

The Arms Race

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I

Fanciful scientists have discussed the possibility of colonising the solar system, but meanwhile we have only one world and we have created a situation which threatens to make it uninhabitable. When I say *we* I am referring to the generation of the human race now extant, led and manipulated by the ruling powers of the great industrial nations. The peril threatening the world arises from a technological development in warfare. Over the centuries wars have been growing more and more destructive, but up till now it was always possible to restore the economic base of the countries concerned after the war was over. From nuclear destruction there is no recovery.

This has been proved both by a priori calculations and by an actual demonstration. A large area in the Urals in Russia was ruined by an accidental explosion (believed to have been in a deposit of waste nuclear fuel), which not only destroyed all man-made structures and all animal and vegetable life but rendered the place uninhabitable and uncultivable for hundreds of years, if not forever.

The exploitation of nuclear power threatens not only the basis of the livelihood of mankind but also human life itself.

In view of the threat that nuclear technology poses to the ecosphere, we must acknowledge that *Homo sapiens* has reached an evolutionary turning point. Thousands of tons of radioactive materials, released by nuclear explosions and reactor spills, are now dispersing through the environment. Nonbiodegradable, and some potent virtually forever, these toxic materials will continue to accumulate, and eventually their effects on the biosphere and on human beings will be grave: many people will begin to develop and die of cancer; or their reproductive genes will mutate, resulting in an in-

creased incidence of congenitally deformed and diseased offspring — not just in the next generation, but for the rest of time. An all-out nuclear war would kill millions of people and accelerate these biological hazards among the survivors: the earth would be poisoned and laid waste, rendered uninhabitable for aeons.¹

Dr. Helen Caldicott includes the effects of accidents from nuclear power stations in this warning. The pros and cons of civilian use of nuclear power is a subject that I cannot go into here, but I must object that those who glibly protest that coal mining is also dangerous have not taken in the point. The damage caused by nuclear poison is not just to some unlucky individuals but to the pool of genes to be passed on to future generations. The peril is not just to us, who are alive today, but to the human race itself.

The stockpile of arms in the world today provides: “enough firepower . . . to destroy every city on earth seven times over. Still, the arms race continues, the weapons multiply and become more specialized, and the likelihood of their utilization grows. . . . Countries, driven by fear and a mutual distrust bordering on the pathological, are locked into a suicidal strategy calling, in the words of the Pentagon, for ‘mutually assured destruction’ (MAD) as the best deterrent to war. But ‘arms for peace’ and ‘security through mass genocide’ are strategies that defy logic and common sense. They epitomize our nuclear madness.”²

How has this situation been allowed to arise? Mainly, I suppose, because the whole subject is so horrifying that we prefer not to think about it and, in each country, leave the notions of various so-called experts and the interplay of various vested interests to shape our history for us. But just not to think about it makes it all the more dangerous.

¹ Helen Caldicott, with the assistance of Nancy Herrington and Nahum Stiskin, *Nuclear Madness: What You Can Do!* (New York: Autumn Press, 1979), p. 17.

² *Ibid.*, p. 83.

Before we begin, one point must be made clear. Military expenditure in each country goes under the heading of “defense.” This is a misnomer. In the case of nuclear missiles there is no defense possible. (Perhaps the development of lasers is going to change the situation, but that is not in sight yet.)

Earl Mountbatten, shortly before he was murdered by an Irish fanatic, issued this warning to the world:

A military confrontation between the nuclear powers could entail the horrifying risk of nuclear warfare. The Western powers and the USSR started by producing and stockpiling nuclear weapons as a deterrent to general war. The idea seemed simple enough. Because of the enormous amount of destruction that could be wreaked by a single nuclear explosion, the idea was that both sides in what we still see as an East-West conflict would be deterred from taking any aggressive action which might endanger the vital interests of the other.

It was not long, however, before smaller nuclear weapons of various designs were produced and deployed for use in what was assumed to be a tactical or theatre war. The belief was that were hostilities ever to break out in Western Europe, such weapons could be used in field warfare without triggering an all-out nuclear exchange leading to the final holocaust.

