Escape from reason: antiscience trends in the USSR

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In this article, written before the final collapse of the Soviet Union as a State, a well-known Soviet scientist analyses the causes of a rise in superstition and antitechnological public attitudes.

The recent profound changes in the USSR that we associate with *perestroika* and the policies triggered off by Mikhail Gorbachev have at the same time unleashed manifest expressions of anti-scientific and antitechnological feelings. These public attitudes have found a powerful expression in the rejection of nuclear energy in the aftermath of Chernobyl, in the general reaction against technological progress, and in numerous other manifestations of irrationality and interest in the supernatural.

In understanding these social aberrations it is important not to mix their visible symptoms with the deeper reasons for this dramatic change in a society that, until recent years, was purportedly proscientific and rational, even 'scientifically' designed. I shall rather use these external symptoms as signals of the crisis, as a way to illustrate the deeper and hopefully real reasons for these social phenomena.

The nature of the change

In the first place one must understand the magnitude of the transition through which the country is passing. I draw attention to the fact that the cold war is over. When a war is over, you have the victors and the vanquished. We know who won — Japan and Germany. (I will not at present discuss where the US stands.) But the main loser is the Soviet Union[1].

The war was indeed a cold one. If it had been hot, there would not be much to talk about and hardly anyone to listen, even if we were still alive ourselves. But the symptoms of defeat are just as real. Our troops are withdrawing in humility or disgrace from all fronts. Our former allies and client states have left or are leaving in haste, going through rapid changes of their own.

The economy at home is in great disarray with escalating inflation, the corrupt distribution system not even able to feed the people. The transition from a centrally planned economy to a market one is happening not only because of the expected efficiency of the market, but because the centrally planned economy was primarily military-oriented. Thus military defeat is also one of the main forces driving economic change. The cold war was mainly fought on the economic front, and our defeat in the arms race is even more obvious than the unseen military loss of battles never fought. In the unspoken laws of the cold war you admit defeat before being induced into submission by force, just as deterrence is the way of fighting the war without going to battle.

The crisis is primarily a political one. The *ancien régime* is falling apart even more rapidly than the economy. The demise of the central authority is leading to an outright threat to the very existence of the Union. By the time this article may be read we could well have witnessed the secession of republics from the Soviet Union. In fact the economic ties in the form of the electric grid, communications, railroads and airlines, all the complex connections in a highly organized industrial state, are to a greater extent a unifying factor than the dwindling power of the central authority. The central authority may even have to resort to the last vestige of political power — to military force — to save the Union.

What we must admit is that the main goal of the Soviet socialist state, after 70 years of fighting for it, no longer exists. Gone is the grand concept of a socialist and communist revolution, a great change that would lead to a global spread of these ideas through a world-wide upheaval. This is the very struggle that we have finally lost and this is the ultimate reason for our crisis. Today we must demilitarize both our economy and our mentality.

The whole concept of world revolution and the various guises that it took through the past decades was based on Marxist ideology. (I shall not discuss the difference between the ideas of Marx, Marxism, and what was preached and practised in the Soviet Union.) Now we see the collapse of this system of ideas as the motive for the policies, both at home and abroad, of the Soviet Union. This is the real measure of our admission of defeat, the dimension of the historic transition through which we are now passing.

I think that in the Soviet Union we are gradually, if not getting used to this point of view, tacitly in general agreement with it. Much is still said in support of some of the old ideas. Our military is still to succumb to the realities of its new position. Attempts are made to salvage what can be saved from the past. For instance, there is much in socialism, public ownership and planning that certainly makes sense and works in many countries. With all the uncertainties of privatization, expectations of the power of market forces and the primary concepts of social justice certainly have had a profound influence on both modern history and political theory, and are being expressed in the positive developments in Soviet society.

It is not my intention in this article to enter into this debate. What is worth mentioning is that some of the reasons for the Soviet crisis are of a more general nature, especially the use of military power as an instrument of politics. This we may see as one of the indications of the crisis of primitive rationality.

