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The Moral Responsibility of the Scientist

By Karl R. Popper

THE TOPIC I am going to discuss was not of my choosing, but was suggested by the organisers of this conference. I say this because I do not think that I can make any significant contribution to the solution of the grave problems involved. Why I nevertheless accepted the invitation to speak about it is that I believe that in this respect we are all more or less in the same boat. I take it that our topic, "the moral responsibility of the scientist", is a kind of euphemism for the issue of nuclear and biological warfare; but I shall try to approach our topic with some wider issues in mind.

One may say that the problem has become

more general especially because all science, and indeed all learning, has tended to become potentially applicable. Formerly, the pure scientist or the pure scholar had only one responsibility beyond those which everybody has; that is, to search for truth. He had to further the growth of his subject as well as he could. For all I know Maxwell had little reason to worry about the possible applications of his equations; and perhaps even Hertz did not worry about Hertzian waves. This happy situation belongs to the past. Today not only all pure science may become applied science, but even pure scholarship.

For applied science the problem of the moral responsibility is a very old one, and like many other problems, it was first posed by the Greeks. I have in mind the Hippocratic Oath, a marvellous document even though some of its main ideas may be in need of renewed scrutiny. I myself have taken an oath which no doubt historically derives from the Hippocratic Oath when I graduated from the University of Vienna. One of the most interesting points about the Hippocratic Oath is that it was not a graduation oath but an oath to be taken by the apprentice to the medical profession. Essentially, it was taken at the beginning of the student's initiation to applied science.

The Oath consisted in the main of three parts.

SIR KARL POPPER'S paper was read recently to a special session, "Science and Ethics," at the International Congress of Philosophy, held in Vienna. "I am greatly indebted," the author writes, "to my friend Ernst Gombrich for his help in the preparation of the final version." Karl Popper is Professor of Logic and Scientific Method in the University of London. Among his books are *The Open Society and Its Enemies*; *The Logic of Scientific Discovery*; and *Conjectures and Refutations*. His article, "On the Sources of Knowledge and Ignorance," appeared in the September 1962 ENCOUNTER.

First, the apprentice undertakes to recognise his deep personal obligation to his teacher. By implication, this obligation is considered to be mutual. Secondly, the apprentice promises to carry on the tradition of his art, and to preserve its high standards, dominated by the idea of the sanctity of life, and to hand on these standards later to his students. Thirdly, he promises that to whatever house he will go, he will enter it only in order to help the suffering, and that he will preserve silence about whatever may become known to him in the course of his practice.

I have stressed the fact that the Hippocratic Oath is an apprentice's oath, because in many discussions of our topic the situation of the apprentice, that is of the student, is not sufficiently considered. However, prospective students are worried about the moral responsibility which they will have to carry once they become creative scientists, and I feel it may be of considerable help if they have an opportunity to discuss these issues at the beginning of their studies. Ethical discussions, unfortunately, tend to become somewhat abstract and here is an opportunity of making the issues more concrete. My proposal would be to try and hammer out a modern form of an undertaking analogous to the Hippocratic Oath, in cooperation with the students.

It is obvious that no such formula should be imposed upon the students. If they object, they would thereby show a most welcome interest and they should be asked to offer an alternative version or give reasons for objecting. The main purpose would be to draw their attention to the significance of the issues and to keep their discussions going.

I should propose to invert the order of the Hippocratic Oath, according to the significance of the various points. Thus my own points 1, 2 and 3 will somewhat correspond to the points 2, 1 and 3 of the Hippocratic Oath, as I have summarised them. Also, the main issues of the Oath might have been generalised, perhaps somewhat along the following lines.

1. Professional Responsibility. The first duty of every serious student is to further the growth of knowledge by participating in the search for truth—or in the search for a better approximation to the truth. Of course, every student is fallible, as are even the greatest masters; everybody is bound to make mistakes, even the greatest thinkers. Though this fact should encourage us not to take our mistakes over-seriously, we must resist the temptation to look upon our mistakes leniently: the establishment of high standards to judge our work by, and the duty constantly to raise these standards by hard work, are indispensable. At the same time, we must constantly remind ourselves (speci-

ally in connection with applications) of the finitude and fallibility of our knowledge, and the infinity of our ignorance.

2. The Student. He belongs to a tradition and to a community, and he owes respect to all who have contributed, or are contributing, to the search for truth. He also owes loyalty to all his teachers who freely and generously share with him their knowledge and enthusiasm. At the same time, he has a duty to be critical towards himself and to others, including his teachers and colleagues; and, most important, he has the duty to try not to succumb to intellectual fashions, and to beware of intellectual arrogance.

3. The Overriding Loyalty. This he owes neither to his teacher nor to his colleagues, but to mankind, just as the physician owes his overriding loyalty to his patients. The student must be constantly aware of the fact that every kind of study may produce results which may affect the life of many people, and he must constantly try to foresee and guard against possible danger and possible misuse of his results, even if he does not wish to have his results applied.

