The Enlightenment, Popper and Einstein

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Introduction

I am delighted to be contributing to this volume in honour of Milan Zeleny. I hope he will forgive me for taking the reader, at least initially, on a journey back to the 18th century. I do this with the present very much in mind. For it is my view that the Enlightenment, despite its heroic qualities, also made serious mistakes – mistakes we still suffer from today, without realizing what they are or where they come from.

The basic idea of the French Enlightenment of the 18th century was to learn from the progress of natural science how to achieve social progress towards an enlightened world. This profoundly important and immensely influential idea was passionately pursued by Voltaire, Diderot, Condorcet, and other *philosophes*. I shall call this idea *The Enlightenment Programme*.

The *philosophes* had their hearts in the right place. Unfortunately, in developing the idea, the *philosophes* blundered. They sought to implement a damagingly defective version of The Enlightenment Programme. This version was further developed throughout the 19th century by all those concerned with social science, from Comte and Marx to Mill, and then built into the institutional structure of academic inquiry in the early years of the 20th century. The outcome is what we are suffering from today: a kind of academic inquiry damagingly irrational when judged from the standpoint of helping to promote human welfare. When assessed from this standpoint, academic inquiry today, I shall argue, violates *three* of the four most elementary rules of reason one can think of. Our global problems, I shall argue, are the outcome of this rarely noticed, severely irrational character of academic inquiry as it mostly exists today. We urgently need to bring about a revolution in the aims and methods of academe.

I shall develop this argument by considering in turn four versions of The Enlightenment Programme:-
1. The Traditional Enlightenment Programme.
2. The Popperian Version of the Enlightenment Programme.
3. The Improved Popperian Enlightenment Programme.
4. The New Enlightenment Programme.

As one goes down this list, defects are progressively corrected, the Programme is improved, until with The New Enlightenment one arrives at a version of The Enlightenment Programme well designed, rationally designed, to help humanity make progress towards a civilized, enlightened world. As I will explain, all too briefly, Einstein can be associated with a part of The New Enlightenment. He did not however explicitly advocate it as I shall expound it here, although I like to think that he would have approved of it.

During the course of the argument I shall consider two kinds of inquiry, two conceptions of inquiry, which I shall call *knowledge-inquiry* and *wisdom-inquiry*. Knowledge-inquiry is to be associated with the first two versions of The Enlightenment Programme, wisdom-inquiry with the last two versions. Knowledge-inquiry, what we by and large have today, is so seriously irrational that it violates three of the four most basic rules of reason conceivable. Wisdom-inquiry is what results when knowledge-inquiry is modified just sufficiently to comply with all four rules of reason.

The aim of achieving world enlightenment, world civilization, a good world, is of course deeply problematic. It is not just a question of how we get there; what we should be striving to achieve is in itself profoundly problematic. Most traditional ideas about what would constitute a good, a civilized world have amounted to various kinds of hells on earth, and in any case have

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been hopelessly unrealisable. What do I mean by an enlightened world? In the circumstances, the reader is right to be highly suspicious. All I can say, at the moment, is: please give me the benefit of the doubt for the time being. When it comes to discussing the fourth, New Enlightenment Programme I shall address this question of what we should mean by an enlightened or civilized world, what our basic aim ought to be in this context, and I hope that you will find what I say eminently sensible.

The argument I am about to unfold is spelled out in much more detail in my books *From Knowledge to Wisdom* (Blackwell, 1984), *What's Wrong With Science?* (Bran's Head Books, 1976) and, most recently and lucidly *Is Science Neurotic?* (Imperial College Press, December 2004). Aspects of the argument are to be found also in *The Comprehensibility of the Universe* (Oxford University Press, 1998, pbk. 2003), and *The Human World in the Physical Universe* (Rowman and Littlefield, 2001). See also my website: **www.nick-maxwell.demon.co.uk**.

2. The Traditional Enlightenment Programme

According to The Traditional Enlightenment Programme, in order to implement the basic Enlightenment idea of learning from the progress of natural science how to achieve social progress towards an enlightened world what needs to be done is to create social science alongside natural science. Francis Bacon stressed the fundamental importance of improving our knowledge of nature in order to transform the human condition for the better. The *philosophes*, reasonably enough, held that it was also vitally important to improve knowledge of the social world. They, and their successors – Comte, Marx, Mill and many others – set about creating and developing social sciences: economics, anthropology, psychology, sociology, political science, history. These social sciences were then built into the institutional structure of academic inquiry in the early 20th century with the creation of departments of social science in universities all over the world.

The outcome of this Traditional Enlightenment Programme is what we have, by and large, today: academic inquiry devoted to the acquisition of knowledge. First, knowledge is to be acquired; then it can be applied to help solve social problems. The *intellectual* aim of inquiry, of acquiring knowledge is to be sharply distinguished from the *social* or *humanitarian* aim of promoting human welfare. In the first instance, academic inquiry seeks to solve problems of knowledge, not social problems of living. Values, politics, expressions of feelings and desires, political philosophies and philosophies of life must all be excluded from the intellectual domain of inquiry to ensure that the pursuit of objective, factual knowledge does not degenerate into mere ideology or propaganda. In order to produce what is of real human value – genuine, objective factual knowledge – inquiry must, paradoxically, exclude from the intellectual domain of inquiry all expressions of human problems, suffering and values (although of course factual *knowledge* about these things can be developed).

At the centre of knowledge-inquiry there is an even more restrictive conception of *science*. According to this orthodox view, claims to scientific knowledge must be assessed impartially with respect to the evidence, with respect to empirical success and failure. Metaphysical theses – theses which are neither empirically verifiable nor falsifiable, are to be excluded from science. (One form of this idea is Popper's famous demarcation criterion: a theory, in order to be scientific, must be *falsifiable*.)

The Traditional Enlightenment and its outcome, knowledge-inquiry, were opposed. They were opposed by Romanticism. Whereas the Enlightenment valued science, reason, knowledge, evidence, method, the Romantic opposition found all this oppressive and dictatorial, and valued instead art, imagination, passion, inspiration, genius, self-realization. Blake, Keats, Coleridge, Kiekergaard, Nietzsche, Dostoevsky and many other poets, novelists, artists and thinkers

opposed reason and science and instead put their faith in the liberating power of art, inspiration and imagination.

Romanticism too had an impact on academic inquiry, on some aspects of social science, and the humanities. It led to such movements as existentialism, phenomenology, structuralism, post-structuralism, post-modernism, and social constructivist conceptions of knowledge.