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The expectations of rationality

Rational issues in public policies and social thinking have existed from bygone ages. Here I am not going to quote Plato, St Paul or St Mark, St Augustine or Tertullian[2]. It would be best to go back only as far as the seventeenth century to look into the roots of modern rational thinking. First it happened in the natural sciences, prefaced in the art of the Renaissance and the emergence of humanism. The history of modern science, beginning with Copernicus and Vesalius, Kepler and Galileo, Descartes and Bacon, is part of the development of rational thinking. With spectacular effect it was applied to mechanics, and culminated in classical mechanics. The remarkable success of the celestial mechanics of the solar system was certainly one of the greatest intellectual adventures of all time. Was it not Voltaire who translated Newton into French as a message in epistemology and culture rather than that of science, as everyone could read *Principia* in Latin?

These developments in science, the emergence of capitalism and world trade, the decline of the authority of the Church and monarchy all happened in Europe at the same time. On all counts it was the great *perestroika* of Europe, that of the Reformation, with a thirty-year war, running on for most of the century. During this great upheaval superstitions of all kinds flourished. I will note only that it was then that reportedly 50,000 witches were burnt alive or drowned, more than at any other time[3]. It took even Kepler a great effort to save his mother from the stake. The end of a millennium of mediaeval ideology and a way of life did not pass without these painful indications of social unrest and insecurity. On a lesser scale we see these symptoms reappearing in mesmerism before the French Revolution, in spiritism, and in 'scientific' superstitions during the profound and rapid changes in European society preceding World War I. The extent to which outward manifestations of irrationality are socially indicative is also illustrated by the case of the hippies in the US during the Vietnam war. In the summer of 1967, on my first visit to the US, I flew into San Francisco from Sydney. On that very Sunday I was taken to Haight-Ashbury to meet the 'flower children'. (Next day I went to SLAC (Stanford linear accelerator) at Stanford, and news of the Arab–Israeli conflict that became the six-day war came over to remind us of the facts of real life.)

There is a surprising consistency in the recurrence of superstitions, cults and mysticism in times of social crisis. Today it is ESP (extrasensory perception) and UFOs, astrology and clairvoyance, mystic cults and mesmeric healers. The growth of interest towards such things is a sure indicator of social unrest, personal uneasiness, frustration and loss of purpose.

I have mentioned the external, outwardly symptoms of social discomfort appearing at a time of change as an immediate reaction towards change. It is also interesting to look at the precursors of a time of change. One may see these in art and writing at a deeper level of social consciousness. Do not Bosch and Breugel, who came before the great changes in Europe, as did Nostradamus with his prophecies, still find their readers? Possibly, today, we may in the same way consider the message contained in art modérne and in science fiction. Both appeared before the great changes of the twentieth century, and signalled the shape of things to come. On the other hand the art of today is well separated into the art of the ordinary and the imagery born of the tormented body and soul of the artist facing all the unrest of our unsettled world. The latest development of postmodernism expresses this mood by going to the very limits of artistic perception. For example, a writer can sacrifice not only the punctuation of his text, but also the pagination. In this case only the local, transitory part of the message remains.

Next we may consider the role of the media[4]. In the Soviet Union, *glasnost* has brought a remarkable change in public discourse. The whole pattern of social consciousness has changed. Unfortunately, with all the positive results, forces of the irrational were also unleashed, forces that for so long were contained by the power of central authority and direct censorship.

Are we to publish all the nonsense that is fit to print? What today are the real responsibilities of the media—press and television—in propagating the anti-scientific and irrational? Are we to invite control, or should we rely on a sense of decency and responsibility on behalf of the producer or publisher? In the case of outspoken violence and pornography Gorbachev recently made a decree, asking the minister of culture to intervene in these matters. But it seems that there is no one to protect the public from astrologers and soothsayers. It is interesting to note that, at the same time, the number of popular science magazines and television programme on science and technology have declined markedly. This change is widespread and unfortunate, and the scientific community should take due action, if only to protect its own interests. For the Soviet Union, the attitude of society to science and technology is really the key to a sustainable future.

Without going into the subtle points of the philosophy of science the distinction between knowledge and what one believes is sufficiently clear. A point one must bear in mind is that the message of the popularizer of science is in most cases taken on trust. The layman believes what he is told, as the proof is obtainable only through education. Thus the trust in the message of science demands great responsibility on the part of the messenger. On the other hand, the persuasive power of the media, especially of television, is remarkable, and the misuse of its potential is a matter of great ethical importance for society.