THIS IS A VERY TENTATIVE RESTATEMENT of the Hippocratic Oath, at best a proposal for a renewed discussion, and I must stress that all this is merely peripheral to our topic. But I have started with this practical proposal because I believe both in traditions and in the need for their continuous critical revision. One of the few things we can do about our main issue is to try to keep alive, in all scientists, the consciousness of their responsibility.

I know, of course, that even the beautiful tradition of the Hippocratic Oath can be misused, and that it has been misused or misunderstood by interpreting it as establishing a special ethical obligation towards one's professional colleagues; in other words, it has been interpreted as a kind of guild morality. It is precisely the serious discussion of issues like the gulf between (1) ethics and (2) etiquette ("professional ethics") which, we may hope, may lead us to some much needed advance of our moral awareness. My hopes are modest: I do not think that by such discussions any of the great problems with which we are faced can be solved. But discussions centering on a revision of the Hippocratic Oath may lead to reflection on such fundamental moral problems as the priority of the alleviation of suffering.

MANY YEARS AGO I proposed that the agenda for public policy should consist, in the first place, of finding *ways and means of avoiding suffering*, so far as it is avoidable. Contrasting this with the utilitarian principle of maximising happiness, I proposed that, in the

main, happiness should be, and that it can only be, left to private initiative, while the alleviation of avoidable suffering is a problem of public policy. I have also indicated that at least some utilitarians, when speaking of the maximisation of happiness, may have had in mind the minimisation of misery.

Of course, I never suggested raising the minimisation of suffering to the status of the highest general moral principle. In fact I do not believe in the existence of such a thing as the validity of one single highest general moral principle. What I suggested was that, in matters of public policy, we have constantly to reconsider our priorities, and that, for drawing up a list of priorities, avoidable suffering rather than happiness is to be our main guide. Perhaps not for ever: there may come a time when the alleviation of avoidable suffering will be less important than it is today.

Today the avoidance of war is, I should say by general consent, the overriding problem of public policy. There is no doubt in my mind that we all, whether as scientists, scholars, citizens, or mere human beings, should do everything we can to help to end war; it is part of this effort that we must try to make clear to everybody what war means, not only in terms of death and destruction, but also in terms of moral degradation. In this context it should be stated very clearly that one of the most disturbing aspects of recent events is the cult of violence. We all know that one of the horrible things in our entertainment industry is the constant propaganda for violence, from allegedly harmless Westerns and crime stories to displays of cruelty, pure and simple. It is tragic to see that this propaganda has had its effects even on genuine artists and scientists, and unfortunately also on our students (as the cult of Che Guevara shows).

However, it is my conviction that neither the first nor the second World War, nor the present tragedy of Viet Nam, can be explained in terms of human aggressiveness. At least today the main danger of war comes from the need to resist aggression, and from the fear of aggression; these, combined with muddleheadedness and lack of intellectual flexibility, and perhaps megalomania, are the main sources of danger, in the presence of the tremendous means of destruction which are at our disposal.

Some people have thought that it is therefore the moral obligation of the scientist to withdraw from all military work, and to propagate disarmament at any price, even unilateral disarmament. I think that the situation is by no means as simple as that. We cannot shut our eyes to the fact that atomic war has so far been prevented by the danger of mutual de-

struction. So far the deterrent has been successful in deterring. This is why I do not believe that we should support unilateral disarmament. The fact that Japan did not have atomic arms did not prevent us from using them. I do not think that this happened because we are morally worse than our competitors in the armament race. The question whether we should have ever dropped the bomb on Japan is a very difficult one. The scientists who were in favour of its use were, I am sure, highly responsible people. Where I think they were wrong is that they did not insist that the bomb should have been dropped, in spite of the greater risk involved, on a *purely* military target, such as a concentration of warships (and such concentrations did exist at the time). However, we should realise that decisions like these are frightful. It is all too easy to talk about such matters, but terrible to be involved and to have to make up one's mind which decision would ultimately lead to a lesser amount of suffering. Nor must we forget that the politicians who were responsible for the ultimate decision were acting as trustees for those who elected them. This may be a reason for you or me not to become a politician, but it should not be a reason for you or me glibly to pass judgment on them.

One cannot back out altogether of the general involvement which is part of human life: everything has to be done to avoid a war and, if there is a war, to bring it to an end. This does not mean that I believe that there cannot be something like a just war, a defensive war. There is a world of difference between attack and defence, even though it may not always be easy to decide who has attacked. Who believes that Switzerland or Sweden would nowadays wage an aggressive war? Who can believe for a moment that it was Serbia who attacked Austria in July 1914, or that it was Finland who attacked Russia on 30 November 1939, rather than the other way round? Or that Czechoslovakia has been threatening Russia?