Academia today might be said to consist of knowledge-inquiry – the outcome of putting The Traditional Enlightenment Programme into academic practice – plus the Romantic opposition which has influenced the fringes of academia in such areas as cultural studies, philosophy, and the history and sociology of science.

Knowledge-inquiry – and especially modern science and technology – has indeed transformed the human condition for the good, just as Bacon and the *philosophes* hoped it would. It has led to an immense enrichment in the quality of human life, in industrially advanced countries at least. We are vastly healthier and wealthier than our ancestors of 200 years ago, thanks to modern science and technology. We have all the benefits of modern transport, communications, and other modern amenities made possible by science and technology. And science is of great value to us directly, in enhancing our knowledge and understanding of the universe and ourselves.

But knowledge-inquiry has had bad effects as well. For modern science and technology have made possible modern industry and agriculture, the rapid growth of world population, which in turn have led to almost all our modern global problems:
1. Global warming.
2. The lethal character of modern war and terrorism – and the ill-conceived and dangerous "war on terrorism". The threat posed by modern armaments, conventional, chemical, biological and nuclear.
3. Rapid population growth.
4. Gross inequalities of wealth across the globe.
5. Destruction of tropical rain forests and other natural habitats, the mass extinction of species, and the pollution of earth, sea and air.
6. Depletion of finite natural resources.
7. Dictatorial regimes (helped to stay in power by the resources of modern technology).
8. Annihilation of languages, cultures and traditional ways of life.
9. Aids epidemic (spread by modern transport, and even, possibly, by vaccination with dirty needles).

Given that world politics are run along the lines of a version of gang warfare writ large, the bad consequences of modern science and technology are all but inevitable. For modern science leads to an immense increase in our *power to act* (for some at least) via technology and industry. As I have indicated, this has been used for good, in countless ways but, almost inevitably, it will be, and has been, used for bad, either intentionally, as in the case of millions killed in war, or unintentionally (at least initially), as in the case of global warming and extinction of species.

What has gone wrong? The source of the trouble is the profound, damaging *irrationality* of knowledge-inquiry, the profound *defects* in The Traditional Enlightenment Programme. Knowledge-inquiry is so irrational that, when judged from the standpoint of helping to promote human welfare it violates *three* of the four most elementary rules of reason conceivable.

What do I mean by "reason"? Reason, as I use the term, appeals to the idea that there are general methods or strategies which, if put into practice, give us, other things being equal, our best chance of solving our problems, realizing our aims. Reason does not decide for us, it helps us to decide well for ourselves.

Four absolutely basic rules of reason are the following:
(1) Articulate, and try to improve the articulation of, the problem to be solved.

(2) Propose and critically assess possible solutions.

(3) When necessary, break recalcitrant problems into easier-to-solve preliminary, subordinate, specialized problems.

(4) Interconnect basic and specialized problem-solving so that each may guide the other.[1]

In order to enhance the quality of human life, make progress towards an enlightened world, the problems we need to solve are, fundamentally, problems of *living*, problems of *action*, not problems of knowledge. Even where new knowledge and technology are needed, as in agriculture or medicine for example, it is always what this enables us to *do* (or refrain from doing) that enables us to achieve what is of value (except, of course, in so far as new knowledge is in itself of value). Thus a kind of inquiry *rationally* devoted to promoting human welfare would give absolute priority to the tasks of (1) articulating our problems of living, and (2) proposing and critically assessing possible solutions, possible actions, policies, political programmes, legislation, philosophies of life. This knowledge-inquiry cannot do. The intellectual domain of knowledge-inquiry is restricted to tackling *problems of knowledge*. Intellectual priority cannot be given to articulating, and trying to discover solutions to, *problems of living* within knowledge-inquiry, for problems of living and ideas for their solution require for their formulation expressions of human desires and aspirations, human suffering, values and ideals, proposals for *action*, political programmes and philosophies, all of which must be *excluded* from the intellectual domain of knowledge-inquiry.

Knowledge-inquiry puts rule (3) into practice to a quite extraordinary extent. Modern academic inquiry consists of a vast maze of more and more specialized disciplines – sub-disciplines within disciplines within disciplines. But, because rules (1) and (2) are not, and cannot be, put into practice, rule (4) cannot be implemented either. If our basic problems of living, and ideas for their solution, are not articulated, specialized problem-solving pursued in accordance with rule (3) cannot guide and be guided by basic problem-solving, in accordance with rule (4). Thus rules (1), (2) and (4) are violated in a wholesale, structural way by knowledge-inquiry, by modern academic inquiry, and only rule (3) is implemented.

It is this longstanding, wholesale, structural irrationality of modern academic inquiry that is at the root of our current global problems and our incapacity to tackle them effectively: the combination of an immensely successful natural science and associated technological research vastly increasing our power to act on the one hand, and the absence of inquiry rationally devoted to enhancing our power to resolve our conflicts and problems of living in increasingly cooperative ways on the other hand. Science without wisdom, one might say, is *the* crisis of our times, the one behind all the others.

Where, exactly, did The Traditional Enlightenment Programme go wrong?

It is important to appreciate that three steps are involved in putting the basic idea of the Enlightenment Programme into practice – the key idea, that is, of learning from scientific progress how to achieve social progress towards an enlightened world.

Step 1. Specify correctly what the progress-achieving methods of natural science are.

Step 2. Generalize these progress-achieving methods so that they become fruitfully applicable to any worthwhile, problematic human endeavour, and not just to science.

Step 3. Apply them to the highly worthwhile and problematic endeavour of achieving world enlightenment, world civilization.

The Traditional Enlightenment got (and gets) all three steps wrong. The big failure is step 3: instead of applying progress-achieving methods (generalized from those of science) to social *life*, to other institutions besides that of natural science, the *philosophes* in effect applied the methods

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1. We shall encounter these four rules of rational problem-solving again when we come to The Improved Popperian Enlightenment Programme below.

they came up with to *social science*. Instead of progress-achieving methods being used to promote social progress towards an enlightened world, the methods they arrived at were used to promote *knowledge* of social phenomena. Academia as it exists today – knowledge-inquiry plus some Romantic opposition – is the outcome of putting into academic practice this *botched* version of The Enlightenment Programme, botched by the *philosophes* of the 18th century French Enlightenment.

