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Can science be at the centre of modern culture?*

Gerald Holton

Increasingly, such concepts as the ‘End of the Modern Era’, the ‘End of Progress’, and the ‘End of Objectivity’ have been given public exposure, originating from parts of academe and from popularizers. Far from being merely a passing phase connected with the usual fin-de-siècle preoccupations, the movement appears to signal the resurgence of an old, recurring rebellion against Enlightenment-based presuppositions of Western civilization, particularly the claim of science to lead to intersubjective (objective) knowledge. The negative impacts upon the public understanding of science are becoming evident, including among legislators of science policy. To understand the movement, a survey is given of some of the chief theorists on the question of whether science may play a central role in 20th-century culture, including Oswald Spengler, the Vienna Circle scientist-philosophers, Sigmund Freud, Isaiah Berlin, and Václav Havel.

The place which science is thought to occupy properly in Western civilization at any given time is an august and embattled subject. Attending to its turbulent history seems to me a natural prerequisite for any sound study in the field that has named itself ‘the public understanding of science’, if only to put into perspective the increasingly sophisticated and adversarial relation, now and during recent decades, between science and that important part of the public which consists of an eloquent segment of the intelligentsia. For evidently we have now put behind us the more innocent phase when the pursuit of scientific knowledge was widely thought in Western civilization to be an embodiment of the classical values, starting with the three primary virtues of truth, goodness and beauty; when science was generally praised as a central truth-seeking and enlightening process in modern culture—one might call it the Newtonian search for Omniscience; when science was thought to embody the ethos of practical goodness in an imperfect world, both through its largely self-correcting practice of honour in science and through its tendency to lead to applications that might improve the human condition—its Baconian search for benign Omnipotence; and when the discovery of beauty in the structure, coherence, simplicity and rationality of the world was thought of as the reward for a Keplerian enchantment.

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The last time the optimistic description which I have just given could have been said to be generally taken for granted even in the population at large, at least in the United States, was the period immediately following the ending of World War II. It was embodied for example in the famous Vannevar Bush report, *Science, The Endless Frontier*, of nearly 50 years ago, which became the main driving force of science policy in that country thereafter. Because it is such a convenient example of modern post-Enlightenment optimism about the positive role of science in culture, it will be illuminating to look at the main thrust of the document.

In November 1944, during the last phase of World War II, President Roosevelt requested from Vannevar Bush, the head of the wartime Office of Scientific Research and Development, a report that would outline how, in the postwar world, research in the natural sciences—‘the new frontiers of the mind’—could be strengthened and put to service for the nation and humanity. Roosevelt was particularly interested in waging a new ‘war of science against disease’, in ‘discovering and developing scientific talent in American youth’, and in a new system of federal support for scientific research in the public and private sectors. Above all, he argued that science, so successful in war (with the successes of radar, anti-submarine devices and proximity fuses the most striking examples at that time), could be harnessed to ‘create a fuller and more fruitful employment, and a fuller and more fruitful life’.

Vannevar Bush’s detailed response came less than eight months later. Roosevelt had died, but with the war’s successful end plainly in sight, the American administration proved generally hospitable to its ideas. While some of the details in the report were too optimistic and others were modified in practice, often to Bush’s dismay, his vision, it is generally agreed, set the stage for the new institutions for the support of science during more than two decades, and for the generally favourable popular attitudes that were prerequisites. Not until the Vietnam war had escalated was there substantial popular disenchantment with both governmental authority and the wartime use of technology, which signalled the end of that rather euphoric phase in the relation of science and society.

The Bush report, as well as its ultimately unsuccessful rival proposal by Senator Harley Kilgore, were at bottom historic exemplars of the victory of science-based progressivism, which saw science and democracy as natural allies in the service of the ideal of enlightenment and empowerment of the polity as a whole. In this sense, they were part of the American dreams as far back as Benjamin Franklin and his fellow statesmen-science amateurs. Vannevar Bush himself hinted as much in the brief preface to his report, taking courage from the fact that, as he put it, ‘the pioneer spirit is still vigorous within the nation’. And to make the connection with the tradition of Condorcet even more explicit, he added a sentence which, while presenting the unchallenged wisdom of a citizen of the mid-1940s, is likely to be rejected today by some who think of themselves as children of the 1960s and 70s. He wrote: ‘Scientific progress is one essential key to our security as a nation, to our better health, to more jobs, to a higher standard of living, and to our cultural progress’. One could hear an echo of Thomas Jefferson’s formula: ‘The important truths [are] that knowledge is power, knowledge is safety, knowledge is happiness’. Bush and his contemporaries could hardly have imagined that by the early 1990s those hopes had begun to be rejected at the highest levels, that for example the key person in the US Congress for science policy would be transferring to the account of science (as we shall see in more
detail later) the failures of decades of political leadership, saying: "Global leadership in science and technology has not translated into leadership in infant health, life expectancy, rates of literacy, equality of opportunity, productivity of workers, or efficiency of resource consumption. Neither has it overcome failing education systems, decaying cities, environmental degradation, unaffordable health care, and the largest national debt in history."

