

What's Wrong With Science?

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Here is an idea that just might save the world. It is that science, properly understood, provides us with the methodological key to the salvation of humanity.

A version of this idea can be found buried in the works of Karl Popper. Famously, Popper argued that science cannot verify theories, but can only refute them. This sounds very negative, but actually it is not, for science succeeds in making such astonishing progress by subjecting its theories to sustained, ferocious attempted falsification. Every time a scientific theory is refuted by experiment or observation, scientists are forced to try to think up something better, and it is this, according to Popper, which drives science forward.

Popper went on to generalize this falsificationist conception of scientific method to form a notion of rationality, *critical rationalism*, applicable to all aspects of human life. Falsification becomes the more general idea of *criticism*. Just as scientists make progress by subjecting their theories to sustained attempted empirical falsification, so too all of us, whatever we may be doing, can best hope to achieve progress by subjecting relevant ideas to sustained, severe *criticism*. By subjecting our attempts at solving our problems to criticism, we give ourselves the best hope of discovering (when relevant) that our attempted solutions are inadequate or fail, and we are thus compelled to try to think up something better. By means of judicious use of criticism, in personal, social and political life, we may be able to achieve, in life, progressive success somewhat like the progressive success achieved by science. We can, in this way, in short, learn from scientific progress how to make personal and social progress in life. Science, as I have said, provides the methodological key to our salvation.

I discovered Karl Popper's work when I was a graduate student doing philosophy at Manchester University, in the early 1960s. As an undergraduate, I was appalled at the triviality, the sterility, of so-called "Oxford philosophy". This turned its back on all the immense and agonizing problems of the real world – the mysteries and grandeur of the universe, the wonder of our life on earth, the dreadful toll of human suffering – and instead busied itself with the trite activity of analysing the meaning of words. Then I discovered Popper, and breathed a sigh of relief. Here was a philosopher who, with exemplary intellectual integrity and passion, concerned himself with the profound problems of human existence, and had extraordinarily original and fruitful things to say about them. The problems that had tormented me had in essence, I felt, already been solved.

But then it dawned on me that Popper had failed to solve his fundamental problem – the problem of understanding how science makes progress. In one respect, Popper's conception of science is highly unorthodox: all scientific knowledge is conjectural; theories are falsified but cannot be verified. But in other respects, Popper's conception of science is highly orthodox. For Popper, as for most scientists and philosophers, the basic aim of science is knowledge of truth, the basic method being to assess theories with respect to evidence, *nothing being accepted as a part of scientific knowledge*

independently of evidence. This orthodox view – which I came to call *standard empiricism* – is, I realised, *false*. Physicists only ever accept theories that are *unified* – theories that depict the same laws applying to the range of phenomena to which the theory applies. Endlessly many empirically more successful *disunified* rivals can always be concocted, but these are always ignored. This means, I realised, that science does make a big, permanent, and highly problematic assumption about the nature of the universe independently of empirical considerations and even, in a sense, in violation of empirical considerations – namely, that the universe is such that all grossly *disunified* theories are false. Without some such presupposition as this, the whole empirical method of science breaks down.

It occurred to me that Popper, along with most scientists and philosophers, had misidentified the basic aim of science. This is not truth *per se*. It is rather truth *presupposed to be unified*, presupposed to be explanatory or comprehensible (unified theories being *explanatory*). Inherent in the aim of science there is the metaphysical – that is, untestable – assumption that there is some kind of underlying *unity* in nature. The universe is, in some way, physically comprehensible.

But this assumption is profoundly problematic. We do not *know* that the universe is comprehensible. This is a conjecture. Even if it is comprehensible, almost certainly it is not comprehensible in the way science presupposes it is today. For good Popperian reasons, this metaphysical assumption must be made explicit within science and subjected to sustained *criticism*, as an integral part of science, in an attempt to improve it.

The outcome is a new conception of science, and a new kind of science, which I called *aim-oriented empiricism*. This subjects the aims, and associated methods, of science to sustained critical scrutiny, the aims and methods of science evolving with evolving knowledge. Philosophy of science (the study of the aims and methods of science) becomes an integral, vital part of science itself. And science becomes much more like natural philosophy in the time of Newton, a synthesis of science, methodology, epistemology, metaphysics and philosophy.

The aim of seeking *explanatory truth* is however a special case of a more general aim, that of seeking *valuable truth*. And this is sought in order that it be *used* by people to enrich their lives. In other words, in addition to metaphysical assumptions inherent in the aims of science there are *value* assumptions, and *political* assumptions, assumptions about how science should be used in life. These are, if anything, even more problematic than metaphysical assumptions. Here, too, assumptions need to be made explicit and critically assessed, as an integral part of science, in an attempt to improve them.

Released from the crippling constraints of standard empiricism, science would burst out into a wonderful new life, realising its full potential, responding fully both to our sense of wonder and to human suffering, becoming both more rigorous and of greater human value.

And then, in a flash of inspiration, I had my great idea. I could tread a path parallel to Popper's. Just as Popper had generalized falsificationism to form critical rationalism, so I could generalise my aim-oriented empiricist conception of scientific method to form an aim-oriented conception of rationality, potentially fruitfully applicable to all that we do, to all spheres of human life. But the great difference would be this. I would be starting out from a conception of science – of scientific method – that enormously improves on

Popper's notion. In generalizing this, to form a general idea of progress-achieving rationality, I would be creating an idea of immense power and fruitfulness.

