad spectrum of people, this is accidental not necessarily his objective. Art is based on genuine differences of taste, feeling, and culture. There is no dispute about taste, and you cannot experience other peoples feeling. The existences of irreconcilable schools of thought, the multiplicity of viewpoints, indicate that in art consensus is not a criterion and there is no urge to achieve it. Avant-gardism is not simply permissible; it is irresistibly admissible in art. These are precisely what excite Feyerabend about art and he urges that science should emulate those. He is also excited by the fact that art has managed to resist the vociferous demands of reason; excited by art's pluralism, its use of the method of multiple representations and the freedom of artistic creation (Feyerabend, 1999, p.7).

In equal terms, he deplores what he calls the "monistic" ideology of science which he says inhibits freedom of thought. He therefore admonishes scientists to emulate these features of art strongly hoping that when this is done human knowledge and freedom will be improved.

The implication of Feyerabend's theoretical pluralism is science-art assimilation leading ultimately to relativism in science. If science becomes relative, it becomes something like poetry. He writes that science is simply one of the so many pastimes humans have invented to amuse themselves. It is one of the "supermarkets" just like art or religion from which humans select what they want (Feyerabend, 1999, p.7). If the assimilation of science and art is executed as Feyerabend endeavours to do, then science becomes inherently culture bound or national.

The history of the development of science does not, however, support the relative conception of science. On the contrary, the history of science is replete with examples of scientists who have as their official philosophy positivism, the logico-inductive conception of the scientific method, the view that science arrives at truth by logical inference from empirical observations. Science has many successes and fruitful results to show for adopting this philosophy. Science is not relative; it is not inherently national and so we cannot base any discussion of science in a developing nation on that ground.

Science in Developing Countries

If science is not inherently national, how can we talk about national differences in scientific development? In actual fact how can we talk about science universalism and internationalism on the one hand and nationalism on the other? How can we talk about the development of science in national context?

The notion that socio-cultural conditions (religion, class structure, and language, type of government, library, and facilities for intellectual work, public understanding of science, and the value placed on science) govern the development of science, though it has been there since the industrial revolution, became accentuated after the World Wars. Since the world wars, especially the World War II, science and the industrial state are involved with each other in a symbiotic and synergetic relation. This means that science is now used to achieve national goals, aspirations and pride, in turn the development of science is influenced by national characteristics. Consequently science loses its autonomy – a definitive feature which, at its inception in the 16th/17 centuries insulated it from and or made it independent of national needs and concerns. Against this setting, we can now talk of national sciences. We can now talk of science in developing countries without fear of conceptual contradiction.

The development of science in developing countries, like African countries, has the best chance of being clarified and understood if examined in the light of the analytic construct, the center-periphery dichotomy. According to this intellectual construct, the world of science is divided into two, the center (or centers) and the periphery. Today, the scientific centers are the industrialized nations of Europe and North America; Japan not excluded. The periphery is constituted of developing nations of Africa, South America, Middle East and Asia. In this construct, periphery means inferiority and dependence. Scientific development in the light of this construct is basically a process of diffusion and transplantation of models from the center to the periphery. All that the peripheral countries can hope to do is to copy the models or the organization of scientific work at the center and thereby adopt its work orientations. The relation between the center and the periphery is best described as cultural or scientific imperialism. The center will always occupy a top monopolistic and independent position; while the periphery will occupy low and dependent position.

In the same light of center-periphery dichotomy, science in developing countries is characterized by imported concepts, procedures, and methods. Thus there is in the developing countries the problem of imitating or copying scientific ideas and high technologies from developed or industrialized nations. Developing countries apply already existing knowledge developed in scientific communities of developed countries to their problems and depend on technologies transferred therefrom. The implication is the absence of knowledge of the ecology of developing countries. There is the problem of technology transfer. Scientists in developing nations should tackle problems relating to their situation instead of replicating research done in developed nations. There should also be appropriate technology rather than high technology transferred from abroad. The idea of doing research in universities in peripheral countries simply because a prestigious university at the center has the idea, needs some data, or wishes to test something out, is antithetical to the development of science in peripheral countries. Scientific imperialism is executed sometimes in the name of overseas funding. A lot of money is given to do research for the donor country. The creative energy of a young man from a developing country is spent day and night toiling to provide for somebody so far away and on an issue not relevant to him instead of concentrating on what is relevant to his situation.

It is a feature of science in developing countries that there is low value placed on it. By this we mean that the relevance of science is not fully appreciated by individuals,

policy makers and governments. It is either they don't understand what the scientists are doing or they are impatient for the results, which usually take long to come. A comparative study of science or religion or engineering, or administration, shows that any of these has more value than science in most developing countries. In Nigeria for instance, government funds pilgrimages to Holy lands more than scientific researches. In developing countries, scientists get more recognition outside science. That is, on maturity as a scientist, one gets appointed as an administrator, a minister, or such a responsibility that takes one away from science. Thus within developing countries, there is brain drain from the scientific community of developing countries to other areas or scientific research institutions and universities abroad. The reason for this kind of brain drain is found in the center-periphery dichotomy but sometime in the fact that governments in developing countries mostly fail to provide enabling environment for trained scientists to carry on their research back home. There are institutional problems. Extended family setting is an entanglement and is time consuming. It leaves little time for research. The equipment when available is either rudimentary or primitive. Support staffs (technicians) are either not there or not well trained. In highbrow universities where scientific researches are supposed to be going on, you find that there is no electricity, no running water, no books, and no periodicals. There is often political instability which restricts scientific research. And over and above there is usually little or no funding.

Current advances made in electronic communications have given us networking technologies such as the internet, mobile phone technology, Voice Over IP Telephony (VOIP), satellite communications, e-mail, video-conferencing, browsing, e-library and a lot of others still in their infancy. Communication is the age-mark of this age. But this is as far as industrialized nations are concerned. There is still the problem of communication within and without the scientific community of developing nations. Scientific activities in developing nations are isolated. There are scientific ideas and technical know-how that can be shared within and without the scientific community of developing nations. There ought to be more communications between scientists and when this is achieved, you will discover that there is a lot of scientific information that may be of use both to other parts of the developing and developed nations. Closely allied to the above is the lack of genuine cooperation between developed and developing countries in scientific matters. There should be mutual exchange of visits and information. The relationship should not be missionary in which developed countries are on top and developing countries below.

Conclusion

We started with noting the two major senses of science: the loose sense which is co-extensive with knowledge; and the strict sense which is an institutionalized (scientifically methodic) system of inquiry. In this sense, the natural sciences are paradigmatic of science. This is the sense of science adopted in this paper.

The striking features of science conceived in this sense are universalism and internationalism. These derive from the positivists' conception of the scientific method as an objective, well defined and standard procedures adhered to uncompromisingly. Science is thus 'consensible'; that is, it is generalizable and reproducible in the widest possible spectrum of experts. The implication is that science is supernational; and apparently a conceptual contradiction to talk of national science or science in developing countries.

P.K. Feyerabend, however, denies the existence of scientific method, as the positivists want us to believe. He says that the method observable in the history of scientific research is “anything goes”. He thus advocates “methodological opportunism or anarchism”. Persuasive as Feyerabend’s scientific relativism may be, his view is not supported by the history of science.

The notion that socio-cultural conditions govern the development of science became accentuated during the World Wars. Against this background we can then discuss science in national contexts without fear of conceptual contradiction. To do this discussion we applied the intellectual construct of center-periphery dichotomy. According to this construct, the development of science in developing countries is inextricably tied to science in developed countries. This renders science in developing countries mere replications of science in developed countries and makes advancement near impossible.

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