



**ONLY THEN SHALL
WE FIND COURAGE**

By **ALBERT EINSTEIN**

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In an Interview with Michael Amrine

MANY persons have inquired concerning a recent message of mine that "a new type of thinking is essential if mankind is to survive and move to higher levels."

Often in evolutionary processes a species must adapt to new conditions in order to survive. Today the atomic bomb has altered profoundly the nature of the world as we know it, and the human race consequently finds itself in a new habitat to which it must adapt its thinking.

In the light of new knowledge, a world authority and an eventual world state are not just *desirable* in the name of brotherhood, they are *necessary* for survival. In previous ages a nation's life and culture could be protected to some extent by the growth of armies in national competition. Today we must abandon competition and secure cooperation. This must be the central fact in all our considerations of international affairs; otherwise we face certain disaster. Past thinking and methods did not prevent world wars. Future thinking *must* prevent wars.

MODERN war, the bomb, and other discoveries present us with revolutionary circumstances. Never before was it possible for one nation to make war on another without sending armies across borders. Now with rockets and atomic bombs no center of population on the earth's surface is secure from surprise destruction in a single attack.

America has a temporary superiority in armament, but it is certain that we have no lasting secret. What nature tells one group of men, she will tell in time to any group interested and patient enough in asking the questions. But our temporary superiority gives this nation the tremendous responsibility of leading mankind's effort to surmount the crisis.

Being an ingenious people, Americans find it hard to believe there is no foreseeable defense against

atomic bombs. But this is a basic fact. Scientists do not even know of any field which promises us any hope of adequate defense. The military-minded cling to old methods of thinking and one Army department has been surveying possibilities of going underground, and in wartime placing factories in places like Mammoth Cave. Others speak of dispersing our population centers into "linear" or "ribbon" cities.

Reasonable men with these new facts to consider refuse to contemplate a future in which our culture would attempt to survive in ribbons or in underground tombs. Neither is there reassurance in proposals to keep a hundred thousand men alert along the coasts scanning the sky with radar. There is no radar defense against the V-2, and should a "defense" be developed after years of research, it is not humanly possible for any defense to be perfect. Should one rocket with atomic warhead strike Minneapolis, that city would look almost exactly like Nagasaki. Rifle bullets kill men, but atomic bombs kill cities. A tank is a defense against a bullet but there is no defense in science against the weapon which can destroy civilization.

OUR defense is not in armaments, nor in science, nor in going underground. Our defense is in law and order.

Henceforth, every nation's foreign policy must be judged at every point by one consideration: does it lead us to a world of law and order or does it lead us back toward anarchy and death? I do not believe that we can prepare for war and at the same time prepare for a world community. When humanity holds in its hand the weapon with which it can commit suicide, I believe that to put more power into the gun is to increase the probability of disaster.

Remembering that our main consideration is to avoid this disaster, let us briefly consider international relations in the world today, and start with America. The war which began with Germany using

weapons of unprecedented frightfulness against women and children ended with the United States using a supreme weapon killing thousands at one blow.

Many persons in other countries now look on America with great suspicion, not only for the bomb but because they fear she will become imperialistic. Before the recent turn in our policy I was sometimes not quite free from such fears myself.

Others might not fear Americans if they knew us as we know one another, honest and sober and neighbors. But in other countries they know that a sober nation can become drunk with victory. If Germany had not won a victory in 1870, what tragedy for the human race might have been averted!

We are still making bombs and the bombs are making hate and suspicion. We are keeping secrets and secrets breed distrust. I do not say we should now turn the secret of the bomb loose in the world, but are we ardently seeking a world in which there will be no need for bombs or secrets, a world in which science and men will be free?

While we distrust Russia's secrecy and she distrusts ours we walk together to certain doom.

THE basic principles of the Acheson-Lilienthal Report are scientifically sound and technically ingenious, but as Mr. Baruch wisely said, it is a problem not of physics but of ethics. There has been too much emphasis on legalisms and procedure; it is easier to denature plutonium than it is to denature the evil spirit of man.