2. The Popperian Version of the Enlightenment Programme

Karl Popper corrects some – but only *some* – of the blunders of The Traditional Enlightenment. His version of the Enlightenment Programme is to be found in his first four books: *The Logic of Scientific Discovery, The Open Society and Its Enemies, The Poverty of Historicism,* and *Conjectures and Refutations*. Even though Popper did not present his work in this way, what one finds in these books is a line of argument that in effect amounts to a profound reformulation and improvement of The Traditional Enlightenment. The Popperian version of The Enlightenment Programme might be summed up like this:-
Step 1. Falsificationism.
Step 2. Critical Rationalism.
Step 3. The Rational Society = The Open Society.
In *The Logic of Scientific Discovery* Popper points out that scientific theories cannot be verified, but they can be falsified. Scientific method consists in putting forward highly falsifiable conjectures, which are then subjected to ruthless attempts at empirical falsification. When a theory is falsified, scientists must think up an even more falsifiable conjecture, which predicts everything its predecessor predicts, is not falsified by the experiment that falsified its predecessor, and predicts additional phenomena as well. As a result of proceeding in this way, science is able to make progress because falsehood is constantly being detected and eliminated by this process of conjecture and refutation. As a result of discovering a theory is false, scientists are forced to try to think up something better.

Popper then generalized this falsificationist conception of scientific method, in accordance with step 2 above, to form his conception of (critical) rationality, a general methodology for solving problems or making progress. As Popper puts it in *The Logic of Scientific Discovery* "inter-subjective *testing* is merely a very important aspect of the more general idea of inter-subjective *criticism*, or in other words, of the idea of mutual rational control by critical discussion" (p. 44).

In *The Open Society and Its Enemies* and *The Poverty of Historicism* Popper applies critical rationalism to problems of civilization, in accordance with step 3 above of The Enlightenment Programme. From all the riches of these two books, I pick just two points, two corrections Popper makes to ideas inherited from the Enlightenment.

First, there is Popper's devastating criticism of historicism. Historicism can be viewed as the outcome of an especially defective attempt to put step 3 of The Enlightenment Programme into practice. If one seeks to develop social science alongside natural science, and if one takes the capacity of Newtonian science to predict states of the solar system far into the future as a paradigmatic achievement of natural science, one may be misled into holding that the proper task of social science is to discover laws governing social evolution. Historicism is the doctrine that such laws exist. Popper decisively demolishes historicism, and demolishes the above rationale for adopting historicism. In doing so, he demolishes one influential and especially defective version of the traditional Enlightenment Programme.

Second, Popper's revolutionary contributions to steps 1 and 2 of The Enlightenment Programme (just indicated) lead to a new idea as to what a "rational society" might be, one that

is fully in accordance with liberal traditions, and not entirely at odds with such traditions. A major objection to The Enlightenment Programme is overcome. If one upholds pre-Popperian conceptions of science and reason, and construes reason, in particular, as a set of rules which determine what one must accept or do, the very idea of "the rational society" is abhorrent. It can amount to little more than a tyranny of reason, a society in which spontaneity and freedom are crushed by the requirement that the rules of reason be obeyed. When viewed from the perspective of Popper's falsificationism and critical rationalism, however, all this changes dramatically.

Popper's falsificationist conception of science requires that theories are *severely* tested empirically. But, in order to make sense of this idea of *severe* testing, we need to see the experimentalist as having at least the germ of an idea for a rival theory up his sleeve (otherwise testing might degenerate into performing essentially the same experiment again and again). This means experiments are always *crucial experiments*, attempts at trying to decide between two competing theories. Theoretical pluralism is necessary for science to be genuinely empirical. And, more generally (implementing step 2), in order to *criticize* an idea, one needs to have a rival idea in mind. Rationality, as construed by Popper, requires plurality of ideas, values, ways of life. Thus, for Popper, the rational society *is* the open society, the society in which diverse ways of life can flourish. In short, given pre-Popperian conceptions of science and reason, the Enlightenment idea of creating a rational society guides one towards a kind of tyranny of reason, the very opposite of a free or open society. Adopt improved Popperian conceptions of science and reason, and the Enlightenment ideal of the rational society is one and the same as the ideal of the free, open society. At a stroke, a major objection to the Enlightenment Programme is overcome.

Despite the enormous improvements that Popper has made to The Traditional Enlightenment Programme, his version of the Programme is still defective. I now discuss two ways in which Popper's version of the Programme needs to be improved. Both involve changing dramatically Popper's conception of social science. It is important to note that Popper defends a highly traditional conception of social science. According to him, the methods of social science are broadly the same as those of natural science. But it is this key element of the 18th century Enlightenment, so profoundly influential over subsequent developments, that constitutes The Traditional Enlightenment's greatest blunder. Popper endorses, and fails to correct, this blunder. In addition, Popper defends his falsificationist version of the orthodox view that evidence alone decides what theories are to be accepted in science: but all versions of this orthodox conception of science are untenable, as we shall see below. Furthermore, Popper defends a version of knowledge-inquiry: but this, as we have seen, is damagingly irrational. Popper's philosophy is a step in the right direction, but further steps need to be taken.

3. The Improved Popperian Enlightenment Programme

The Improved Popperian Enlightenment Programme can be summarized like this:
Step 1. Science proceeds by implementing the four rules, (1) to (4), of rational problem-solving, indicated above. First, rules (1) and (2) are put into practice in an attempt to solve the *fundamental* problem: What is the nature of the universe? Unfalsifiable, *metaphysical* ideas are proposed and critically assessed, attempted solutions to this fundamental problem. (This initial step was taken by the Presocratic philosophers.) Then rules (3) and (4) are put into practice. More precise, specialized, *falsifiable* theories are proposed, and then critically assessed from the two standpoints of (a) compatibility with the best metaphysical conjecture concerning the nature of the universe, and (b) the capacity successfully to predict empirical phenomena (criticism here taking the especially severe form of attempted empirical refutation). Almost all of science today

is the outcome of implementing (3) and (4).

Step 2. This problem-solving conception of scientific method is then generalized to form the four rules of rational problem-solving, (1) to (4), formulated above.

Step 3. Academia is then transformed so that its basic task becomes to help humanity resolve its conflicts and problems of living in increasingly cooperatively rational ways, by putting the four rules of rational problem-solving increasingly into practice in personal, social and institutional life.