In many cases there is a strong correlation of antiscience and anti-technology trends with those towards violence and extreme social ideas, such as rampant nationalism and fascism. The traditional links between anti-Semitism and anti-intellectual tendencies are also present. Perhaps these connections are really a signal of danger, one that goes well beyond the irrational cravings of a minority of UFOlogists. Political extremism is what follows when these forces gain ground. Here we have a real menace to the great and welcome changes now taking place. Another way of looking at what is now going on in the Soviet Union is to say that we are seeing a change from one set of myths to another, which is not in any way new or reasonable, for we are still in the domain of mythological thinking. The concept of mythological thinking as opposed to scientific, rational reasoning was explored by Lévi-Strauss[5]. From a

social-anthropological point of view, the present revival and regression into mythological thinking is interesting and certainly worth studying as a separate event. Perhaps this process can be seen as a change from one mythology to another, for the communist ideology did degenerate into a mythology of its own. Thus the surrender to irrationality has happened not now, but much earlier. On the other hand, Rauschenbach[6] has discussed the social demand for religiou as a developed mythological system satisfying a fundamental human need. He draws attention to the origins of mythological thinking in the right side of the brain, as opposed to logical thinking residing in its left half.

The extent of the decay of the official ideology can be well illustrated by the case of A. Spirkin. For many years he was the principal philosopher of the Soviet Academy of Sciences, elected as the only corresponding member to the chair of dialectical materialism. On this subject Spirkin wrote the standard textbook, which went through many editions. In spite of professional adherence to dialectical materialism, Spirkin became well known for his systematic support of ESP, witch doctors, clairvoyance and other pseudoscientific stuff. He thinks, perhaps honestly, that we must explore these extreme dimensions of the human experience not as an aberration but as the real thing. But professionally and scientifically he is in no way equipped to face these issues. On a number of occasions he has even been engaged in unbecoming activities with his 'objects of study'[7].

In the elections to the Academy of Sciences in 1990 Spirkin was elected a full member by the vote of the department of philosophy and law. The charter of the academy states that these primary elections must be endorsed by the vote of all members. Happily, it was here that reason won, and Spirkin got 58 votes out of 240. Academician I. Frolov, perhaps the only professional and responsible member of the department of philosophy and law, called for its disbandment on account of incompetence, remarking, 'How can you expect ten alchemists to elect a chemist?' The Spirkin affair shows all the depravity and disgrace of our philosophy establishment. For decades it was subservient to the ruling Party, which ran the country using these ideologies and the police as instruments of power of the totalitarian state. This event is certainly symptomatic, and in many ways more important than the writings of the Soviet tabloid press. Unfortunately the Academy of Sciences is not beyond reproach in what it prints. Recently its publishing house Nauka (the Russian word for science) published a book on astrology. The new journal *Social Sciences and Modernity* is advocating reports on a 'voice from space' recorded by the All-Union scientific coordinating study centre for UFOlogy.

On the other hand we do have a vocal and growing number of writers on social matters who are seeking a new set of ideas and new values (see ref. 8 for a good example). Today, apart from the economic issues, this search is the challenge for those who want in a responsible and creative way to find solutions to the problems posed by our present condition. This concerns not only Soviet scientists and writers, for the crisis of rationality is also seen elsewhere.

The mechanistic legacy

The present critical events derive, to a certain extent, from simplistic, even mechanistic ideas of social development. Indeed, many of our present social ideas are still dominated by positivist thinking, of which Marxism is perhaps the most pronounced. (I hope readers will excuse this oversimplification.) What I am suggesting is that the great success of the natural sciences, of physics and of classical mechanics in the seventeenth and eighteenth centuries set a certain example for social sciences and political theories. The concepts, and even the words of mechanics dominate the vocabulary of much of social theory, especially that of the nineteenth century. One spoke of social forces, masses of people, energy of nations, described history as a movement governed by deterministic laws of social development in a causal process. In that same century the ideas of evolution and of statistical mechanics came into being, but somehow they did not have much effect on social thinking. The economists still prefer to speak of the balance of payments and conservation laws, disregarding the fact that we are dealing with an open and nonequilibrium system where the concept of entropy is just as important as that of energy. Speaking of recent developments, the concept of chaos, now so much in vogue, is yet to find its place, beyond one as a metaphor, in political theory. Conceptually, for a social scientist it is important to understand that long-range order following a seemingly teleological and rational pattern may be caused by local forces operating without any grand idea or concept, as it is now understood to be caused in the evolution of complex systems and in life itself.