A scientist who feels that his country is threatened by an attack cannot be blamed for working to defend his country. However, even a just war may get utterly out of hand, and it seems to me unlikely that there can be, or that there has ever been, a war without war crimes on both sides. Thus, once a war has started, the scientist, like any other citizen, is caught in a terrible moral difficulty, and nobody can give him advice.

One point can be made clear. It was the politicians and the law officers of the various Allied countries who staged the Nuremberg Trials which established the status of war crimes and thereby recognised that the conscience of every human being is the ultimate court of appeal with respect to the question whether a certain

command is, or is not, to be resisted. Without contradicting themselves it is impossible for these same politicians and law officers now to assert that it is the duty of the citizen, and of the scientist, not to ask the reason why and to obey any command. The freedom for which we must be prepared to fight is precisely the freedom to resist a command which we feel it would be criminal to obey. It is, I believe, the inescapable duty of every loyal politician in a democracy to understand the terrible situation in which a scientist may find himself, and to champion the rights of the conscientious objector, whether he is a scientist or a soldier.

The trouble with the present legislation concerning conscientious objectors in the United States is that a man, in order to plead conscientious objection, has to declare that he objects for religious reasons to *all* wars. But there are people who would feel it their duty to fight for the United States, provided they can see that the war is waged for the defence of the United States, but who feel that they cannot conscientiously fight in Viet Nam. Clearly such moral scruples should be respected as much as any that fall under the present definition of conscientious objection. Here, as always, I believe in the critical discussion of the issue involved, rather than in facile slogans from either side.

I DISCUSS THESE VERY GRAVE ISSUES not because I believe in my ability to solve them or to say anything new about them, but mainly because I feel that they should not be dodged. I am convinced, however, that the moral responsibility of the scientist is not confined to his responsibility in connection with war or armament.

The late Dr. Robert Oppenheimer is reputed to have said: "We scientists have been on the brink of presumptuousness in these years. We have known sin. . . ." But this, again, is not a recent issue. When Bacon tried to make science attractive by saying that *knowledge is power*, he too was on the brink of presumptuousness. Not that he had much knowledge or much power, but he wanted knowledge because he wanted power—or at least he gave the impression that he did so.

I do not intend to philosophise about the wickedness of power in general, although my experience corroborates Lord Acton's saying that power corrupts and that absolute power corrupts absolutely. As far as science is concerned, there is no doubt whatsoever in my mind that to look upon it as a means for increasing one's power is a sin against the Holy Ghost. The best antidote against this temptation is the awareness of how little we know and that the best of those little additions to our know-

ledge which we have achieved have shown their significance precisely by the fact that they opened up some new continents of our ignorance.

The social scientist has a particular responsibility here, because his studies concern more often than not the use and misuse of power pure and simple. I feel that one of the moral obligations of the social scientist which ought to be recognised is that, if he discovers tools of power, especially tools which may one day endanger freedom, he should not only warn the people of the dangers but devote himself to the discovery of effective counter-measures. I am confident that in fact most scientists, at least most creative scientists, value independent and critical thinking very highly. Most of them hate the very idea of a society manipulated by the technologists and by mass-communication. Most of them would agree that the dangers inherent in these technologies are comparable to those of Totalitarianism. Yet although we built the atom bomb in order to combat Totalitarianism, few of us regard it as our business to think of means to combat the dangers of mass-manipulation. And yet, there is no doubt in my mind that much should and could be done in this direction, without censorship or any similar restriction of freedom.

IT COULD BE QUESTIONED whether there is a responsibility of the scientist which differs from that of any other citizen or any other human being. I think the answer is that everybody has a special responsibility in the field in which he has either special power or special knowledge. Thus, in the main, only scientists can gauge the implications of their discoveries. The layman, the politician, does not know enough. This holds for such things as new chemicals for increasing the output of farming products as much as for new armaments. Just as in former times *noblesse oblige*, so now, as Professor Mercier has put it, *sagesse oblige*: it is the potential access to knowledge which creates the obligation.

Only scientists can foresee the dangers, for example, of population increase, or of the increase in the consumption of oil products, or the dangers inherent in atomic waste, and thus even in atoms for peace. Do they know enough about it? Are they conscious of their responsibilities? Some of them are; but it seems to me that often they are not. Some, perhaps, are too busy; others, perhaps, are too thoughtless. Somehow or other, the unintended repercussions of our heedless general technological advance seem to be nobody's business. The possibilities of application seem to be intoxicating. Though many people have questioned whether technological advance does always

make us happier, few people make it their business to find out how much avoidable suffering is the unavoidable, though unintended, consequence of technological advance.

The problem of the unintended consequences of our actions, consequences which are not only unintended but often very difficult to foresee, is *the* fundamental problem of the social scientist.

Since the natural scientist has become inextricably involved in the application of science he, too, should consider it one of his special responsibilities to foresee as far as possible the unintended consequences of his work and to draw attention, from the very beginning, to those which we should strive to avoid.

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