The changing balance of sentiments

After this reminder of a worldview that was still predominant among intellectuals in the West in the 1940s when the generation now in or near leadership position came on the scene, we turn from the level of appearances to get closer to the causal mechanisms for understanding the change in the place assigned to science. And here we must begin with the notion that at any given time and place, even when a civilization appears to be in a stable phase, there is a struggle between many conflicting ideologies and outlooks. Below the level of the current dominant worldview, each of these elements fervently desires to rise to a position where it would count (at least among the prominent cultural agents) as the ‘taste of the time’ characterizing that particular age and region; and each at the same moment is also trying to delegitimate the claims of its main rivals to count among the central energizing ideas. Especially when the stable phase breaks down, the pandemonium of contrasting voices gets louder; a set of partial victors rises above the rest, and then is recognized—sometimes more clearly in retrospect, allowing a simplified terminology to be applied, such as ‘The Age of Reason’—as the ideational embodiment of the new worldview or ‘sentiment’ of that age and place.

In this struggle, from that of Apollo versus Dionysus in Greece to this day, the scientific conception of the world has always played a part, for better or worse, sometimes being at the cherished core of the rising or victorious overall worldview, sometimes finding itself embedded in the sinking or defeated one, and then even accused of nourishing, directly or indirectly, a great variety of sins against the better interests of humanity.

Historians of ideas have mapped the changing forms of these contrary trends. Wise political leaders, too, have at times watched with apprehension as the net balance of prevailing sentiments has taken a turn, for as Thomas Jefferson said, ‘it is the manner and spirit of a people which preserve a republic in vigor. A degeneracy in these is a canker which soon eats into the heart of its laws and constitution’. Weighty scholarship has chronicled how one of the world conceptions, and the scientific position within them, gained predominance over the others for some decades in significant segments of Western culture—an example is Robert K. Merton’s early study on science and 17th-century Puritanism. But equally, there is much documentation that these predominant sentiments subsequently gave ground, as the overall balance of benignity or distress moved the other way for some more decades. As to the practising scientists themselves, in recent times most of them have typically been too busy to pay much attention to this constant see-saw of sentiments, except to weigh in now and then as promoters of the positive swings, or occasionally to become the victims during the negative ones.

But today, at our own fin-de-siècle, this oscillating spectacle, so engrossing to the scholar, has ceased to be merely the site for their research or amusement. The general
balance among the contending elements, and with it the attitude of traditional patrons, are changing precipitously before our eyes. Studying this drama in real time is as fascinating and fruitful for the historian of ideas, whose perspective I shall be taking here, as the unexpected explosion of a supernova may be for an astronomer.

Oswald Spengler’s diagnosis and prediction

A foretaste of the current struggle between opposing answers to the question of what role science may play in modern culture came in the decades around the turn of the last century. On the one hand was the group of fundamentally optimistic intellectuals, who proudly called themselves either Monists or positivists. I have described the striking, imperial ambition of the latter as shown for example in their manifesto (Aufruf) of late 1911, calling for ‘a comprehensive Weltanschauung based on the factual material accumulated by the separate sciences’—a total worldview for use not only in science but for ‘our era as such’. They truly thought science could not only be one of the forces at the centre of culture, but had to be the main centre.

But against these Apollonians there soon was a powerful reaction, most simply typified perhaps by the astounding success of the publication, first in 1918, of Oswald Spengler’s Untergang des Abendlandes (inadequately translated into English as The Decline of the West). No mere summary can be justice to that richly baroque work, but the point I want to focus on here is what its answer was to the question before us today. As you may recall, Spengler’s key conception was that for every part of mankind, in every epoch, history has taken fundamentally the same course. And from that inevitable course follow in each case naturally the specific forms of activity, whether social, political, loiterary, artistic, spiritual-religious, or indeed scientific. Each of the mighty cultures of humankind—for example the ancient Indian, Chinese, Arabian, and the classical Graeco-Roman—was not only as valid and significant as is our own Western civilization, but each is a drama with analogous structure. That is, each goes through the same season-like cycle, from its own nascent spring to its eventual burial in its own winter. Thus our own inevitable destiny in the West is to go to dust according to a timetable that can be calculated from the available precedents. Our time, Spengler said, corresponds not to that of Athens in the time of Pericles, but to that of Rome under the brutal Caesars. Of great painting, music, architecture or science, there can be for us no longer any hope. Our best strategy, he says, is to be bravely resigned and try at least to get a first glimpse of the rise of the next wave, which is coming from the East to triumph over the West. He predicted the very year of our undoubted demise: the year 2000.