With the arrogance of a 'natural' scientist, it is easy to ridicule the experience of 'unnatural' scientists in their effort to understand the pattern of behaviour of the real world by relying so much on the mechanistic concept of history. On the other hand, do we not also see a persistent craving for the deterministic and mechanistic approach in all-out computer modelling, which, the modellers believe, promises to lead to magical insights, to forecasting and to resolving the complexities of the world? The computer is great at handling data, but before using it we must know where we stand and what we are aiming for. At present the limitations of human intelligence seem to be greater than the expected aid from an artificial one This should remind us that social theory is much more demanding and complex intellectually than all our physics.

In the political institutions in the Soviet Union today, this mechanistic legacy is still powerful and conceptually dominates much of the public debate and performance of our newborn parliament. For that is how this generation of legislators was brought up and educated. One hopes that the next generation will get a more socially and humanly oriented mind-set. That is why it is so important today to give some guidance as to where to go. This is the challenge for all who are engaged in exploring the novel and exciting opportunities now open. A demand for new ideas, new ideals and even ideology—despite all the negative connotations the last word evokes—is certainly the order of the day. I can hardly agree with those who say that history with ideology is finished. The old ideas have run out of use, but that does not mean that history will not go on, even by clinging to old and definitely outmoded systems of ideas of fundamentalism of various persuasions that are now emerging and filling the ideological vacuum. This is an important

and real signal of social distress. That is why we must find a way for reason to carry on, taking into account the lessons of history. However, has it not been said that the main message of history is that no such lessons are to be learnt?

Evolution and revolution: the challenge of extremism

One of the main concerns is that we should strive for evolution rather than revolution. It is here that the local, temporal order is so important and operative, rather than long-term objectives as a promise of salvation or communal bliss. Much of the hope of a revolution is also the social expectation of rapid change, as in a miracle offering deliverance from all ills through the magic of the new creed. In the past the promise was often religious and moral, now science and reason are the passwords.

In many cases this is the promise of the extremist, of the lone mind that is often desperate and unhappy. It is he who challenges the laws of society and science, the conventional wisdom of the established order. But without these revolutionaries, these true pathfinders, no progress, however halting, would be possible. That is why we must be tolerant of those who want to break into the unknown, even allow for outright initial craziness and irrationality. We know well that a society that persecutes all dissenters and imposes stability is bound to stagnate and decay. where, then, are the limits? How much dissent is to be tolerated?

Today the power of political and social extremism is so great that the fragile forces of social order are often not sufficient to counter it. This is the problem facing the Soviet Union in its passage through rapid change. This passage would be better if not for a number of events that are connected to the limitations of the promise of modern medicine, science and technology.

For instance, there have been a number of cases recently of 'extrasensorial' healing. The best known example is A. Kashpirovskii, who has appeared on many occasions on television. For an hour or more he speaks to a nationwide audience, persuading them that all their ills will leave them if they trust him. The feeble opposition voiced by the medical profession could not in any way countermand the huge popularity generated by the television programmes. The point of importance is that modern medicine does have a crisis of humanism of its own, even if it is to promise a death with dignity. On New Year's Eve in 1990 the Communist party newspaper *Pravda* devoted half a page to the support of this quack. The same issue had a detailed and sympathetic report on a seer from India, who offers expert and patently true advice on political and personal matters. A few days later the same paper supported a woman who has novel ideas on 'rotational' gravitation. In none of these issues was there a single item on science and technology.

Antiscientific and unconventional ideas have haunted Soviet science on many occasions in the past. In a sense the Lysenko affair was the result of support by the totalitarian state of a set of pseudoscientific concepts. What is important today is that the seeds from which such monstrosities can grow are still around. That is why political backing and media support of antiscientific and irrational ideas are dangerous.

The remarkable thing about pseudoscience and irrational ideas is that their perpetrators are not content with their being considered as mythology; they must be taken as scientific. Thus we read about scientific astrology and scientific healing. Perhaps 'Christian science' was a pioneering attempt at attaching science to mythological thinking as a way to give support to a system of ideas that is anything but scientific. The Bible, and the *Arabian Nights* for that matter, will always be regarded as great writing, as literature, as an important contribution to our culture and civilization, but should we call it science? If that is the only way to make one believe in the message, we have a basic contradiction between the method of scientific cognition and that of artistic, imaginative perception.