The United Nations is the only instrument we have to work with in our struggle to achieve something better. But we have used U. N. and U. N. form and procedure to outvote the Russians on some occasions when the Russians were right. Yes, I do not think it is possible for any nation to be right all the time or wrong all the time. In all negotiations, whether over Spain, Argentina, Palestine, food or atomic energy, so long as we rely on procedure and keep the threat of military power, we are attempting to use old methods in a world which is changed forever.

No one gainsays that the United Nations Organization at times gives great evidence of eventually justifying the desperate hope that millions have in it. But time is not given to us in solving the problems science and war have brought. Powerful forces in the political world are moving swiftly toward crisis. When we look back to the end of the war—it seems ten years ago! Many leaders express well the need for world authority

and an eventual world government, but actual planning and action to this end have been appallingly slow.

PRIVATE organizations anticipate the future, but government agencies seem to live in the past. In working away from nationalism toward a supra-nationalism, for example, it is obvious that the national spirit will survive longer in armies than anywhere else. This might be tempered in the United Nations military forces by mixing the various units together, but certainly not by keeping a Russian unit intact side by side with an intact American unit, with the usual inter-unit competition added to the national spirit of the soldiers in this world enforcement army. But if the military staffs of the U. N. are working out concrete proposals along these lines, for a true internationally minded force, I have yet to read of it.

Similarly, we are plagued in the present world councils over the question of representation. It does not seem fair to some, for example, that each small Latin-American nation should have a vote while much larger nations are also limited to one vote. On the other hand, representation on a population basis may seem unfair to the highly developed states, because surely great masses of ignorant, backward peoples should not carry as much voice in the complicated technology of our world as those with greater experience.

Fremont Rider in an excellent book, "The Great Dilemma of World Organizations," discusses the idea of representation on the basis of education and literacy—number of teachers, physicians, and so on. Backward nations looking forward to greater power in the councils of men would be told, "To get more votes you must *earn* them."

THESE and a hundred other questions concerning the desirable evolution of the world seem to be getting very little attention. Meanwhile, men high in government propose defense or war measures which would not only compel us to live in a universal atmosphere of fear but would cost untold billions of dollars and ultimately destroy our American free way of life—even before a war.

To retain even a temporary total security in an age of total war, government will have to secure total control. Restrictive measures will be required by the necessities of the situation, not through the conspiracy of wilful men. Starting with the fantastic guardianship

now imposed on innocent physics professors, outmoded thinkers will insidiously change men's lives more completely than did Hitler, for the forces behind them will be more compelling.

BEFORE the raid on Hiroshima, leading physicists urged the War Department not to use the bomb against defenseless women and children. The war could have been won without it. The decision was made in consideration of possible future loss of American lives—and now we have to consider possible loss in future atomic bombings of *millions of lives*. The American decision may have been a fatal error, for men accustom themselves to thinking a weapon which was used once can be used again.

Had we shown other nations the test explosion at Alamogordo, New Mexico, we could have used it as an education for new ideas. It would have been an impressive and favorable moment to make considered proposals for world order to end war. Our renunciation of this weapon as too terrible to use would have carried great weight in negotiations and made convincing our sincerity in asking other nations for a binding partnership to develop these newly unleashed powers for good.

THE old type of thinking can raise a thousand objections of "realism" against this simplicity. But such thought ignores the *psychological realities*. All men fear atomic war. All men hope for benefits from these new powers. Between the realities of man's true desires and the realities of man's danger, what are the obsolete "realities" of protocol and military protection?

During the war many persons fell out of the habit of doing their own thinking, for many had to do simply what they were told to do. Today lack of interest would be a great error, for there is much the average man can do about this danger.