Step 3 requires that knowledge-inquiry be modified just sufficiently so that the four rules of rational problem-solving are put into academic practice. If this were to be done, it would bring about a revolution in academic inquiry. The outcome would be a new kind of inquiry, which I shall call *wisdom-inquiry*. Let us now see, in general terms, what this new kind of inquiry would look like.

First, two preliminary points.

(a) In order to make progress towards a good, enlightened world, the problems we need to solve are, fundamentally, as I have already remarked, problems of *living*, problems of *action*, rather than problems of knowledge or technology. Even when new knowledge or technology is essential, as in medicine or agriculture, it is always what this enables us to *do* (or refrain from doing) that achieves what is of human value (except when knowledge is of value per se).

(b) In order to make progress towards a good world we need to discover how to resolve our conflicts and problems of living in increasingly cooperative ways. There are degrees of cooperativeness, from its complete absence at one extreme – all out annihilation of the opposition – to threat of war or murder, to threats of less extreme kinds as in industrial disputes, to manipulation, voting, bargaining, to extreme cooperation at the other extreme – the attempt being made to find that option that is in the best interests of all those involved by means of cooperatively rational discussion. In various contexts, there are limits to the extent to which cooperation is desirable. Nevertheless, in our world, plagued by brutal conflict, injustice, manipulation and threat, there is room for greater cooperation.

Granted, then, that the task of academic inquiry is to put the four rules of problem-solving rationality into practice in such a way as to help humanity learn how to make progress towards a civilized, enlightened world, the primary intellectual tasks must be:

(1) To articulate, and try to improve the articulation of, those social problems of living we need to solve in order to make progress towards a better world.

(2) To propose and critically assess possible, and actual, increasingly cooperative social actions - these actions to be assessed for their capacity to resolve human problems and conflicts, thus enhancing the quality of human life.

These intellectually fundamental tasks are undertaken by social inquiry, at the heart of the academic enterprise. Social inquiry also has the task of promoting increasingly cooperatively rational tackling of problems of living in the social world - in such contexts as politics, commerce, international affairs, industry, agriculture, the media, the law, education.

Academic inquiry also needs, of course, to implement the third rule of rational problem solving; that is, it needs:

(3) To break up the basic problems of living into preliminary, simpler, analogous, subordinate, specialized problems of knowledge and technology, in an attempt to work gradually towards solutions to the basic problems of living.

But, in order to ensure that specialized and basic problem solving keep in contact with one another, the fourth rule of rational problem-solving also needs to be implemented; that is, academic inquiry needs:

(4) To interconnect attempts to solve basic and specialized problems, so that basic problem-solving may guide, and be guided by, specialized problem-solving.

There are a number of points to note about this "rational problem-solving" conception of academic inquiry. Social inquiry is not, primarily, social science; it has, rather, the intellectually basic task of engaging in, and promoting in the social world, increasingly cooperatively rational tackling of conflicts and problems of living (see my *Is Science Neurotic?*, chs. 3 and 4 for further details). Social inquiry, so conceived, is actually intellectually more fundamental than natural science (which seeks to solve subordinate problems of knowledge and understanding). Academic inquiry, in seeking to promote cooperatively rational problem-solving in the social world, must engage in a two-way exchange of ideas, arguments, experiences and information with the social world. The thinking, the problem-solving, that really matters, that is really fundamental, is the thinking that we engage in, individually, socially and institutionally, as we live; the whole of academic inquiry is, in a sense, a specialized part of this, created in accordance with rule 3, but also being required to implement rule 4 (so that social and academic problem-solving may influence each other). Academic inquiry, on this model, is a kind of peoples' civil service, doing openly for the public what actual civil services are supposed to do, in secret, for governments. Academic inquiry needs just sufficient power to retain its independence, to resist pressures from government, industry, the media, religious authorities, and public opinion, but no more. Academia proposes to, argues with, learns from, attempts to teach, and criticizes all sectors of the social world, but does not instruct or dictate. It is an intellectual resource for the public, not an intellectual bully.

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 desirable and of value in life, for oneself and others ("realize" meaning both "to apprehend" and "to make real"). Wisdom includes knowledge, know-how and understanding but goes beyond them in also including the desire and active striving for what is of value, the ability to experience value, actually and potentially, in the circumstances of life, the capacity to help realize what is of value for oneself and others, the capacity to help solve those problems of living that need to be solved if what is of value is to be realized, the capacity to use and develop knowledge, technology and understanding as needed for the realization of value. Wisdom, like knowledge, can be conceived of not only in personal terms but also in institutional or social terms. Thus, the basic aim of academic inquiry, according to the view being indicated here, is to help us develop wiser ways of living, wiser institutions, customs and social relations, a wiser world.

Diagram 1 provides a cartoon sketch of wisdom-inquiry.

It is important to appreciate that the conception of academic inquiry that we are considering is
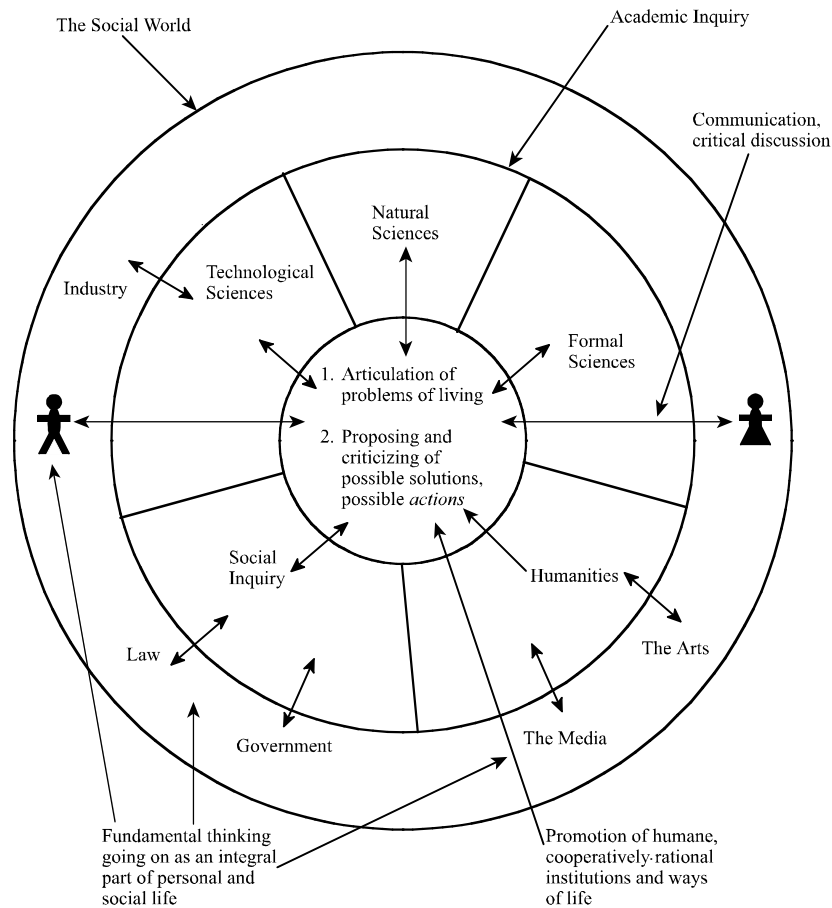
The Social World · Academic Inquiry · Communication, critical discussion · Natural Sciences · Technological Sciences · Industry · Formal Sciences · 1. Articulation of problems of living · 2. Proposing and criticizing of possible solutions, possible *actions* · Social Inquiry · Humanities · The Arts · Law · Government · The Media · Fundamental thinking going on as an integral part of personal and social life · Promotion of humane, cooperatively·rational institutions and ways of life

