

Reason and Unreason in Twenty-first Century Science

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Introduction

The second half of the twentieth century saw spectacular advances in both the physical and the biological sciences. The former have given us a much clearer picture of how the universe and the Earth came into being, our planet's age and place in the Universe and of how the physical world works. We now understand the processes that lead to earthquakes and volcanic eruptions and many of the factors that influence climate. Advances in the latter have seen the rise of molecular biology in all its forms and have led to major improvements in public health and medicine, which have substantially contributed to longer, healthy life for billions.

Despite these undoubted intellectual and practical advances, during this period there has come into view a dynamic and an increasingly audible range of voices with varying degrees of influence, that seem to reject modern science and scholarship and indeed the Enlightenment as a whole. Scientists are often distrusted. The whole scientific enterprise is seen by many as some sort of sinister conspiracy, created by the industrial establishment to make money at the expense of our health and planet. 'Science' (rather than greed, incompetence, laziness or simple expediency) is often blamed for the degradation of our environment, pollution, threats to species. In the Internet Age, conspiracy theorists prosper. There have always been conspiracies of course, but never before has the dissemination of information been so simple or so cheap. Comments such as 'the Moon landings were faked', 'medicine kills far more people than it saves' or 'vaccines do more harm than good' acquire a spurious truth through repetition and exposure that they would have struggled to acquire in the age of the salon and the printed pamphlet. We live in the era of the instant, self-proclaimed expert.

We can't just blame the Internet of course. Some of the rejection of science stems from traditional religious belief when this belief is in conflict with scientific discovery. For some Fundamentalist Christians, for example, the impossibility of reconciling our knowledge of the physical world with the creation accounts in the Biblical story of Genesis, or our knowledge of evolution with its story of the creation of humankind

demonstrates that ‘science must be wrong’. Other voices, which might be considered by most in the scientific profession to be ‘non-rational’, extend their objections into many other fields. Alternative medicine in all its forms, objections to vaccination, to reproductive technologies and to genetic modification of food plants are some striking examples.

This high-level workshop explored these ‘alternative’ views, the possible reasons that they are held and what, if anything, scientists and people who support scientific rationality should do about them. Speakers investigated whether there are any plausible grounds for a reasonable and reasoned scepticism of science in the twenty-first century, what might motivate it and how such scepticism may be reconciled with known scientific realities. This required an authoritative evaluation of the science involved (including what is not known) and a pragmatic approach to how to communicate this to a non-scientific audience. The workshop also explored evidence for and reasons why an ‘anti-enlightenment’ movement might once again be able to flourish at the beginning of the twenty-first century.

These are not purely theoretical matters. Unreason can kill. *De facto* objections to transgenic crop technologies and vaccination have undoubtedly already led to death, illness and misery and will continue to do so. Sometimes Unreason crosses the boundary from something unpleasant and unwelcome to something approaching the intellectual equivalent of a war crime; how will generations hence look back on the three decades when science had the answer to solving one of the great nutritional crises that affects the world, simple Vitamin A deficiency, yet due to political and quasi-environmental concerns ‘we’ chose not to act? Not all crimes are crimes of commission.

The level of discourse needs to be raised – on both sides. Discussions of the effects of climate change and what can be done to mitigate it or prevent things getting worse all too often descend into sparring matches between scientists and those who appear to oppose them simply on emotional or perhaps financial grounds. Ethics, science, Reason and Unreason jostle uncomfortably with some of the most vexing issues of our time; how we treat our environment, our responsibility to future generations, artificial reproduction, the legalisation of narcotics and euthanasia. How do we evaluate, and re-evaluate, (and then communicate) risk in a world of rapidly changing data? How should scientists communicate uncertainty? And to what extent, if any, should we pay heed to the Precautionary Principle? These are all in a way old debates but given fresh urgency by the advent of new technologies and scientific insights.

The media must share some responsibility for the growth of Unreason, or at least its anachronistic persistence. Forty years ago, if the newspapers reported science at all, it was usually in reverent tones. There was a *Tomorrow’s Worldish* air to the way new technological breakthroughs were reported, new ‘wonder drugs’ unveiled. The starry-eyed newsreel footage of the first civil nuclear power stations is testament to a more innocent, unquestioning age. This was an era when ‘boffins’ were generally held in high regard, a consequence perhaps of the role scientists had played in the recent war against Nazi Germany and its allies as well as the excitements of the space age and the dawn of the computing era.

