Science and the Environment: A new enlightenment

Nicholas Maxwell believes that while we have developed an excellent way of learning about the nature of the universe, we have so far failed in our attempts to apply this method to create a civilized world.

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Two great problems of learning confront humanity: learning about the nature of the universe and our place in it, and learning how to become civilized.

The first problem was cracked, in essence, in the 17th century, with the birth of modern science. A method was discovered for progressively improving knowledge and understanding of the natural world, the famous empirical method of science. There is of course much that we still do not know and understand, three or four centuries after the birth of modern science; nevertheless, during this time, science has immensely increased our knowledge and understanding, at an ever accelerating rate.

But it is much less certain that the second great problem of learning has been cracked. Many, indeed, doubt that it can be solved. The 20th century record is not exactly encouraging. The question arises: Can we learn from our solution to the first great problem of learning how to solve the second problem? Can the progress-achieving methods of science be generalized so that they become fruitfully applicable to the immense task of making social progress towards a more civilized world? What kind of inquiry can best help us learn how to achieve global civilization?

Science without Civilization

What makes these questions especially urgent is that solving the first great problem of learning without solving the second is almost bound to put humanity into a situation of great danger, and has in fact done just that. With rapidly increasing scientific knowledge comes rapidly increasing technological know-how, which brings with it an immense increase in the power to act. In the absence of a solution to the second great problem of learning, the increase in the power to act may have good consequences, but will as often as not have all sorts of harmful consequences, whether intended or not.

Just this is an all too apparent feature of our world. Science and technology have been used for human benefit, but have also been used to wreak havoc, whether intentionally, in war, or unintentionally, in long-term environmental damage - a consequence of growth of population, industry and agriculture, made possible by growth of technology. As long as humanity's power to act was limited, lack of wisdom, of enlightenment did not matter too much: humanity lacked the means to inflict too much damage on the planet. But with the immense increase in our powers to act that we have achieved in the last century or so, our powers to destroy have become unprecedented and terrifying: global wisdom has become, not a luxury, but a necessity.

What is Civilization?

By "civilization", I mean that ideal, realizable social order (whatever it may be) which we ought to try to attain in the long term. A little more specifically, I mean a world in which everyone can share equally in enjoying, sustaining and creating what is of value in life, insofar as this is possible. I conjecture, a little more specifically still, that a civilized world is one which is liberal, democratic, just, sustainable, egalitarian, peaceful, knowledgeable, rational and wise, one that tackles problems of human suffering and deprivation in effective ways, but also one that sustains friendship, love, kindness, individual freedom, creativity, adventurousness, great art and science.

The Enlightenment

The idea of learning from the solution to the first great problem of learning how to solve the second problem goes back to the Enlightenment of the 18th century. Indeed, this was the basic idea of the philosophes of the Enlightenment - Voltaire, Diderot, Condorcet et al.: to learn from scientific progress how to achieve social progress towards world enlightenment.

The best of the philosophes did what they could to put this immensely important idea into practice, in their lives. They fought dictatorial power, superstition, and injustice with weapons no more lethal than those of argument and wit. They gave their support to the virtues of tolerance, openness to doubt, readiness to learn from criticism and from experience. Courageously and energetically they laboured to promote rationality in personal and social life.

Unfortunately, in developing the Enlightenment idea intellectually, the philosophes blundered. They developed the Enlightenment programme in a seriously defective form, and it is this immensely influential, defective version of the programme, inherited from the 18th century, which may be called the "traditional" Enlightenment, that is built into late 20th century institutions of inquiry. Our traditions and institutions of learning, when judged from the standpoint of helping us learn how to become more enlightened, are defective in a wholesale and structural way, and it is this which, in the long term, sabotages our efforts to create a more civilized world, and prevents us from avoiding the kind of horrors we have been exposed to during this century - wars, third-world poverty, environmental degradation.

The Traditional Enlightenment

The philosophes of the 18th century assumed, understandably enough, that the proper way to implement the Enlightenment programme was to develop social science alongside natural science. Francis Bacon had already stressed the importance of improving knowledge of the natural world in order to achieve social progress. The philosophes generalized this, holding that it is just as important to improve knowledge of the social world. Thus the philosophes set about creating the social sciences: history, anthropology, political economy, psychology, sociology.

This had an immense impact. Throughout the 19th century

the diverse social sciences were developed, often by non-academics, in accordance with the Enlightenment idea. Gradually, universities took notice of these developments until, by the mid 20th century, all the diverse branches of the social sciences, as conceived of by the Enlightenment, were built into the institutional structure of universities as recognized academic disciplines.