Diagram 1 Wisdom-Inquiry Implementing Rules of Rational Problem-Solving

designed to help us to see, to know and to understand, for their own sake, just as much as it is designed to help us solve practical problems of living. It might seem that social inquiry, in articulating problems of living and proposing possible solutions, has only a severely practical purpose. But engaging in this intellectual activity of articulating personal and social problems of living is just what we need to do if we are to develop a good empathic or "personalistic" understanding of our fellow human beings (and of ourselves) - a kind of understanding that can do justice to our humanity, to what is of value, potentially and actually, in our lives. In order to understand another person *as a person* (as opposed to a biological or physical system) I need to be able, in imagination, to see, desire, fear, believe, experience and suffer what the other person sees, desires, etc. I need to be able, in imagination, to enter into the other person's world; that is, I need to be able to understand his problems of living as he understands them, and I need also, perhaps, to understand a more objective version of these problems. In giving intellectual priority to the tasks of articulating problems of living and exploring possible solutions, social inquiry thereby gives intellectual priority to the development of a kind of understanding that people can acquire of one another that is of great intrinsic value. In my view, indeed, personalistic understanding is essential to the development of our humanity, even to the development of consciousness. Our being able to understand each other in this way is also essential for cooperatively rational action.

   And it is essential for science. It is only because scientists can enter imaginatively into each other's problems and research projects that objective scientific knowledge can develop. At least

two rather different motives exist for trying to see the world as another sees it: one may seek to improve one's knowledge of the other person; or one may seek to improve one's knowledge of the world, it being possible that the other person has something to contribute to one's own knowledge. Scientific knowledge arises as a result of the latter use of personalistic understanding - scientific knowledge being, in part, the product of endless acts of personalistic understanding between scientists (with the personalistic element largely suppressed so that it becomes invisible). It is hardly too much to say that almost all that is of value in human life is based on personalistic understanding. (For further details see my *From Knowledge to Wisdom*, pp. 172-89 and 264-75, and my *The Human World in the Physical Universe*, chs. 5-7).

The basic intellectual aim of the kind of inquiry we are considering is to devote reason to the discovery of what is of value in life. This immediately carries with it the consequence 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. Literature and drama also have a rational role to play in enhancing our ability to understand others personalistically, as a result of identifying imaginatively with fictional characters - literature in this respect merging into biography, documentary and history. Literary criticism bridges the gap between literature and social inquiry, and is more concerned with the *content* of literature than the means by which it achieves its effects.

Another important consequence flows from the point that the basic aim of inquiry is to help us discover what is of value, namely 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 Rationalism and Romanticism, and helps us to acquire what we need if we are to contribute to building civilization: mindful hearts and heartfelt minds.

All this differs dramatically from academic inquiry as it mostly exists at present, devoted primarily to the pursuit of knowledge. The differences all stem, however, from the simple demand that academic inquiry puts the above four rules of rational problem-solving into practice in seeking to help promote human welfare by intellectual and educational means.

Popper stressed that science, and all rational discussion, employ one and the same method, namely that "of stating one's problem clearly and of examining its various proposed solutions *critically* (*The Logic of Scientific Discovery*, p. 16). How, then, does The Improved Popperian Enlightenment Programme (IPEP) improve on Popper? It does so in four ways. First, IPEP requires that science arrives at a conjectural *metaphysical* (i.e. unfalsifiable) solution to the fundamental problem of the nature of the universe before the specialized *scientific* enterprise of conjecturing and testing empirically falsifiable theories can get underway. This point will be spelled out in more detail in a moment. Second, IPEP emphasizes the importance of specialization. Popper was too much opposed to specialization to stress its importance. He failed to appreciate that rule (4) of rational problem-solving, as formulated above, if implemented, keeps rampant specialization in check, and ensures that fundamental and specialized problem-solving guide each other. Third, IPEP holds that social inquiry is not primarily science, or even the pursuit of knowledge; its task ought to be to promote cooperatively rational tackling of problems of living in the real world. Popper, as I have already remarked, failed to correct the greatest blunder of The Traditional Enlightenment, in that he held that social

inquiry is *science*, with methods essentially the same as those of natural science (although he did express some tentative doubts about this in his later writings). Finally, whereas IPEP requires that we bring about a revolution in the aims and methods of academic inquiry in the interest of reason and humanity, Popper continued to defend knowledge-inquiry to the end of his life.