Spengler tells us how each cycle progresses, from start to finish. Following Nietzsche, Spengler declares that each beginning is characterized by what he calls the Apollonian spirit, symbolized by the sensuous, individual body which we can see in classical Greek sculpture. With it goes a world view embracing attention to form and the organic, rather than to the mechanical or mathematical interpretation of experience that took its place later. It is the time of contemplation, not yet of investigation, of faith rather than scepticism, of high art rather than what he calls merely the ‘cult of science’.

At some point into this cycle, however, there occurs a kind of historic change of phase of the Apollinian soul and of the culture which it animates. It gives way to its opposite, a so-called Faustian one, which starts with a rather Germanic form of lonely
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romanticism, a yearning for the infinite, but gradually becomes more and more intellectualized. Thereby what was a ‘culture’ is changed into a mere ‘civilization’. What then counts is the notion of causality instead of destiny; attention to cause and effect rather than to what Goethe had called ‘living nature’; to abstractions such as infinite and empty space, rather than to the palpable earth which you can feel and smell. In a civilization, the primacy of soul is replaced by intellect; concern for human needs degenerates into debates about money; mathematics pervades more and more activities; the principle of causality is forced onto the understanding of phenomena, and nature is reinterpreted as a network of laws within the corpus of ‘scientific irreligion’. As Nietzsche had predicted, ours would be the century of weapon-hungry tyrants in the West, engaged in a struggle for world rule—even as an entirely new culture is getting ready to take over the field.

Here Spengler introduces his most startling idea, one that has become familiar in new garb also. He warns that it is characteristic of the winter phase of civilization that precisely when high science is most fruitful within its own sphere, the seeds of its own undoing begin to sprout. This is so for two reasons: the authority of science fails both within and beyond its disciplinary limits, and an antithetical, self-destructive element arises inside the body of science itself that eventually will devour it.

The failure of science’s authority outside its laboratories, he says, is due in good part to the tendency to over-reach and misapply to the cosmos of history the thinking techniques that are appropriate only to the cosmos of nature. Spengler holds that the thought style of scientific analysis, namely ‘reason and cognition’, fail in areas where one really needs the ‘habits of intuitive perception’ of the sort he identifies with the Apollinian soul and the philosophy of Goethe. To be sure, by asserting that an unbridgeable contrast exists between the pure ‘rationality’ of science and the intuitive life as lived, Spengler commits the same error as all such critics of science before him and after, to this day, of whom few seem even to have come closer to science than through their school textbooks. Therefore they are quite ignorant of the vast difference between ‘public science”—the final results of intersubjective negotiations to fashion a (frequently only temporary) consensus and globalization on the basis of experiment and logic—on one hand, and the earlier, ‘private’ version of science on the other hand, where the particular researcher’s intuitive, aesthetic, thematic or other non-logical preference may be the key to the individual’s advance beyond the previous stage of public science. This complementarity between the two quite different stages in the actual practice of science explains why in a given field the results of natural scientists from vastly different cultures and styles can be harnessed into a common product.

All this is clear enough to those who do scientific work, but almost never to their critics. But, Spengler continues, even in the cosmos of nature there is an attack on the authority of science, arising from within its own empire: every conception is at bottom ‘anthropomorphic’, and each culture incorporates this burden in the key conceptions and tests of its own science, which thereby become culturally conditioned illusions. All our rushing after positive scientific achievements in our century only hides the fact, he thinks, that as in Classical times, science is once more destined to ‘fall on its own sword’, and so make way for the coming world outlook, the ‘second religiousness’.

What he calls the orgy of two centuries of exact sciences will shortly be ending, together with the rest of what was valuable in Western civilization. Indeed, the only activities which are on the ascent during this final act are economics, politics, and technology. And as a kind of postscript, in his later book, Man and Technics (1931),
Spengler adds his opinion that advancing technology, with its mindlessly proliferating products, will also turn out to undermine the society of the West because, he predicts, there will be a failure of science and engineering education: its level in the 'metaphysically exhausted' West will not be up to maintaining the advance even there. The previously over-exploited races, 'having caught up with their instructors', have begun to surpass them and 'forge a weapon against the heart of the Faustian civilization'. The non-Caucasian nations will adopt the technical arts and turn them against the Caucasian inventors. As H. Stuart Hughes summarized it, the East will first triumph through better technology in commerce, and then militarily.3

**Fashioning a 'scientific world conception'**

In the period after World War I, the responses to the pessimistic Spenglerian diagnosis and expectations were predictably bimodal—fervent acceptance on one side, violent opposition on the other. The opponents to Spengler, including many prominent scientists, found allies in a movement that had its roots in the Enlightenment tradition and turn-of-the-century positivism. Over the span of the first four decades of this century there formed a thought collective that had few parallels in history in terms of the international outreach of the group, the high intellectual quality of its members, their dedication, and their ambitions. I am referring of course to the movement that, basing itself on a strain of Austrian liberalism in the second half of the 19th century, had started soon after 1900 among a small group of scholars and scientists, meeting in Viennese coffee houses, and which then grew into the study group that called itself the Vienna Circle. It named its public education outlet the Ernst Mach Verein.