This nation held a great debate concerning the menace of the Axis, and again today we need a great chain reaction of awareness and communication. Current proposals should be discussed in the light of the basic facts, in every newspaper, in schools, churches, in town meetings, in private conversations, and neighbor to neighbor. Merely reading about the bomb promotes knowledge in the mind, but only talk between men promotes feelings in the heart.

Not even scientists completely understand atomic energy, for each man's knowledge is incomplete. Few men

have ever seen the bomb. But all men if told a few facts can understand that this bomb and the danger of war is a very real thing, and not something far away. It directly concerns every person in the civilized world. We cannot leave it to generals, Senators, and diplomats to work out a solution over a period of generations. Perhaps five years from now several nations will have made bombs and it will be too late to avoid disaster.

IGNORING the realities of faith, good-will and honesty in seeking a solution, we place too much faith in legalisms, treaties, and mechanisms. We must begin through the U. N. Atomic Energy Commission to work for binding agreement, but America's decision will not be made over a table in the United Nations. Our representatives in New York, in Paris, or in Moscow depend ultimately on decisions made in the village square.

To the village square we must carry the facts of atomic energy. From there must come America's voice.

This belief of physicists prompted our formation of the Emergency Committee of Atomic Scientists, with headquarters at Princeton, N. J., to make possible a great national campaign for education on these issues. Detailed planning for world security will be easier when negotiators are assured of public understanding of our dilemmas.

Then our American proposals will be not merely documents about machinery, the dull, dry statements of a government to other governments, but the embodiment of a message to humanity from a nation of human beings.

SCIENCE has brought forth this danger, but the real problem is in the minds and hearts of men. We will not change the hearts of other men by mechanism, but by changing *our* hearts and speaking bravely.

We must be generous in giving to the world the knowledge we have of the forces of nature, after establishing safeguards against abuse.

We must be not merely willing but actively eager to submit ourselves to binding authority necessary for world security.

We must realize we cannot simultaneously plan for war and peace.

When we are clear in heart and mind—only then shall we find courage to surmount the fear which haunts the world.

Is Einstein Right?

By CHRISTIAN GAUSS

IN THE course of the past summer Professor Einstein issued a statement designed to shock the public out of its complacency. He was evidently deeply concerned, for he followed it shortly thereafter by an interview which he gave to the *New York Times*. Everyone who knows Professor Einstein realizes that he has all his life been unwilling to step out of his role as scientist, to make any statements on public questions. His work has done more than that of any other man to direct the thinking of our time into those channels which have finally resulted in the creation of the atomic bomb. He had accepted the chairmanship of the Emergency Committee of Atomic Scientists and had done this, not in order to stimulate further research along scientific lines, but to startle you and me into a sense of our new responsibility. Our victory in World War II, he tells us, is portentous, for it was achieved at the cost of a revolution. The nature of this revolution must be immediately recognized and its possible consequences forestalled, if our civilization is to continue. "A world authority and eventually a world state are now not merely desirable in the name of brotherhood; they are necessary for survival."

When Professor Einstein tells us that we must carry the facts of atomic energy to the man in the village square he indicates that significant political action is called for and that he believes in the democratic process. This is not for the moment our primary concern. When he tells us, however, that "a new type of thinking is essential if mankind is to survive," it is worth our while to inquire whether this involves a reorientation of the type of thinking done by scholars and university professors, and why this is necessary. Let us consider briefly the nature of the problem with which the scientists have confronted their colleagues in other fields of study.

New theories on the nature of our world and new inventions have, of course, influenced civilization in the past. The American anthropologist, Morgan, in the nineteenth century, found that even in primitive

forms of social organizations, inventions or the rudimentary applications of technology were so important that they could serve as a basis for determining the nature and degree of civilization. A very few of these inventions, like the use of fire and the manufacture of pottery in which men could cook their food, were sufficient to raise them from what he called "savagery" to "barbarism." The addition of a few other discoveries, like agriculture, the domestication of animals, the use of metals, the invention of the wheel, were sufficient to lift them from barbarism to the civilized state. We are not here concerned with the reasons that led later students to abandon Morgan's specific gradations. All of us are familiar with the somewhat similar classification of various epochs into the stone age, the iron age, the bronze age, etc. In the discussions of the reasons for the decline of particular civilizations which have reached a high degree of development, this question of the applications of science and technological invention has persistently reappeared. We shall mention but one instance.