The Romantic Opposition

The Enlightenment was opposed by Romanticism on the grounds that it put far too much emphasis on reason. Romanticism - stemming from such figures as Rousseau, Blake, Wordsworth, Beethoven, Goethe - stressed the supreme value of art, self-expression, personal feelings, imagination, spontaneity, individuality, creativity, sympathetic understanding, inspiration.

Romanticism was right to object to the traditional Enlightenment, but wrong to object on grounds of too much reason. What is wrong with the traditional Enlightenment is that it lacks reason. It is a characteristic kind of irrationality masquerading as rationality. In some respects it is Romanticism, rather than the traditional Enlightenment that embodies reason - especially when it stresses emotional and motivational honesty. If the basic Enlightenment idea had been put properly into practice, free of the blunders of the traditional Enlightenment, there would have been no need for the Romantic opposition: the Enlightenment would have been a synthesis of Rationalism and Romanticism from the outset and we, today, would possess a kind of inquiry well-designed from the standpoint of helping us become civilized.

The New Enlightenment

In order to implement properly the basic Enlightenment idea of learning from scientific progress how to achieve social progress towards a civilized world, it is essential to get the following three things right.

1. The progress-achieving methods of science need to be correctly identified.
2. These methods need to be correctly generalized so that they become fruitfully applicable to any human endeavour, whatever the aims may be, and not just applicable to the endeavour of improving knowledge.
3. The correctly generalized progress-achieving methods then need to be exploited correctly in the great human endeavour of trying to make social progress towards an enlightened, civilized world.

Unfortunately, the philosophes of the Enlightenment got all three points disastrously wrong. That the philosophes made these blunders in the 18th century is forgivable; what is unforgivable is that these blunders still remain unrecognized and uncorrected today, over two centuries later. Instead of correcting the blunders, we have allowed our institutions of learning to be shaped by them as they have developed throughout the 19th and 20th centuries.

There is, I regret, insufficient space for me to discuss all three blunders: for that, see my From Knowledge to Wisdom (Blackwell, 1984), and The Comprehensibility of the Universe

(forthcoming). Here I shall consider only the third blunder, by far the most dramatic and damaging.

I assume here that Karl Popper has correctly identified the progress-achieving methods of natural science (step one); and I assume that Popper's generalization of these methods, when improved a little, adequately captures what we should mean by progress-achieving rationality, fruitfully applicable, potentially, to anything worthwhile that we might do (step two). It is the third step that we will be concentrating on: exploiting the strategies of reason properly to make social progress towards a wise, enlightened world.

According to Popper, science makes progress by means of the method of conjecture and refutation. In response to problems, scientists put forward conjectured solutions which they then assess by means of attempted empirical falsification.

Popper generalizes this to form a conception of rationality, critical rationalism. The decisive point, for Popper, is that empirical falsification is just one especially severe form of criticism. The scientific method of tackling problems by means of conjecture and refutation becomes the general method of tackling problems by means of conjecture and criticism. Popper's conception of rationality, when improved somewhat, can be summarized in the following four rules.

(i) Articulate and seek to improve the articulation of the basic problem(s) to be solved.

(ii) Propose and critically assess alternative possible solutions.

(iii) When necessary, break up the basic problem to be solved into a number of preliminary, simpler, analogous, subordinate or specialized problems (to be tackled in accordance with rules (i) and (ii)), in an attempt to work gradually towards a solution to the basic problem to be solved.

(iv) Inter-connect attempts to solve basic and specialized problems, so that basic problem-solving may guide, and be guided by, specialized problem-solving.

The nub of Popper's critical rationalism is in rule (ii). But rule (i) is required as well. In real life (as opposed to academic examinations) we do not encounter problems clearly and correctly formulated; recognition of the existence of a problem may begin merely with the disappointment of some unformulated expectation. Clarifying the nature of the problem we seek to solve is a vital part of rational problem-solving (and scientific research).

Rule (iii) becomes vital when a problem is too difficult to solve at once. The fundamental scientific problem "What is the nature of the universe?" is an example. We may regard the Presocratic philosophers as trying to solve this problem all at once, by putting forward rival conjectures, in accordance with rule (ii); but this direct attack failed. Modern science began when Galileo, Kepler and others tried to tackle preliminary, subordinate problems within the framework of a general answer to the fundamental scientific problem (formulated by Galileo as "the book of Nature is written in the language of mathematics").

Once rule (iii) is put into practice it is vital, also,

to put rule (iv) into practice, so that efforts to solve specialized and fundamental problems may learn from each other, and so that absorption in specialized problems does not lead to the basic problem to be solved being forgotten.