At its height, the debates and cooperative publications of that movement involved a brilliant galaxy. I need only mention a few of the collaborators who met in the 1920s and early 30s for discussion, publication, and what they called 'fruitful mutual inspiration': Rudolf Carnap, Herbert Feigl, Philipp Frank, Kurt Gödel, Hans Hahn, Victor Kraft, Karl Menger, Otto Neurath, Moritz Schlick, Friedrich Waismann. Among their active sympathizers, they could count on Josef Frank, Hans Reichenbach, Edgar Zilsel, Richard von Mises, and in America, B. F. Skinner, P. W. Bridgman, Charles Morris, and W. V. Quine. As their models from related areas, they listed Albert Einstein, Bertrand Russell and Ludwig Wittgenstein.

Not least because the so-called postmodern movement of the 1980s and 90s is explicitly in opposition to central tenets of that modernist empiricism, it is appropriate here to take at least a brief glimpse at what was its central message and aim. These emerge most readily from the slim pamphlet which the group issued in October 1929 as a kind of manifesto of the movement, the main title being nothing less than *Wissenschaftliche Weltauflage (The Scientific Conception of the World).*4 The very title was a trumpet blast in the fight to put science at the centre of modern culture and against what the pamphlet calls, in the first sentence, the chief alternative, namely metaphysical and theologizing thought, those old helpmates of the Romantic movements.

Although most of the scholars involved with the Vienna Circle concerned themselves chiefly with the study of the epistemological and logical problems at the foundations of science, there was a clear undercurrent of wider cultural, social, political and pedagogic ambitions as well. For, as the manifesto said, 'The attention toward questions of life are more closely related to the scientific world conception
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than it might at first glance appear. For instance, endeavours toward a new organization of economic and social relations, toward the unification of mankind, toward a reform of school and education, all show an inner link with the scientific world conception. We have to fashion intellectual tools for everyday life. The vitality that shows itself in the efforts for a rational transformation of the social and economic order permeates the movement for a scientific world conception, too’ (p.304–305).

The members of the Circle associated themselves explicitly not with the Platonists and Pythagoreans, but with the Sophists and Epicureans, ‘with those who stand for earthly being, and the here and now’. A science free from metaphysics would be a unified science; it would know no unsolvable riddles; it would train thinking to produce clear demarcations between meaningless and meaningful discourse, between intellect and emotion, between the areas of scientific scholarship on the one hand and myth on the other. Just as this approach would, by this formulation, clarify the foundations of mathematics, of the physical sciences, of biology and psychology, it would also demystify the foundations of the social sciences, ‘and in the first place . . . history and economics’. This empiricist, antimetaphysical attitude would allow the rejection of such dangerous conceptions as ‘folk spirit’, and would ‘liberate one from inhibiting prejudices’. Thus, the ‘debris of millennia’ would be removed, and ‘a unified picture of this world’ would emerge, free from magical beliefs. The social and economic struggles of the time would be ameliorated because the ‘broad masses of people’ would reject the doctrines that have misled them (p.315–317).

Beyond that, the spirit of the scientific world conception would penetrate ‘in growing measure the forms of personal and public life, in education, upbringing, architecture, and the shaping of economic and social life according to rational principles’. And the manifesto for a new modernity ended with the blazing formulation, in italics: ‘The scientific world conception serves life, and life receives it’ (p.318).

Perhaps the most carefully developed of the many publications expressing the Circle’s position on science and its rationality as the key to a sane world picture was the major book by Richard von Mises, the Austrian scientist, mathematician, engineer and philosopher (as well as scholar of the poet Rainer Maria Rilke). Von Mises entitled his big volume, with a bit of irony, Kleines Lehrbuch des Positivismus: Einführung in die empiristische Wissenschaftsauffassung. (He allowed the simpler title, Positivism: A Study in Human Understanding, for the English translation.) The aim was not only to show what an empiricist-rational scientific world conception would consist of, what its tools would be, and what problems it could solve within the sciences, from mathematics and physics to biology and the social sciences. All this is done in great detail; but an equally motivating force was to present thereby a choice from the then-reigning alternatives in German-speaking Europe: the Kantianism in Germany and the clerical-metaphysical trend in Austria, both of which were then being invaded by the growing totalitarian ideologies. Von Mises included quite explicit opposition to what he called ‘negativism’, in which he includes systematic, philosophical and political anti-intellectualisms that have remained part of the present landscape. Among the examples he cited were, in fact, Oswald Spengler, and the once-popular German philosopher Ludwig Klages, whose point of view was enshrined even in the title of his main work, The Mind as Enemy of the Soul.