4 The New Enlightenment Programme

The Improved Popperian Enlightenment Programme fails to do justice to the profoundly problematic character of the aims of science, and the aims of life. The New Enlightenment puts this right. It can be summarized like this.
Step 1. Aim-oriented empiricism (a conception of the progress-achieving methods of science which does full justice to the profoundly problematic character of the aims of science).
Step 2. Aim-oriented rationality, a conception of rationality arrived at by generalizing aim-oriented empiricism much as Popper generalized falsificationism to arrive at critical rationalism. This conception of rationality is designed to help us improve problematic aims as we live, as we act.
Step 3. Aim-oriented rationality is put into practice in personal, social, institutional and political life in such a way that we make progress towards what is best in the profoundly problematic goal of a good, enlightened, civilized world.
I take these three steps in turn.
Most scientists and philosophers of science take for granted some version of the orthodox view that the basic aim of science is knowledge of truth, the basic method being to assess claims to knowledge impartially with respect to evidence. (Popper's falsificationism is a version of this orthodox view). The view is, however, untenable. In physics (where the relevant issues arise in their most naked form) two considerations govern selection of theories: (a) empirical success and failure, and (b) unity, or non *ad hoc* character of the theory in question. Given any accepted, empirically successful physical theory, such as Newtonian theory let us say, countless empirically more successful rival theories can easily be thought up by arbitrarily modifying Newtonian theory, in a wholly *ad hoc* way, to produce non-Newtonian predictions for unobserved phenomena (or correct predictions for phenomena that clash with Newtonian theory, such as the orbit of Mercury). At the same time independently empirically confirmed hypotheses can be added on to such an arbitrarily modified version of Newtonian theory, thus increasing the empirical success of the resulting theory. There are endlessly many empirically more successful rivals to Newtonian theory which, quite properly, are not considered for a moment within science because they are all horribly *ad hoc* and disunified. They are what might be described as "patchwork quilt" theories, in that they are made up of different sets of laws, for different ranges of phenomena, arbitrarily stuck together, instead of just *one* set of laws applicable to *all* the phenomena with which the theory deals.
Now comes the crucial point. The fact that, in physics, unified theories are persistently selected *against the evidence*, in preference, that is, to endlessly many empirically more successful patchwork quilt rivals, means that physics makes a persistent, substantial, influential, highly problematic but implicit *metaphysical* (i.e. untestable) assumption: the universe is such that no patchwork quilt theory is true. Some kind of underlying unity exists in nature, in that *the same* set of laws governs *all* phenomena. Theories in physics are only accepted if they are (a) sufficiently empirically successful, and (b) sufficiently in accord with the metaphysical assumption of unity of law. The orthodox conception of science, which holds that no substantial thesis about the world must be accepted as a part of scientific knowledge independent of evidence, is untenable.
Furthermore, precisely because the thesis that there is unity in nature is an *assumption* which,

in the form that it is accepted at any stage in the development of science, is more than likely to be *false*, it is essential that this assumption is made explicit so that it can be critically assessed, modified, and improved. Rigour, quite generally, requires that assumptions that are substantial, problematic and implicit be made explicit so that they can be criticized and, perhaps, improved.

In order to facilitate the capacity of science to criticize, and improve, this problematic assumption, we need to construe science as making a *hierarchy* of assumptions, these assumptions becoming less and less substantial, and hence more and more likely to be true, as we go up the hierarchy: see diagram 2. At the top of the hierarchy, there is the assumption that the universe is such that we can acquire some knowledge of our local circumstances, sufficient to make life possible. Making this assumption can only help, and cannot hinder, the acquisition of knowledge whatever the universe is like. We are justified in accepting this as a permanent tenet of scientific
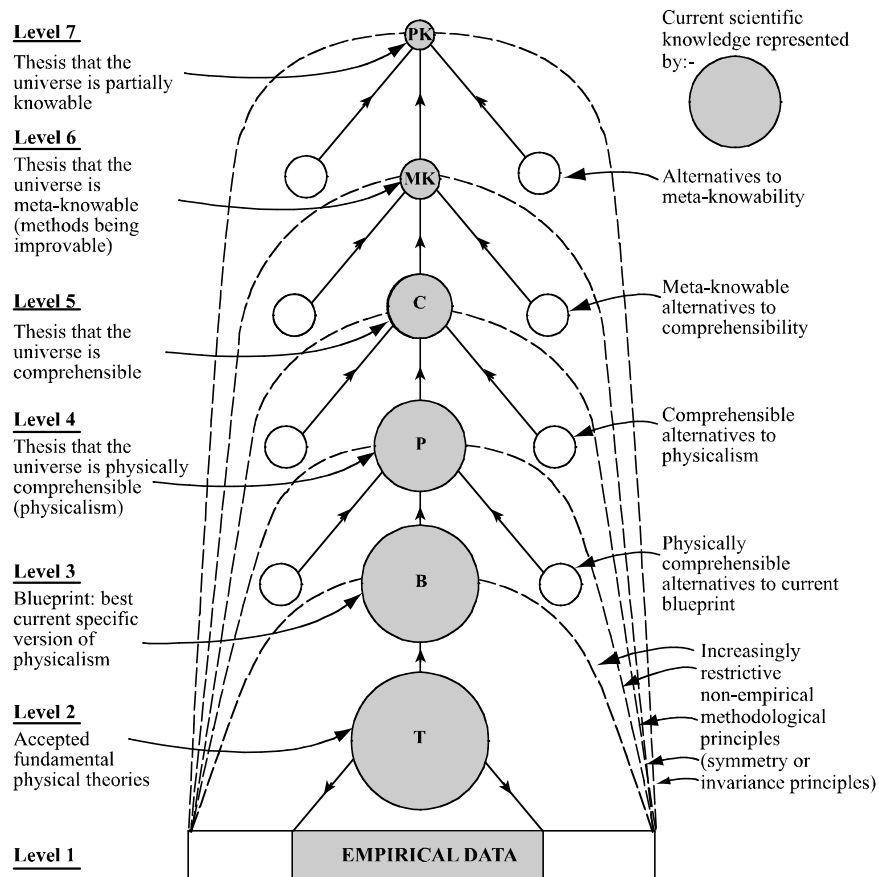

Level 7
Thesis that the universe is partially knowable

Level 6
Thesis that the universe is meta-knowable (methods being improvable)

Level 5
Thesis that the universe is comprehensible

Level 4
Thesis that the universe is physically comprehensible (physicalism)

Level 3
Blueprint: best current specific version of physicalism

Level 2
Accepted fundamental physical theories

Level 1

Current scientific knowledge represented by:-

Alternatives to meta-knowability

Meta-knowable alternatives to comprehensibility

Comprehensible alternatives to physicalism

Physically comprehensible alternatives to current blueprint

Increasingly restrictive non-empirical methodological principles (symmetry or invariance principles)

EMPIRICAL DATA

Diagram 2: Aim-Oriented Empiricism

knowledge. As we descend the hierarchy, from level 7 to level 3, the corresponding theses assert more and more about the world and thus are more and more likely to be false. At level 5 there is the thesis that the universe is comprehensible in some way or another, there being some overall explanation for phenomena. At level 4 there is the much more specific thesis that the universe is *physically* comprehensible, the same physical laws governing all phenomena. This is the thesis we have already encountered. At level 3 there is an even more specific thesis, which asserts that the universe is physically comprehensible in some specific way. This thesis is almost bound to be false. The thesis at this level has changed a number of times in the history of physics. In the 17th century it was the thesis that the universe is made up of corpuscles that interact by contact;

then came the thesis that the universe is made up of point-atoms that interact by means of forces at a distance; then that it is made up of a unified field. Today there is the idea that it is made up of minute quantum strings in ten or eleven dimensions of space-time. The mere fact that we have changed our ideas several times at this level as science has developed indicates that the latest version of this assumption, string theory, is quite likely to be false, and in need of further revision.