A distinguished nineteenth century scientist, Liebig, and the well-known German scientist and historian, Du Bois-Reymond, carried on a discussion which may possibly have some relevance here. Roman civilization had reached a point of development considerably higher than that of any of the peoples outside Rome's dominion. Why was it that this civilization should have collapsed and the Roman Empire have fallen? One of the learned debaters held that the Roman Empire fell because of the Romans' ignorance of phosphoric acid, or as we would say today, chemical fertilizer. It was this ignorance which prevented the Romans from restoring the fertility of their exhausted soil. The other believed that it was the Romans' ignorance of gunpowder; with it they could easily have repelled barbarian attacks upon their far-flung frontiers.

THE seriousness of the problem and the standing of the debaters were such that reverberations of this debate can still be found in the pages of learned journals. That the results were so largely negative should be ascribed to the fact that Liebig and Du Bois-Reymond dealt not with the disease which was to

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prove fatal, but only with two of its symptoms. To hold her empire together Rome needed also a more rapid and effective means of communication; and we might with almost equal justice ascribe the fall of Rome to her ignorance of the telephone or telegraph. She needed also a more rapid and effective system of transport, and though the Romans knew the principle involved in the phenomenon which Watt utilized in developing the steam engine, the possibilities of steam power never seemed to tempt them.

The malady of which the Roman Empire died went much deeper. The Roman mind which excelled in its capacity for law and administration remained oriented toward the past and was essentially unimaginative. The forces which had been adequate to found and protect the original city on the seven hills were no longer adequate to rule and maintain an empire which embraced the Mediterranean world. She failed to recognize that in expanding her empire, she had altered the nature of her problem. She never dreamed of creating the technological instruments which might have assured her dominion over her over-extended and increasingly impoverished domain. Necessity could not become the mother of invention for a people who remained complacently ignorant even of their needs.

If, in its technological aspect, Rome's predicament was then the opposite of ours, in one sense we are suffering from the same malady. We must realize that a civilization which is altered in one of its aspects cannot remain anchored to its past. It must orient itself toward the future. It must reverse its time sense. In Einstein's words, "A new type of thinking is essential if mankind is to survive."

IN ASSESSING our present situation we must, however, bear in mind that in terms of increased power for constructive or destructive purposes placed at the disposal of men, gunpowder and steam power were petty and minor inventions. It is impossible to establish anything like a ratio between them and the bomb. We may gather some idea of the potentialities involved in nuclear fission if we consider one of Professor Einstein's equations, $E = mc^2$. Here "E" represents energy expressed in ergs; "m," mass in grams; and "c," the speed of light in centimeters per second. This has been interpreted to mean that "every pound of any kind of matter contains as much energy as is given off by the explosion of fourteen million tons of T.N.T." We may momentarily console ourselves by remembering that present methods of nuclear fission release only a fraction of this theoretically possible power. But

even so, the little bomb which was dropped on Hiroshima and killed eighty thousand civilians and demolished a city was of an incommensurably greater order of magnitude. If the revolutionary adjustments demanded are in any sort of proportion to power released, then scholars would do well to realize that figuratively speaking, the bomb has fallen on their own heads as well.

Philosophers used to tell us that there was no such thing as an isolated problem. No problem in any field could be finally insulated from the problems in other fields. Every problem in science or politics impinged, for instance, on problems of ethics, religion and art. This was merely another way of expressing what we used to call the unity of knowledge.