It might seem that the above transition from scientific method to rationality loses the idea of learning from experience; but this is not so. The above four rules do constitute a method for learning from experience. Experience is what we acquire through trying out various possible solutions to the problem we wish to solve, and discovering that these possibilities more or less fail. Experience, in this broad sense, is a generalization of the notion associated with science - observation and experimentation.

We come now to the all-important third step in the Enlightenment programme.

According to the traditional Enlightenment (supported by Popper), this third step involves applying the progress-achieving methods of natural science to the task of developing social science.

But the basic Enlightenment idea, remember, is to learn from scientific progress how to make social progress towards an enlightened world. This means that appropriately generalized versions of the progress-achieving methods of science need to be applied, not just to social science, but to social life itself. The task must be to get into the fabric of our personal and social lives strategies which will help us to make progress towards better ways of living. We need to extract from the one immensely successful institutional enterprise of natural science those methods responsible for this success, so that they may be generalized and applied to other institutions - government, industry, agriculture, the media, the law, international relations, education, the arts. What matters is that social life makes progress towards enlightenment, and not just that social science makes progress towards greater knowledge of social phenomena.

Academic Inquiry to Promote Civilization

The proper task, then, is to get problem-solving in personal, social, institutional and political life to exploit the above four rules of rationality. Let us now consider what the overall character of academic inquiry needs to be if it is to help with the task of helping humanity solve the second great problem of learning.

Two preliminary points.

First, in order to solve environmental problems, and problems of civilization more generally, it is what we do (or refrain from doing) that matters, and not just what we know. Solutions to problems of living are appropriate human actions. Even where new knowledge or technology is needed, in connection with agriculture or medicine for example, it is always what this enables us to do that solves the problem of living.

Second, in order to make progress towards a sustainable, civilized world we need to learn how to resolve our conflicts in more cooperative ways than at present. There are degrees of cooperativeness, from its absence, all out violence, at one extreme, through settling of conflicts by means of threat,

agreed procedures such as voting, via bargaining to all out cooperativeness at the other extreme. If we are to develop a sustainable, civilized world we need to move progressively away from the violent end of this spectrum towards the cooperative end.

Granted, then, that a basic task of academic inquiry is to help us tackle our problems of living in cooperatively rational ways so as to make progress towards civilization, the basic intellectual work of academia will be (i) to articulate personal, social and global problems of living, and (ii) to propose possible solutions, possible actions, to be critically assessed from the standpoint of their capacity, if enacted, to enable us to realize what is of value in life. Academic inquiry needs itself to engage in rational exploration of problems of living in this way, and needs to promote the doing of this in the world at large, by means of advocacy, argument, debate, and education. Academic inquiry has the overall social or political goal of helping humanity become more cooperatively rational by cooperatively rational means.

These intellectually central and fundamental tasks, undertaken in accordance with rules (i) and (ii), will be performed by social inquiry and the humanities. Thus economics, politics, sociology, psychology and anthropology are not primarily sciences at all; they are not even non-scientific disciplines devoted to acquiring knowledge of the human world (as Romanticism holds). Their primary intellectual task is to invent and explore imaginatively diverse possible, more or less cooperative actions, diverse possible ways of living, policies, economic and political programmes, institutions, philosophies of life, and to assess these critically from the standpoint of their desirability and feasibility, their capacity, if implemented, to help us make progress towards a good world. Social inquiry and the humanities are primarily concerned to improve our ideas about how to live rather than our ideas about what is the case. Pursued in this way, social inquiry and the humanities form the central, fundamental part of inquiry as a whole; they are intellectually more fundamental than the biological, physical and technological sciences (see diagram).

In addition, in order to do justice to the intractability of many problems of living, inquiry will implement rule (iii), and break up fundamental problems of living into a host of subordinate, specialized problems of knowledge and know-how, thus creating many subordinate, specialized disciplines. Social inquiry itself needs to acquire knowledge of relevant social phenomena, in order to aid articulation of problems of living and assessment of proposed solutions. The technological sciences tackle diverse technical problems of know-how, thus enhancing our power to act, to solve our problems of living, to achieve what is of value. The physical and biological sciences tackle problems of knowledge and understanding of diverse aspects of the natural world, thereby improving our knowledge and understanding of what it is possible and not possible to do in order to solve problems of living. Mathematics, by contrast, is concerned to develop, systematize and unify abstract problem-solving methods; it is concerned with the exploration of problematic possibilities,

thus enhancing our problem-solving powers.