But of course the media loves to create a hero only to tear him down again. The turning point may have come with the thalidomide scandal, and in the United Kingdom the late-1960s’ campaign run by a Sunday newspaper for compensation for

thalidomide victims. This coincided with a new zeitgeist, in which science began to be distrusted as a symbol of oppression and conformity, when ‘boffins’ were associated more with Agent Orange than Bletchley Park and everyone started to become terrified of the atom.

Gradually, the media turned against science, mounting coordinated campaigns against everything from vaccination to wi-fi radiation and various ‘chemicals’ that had little measurable impact on public health at all. Suddenly pseudoscience and quackery were getting a hearing rather than ridicule. The media loves conspiracies and the idea that, for example, the HIV–Aids link was either a gigantic mistake or some sort of pharmaceutical fraud was too good a story to be missed, despite the fact that it was obviously untrue. Sadly, the enthusiastic promotion of the Aids-deniers by some elements of the media in Britain and elsewhere probably contributed to fatal delays in instigating public health measures in the African nations most affected, and can thus be said to have indirectly caused tens of thousands of unnecessary deaths.

Less dramatically the persistence of Unreason in industrialised societies has led to the diversion of precious economic resources. In the United Kingdom and other countries state-funded academics teach students the tenets of non-evidence-based medicine such as homeopathy and reflexology and such treatments may be available on state-funded healthcare schemes. This reflects current fashion more than anything else (no one teaches courses in alchemy these days). The good news is that this particular flowering of unreason appears to be on the decline, in Britain at least.

We must be careful not to name-call. It is not enough to dismiss such sceptics as irrational, insane or evil. Sometimes these labels can be fairly applied. But in many cases unreason emerges as a result of a complex interplay of religious faith and dogma, well-meaning concern, an attachment to the precautionary principle, intellectual inertia, often well-founded suspicion of some scientific enterprises (the activities of some pharmaceutical companies, the historical secrecy of the nuclear industry, resistance to anti-pollution measures and so forth) as well as simple misunderstanding.

Science is often counter-intuitive. The very idea of Darwinian evolution, a mechanism that turned inanimate chemicals into people, appears unnatural, contrary to common-sense and does not fit in with the way we see the world around us work. Evolution is at least comprehensible; arguably, the human mind is simply not equipped at any level to visualise the weird world of the quantum, to grasp why moving clocks run slow or to get any handle whatsoever of the scale of the Universe.

Science is *hard*, there is no getting round it. A comprehensive understanding of modern physics or molecular biology probably requires a bigger intellectual toolkit than a similar understanding of art or history. Skills, particularly mathematical skills, must be brought into play and it is the case that not all people are able to acquire these skills even with a great deal of trying.

One of the reasons for the extraordinary flourishing in the teaching of alternative medicine in European institutions in the last 20 years is simply that learning to be a homeopath is a great deal easier than learning to be a doctor. It is not surprising, and perhaps forgivable, that in an era where it is not possible for a single person to know ‘all there is to know’ (as may have been the case 200 years ago) so many turn their backs on

an exercise that seems bewildering and written in language that can occasionally be perceived as deliberately designed to obfuscate and confuse. The world of medicine in particular is littered with unfortunate terms – ‘abortion’ and ‘herd immunity’ are two that come immediately to mind – that have meanings to the layperson quite different to the professionals. Perhaps some thought should be given to tweaking the lexicon of science to avoid misunderstanding?

It is important that scientists, and the institutions they represent and work for, recognise that Unreason can only truly flourish in a culture of ignorance. It is up to them to provide evidence for claims that have importance in the public sphere. Non-scientists cannot be expected to read scientific journals when the reality is that many professional researchers rarely read anything outside their own field.