As a sign that the main aim of the book was to put science at the centre of a healthy culture, the von Mises volume dealt at length with the way the scientific world conception can illuminate the understanding of metaphysics, poetry, art, the law, and
ethics. The underlying commonality of the various forms of cultural achievements were considered by von Mises to be due to the principal unity of their methods if carried through rationally and soundly. The reader of the book feels they are in the presence of an updated follower of Auguste Comte. The very last sentence is here too, as it were, the summary of the whole project: 'We expect from the future that to an ever-increasing extent scientific knowledge, i.e., knowledge formulated in a connectable manner, will regulate life and the conduct of man' (p.370).  

**Freud: instinctual passions versus reasonable interests**

But now we will see the lever of sentiments shift again, the balance changing once more, and indeed on the very issue of whether knowledge formulated in a scientific manner can lead mankind to saner and more rational conduct. In 1929, the same year in which the optimistic manifesto of the Vienna Circle was published, Sigmund Freud, writing in the same city, produced a book of his mature years giving his sombre and pessimistic answer. To the founder of psychoanalysis, the role of science in our culture had been a continuing preoccupation, and in 1911 he had still been optimistic enough to sign the *Aufruf* of the Society for Positivistic Philosophy. But in that book of late 1929, *Das Unbehagen in der Kultur,* Freud found that science, while counting among the most visible manifestations of civilization, was at best an ameliorating influence in a titanic struggle on which the fate of our culture depended. That struggle, he said was centred on mankind's often doomed effort to master 'the human instinct of aggression and self destruction. Even then he saw, in the last paragraph of the book, that 'Mankind has gained control over the forces of nature to such an extent that with their help it may have no difficulty to exterminate one another to the last man' (p.92).  

Freud held that the restrictions which civilization imposes upon the demands of our instincts produce an irremediable antagonism between these restrictions and the 'destructive instinct', or 'death instinct' (pp.7, 8), the drive which is constantly at odds with the civilizing project to elevate the moral condition of humankind. He wrote, '.. man's natural aggressive instinct, the hostility of each against all, and of all against each, opposes this program of civilization. This aggressive instinct is the derivative and the main representative of the death instinct which we have found alongside of Eros and which shares world-domination with it. And now, I think, the meaning of the evolution of civilization is no longer obscure to us. It must present the struggle between Eros and Death, between the instinct of life (*Lebenstrieb*) and the instinct of destruction (*Destruktionstrieb*), as it works itself out in the human species. This struggle is what all life essentially consists of, and the evolution of civilization may therefore be simply described as the struggle for life of the human species. And it is this battle of the giants that our nurse-maids try to appease with their lullaby about Heaven' (p.69).  

In this conflict, scientific and other cultural activities result from the successful if incomplete 'sublimation of instinctual aims', making science at first glance merely a 'vicissitude which has been forced upon the instincts by civilization'. The accomplishments of science and technology originated as welcome tools in the effort to protect men against the hostile forces of nature; they have now become 'cultural acquisitions' that 'do not only sound like a fairy tale, they are actual fulfilments of every—or almost every—fairy tale wish'. They verge on our attaining the old ideas of...
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potence and omniscience'. Man 'has, as it were, become a kind of prosthetic God' (pp.38–39).

But there's the rub; happiness still eludes him—'present-day man does not feel happy in his God-like character', either individually or in terms of the groups. That again has its reason in the fact that 'civilization is built upon a renunciation of instinct', such as sexuality and aggressiveness, and 'presupposes precisely the non-satisfaction (by suppression, repression, or some other means) of powerful instincts'. Hence a 'cultural frustration' [Unbehagen] which dominates the whole field of social relationships between human beings (pp.43–44, 62).

Freud's pessimistic conclusion follows: 'In consequence of this primary mutual hostility of human beings, civilized society is perpetually threatened with disintegration. The interest of work in common would not hold it together; instinctual passions are stronger than reasonable interests. . . . In spite of every effort these endeavors of civilization have not so far achieved very much. . . . It is always possible to bind together a considerable number of people in love, so long as there are other people left over to receive the manifestations of their aggressiveness', as in religious or ethnic persecution (pp.59, 61).

During the decades since this was written, modern history has all too often seemed to be the experimental verification of these dark assessments of Freud, according to which neither science nor any other cultural activity can fully displace our animal nature from its central position, nor can but delay the ultimate fate that threatens.