We also see the appearance of various occult movements of oriental origin, like the Krishnaites and others. It would be interesting from a social and psychological point of view to understand how much here is due to the search for the exotic and the remote and how much is escapism, fleeing from the realities of life. Because the spread of these ideas is not at all harmless, in 1988 the magazine *Priroda* (the Russian word for nature) published a set of four papers that gave case studies and comments on these and similar developments[7]. This publication of a scientific and critical nature went practically unnoticed, and now we have a veritable deluge of all this mystical, occult and pseudoscientific fringe stuff. One can only come to the conclusion that powerful irrational forces are at work, perhaps even supported and exploited for obscure political reasons.

One is also reminded of the case of Nancy Reagan's astrologer, which recently got a lot of publicity. In the literature of the recent past one can see the treatment of power and mysticism by Leon Feuchtwanger in his book *The Lautensack Brothers* (1949), which depicted life in Hitler's Third Reich. In a more documentary style, the facts provided by S. Goldsmith in *Alsos Mission* (1948) on pseudoscience in Nazi Germany are instructive. In the more distant past one has the well-known chapters in Gibbon's *The Decline and Fall of the Roman Empire* in which there is a classic description of the symptoms of a collapsing rational society and of emerging religion. We may conclude that crises of reason and rationality are a chapter in social anthropology and should really be treated as a subject for study, as a *petit mal* of a society rather than anything else. Then, the professional detachment of the historian is more in place than the attitude of the scientist or journalist personally engaged in this bizarre debate.

Nuclear and technological issues

Five years after Chernobyl its repercussions are very much with us. This accident, the biggest in nuclear history, has been well documented. As a society we, and here I am primarily speaking of the Soviet Union, are not prepared technologically and psychologically, even intellectually, for the realities of the nuclear age. The forces at the command of a nuclear technologist are so great that the appropriate responsibilities and social and legislative guarantees have not been properly developed. This is the main and painful lesson of Chernobyl, which makes it more than a mere technological disaster.

We now see a widespread and profound reaction to the disaster. The consequences of Chernobyl, besides the economic ones, are direct and indirect losses to public health and well-being. Physicians are not even sure what causes more suffering and unhappiness—radiation or fear of it. We must also note the loss of public confidence in science, scientists and even the medical profession. Initially much was done to play down the magnitude of the event and even to misinform the public about the true consequences following pressure from those in power: the coming of nuclear *glasnost* is long and painful. Can we blame the public for the widespread resentment towards nuclear energy, and with it towards much of technology? This resentment has led to a full stop for all new nuclear power stations in the USSR.

Of great public significance is the protest, even revolt, against nuclear testing in Kazakhstan. It has become a major public issue, both socially and on a regional governmental level. This makes it practically impossible to continue testing in that nuclear-ridden republic. Conditions at the northern test site at Novaya Zemlya are not much better (for the bomb makers). In a sense these reactions towards testing are benign.

The nuclear testing issue as a whole is the result of the utterly monstrous and irrational accumulation of nuclear weapons as an outcome of the arms race. It is an issue of its own, going well beyond these local protests and public feelings. One may even say that the arms race is a global demonstration of the mechanistic hope for a technological fix for social problems. Here the proof of the futility of power has been reached at too great a cost for all parties concerned.

In observing the recent origins of irrationality it is not surprising that it also may be found within the military. I was told by the political officer of a large battleship that they once found a flourishing extreme cult group among their young sailors. When I asked how it could have ever happened, he said, 'You think we really know what is going on in the damp and dark of the ten decks of our ship?'

In the crisis-stricken scientific and military industrial complex that is the Soviet Union today, we have a breeding ground for the irrational. At a recent international seminar on converting space industry to peaceful purposes, an accompanying exhibition had a large booth devoted to UFOlogy. One could hardly find a better demonstration of mild psychotic disorder and poor photographic technique! Even in certain areas of research supported by the military, some *glasnost* and exposure to public scrutiny would be helpful, if not necessary, for normal development.

In 1978, during a conversation with Olof Palme, I asked him how it came about that he lost his premiership in Sweden on the issue of nuclear energy. He said that the country balked from paying attention to educating the public on these matters. This by a former prime minister of one of the most civilized countries in Europe! Any meaningful effort in nuclear energy should begin with a thorough educational programme for the public, and for the scientists, engineers, administrators and legislators.