All this more specialized problem-solving is however inter-connected with thought about fundamental problems of living, in accordance with rule (iv), so that each may guide the other. (This does not mean, however that only those specialized problems are tackled which are relevant to current problems of living. Knowledge can be of value in its own right; and some practical problems are only solved, or even discovered, by research apparently unrelated to practical needs.)

For each one of us, the most important and fundamental inquiry going on in the world is the thinking that we engage in as we live - the thinking that guides our actions. And from the standpoint of building a better world it is this kind of personally and socially active thought guiding personal and social life that really matters. The basic task of academic thought is to help enhance, by cooperatively rational means, the quality of personally and socially active thought so that it may all the better enable us to realize what is of value in so far as this is compatible with a good world. The intellectual progress of socially active thought is what ultimately matters, the intellectual progress of academia being but a means to that end.

In a sense, academic inquiry as a whole is a specialized part of the more fundamental socially active inquiry which we all engage in as we live. To the extent that this is true, the relationship between academic thought, and thought in the rest of the social world needs to comply with rule (iv): each needs to learn from the other. Again, within academic inquiry, social inquiry is more fundamental than natural science, insofar as social inquiry tackles our fundamental problems of living whereas natural science tackles subordinate problems of knowledge.

In the diagram I have tried to indicate how the rules of reason, (i) to (iv), being built into the institutional structure of academic inquiry, affect both its internal organization and its relationship to the rest of the social world.

The basic intellectual aim of inquiry may be said to be, not knowledge, but wisdom - wisdom being understood to be the desire, the active endeavour and the capacity to realize what is of value in life, for oneself and others. Wisdom includes knowledge, know-how and understanding but goes beyond them in also including the desire and capacity to help realize what is of value. Wisdom, like knowledge, can be conceived of not only in personal terms but also in institutional or social terms. The basic task of rational inquiry is to help us develop wiser ways of living, wiser institutions, a wiser world.

It is essential that academic inquiry is without political power, and is non-authoritarian in character. There can be no question of academics deciding for the rest of us what our problems are, how they should be solved, how we should live or what is of value. Far from depriving us of the power to decide for ourselves, the task of academic inquiry is to help us enhance our power to decide well for ourselves by providing us with good ideas, proposals and arguments for our

consideration. Academic inquiry is a sort of people's civil service, doing openly for the public, with exemplary intellectual honesty and integrity, what actual civil servants are supposed to do, in secret, for governments.

Academic inquiry must of course retain its independence, and must not degenerate into merely serving the special interests of government, industry, the nation, or public opinion. The academic world needs just sufficient power and authority to retain its independence, but no more.

So far nothing has been said about learning from experience. But, as I indicated above, the four rules of reason that we are considering are also rules for learning from experience; this has a vital role to play in the conception of inquiry we are considering. What we learn as a result of attempting to put into practice some proposed solution to a problem of living is of course all important for learning how to build a better world. A vital task for academic inquiry (especially for history) is to monitor the successes and failures of our past attempts at solving problems of living.

The conception of academic inquiry that we are considering is designed to help us to see, know and understand, for their own sake, just as much as it is designed to help us solve practical problems of living (as I argue in the books referred to above).

That the basic intellectual aim of inquiry is to help realize what is of value in life has two further consequences.

First, it means that the arts have a vital rational contribution to make to inquiry, as revelations of value, as imaginative explorations of possibilities, desirable or disastrous, or as vehicles for the criticism of fraudulent values through comedy, satire or tragedy.

Second, it means that our feelings and desires have a vital rational role to play within the intellectual domain of inquiry. If we are to discover for ourselves what is of value, then we must attend to our feelings and desires. But not everything that feels good is good, and not everything that we desire is desirable. Rationality requires that feelings and desires take fact, knowledge and logic into account, just as it requires that priorities for scientific research take feelings and desires into account. In insisting on this kind of interplay between feelings and desires on the one hand, knowledge and understanding on the other, the conception of inquiry that we are considering resolves the conflict between traditional Rationalism and Romanticism, and helps us acquire what we need if we are to contribute to building civilization: mindful hearts and heartfelt minds.

This concludes my sketch of academic inquiry shaped by the "new" Enlightenment. It differs dramatically from academic inquiry as it mostly exists today. This is because academic inquiry, as it actually exists, has been massively influenced by the intellectually defective traditional Enlightenment, and by the Romantic opposition. As a result, we do not have today what we so urgently need, a kind of academic inquiry rationally devoted to helping us create a better world.

Conclusion

In order to learn from our solution to the first great problem of learning how to solve the second problem, we need to bring about a revolution in academic inquiry, so that its basic task becomes to help humanity devote reason to the realization of what is of value in life. Would such a revolution suffice to enable us to create a sustainable civilization? Of course not! But it would help.