Scientists as 'Bettayers of the Truth'

Let us now turn to the most recent period. We are all familiar enough with the fluctuations, during the 1960s and 1970s, of opinion in academe and among the public regarding the interactions of science and society. But during the 1980s, a new and powerful element entered into this debate which is assuming ever greater attention and institutionalization, at least in the United States. The new element, the new force, has added to the derogation of the ambitions and credibility of science. That force is the insistence from some quarters—which has fallen on receptive ears among the population—that to a previously completely unrealized degree the pursuit of science is, and has been all along, even since the days of Hipparchus and Ptolemy, thoroughly corrupt and crooked, and that consequently severe measures must be applied to the practice of science from outside.

My favourite example of this assertion is the book by two very influential New York Times science editors, William Broad and Nicholas Wade, which stated its intention in the title on the jacket, Betrayes of the Truth: Fraud and Deceit in the Halls of Science, and which opens with the unqualified canon shot of a sentence: 'This is a book about how science really works'. Going far beyond the need to expose the relatively few rotten apples in any barrel, which the scientific community itself has long recognized if only for the sake of its own health, this kind of rhetoric has become commonplace. Similarly, the report to Congress by the Congressional Research Service, entitled 'Scientific Misconduct in Academia', stated that, more and more, 'the absence of empirical evidence which clearly indicates that misconduct in science is not a problem. . . . suggests that significant misconduct remains a possibility'. Among all the imaginable targets to preoccupy those who are charged with timely attention to
misconduct damaging to our republic, this formulation singles out the conduct of science as being guilty until proved innocent.

There are two reasons for the power of the current generalized allegation against the conduct of science. One is of course the astonishing claim that basic research scientists in considerable numbers are intentionally false to their own most fundamental avowed mission, namely, to the pursuit of truths; or in other words, that not just a few apples are rotten, but the whole barrel is.

Yet, even in the presence of the occasional scandalous misdeeds by a few of the world’s millions of scientific researchers, that vastly overblown generalization of pervasive and ingrained fraud and deceit in science would not have been taken so seriously that in the US the newspapers, college courses, training courses for scientists and physicians, Congressional committees, scientific societies, and so on, are now massively and expensively preoccupied with the institutionalization of prevention of misconduct in science—as if a great plague of dishonesty had invaded all our laboratories. In fact the available quantitative measures of the rate of misconduct in science indicate that the actual rate is astonishingly low. For example, the National Library of Medicine found that for the period of 1977 to 1986, when about 2,800,000 articles were published in the world’s biomedical literature, 41 of these had to be withdrawn because fraudulent or falsified data appeared in them—a rate of under two one-thousands of one percent. Even if the actual rate were a hundred times greater, the interesting question would still be why science as a whole progresses so well despite being done by mere human beings.

Science as myth

There is indeed a second, reinforcing reason for the widespread success of the current generalized assault on the credibility of scientific research. This second reason is that a line of attack has been opened by a loose assemblage made up of a branch of contemporary philosophy of science and other humanists, of the so-called ‘strong-programme’ constructivist portion of sociology, of a small subset of the media, of a small but growing number of government officials, and of a vocal segment of literary critics and political commentators associated with the avant-garde of the postmodern movement. This potent and eloquent collective has generalized the claim and made it even more serious: put in starkest terms, they claim that the most basic fraud committed by the scientific community is the claim that there is any truth to be found at all. For there is nothing there even to betray and falsify; and conversely, science is inherently not corrigible, even if all misconduct were eliminated.

From that point of view, the business of science is mainly careerist, for example by operating expensive institutions that claim to be looking for objectively ascertainable information about entities like quarks and bosons, which however are nothing more than socially constructed fictions. To the naive realism that most scientists still embrace, and to the agnosticism of the more sophisticated ones, the new critics counterpose the radical solution: as one speaker put it at the workshop from which this volume of papers derives, ‘There is no Nature; there is only a communication network [among scientists]’. The literature is now full of statements such as ‘science is a useful myth’, or ‘we must abolish the distinction between science and fiction’, or ‘science is politics by other means’. The vaunted purity of science is a sham that must
be exposed, for its programme and agenda are anchored in power and directed to more power for a small elite. The whole modern era, launched under the flag of progress, has only led to tragedy. The extreme over-optimism of Herbert Spencer and Friedrich Engels can never be replaced by a more sober conception. Progress is illusion. The globalizing programme of science to find basic unities below the level of apparent variety is contrary to the postmodern drive to celebrate individuality and diversity and to extend the equality of standing to every conceivable style and utterance, to every group and interest. Ours is the time to face the end of the search for foundations, the ‘End of the Modern Era’. We are in a state called the ‘objectivity crisis’.