People and public bodies often ask ‘what is the evidence for your claims?’ The public, and especially politicians and other policy-makers who seek to represent them, have a duty to ask this question when dealing with contentious issues such as vaccinations, GM foods or nuclear power. But scientists, surely, also have a duty to explain and not assume that because something is (to them) obvious nonsense this will be enough to persuade people to take the ‘right’ view.

We must also accept that sometimes science does not live up to its own rigorous standards. ‘Take No One’s Word for It’, *Nullius In Verba*, is the motto of the Royal Society, which is all very well but the reality is that science is dominated by the Great and the Good, as much as in any field, Grandees whose word is all too often taken as read. Science is riddled with petty and grand feuds, personality clashes, egotism and occasionally downright fraud. Scientists are people, not machines, and are driven by the same forces that drive academics, indeed professionals of any kind – money, sex, the desire to be respected, liked and even feared – as well as the more noble drivers of curiosity, determination, professionalism and perfectionism.

We must accept that corners can be cut, publications can be biased, the peer-review system can be corrupted (like Churchill’s Democracy, peer-review is the worst system there is for evaluating scientific claims – apart from all the others). Publication bias remains a real problem; results that may not have commercial relevance are all too often passed over for scrutiny when they may be as valuable as a positive finding. It will be interesting to see what the effect of blogging and open-access publishing will be and the advent of the new social media. We must accept that sometimes science is not a well-maintained Swiss watch but a ramshackle, creaking machine held together with shims and other bodes. A precise knowledge of theory and causality are not always needed, particularly in the field of medicine, to be confident something ‘works’. The prescription of aspirin was properly scientific even when we had no real idea how this wonder drug actually functioned.

When science impacts on society there are often valid arguments to be made which are not dependent on data and clinical trials. The debates about legalisation of certain narcotic substances raging in many countries are not wholly scientific matters. It may well be the case that a certain (currently illegal) drug is less harmful than alcohol or nicotine but this logic does not necessarily imply that it is morally, or politically, correct to change the law. These are often decisions that must be made at the emotional, democratic and political level, not in the journals. Similarly, appeals to ‘science’ in the

right-to-die debates are similarly doomed. Science can inform, explain even, but it cannot arbitrate in cases like these.

And we come again to religion, the oldest 'Unreason' of all? How we define the relationship between science and religion has been occupying minds great and not-so-great for centuries and the answer, such as it is, is clearly a muddle. Stephen Jay Gould's concept of Non-Overlapping Magisteria is currently rather unfashionable but describes rather well the conflict, or rather lack of it, that exists today between most forms of religious belief and science. It is quite true that in some places there is direct conflict between the teachings of science in schools, say, and prevalent supernatural beliefs, but in most cases the severity of these conflicts have been overstated.

A quite different matter is the role of faith in science, and the scientific explanation (if there is one) for faith itself. Is some sort of mysticism hard-wired into the human brain? Very few cultures or societies have lacked religion and when formal supernatural-based belief systems are absent, secular religions, such as Leninism-Marxism, the peculiar cults of North Korea or Nazism quickly emerge to take their place. An important question is to what extent moral and ethical beliefs and precepts depend on the existence of religion or faith and to what extent these ethics may themselves be the result of cultural evolution and adaptation.

It is unlikely that Unreason will ever disappear. We are not going to see the sort of future imaged by the science fiction writer Arthur C. Clarke as, in the words of his friend Michael Moorcock, 'brainy men in togas swapping theorems'. But Unreason can be encouraged to dwindle, and this is a good thing. One of the peculiarities of history is not only the great explosion of good health and wealth afforded by science and technology, but also the simultaneous and equally extraordinary decline in human violence, which has been recently charted by Steven Pinker¹ and others. The growth of Reason tends to be associated, probably causally, with the growth of humanity and kindness. The Enlightenment did not just lead to the Industrial Revolution and the birth of modern science; it also coincided with the great Human Rights revolutions which, in much of the world at least, saw an end to slavery, the spread of emancipation and a move away from judicial and societal violence. And it is for this reason, rather than an appeal to abstract intellectual purity, that we must continue to challenge Unreason whenever and wherever it occurs.

Reference

1. S. Pinker (2011) *The Better Angels of our Nature: The Decline of Violence in History and its Causes* (London: Allen Lane).