In the Soviet Union the outspoken movements against technology are not limited to things nuclear. In Moscow public protests have halted construction of a large power station that was to be run on natural gas. Following public demands expressed by a growing environmental movement, many metallurgical, chemical and biochemical plants are to be closed. The result may be long delays in industrial development. The prime minister has issued a strong warning on these matters. I am not sure who is right—the technocratically minded government, which now recognizes the environmental dangers, or the ecologists, who are at a loss as to how to face the pressures and demands of the industrialized world. How to reconcile the honest feelings of the 'greens', who have done so much to make us all aware of the environment and of a rational approach to and a reappraisal of the demands of modern industry, is an issue of great importance, probably requiring a systematic study of its own. If a sensible solution cannot be found, the outcome may be a general decline in standards of living.

In considering the deep and irrational powers that motivate people, even more pronounced than the ecological concepts are those of national identity. The sense of belonging to a group, a tribe, a nation is of such fundamental importance that here again only the social anthropologist can offer an explanation of the origin of these feelings. It must be recognized that they certainly are much stronger than the seemingly rational allegiance to a class distinguished by economic status. The power of national feelings can be illustrated by ethnic jokes. Most people now consider them to be in poor taste, offensive and not proper, although they may be really funny and nicely absurd. Today, with the marked growth of nationalism of all kinds, ethnic jokes are taken to be quite out of place.

It is also well known that both the military and the clergy usually do not approve of any jokes coming from laymen on matters of war or religion. During his years as a student my brother had to spend a couple of months at a military camp. He came to me for a book to read and I gave him the Czech author Hasek's *The Good Soldier Schwejk*. The effect was immediate—all the immortal characters of Hasek were projected and identified among the subalterns and officers. The authorities confiscated the book and reprimanded my brother for subverting the spirit of the army. The modern Russian writer Voinovich had to emigrate for his satire *The Adventures of Private Chonkin*, which proved too much for our military ideologues, just as Salman Rushdie's *The Satanic Verses* was not considered to be in any way funny by muslim fundamentalists.

To a scientist and to most reasonable people one of the characteristics of normal behaviour is a sense of humour. In a joke or an absurd story it is the interaction or the clash of the rational and the irrational that is often at the core of this common pattern in human behaviour—one that is so poorly understood. In the anatomy of the human mind, the division into the logical and analytical, and the pictorial and holistic is taken to correspond to the left and right sides of our brain. The fusion, match or lack of communication between these complementary parts of the human brain is probably at the basis of the whole range of emotions. At any rate, this can be offered as a conjecture, although many may consider it to be too simplistic in explaining the behaviour of the complete human being[9].

The message of science

The controversy between the rational that has become wrong and the irrational

that is partially right but basically wrong can be seen in popularizing science. This is part of the crisis of rationality that is so important in its social consequences. Some years ago I conceived the idea of a public dialogue, based partly on my own experience of a discussion on the Bermuda Triangle mystery, between an astronomer and an astrologer. The astronomer is a leading authority on the sun. For him the great enigma is the discrepancy in the number of neutrinos measured from the sun and the flux of energy observed. In other words he is not sure why the sun shines. This expert but hesitant scientist would certainly lose in a debate with a slick astrologer, a member of an ancient and established profession, whose powers of persuasion are the main source of his living. I will remind you of the classic debate between the Bishop Samuel Wilberforce and T. H. Huxley. The great protagonist of evolution won more by his famous remark linking his origin to that of an ape than by scientific reasoning. Public debate is a powerful didactic device in propagating and teaching science, while professional discussion is usually carried out with little publicity and follows the established procedure of science. The case of cold fusion shows what can happen when this procedure is not observed.

It is fascinating that in the Soviet Union we are now importing creationism from the US, for recently an American film on the biblical origin of mankind was shown on television without any comment from a scientist. After decades of Darwinian indoctrination we now have our own creationists of a religious—not of a Lysenkoist—persuasion.

Carl Sagan of Cornell University told me that in the US there are 15,000 astrologers and only 1500 astronomers. On the other hand, Kepler, whose worries about his mother I have already mentioned, was a practising astrologer, and wrote three horoscopes for himself. In his horoscope Kepler notes that he was conceived on 16 May 1571 at 4.37 a.m. and born on 27 December at 2.30 p.m., after 224 days, nine hours and 53 minutes of pregnancy. Today, our popular and progressive newspaper *Young Communists of Moscow* gives detailed advice regarding the proper hours for sexual activities in the daily horoscope. Astrology on all counts is both an exact and a practical science!