Diagram 2 makes things look rather complicated. But the basic idea is extremely simple. By representing the problematic assumption of unity in nature as a hierarchy of assumptions which become increasingly problematic as we descend the hierarchy, going from an assumption at the top which we will never want to reject or revise, to an assumption at the bottom (at level 3) which is almost bound to be false, and thus in need of revision, we provide ourselves with a fixed framework of assumptions and associated methods within which much more specific and problematic assumptions and associated methods can be revised in the light of our improving scientific knowledge. As our knowledge improves, assumptions and methods improve: our knowledge about how to improve knowledge improves. There is something like positive feedback between improving knowledge, and improving knowledge about how to improve knowledge – the heart of scientific rationality, and the methodological key to the immense success of modern science.

All this can be recast in terms of *aims and methods.* For we can construe physics as having, as its aim, to make precise, in the form of a true, testable theory, the thesis at level 3. A somewhat less specific, and less problematic, version of this aim is to make precise, as a testable theory, the thesis at level 4. And so on up to level 7. Thus diagram 2 can be interpreted as representing the nested aims and methods of science, aims and associated methods becoming increasingly problematic, and increasingly likely to need revision, as we descend the hierarchy. This hierarchical view arises because the basic aim of science is profoundly problematic, and hence science needs to find the best way of *improving* its aim, and associated methods, as it proceeds.

The first scientist explicitly to *do* science in this aim-oriented empiricist way was Albert Einstein. Einstein devoted his life to trying to discover unity in theoretical physics. In particular, he sought to unify Newtonian theory – a *particle* theory – and Maxwell's theory of classical electrodynamics – a *field* theory. All his great contributions to physics in 1905 are variations on this theme of seeking unity in nature – unifying, somehow, particles and fields. In particular, special relativity arose out of the attempt to unify – to reconcile the principle that the laws of nature have the same form with respect to all inertial reference frames (which comes from Newton) with the principle that the constancy of the velocity of light is a law of nature (which comes from Maxwell). On the face of it, these two principles clash horribly, this clash highlighting the clash between Newton's and Maxwell's theories. (How can a pulse of light have *the same velocity* with respect to two people moving with respect to each other?) Einstein discovered that if we adjust our ideas about space and time, the two principles can be reconciled: this discovery is special relativity. The two principles are the two basic postulates of the theory. But special relativity can also be interpreted as making a quasi-metaphysical assertion about the nature of space and time (space-time is Minkowskian); and it can be interpreted as a *methodological principle*: in order to be acceptable, a theory must comply with special relativity (it must be Lorentz invariant). It is noteworthy that Einstein always saw his theory in this light: he always called it "the relativity principle". We thus have a theory, a contribution to physics, which emerges from *the search for unity*, which has a *quasi-metaphysical aspect* (space-time is Minkowskian), and which is also used, with extraordinary fruitfulness for subsequent physics, as *a methodological principle*. Furthermore, the methodological principle is subsequently revised: this happens with the advent of Einstein's theory of general relativity, which asserts that space-

time has variable curvature (contradicting the assumption of special relativity that space-time is *flat*). All this illustrates key features of aim-oriented empiricism. As does general relativity, its method of discovery and character. And furthermore, Einstein came explicitly to stress key features of aim-oriented empiricism – for example, that nature is physically comprehensible – even though he did not advocate the fully fledged doctrine, with all the details indicated in diagram 2. (For further discussion see my "Induction and Scientific Realism, Part 3", *British Journal for the Philosophy of Science 44*, 1993, pp. 275-305.)

So much for the answer to the first step of The New Enlightenment Programme. What are the progress-achieving methods of science? Answer: aim-oriented empiricism.

We come now to the second step. The crucial point, here, is that it is not just in science that aims are problematic; this is the case in life too, either because different aims conflict, or because what we believe to be desirable and realizable lacks one or other of these features, or both. Above all, the aim of creating global civilization is inherently and profoundly problematic. Quite generally, then, and not just in science, whenever we pursue a problematic aim we need first, to acknowledge the aim; then we need to represent it as a hierarchy of aims, from the specific and problematic at the bottom of the hierarchy, to the general and unproblematic at the top. In this way we provide ourselves with a framework within which we may improve more or less specific and problematic aims and methods as we proceed, learning from success and failure in practice what it is that is both of most value and realizable. Such an "aim-oriented" conception of rationality is the proper generalization of the aim-oriented, progress-achieving methods of science. We need to generalize diagram 2 in such a way that the hierarchy of aims might correspond to *any* problematic aim in life, and not just that of science. (For details see my books referred to above, in particular *Is Science Neurotic?*, chs. 3 and 4.)

Any conception of rationality which systematically leads us astray must be defective. But any conception of rationality, such as Popper's critical rationalism, which does not include explicit means for the *improvement* of aims, must systematically lead us astray. It will do so whenever we fail to choose that aim that is in our best interests or, more seriously, whenever we misrepresent our aim - as we are likely to do whenever aims are problematic. In these circumstances, the more "rationally" we pursue the aim we acknowledge, the worse off we will be. Systematically, such conceptions of rationality, which do not include provisions for improving problematic aims, are a hindrance rather than a help; they are, in short, defective. (As we have seen, science specifically, and academia more generally, at present misrepresent basic intellectual aims. This is the central theme of *Is Science Neurotic?*.)

Aim-oriented empiricism and its generalization, aim-oriented rationality, incorporate all the good points of The Improved Popperian Enlightenment Programme, and improve it further by being designed to help science and other worthwhile endeavours progressively improve problematic aims and methods.

