

Science as a Cultural Activity

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In the 19th century, the likes of Byron, Shelley, Walpole and many others would go to the Royal Institution Discourses to learn about science and technology. Indeed, there was a deep interest in understanding of the forces changing society and also, an awareness, that without such an understanding one could not be considered adequately educated. There is food for thought in the fact that, at the start of the 21st century, many consider themselves well educated without any intrinsic understanding of the greatest intellectual achievement of this century, namely, quantum mechanics. Quantum Mechanics underpins the whole of chemistry and biology and much of physics. Few have an understanding of the genetic factors that threaten to shake the foundations of society to its very roots in the next century.

If the "public lecture" was the popular medium of a past era, television is undoubtedly the most powerful visual medium of communication today - yet we find little real science there. After all, one is never going to appreciate Beethoven's late string quartets without significant exposure to his earlier music, and the same is true of modern science. It seems incredible to me that the arts have had a regular forum on television for decades, whereas no analogous outlet exists for the sciences. I am convinced that such a forum would have enabled us to avoid many of the errors that led to the BSE catastrophe and could help us to avoid making similar errors in the future.

One never truly understands a subject until one has solved a problem that is central to that subject. Yet most of the decisions about what aspects of science are to be shown on television are made by non-scientists who are more interested in form than in content. I find the assumption that people can assess the place and importance of scientific culture without any professional scientific understanding to be a disturbing aberration in a world that is becoming more and more dependent on complex scientific and technical advances.

A producer once told me that even the BBC's "Horizon" series, which has arguably the best track record in the world for science broadcasting, is more about entertainment than about science. In a recent programme on Fermat's Last Theorem, we were treated to a fascinating account of how the mathematician Andrew Wiles holed himself up in his room for six years to solve the problem, but we were left with little insight into the nature of the solution. The

programme told a great personal story but at the end it was like going to the opera and reading the libretto without being able to hear the music.

Television is a direct visually stimulating medium. The Royal Institution's Christmas Lecture series similarly exploits the direct approach by demonstrating science through experiments involving a live audience. For example, when Susan Greenfield presented her lectures on the brain, she said she wanted the children to pick up a real one. That is the essence of science. Despite the success of Stephen Hawking's recent series on the universe, I am not sure that cosmology is the best topic to start people on as it is extremely complicated. We are living in an age where people do not understand what happens when they switch on the technological apparatus of modern life – the TV, computer, CD players, microwave cooker, washing machine etc so it is surely far more important for kids to learn how computers and transistors work.

It is true that there has recently been an increase in science-related material on television. However, I maintain that it seldom contains real science. It usually offers some perfunctory description of a recent contribution by science and technology that has been deemed useful. More often than not it is a nature programme, the archetype of which is an eagle shoving bits of gerbil down the throats of eaglets. After a while, the fascination for watching the animal kingdom eating itself wears thin. It is debatable how much useful material is conveyed.

We scientists are continually being asked what our discoveries are useful for, but never what the nature of discovery is, nor why it triggers a cathartic response. What is more, we discuss the long-term value of basic research until we were blue in the face with little understanding. We can describe how it took 100 years to find a use for liquid crystals (in display devices such as wristwatches) or for platinum compounds (as powerful anti-cancer agents), only to be told, as I was - by a journalist - that we were discussing whether or not public money should be spent on useless research. Presumably she meant research like my own which led to the discovery of a most elegant form of carbon and one for which numerous applications appear on the horizon.

To understand science, one needs to understand the language of science. Scientists have been bending over backwards for a decade to explain themselves to non-scientist, but it is time to accept that there is a language barrier. Science is a cultural and intellectual activity, the language of which must be learnt if its ideas are to be understood. Like all languages, it must be acquired very early in life; if a child does not learn language early, he/she never learns, and the same is true of science, particularly mathematics. Attempts to redress the balance later in life are costly in time and effort, and in general will not be very successful. It is about time

that we took account, in our educational programmes, of the fact that the brain's ability to acquire new knowledge and use it decreases rapidly with age.

It may help to see science as perhaps the only truly international culture. Just as we must learn the Japanese language in order to appreciate the true culture of Japan (reading say Kawabata) so the Japanese must learn English to appreciate our culture (embodied say in Shakespeare). So those who want to understand science must familiarise themselves with mathematics and the symbolism of chemistry and physics. There is no point in complaining that we scientists do not come down to some level or other. They must meet us halfway. The chemical term C_6H_6 for benzene has as much significance in chemistry and biology as the name Hamlet does in English literature. Just as one might ask how one can describe a Rothko painting to someone who is colour blind so, one might wonder how to explain the essence of particle physics to someone without a basic knowledge of mathematics. It is, as the late American physicist Richard Feynman said, a severe limitation.

The Vega Science Trust (www.vega.org.uk), which I chair, was set up to create television programmes that treat science as a cultural activity. The programmes aim to give scientists as much flexibility as possible to present their own science in their own way. We also want to capture an archive of key scientists talking about their discoveries and enthusing about what turns them on to science.

There will soon be numerous television channels and the Vega Trust will enable the science community to acquire its own home base. I have heard the comment made that we must avoid making a ghetto but, as the physicist Frank Close has said, let's have a ghetto because anything is better than the present situation. How have we scientists, who created communications technology, allowed ourselves for so long to be told how and what science should be broadcast by those who have so little understanding of science? The same attitude does not occur in other areas of broadcasting and, indeed, would not be tolerated.

It is high time to recognise that the true nature of science is bound up with the intellectual nature of discovery the greatest attribute of the human species. Until this fact is grasped, science will never be appreciated as part of our cultural heritage, and scientists will not be respected. Instead they will be called on to provide ever more material wealth for a society becoming ever more materialistic and totally ignorant about how precariously its very existence is balanced on the achievements of science and technology.