It should be noted that with the comeback in the USSR of established religion as a messenger of morals we still have not built up the rational equivalent of these pressing issues left in the ashes of the totalitarian state ideology and have turned back to traditional beliefs. The whole problem of providing a rational and humane basis for a system of morals is of great current and general importance. Human rights are a powerful common denominator in these matters. Here studies in comparative theology are instructive. Hans Küng[10] has shown that all major religions have a large common component in their moral teachings. This is a message to all sectarians and those who think that they and only they are in possesion of the 'truth', be it political, moral or religious. We must also consider the moral responsibilities of scientists in these issues, a subject that is certainly attracting much attention[11].

In the Soviet Union today there is a resurgence of interest in the trend in Russian philosophy associated with N. Fedorov and the attempts to reconcile science and religion in a humanistic and holistic framework. The outcome became an important connection to the conceptual tradition of Eastern christianity and to the destiny of humankind. Here the legacy of Vernadskii in natural sciences and of the moral philosophers is significant.

The fundamental interest in the unknown, be it our personal future or the behaviour of distant planets, has led mankind to great discoveries in science. Our spirit of invention has led to development of technology. Can we really find fault because these deep and inherently human trends are sometimes misguided and hardly ever are as direct and logical as they may seem later to the rational mind[12]?

Delivering the message

Today perhaps more than at any other time we should give attention to spreading the message of science—not so much to popularizing science, 'making it easy', but rather to developing social attitudes towards matters scientific. Unfortunately in the Soviet Union there is now a decline of what was a traditionally significant effort. We cannot in a direct way fight the manifestations against science. These are symptoms of a malaise lying at deeper levels, and social maladjustments are not so simply treated. A sustained and systematic effort at propagating science as part of modern culture is important for the future, for the generations yet to come, rather than for those who are here now. We must also think in terms of a worldwide effort at propagating science, especially to develop public attitudes towards global matters. This is a major and yet unresolved issue of its own that should become part of the global scientific community's effort. With the emergence of global studies, greater attention should be given to propagating this message.

The instrument for that is here. We now have global television networks operating round the clock. Unfortunately not much has been done to use these remarkable facilities to spread the message of global thinking. Can we hope that now, with a growing understanding of the challenge and the need of propagating this new thinking, means will be found both to work out and to deliver this message? If we do not aim for the great, even the abstract and the remote, we shall hardly manage to influence matters of human conduct in everyday life. That is certainly one of the lessons of the experience of the major religions. Today it is the responsibility of the media to handle these matters in a sensible and, hopefully, rational way.

With the appearance of symptoms of the crisis in art and other expressions of the public mood, we must ask to what extent they reflect a social phenomenon and to what extent they may be responsible for propagating the malaise. In a fundamental way this is what determines the ultimate responsibility of those who control the media and of the artist or writer whose influence may be broadcast. To put it another way, should one, indeed could one, have stopped Hitler by not publishing *Mein Kampf*? On the other hand it is well known how extensively totalitarian regimes use the media to subjugate and control people under their rule. I do not want to say that there is a solution to such dilemmas, yet one cannot but think in these terms, especially at a turbulent period of critical change when causes and consequences are all mixed up.

Of special importance is education of the statesman and the legislator in matters of science. This is a complex issue, where much depends also on the scientist, the extent to which he will

work with the bureaucracy of the government, and the extent to which he can become part of the body politic without losing his intellectual and moral identity. In other words, to what extent are the elite and academic to be on tap but not on top? Perhaps the best way is to take the future governor through university, begin the educational process as early as possible. In fact education at all levels is the single most important factor, the key to our future.

Recently, especially after the demise of official Soviet ideology, attention has been drawn to introducing the humanities into the curricula of our scientific and technical universities. At the Moscow Institute for Physics and Technology, on the initiative of the rector N. V. Karlov, a systematic effort has been made to offer lectures and courses on history of culture, religion and art, and history of science and civilization. This is a welcome trend in our scientific and technical education, and has been met with much enthusiasm by our students. It will certainly help somewhat to shift the educational effort from the technocratic style that was prevalent and still dominates much of the teaching towards a more humanistic one. Critics ask what such courses contribute to the training. The answer is that what really matters is education. Unfortunately this is not properly appreciated, although in the long run this is what led to Chernobyl.