Together, these slogans of the newly emerging sentiment indicate that the aim is not merely a call for a change of practice or for increased accountability, but at bottom is the delegitimization of science as one of the valid intellectual forces. In this respect, there is a big difference here compared with the internal movements of protests, such as those of the logical positivists within philosophy, the Impressionists or Dadaists within art, the atonal composers within music, etc. In all those cases, it was some of the best talent that took up the task of renewal of an established field. Not so here—the issue is not renewal from within but radical cultural politics from without.

The Romantic movement’s challenge

To the historian, this turn of events is quite familiar. The attack has emerged in similar forms many times before, for example, in the German ‘Sturm und Drang’ movement of the end of the 18th century, which rejected the Enlightenment ideas of order and rationality, and swore to replace them by the ‘enthronement of the will’ of individuals. A wise guide to the growth and power of what he calls the Romantic Rebellion is Isaiah Berlin, whose most recent book is entitled The Crooked Timber of Humanity. He starts by remarking that ‘There are, in my view, two factors that, above all others, have shaped human history in this century. One is the development of the natural sciences and technology. . . . The other, without doubt, consists of the great ideological storms that have altered the lives of virtually all mankind: the . . . totalitarian tyrannies of both right and left, and the explosion of nationalism, racism and, in places, of religious bigotry, which interestingly enough, not one among the most perceptive social thinkers of the 19th century had ever predicted’. What commands his attention, in trying to understand the struggle between these antithetical developments, is the change away from the belief in the ‘central core of the intellectual tradition . . . since Plato’, and toward a ‘deep and radical revolt against the central tradition of Western thought’ (p.208), a revolt which is now trying to wrench Western consciousness into a new path.

The central core of the old belief system that had lasted into the 20th century rested on three dogmas which Isaiah Berlin summarized roughly as follows. The first is that ‘to all genuine questions there is one true answer’. The second dogma is that ‘The true answers to such questions are in principle knowable’. And the third is that ‘These true answers cannot clash with one another’, but ‘must form a harmonious whole’ (pp.209–211).

Out of these three ancient dogmas, he says, institutionalized religions as well as the sciences developed their present form. In their pure state, these systems are utopian in
principle. They hold that in the end, 'the reign of irrationality' will end, and 'man will be liberated, and will no longer be the plaything of forces beyond his control [such as] savage nature. . . .' This, he says, is the common ground shared by Epicurus and Marx, Bacon and Condorcet, the Communist Manifesto, the modern technocrats, and the 'seekers after alternative societies' (pp.212–213).

But, Isaiah Berlin explains, this prominent component of the modern world picture is now under siege by the current form of the Romantic Rebellion. No-one, he says, predicted that this worldwide growth would be what dominates the last third of the 20th century. The Enlightenment’s search for generalizability and rational order is rejected by the rebels of our time in favour of the celebration of the individual, by flamboyant anti-rationalism, by 'resistance to external force, social or natural’. In the words of Herder, the rebel shouts: 'I am not here to think, but to be, feel, live!' (p.223).

This assertion of the will over reason now glows forth in the ‘romantic self-assertion, nationalism, the worship of heroes and leaders, and in the end [leads to] Fascism, brutal irrationalism and the oppression of minorities’. Moreover, in the absence of ‘objective rules’, the new rules are those that the rebels make themselves. Ends are not objective values. ‘Ends are created, not discovered’. This war upon the objective world, upon the very notion of objectivity, launched by philosophers and through plays and novels, has infected the modern worldview; the ‘romantics have dealt a fatal blow’ to the earlier certainties, and have ‘permanently shaken the faith in universal, objective truth. . . .' (pp.236–237). As with any revolt, we are confronted with mutually incompatible choices—either/or, instead of the needed complementarity of the rational, the passionate, and the spiritual functions.

The Romantic Rebellion infuses state policy

Other authors provide verification and elaboration of these findings, and especially of the ominous joining in our century of the extreme wing of the Romantic Rebellion with irrational political doctrines, as in the Cultural Revolution of Mao’s China. And surely I need not remind you of a main tenet of fascism under the Nazis, which held that only so-called Aryans have the ability to construct science correctly, all others being handicapped by ethnic burdens. Moreover, as Alan Beyerchen has shown, 'The “Aryan” physics adherents in Germany ruled out objectivity and internationality in science. . . Objectivity in science was, they said, merely a slogan invented by professors to protect their interests'11 (p.131). Herman Rauschning, president of the Danzig Senate, quoted Hitler as follows:

We stand at the end of the Age of Reason. . . A new era of the magical explanation of the world is rising, an explanation based on will rather than knowledge. There is no truth, in either the moral or the scientific sense. . . . Science is a social phenomenon, and like all those, is limited by the usefulness or harm it causes. With the slogan of objective science the professoriat only wanted to free itself from the very necessary supervision by the State.