At about the time of Du Bois-Reymond's speculations on the decline of Rome, the French historian and critic, Taine, reformulated the principle into a law governing the development of civilizations. He called it the Law of Mutual Dependence. According to Taine, this meant that any signal advance (or retrogression) in politics, for instance, must, if the civilization is to remain in balance, induce compensatory changes in law, religion, literature, social organization, etc. The same would of course be true of significant advances in science.

PROFESSOR EINSTEIN then is right in appealing for immediate significant compensatory change in our present political organization. The nation-state with sovereign powers, including the power to make war, was becoming anachronistic with the invention of more effective systems of communication and transport. It is now totally obsolete as an instrument for the protection of the culture and life of its people; and any attempt to maintain pretensions to "sovereign rights" must spell disaster to its own people as well as to our world. Many other cherished notions, such as that which holds that the primary function of governments is to promote and protect "free enterprise," when this may result in the manufacture and traffic in incommensurably greater quanta of energy, are now subject to revision.

What is called for is an extension of the frame of reference against which the validity and permissible limits of human conduct must be judged. This clearly involves the extension of the sphere of law to global dimensions, and a new and global enforcement agency. It is a staggering problem of readjustment, reconstruction and re-education.

What concerns us here is the degree of assistance

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judgment that the true greatness of a work of art depends upon the degree to which it transcends temporal and nationalistic limitations.

So Cervantes' *Don Quixote* is not great because of the Spanish and the seventeenth-century characteristics which it undoubtedly possesses. It is great because Germans, Frenchmen, Czechoslovakians, Russians and Americans today may still understand and enjoy it, and recognize that it presents so significant an aspect of human life and character that they may call one of their own friends "quixotic" without the slightest implication that he is either seventeenth-century or Spanish.

Scientists have long been engaged in the greatest cooperative global enterprise known to man. Biology, astronomy, mathematics, physics, chemistry, have known no nationalistic limitations. These sciences have been advanced by the coordinated work of men of many nations, just as nuclear fission has been accomplished by the cooperation of men of varied national origins. It is easier for them to give political reality to this world in which they have in part lived and moved and had their being, with no loss of freedom and much profit to themselves.

It should also be easier for students and teachers of religion who admit the moral validity today of ideals set forth by Jesus and spread by Jews in Palestine nineteen hundred years ago. They might assist their colleagues teaching the innumerable new post-war courses in American Civilization, to explain why it is that Christmas, the anniversary of His birth which occurred so far beyond the temporal and geographic limits of the United States, still arouses a deeper emotional response in Americans than even our own Fourth of July.

It will be far more difficult for practitioners of other disciplines who consciously or not have helped to

education from scholars and teachers engaged in other disciplines. The immediate prospect is not encouraging. In the shaping of the modern mind the historians have probably played the major role, and their histories in large measure have been nationalistic. They have tended to emphasize as most significant the unique, particular and incommensurable aspect of every age and people. The objectivity which many of them assume their science demands, leads them to refrain from passing moral or "value" judgments. The nation, they say, is the product of historic forces which have operated in the past, and their operation is the *ultima ratio mundi*.

In this dispensation, history makes men. It is not men, like Lenin, Hitler and Mussolini and, in a quite different realm, Einstein, who make history. This orientation toward the past is nevertheless supposed by many to teach us more effectively than any other discipline how to act wisely in the present. Anyone who holds that in any important new situation wise decisions must be oriented toward the future and based on considerations of human welfare is usually regarded as a visionary or an ignoramus. In connection with the claim that history alone, or history primarily, can teach us to make wise decisions in the present, it is worth considering whether even the most accurate and dispassionate account of every stage that led to the invention and dropping of the bomb could help us very much in reaching a wise solution of the problem with which science has confronted us. Nor can the teaching of more courses in American history, now so widely advocated, help us greatly to transcend the limits of our nationalistic thinking—an act which scientists feel is the only read to security and human welfare. "Americanism," as inculcated in numerous history textbooks, and interpreted by congressional committees, has suddenly become more dangerously