The way out

I can only hope that good will prevails. The price that the Soviet Union has paid in the past to the demands of vulgar and egalitarian rationality is so enormous that we may understand, if not excuse, the current outburst of irrationality. But what we must be concerned about are the limits to which this tendency may develop. Soviet society has been described as a neurotic society. Perhaps this neo-Freudian concept helps in describing the state of the public mind and spirit, as one of frustration, due to insecurity engendered by rapid change. For, in spite of its inhuman nature, our past did offer security and stability, although at a very low level of lifestyle.

The changes taking place now in the Soviet Union are the reason for the current upsurge of the irrational. What is important is that it may be a signal of emerging extremism. Responsible and observant social thinkers and writers have pointed out that that is the real danger. Unfortunately, in the past, many intellectuals have given support to extremism in the belief that the extreme may be just as right in public life as it is in art and science. But with the importance and responsibility of modern science and technology we see that this simplistic attitude is not sufficient to resolve the issues at stake.

I should like to remind readers of the remarkable book *Vekhy* (Russian for signposts) published in 1909 by a group of Russian philosophers[13]. It is a profound and timely warning about the responsibilities and duties of the intelligentsia in social matters. Published in the aftermath of the first Russian revolution of 1905, it speaks in a direct and outspoken way on the dangers of revolutionary political extremism. The book was considered anathema to the political theories of Lenin and of the Bolshevik party and absolutely forbidden in the Soviet Union. Recently it was reprinted in a mass paperback edition. On the other hand a prophetic treatment of political extremism in a Russian setting was given by Dostoyevsky in *The Possessed* (1872). As is often the case, art is well ahead of social theory and practice.

I do hope that in recognizing and studying the current crisis we will reach the right conclusions and act correspondingly and responsibly. In a basic way we are once again looking at the fundamental disparities between our cultural experience and our technological civilization. This is an age-old and well-established dilemma of the human predicament, and is now appearing in a new and less familiar way.

1. This point of view is discussed in detail by V. Toporov in 'After defeat' published in *Neva*, No. 6, 1990. An English translation was distributed as a Pugwash paper.

2. S. Averintzev, 'The two births of European rationalism' published in *Voprosy Filosofii*, No. 3, 1989, pp. 3–13 (in Russian). A fine essay on the Greek origins and that in the Renaissance and Enlightenment of rationalism and democracy.
3. R. Robbins, *Encyclopaedia of Witchcraft and Demonology*, London, 1984, pp. 179–180.
4. S. Kapitza, 'Issues in the popularization of science' published in *Impact of Science on Society*, No. 152, 1985, pp. 317–326, Paris.
5. C. Lévi-Strauss, *Myth and Meaning*, New York, 1978; see also *Structural Anthropology* and *Mythologies*.
6. B. Rauschenbach, 'Religion and morality', in *Znamya*, No. 1, 1991, pp. 204–216 (in Russian). A recent treatment of the subject by a leading Soviet scientist.
7. 'By another one's mind', in *Priroda*, No. 10, 1988, pp. 66–83 (in Russian).
8. A remarkable discussion of the legacy of Dostoyevsky and *The Possessed* has been given by Yu. Karyakin: *Dostoyevsky on the Eve of the Twentyfirst Century*, Moscow, 1989.
9. Interesting comments may be found in R. Gregory, *The Oxford Companion to the Mind*, Oxford University Press, 1987; see entry on humour.
10. H. Küng, *Comparative Studies in World Religions*, 1990.
11. The whole issue of morals and science and ethics for scientists has recently attracted much attention, becoming the subject of discussions on an international level in Pugwash and in the World Science Institute, established by the Collège de France group of Prof. A. Lichnerovicz.
12. A first-class presentation of the case for science is given by P. Medawar, *Pluto's Republic*, London, 1982.
13. *Vekhy*, collection of papers by Russian intelligentsia (1909); reprint edition, Novosti, Moscow, 1990 (in Russian). In 1918 the next book *De Profundis* was published, in which the painful and tragic outcome of the October Revolution is examined. In 1922 most of its authors were exiled to Europe. Those who stayed perished in the camps.
14. E. Fromm, *The Heart of Man*, 1964; *Escape from Freedom*, 1941.

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