That which is called the crisis of science is nothing more than that the gentlemen are beginning to see on their own how they have gotten onto the wrong track with their objectivity and autonomy.12

Those words are so uncomfortably reminiscent of rhetoric which is again fashionable
in Europe and the US that one must stress that there is only a common ancestry to these views rather than a causal connection. For example, a surprising and very persuasive spokesman for a closely parallel critique of science, who surely does not realize the terrible precedent, is the admired Czech poet, playwright, resistance fighter and statesman, Václav Havel. Among his many writings on this theme is a widely quoted essay, which was published in the New York Times on 1 March 1992, entitled ‘The End of the Modern Era’, but more extensively developed in his book Living in the Truth. Havel’s key point is that totalitarianism in our century was simply a perverse extreme of ideas embodied in the programme of science itself. In this sense, Western science gave birth to Communism; and with the fall of the latter the former has been irremediably compromised.

Looking back on this century, other Central Europeans might characterize the totalitarian movements perhaps more as the release of the forces of brutal irrationality and bestiality, as a reversal to the ruthlessness of Pharaonic autocracies, instead of being the offspring of organized scepticism and reasoned consensus, which are at the heart of science. But Václav Havel finds the chief source of trouble to have been the very opposite, namely ‘rational, cognitive thinking’, ‘depersonalized objectivity’, and ‘the cult of objectivity’. He advises we should rather take refuge in the unrepeatable personal experience, and in intuition and mystery. To quote from his book, he writes in the same either/or mode we saw before:

Modern science, constructing its universally valid image of the world [asks us to] break out into the light of objectively verified truth. . . . With that, of course, it abolishes as mere fiction even the innermost foundation of our natural world; it kills God and takes his place on the vacant throne so that henceforth it would be science which would hold the order of being in its hand as its sole legitimate guardian and be the sole legitimate arbiter of all relevant truth. (p.138)

Here we see the giant step which Havel takes: it is modern science itself that has been the fatal agent of the modern era; it has been responsible even for Deicide.

Very recently, there has been an interesting sequel: one of the persons who were deeply affected by Havel’s essay was none other than the distinguished chairman of the US Congress Committee on Science, Space and Technology, one of the staunchest advocates of science during his long tenure in the House of Representatives—George E. Brown, Jr., of California. He acknowledged recently that he was inspired by Havel’s essay to reconsider his role as a public advocate of science. As George Brown puts it, he now sees little evidence that ‘objective scientific knowledge leads to subjective benefits for humanity’. The implicit promise of progress must be doubted. The privileging of the claim of unfettered basic research is void too, he says, because all research choices are ‘contextual’.

Moreover, science has usurped primacy ‘over other types of cognition and experience’. Here, Brown quotes Havel’s definition of the ‘crisis of objectivity’ being the result of subjugating our ‘subjective humanity’. Indeed, he concludes, ‘the promise of science may be at the root of our problems’. And it was he who published the rejection of Vannevar Bush’s hope, a rejection I quoted near the beginning of this article. So his answer to the question in my title, ‘can science be at the centre of modern culture?’, is clearly No. The incidental effect upon such more mundane matters as science funding are also becoming clear.
In this brief overview, ranging from the trembling pillars of the Platonic tradition of the West to today's so-called end of the modern era and the end of progress, we have identified historic trends that have risen and fallen and risen again. Today, the denial that science can be one of the central components of modern culture is still only a minority view. But it is a view held in prominent circles, among persons who can indeed influence the direction of a cultural shift. If that trend continues to gain prominence, the new sensibility in the era to come will be very different indeed from the present one.

Of course, it may turn out that the present version of the Romantic Rebellion will peter out by itself—although I doubt it will. Or it may gain strength, as it did in 19th-century Germany and again prior to the victories of the coupling of its excesses with totalitarian political movements in the twentieth. Or a new compromise might emerge for the culture of the future—conceivably a ‘third way’, based on the concept of complementarity (and analogous to the complementarity within the practice of science itself), in which the benign products of apparently contradictory worldviews are able to coexist peacefully, as hinted by the recent introduction of two very different styles of medicine (‘Western’ and ‘Eastern’) in some first-rate teaching hospitals. At any rate, as historians and scholars, we shall watch the next stages of the struggle for cultural supremacy with continued fascination—and perhaps also with the memory of Oswald Spengler’s ominous prophecy for our fin-de-siècle.

References

1 Quoted in Science, 260 (7 May 1993), p.735.
6 The word ‘control’, used in the English edition, has been corrected to ‘regulate’, which corresponds to the German edition.
7 The title was seriously mistranslated into English as Civilization and its Discontents.
Can science be at the centre of modern culture?

Author