We come now to the third step of The New Enlightenment Programme. The task, here, is to help humanity gradually get more aim-oriented rationality into diverse aspects of social and institutional life - personal, political, economic, educational, international - so that humanity may gradually learn how to make progress towards an enlightened world. Social inquiry, in taking up this task, needs to be pursued as social *methodology* or social *philosophy*. What the philosophy of science is to science, as conceived by aim-oriented empiricism, so sociology is to the social world: it has the task of helping diverse valuable human endeavours and institutions gradually improve aims and methods so that the world may make social progress towards global enlightenment. (The sociology of science, as a special case, is one and the same thing as the philosophy of science.) And a basic task of academic inquiry, more generally, becomes to help humanity solve its problems of living in increasingly rational, cooperative, enlightened ways,

thus helping humanity become more civilized. The basic aim of academic inquiry becomes, I have already said, to promote the growth of *wisdom*. Those parts of academic inquiry devoted to improving knowledge, understanding and technological know-how contribute to the growth of wisdom. The New Enlightenment Programme thus has dramatic and far reaching implications for academic inquiry, for almost every branch and aspect of science and the humanities, for its overall character and structure, its overall aims and methods, and its relationship to the rest of the social world (see *From Knowledge to Wisdom* and *Is Science Neurotic?*).

As I have already remarked, the aim of achieving global civilization is inherently problematic.

This means, according to aim-oriented rationality, that we need to represent the aim at a number of levels, from the specific and highly problematic to the unspecific and unproblematic. Thus, at a fairly specific level, we might, for example, specify civilization to be a state of affairs in which there is an end to war, dictatorships, population growth, extreme inequalities of wealth, and the establishment of democratic, liberal world government and a sustainable world industry and agriculture. At a rather more general level we might specify civilization to be a state of affairs in which everyone shares equally in enjoying, sustaining and creating what is of value in life *in so far as this is possible*. And at a more general level still, we might specify civilization to be that ideal, realizable state of affairs we ought to try to achieve in the long term, whatever it may be. A cartoon sketch of what is needed is indicated in diagram 3, arrived at by generalizing diagram 2 and applying the outcome to the task of creating a better world.
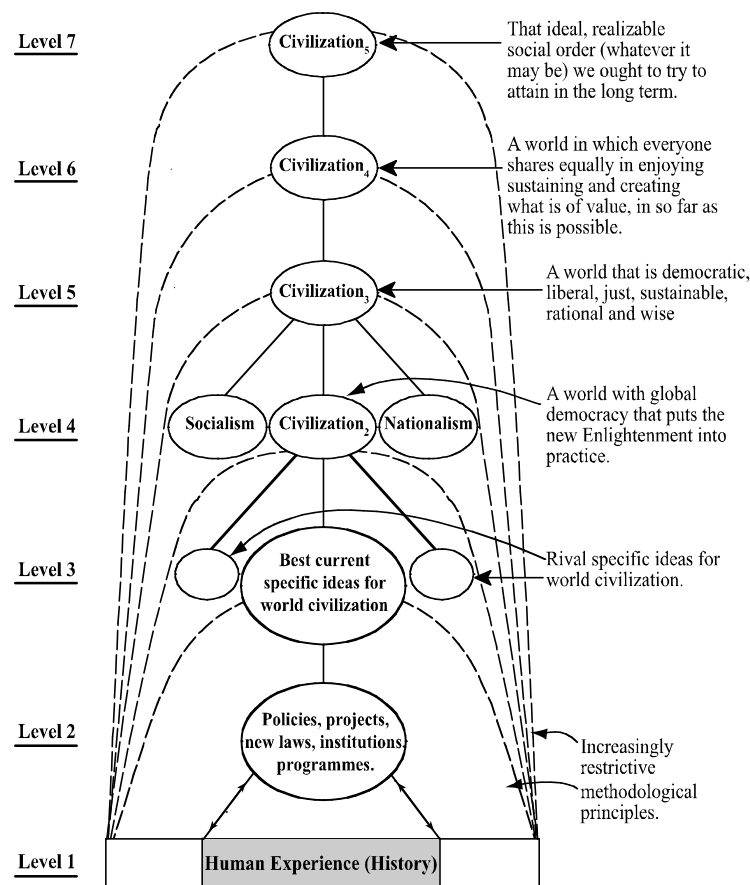

Level 7 — Civilization$_5$	That ideal, realizable social order (whatever it may be) we ought to try to attain in the long term.
Level 6 — Civilization$_4$	A world in which everyone shares equally in enjoying sustaining and creating what is of value, in so far as this is possible.
Level 5 — Civilization$_3$	A world that is democratic, liberal, just, sustainable, rational and wise
Level 4 — Socialism / Civilization$_2$ / Nationalism	A world with global democracy that puts the new Enlightenment into practice.
Level 3 — Best current specific ideas for world civilization	Rival specific ideas for world civilization.
Level 2 — Policies, projects, new laws, institutions, programmes.	Increasingly restrictive methodological principles.
Level 1 — Human Experience (History)	

Diagram 3: Aim-Oriented Rationality Applied to the Task of Creating Civilization

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As a result of building into our institutions and social life such a hierarchical structure of aims and associated methods, we create a framework within which it becomes possible for us progressively to improve our real-life aims and methods in increasingly cooperative ways as we live. Diverse philosophies of life - diverse religious, political, economic and moral views - may be cooperatively developed, assessed and tested against the experience of personal and social life. It becomes possible progressively to improve diverse *philosophies of life* (diverse views about what is of value in life and how it is to be realized) much as *theories* are progressively and cooperatively improved in science.

Aim-oriented rationality is especially relevant when it comes to resolving conflicts cooperatively. If two groups have partly conflicting aims but wish to discover the best resolution of the conflict, aim-oriented rationality helps in requiring of those involved that they represent aims at a level of sufficient imprecision for agreement to be possible, thus creating an agreed framework within which disagreements may be explored and resolved. Aim-oriented rationality cannot, of itself, combat non-cooperativeness, or induce a desire for cooperativeness; it can however facilitate the cooperative resolution of conflicts if the desire for this exists. In facilitating the cooperative resolution of conflicts in this way, aim-oriented rationality can, in the long term, encourage the desire for cooperation to grow (if only because it encourages belief in the possibility of cooperation).

Einstein did not advocate The New Enlightenment Programme, as formulated here. He did however remark that "perfection of means and confusion of goals seems, to my opinion, to characterize our age". I agree entirely. The New Enlightenment Programme, and the associated version of wisdom-inquiry, are designed specifically to help us put right what Einstein so correctly saw as the fundamental fault of our age.

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