I knew already that the line of argument developed by Popper, from falsificationism to critical rationalism, was of profound importance for our whole culture and social order, and had far-reaching implications and application for science, art and art criticism, literature, music, academic inquiry quite generally, politics, law, morality, economics, psychoanalytic theory, evolution, education, history – for almost all aspects of human life and culture. The analogous line of argument I was developing, from aim-oriented empiricism to aim-oriented rationalism, would have even more fruitful implications and applications for all these fields, starting as it did from a much improved initial conception of the progress-achieving methods of science.

The key point is extremely simple. It is not just in science that aims are profoundly problematic. This is true in life as well. Above all, it is true of the aim of creating a good world – an aim inherently problematic for all sorts of more or less obvious reasons. It is not just in science that problematic aims are misconstrued or “repressed”; this happens all too often in life too, both at the level of individuals, and at the institutional or social level as well. We urgently need to build into our scientific institutions and activities the aims-and-methods-improving methods of aim-oriented empiricism, so that scientific aims and methods improve as our scientific knowledge and understanding improve. Likewise, and even more urgently, we need to build into all our other institutions, into the fabric of our personal and social lives, the aims-and-methods-improving methods of aim-oriented rationality, so that we may improve our personal, social and global aims and methods as we live.

One outcome of the 20th century is a widespread and deep-seated cynicism concerning the capacity of humanity to make real progress towards a genuinely civilized, good world. Utopian ideals and programmes, whether of the far left or right, that have promised heaven on earth, have led to horrors. Stalin's and Hitler's grandiose plans led to the murder of millions. Even saner, more modest, more humane and rational political programmes, based on democratic socialism, liberalism, or free markets and capitalism, seem to have failed us. Thanks largely to modern science and technology, many of us today enjoy far richer, healthier and longer lives than our grandparents or great grandparents, or those who came before. Nevertheless the modern world is confronted by grave global problems: the lethal character of modern war, the spread and threat of armaments, conventional, chemical, biological and nuclear, rapid population growth, severe poverty of millions in Africa, Asia and elsewhere, destruction of tropical rain forests and other natural habitats, rapid extinction of species, annihilation of languages and cultures. And over everything hangs the menace of climate change, threatening to intensify all the other problems (apart, perhaps, from population growth).

All these grave global problems are the almost inevitable outcome of the successful exploitation of science and technology plus the failure to build aim-oriented rationality into the fabric of our personal, social and institutional lives. Modern science and technology make modern industry and agriculture possible, which in turn make possible population growth, modern armaments and war, destruction of natural habitats and extinction of species, and global warming. Modern science and technology, in other words, make it possible for us to achieve the goals of more people, more industry and agriculture, more wealth, longer lives, more development, housing and roads, more

travel, more cars and aeroplanes, more energy production and use, more and more lethal armaments (for defence only of course!). These things seem inherently desirable and, in many ways, are highly desirable. But our successes in achieving these ends also bring about global warming, war, vast inequalities across the globe, destruction of habitats and extinction of species. All our current global problems are the almost inevitable outcome of our long-term failure to put aim-oriented rationality into practice in life, so that we actively seek to discover problems associated with our long-term aims, actively explore ways in which problematic aims can be modified in less problematic directions, and at the same time develop the social, the political, economic and industrial *muscle* able to change what we do, how we live, so that our aims become less problematic, less destructive in both the short and long term. We have failed even to appreciate the fundamental need to improve aims and methods as the decades go by. Conventional ideas about rationality are all about *means*, not about *ends*, and are not designed to help us *improve* our ends as we proceed. Implementing aim-oriented rationality is essential if we are to survive in the long term. To repeat, the idea spelled out in this book, if taken seriously, just might save the world.

Einstein put his finger on what is wrong when he said "Perfection of means and confusion of goals seems, to my opinion, to characterize our age." This outcome is inevitable if we restrict rationality to *means*, and fail to demand that rationality – the authentic article – must quite essentially include the sustained critical scrutiny of *ends*.

Scientists, and academics more generally, have a heavy burden of responsibility for allowing our present impending state of crisis to develop. Putting aim-oriented rationality into practice in life can be painful, difficult and counter-intuitive. It involves calling into question some of our most cherished aspirations and ideals. We have to *learn* how to live in aim-oriented rationalistic ways. And here, academic inquiry ought to have taken a lead. The primary task of our schools and universities, indeed, ought to have been, over the decades, to help us learn how to improve aims and methods as we live. Not only has academia failed miserably to take up this task, or even see it as necessary or desirable. Even worse, perhaps, academia has failed itself to put aim-oriented rationality into practice. Science has met with such astonishing success because it has put something like aim-oriented empiricism into scientific practice – but this has been obscured and obstructed by the conviction of scientists that science ought to proceed in accordance with standard empiricism – with its fixed aim and fixed methods. Science has achieved success despite, and not because of, general allegiance of scientists to standard empiricism.

The pursuit of scientific knowledge dissociated from a more fundamental concern to help humanity improve aims and methods in life is, as we have seen, a recipe for disaster. This is the crisis behind all the others. We are in deep trouble. We can no longer afford to blunder blindly on our way. We must strive to peer into the future and steer a course less doomed to disaster. Humanity must learn to take intelligent and humane responsibility for the unfolding of history.