I have never found this idea credible. I have never been able to accept the reasons for the belief that any class of nuclear weapons can be categorised in terms of their tactical or strategic purposes. . . .

I know how impossible it is to pursue military operations in accordance with fixed plans and agreements. In warfare the unexpected is the rule and no one can anticipate what an opponent’s reaction will be to the unexpected.

. . . .

I repeat in all sincerity as a military man I can see no use for any nuclear weapons which would not end in escalation, with consequences that no one can conceive.

And nuclear devastation is not science fiction — it is a matter of fact. Thirty-four years ago there was the terrifying

experience of the two atomic bombs that effaced the cities of Hiroshima and Nagasaki off the map.

. . . .

We remember the tens and thousands who were killed instantly or worse still those who suffered a slow painful death from the effect of the burns — we forget that many are still dying horribly from the delayed effects of radiation. To this knowledge must be added the fact that we now have missiles a thousand times as dreadful; I repeat, a thousand times as horrible.

. . . .

A new world war can hardly fail to involve the all-out use of nuclear weapons. Such a war would not drag on for years. It could all be over in a matter of a day.

And when it is all over what will the world be like? Our fine great buildings, our homes will exist no more. The thousands of years it took to develop our civilisation will have been in vain. Our works of art will be lost. Radio, television, newspapers will disappear. There will be no hospitals. No help can be expected for the few mutilated survivors in any town to be sent-from a neighbouring town — there will be no neighbouring towns left, no neighbours, there will be no help, there will be no hope.

. . . .

As a military man who has given half a century of active Service I say in all sincerity that the nuclear arms race has no military purpose. Wars cannot be fought with nuclear weapons. Their existence only adds to our perils because of the illusions which they have generated.

There are powerful voices around the world who still give credence to the old Roman precept — if you desire peace, prepare for war. This is absolute nuclear nonsense and I repeat — it is a disastrous misconception to believe that by increasing the total uncertainty one increases one's own certainty.

. . . .

After all it is true that science offers us almost unlimited opportunities, but it is up to us, the people, to make the moral and philosophical choices and since the threat to humanity is

the work of human beings, it is up to man to save himself from himself.

The world now stands on the brink of the final Abyss. Let us all resolve to take all possible practical steps to ensure that we do not, through our own folly, go over the edge.

Earl Mountbatten was a cousin of the Queen of England. He was one of the few survivors of the First World War who rose to high command (in the British navy) in the Second. As Chief of the British Defense Staff he was in charge of the preparations for the invasion of Europe in 1944. He could not be dismissed as a deluded left-wing intellectual or a starry-eyed pacifist, but he did not have much influence on British policy.

When the question of siting neutron bombs in Europe came up in February of 1980, the British Prime Minister "made an indirect appeal to the Netherlands to allow new nuclear missiles to be based on Dutch soil. If you value your way of life — the freedoms we have in the West — you must be prepared to defend it. New nuclear weapons are necessary because of the concentration of them in the Soviet Union," Mrs. Thatcher said.³

The nuclear weapons that are now being developed cannot provide defense. If they are not to be used for aggression they could only be used for revenge. This was forcibly illustrated for us in Cambridgeshire when there was a false alarm last summer. In eastern England automatic gadgets are set up which are intended to give a warning signal when a rocket is detected on its way. This was set off by (I think) a flight of geese. Immediately, from the surrounding aerodromes, loaded planes shot into the air, ready to fly east and drop bombs over there. Their function was evidently not defense but retaliation. What satisfaction would it be, when our homeland was destroyed, to go and destroy the homeland of a supposed enemy? It is certainly a misnomer to describe this as defense.

³ *Guardian* (London), February 7, 1980.

The horror, the lack of logic, and the isolation due to rules of secrecy produce strange aberrations of thought: a high-ranking officer in the Air Defence Command is reported as saying in 1952 that “it was not really our policy” to attempt to defend American civilians against atomic attack “for that is so big a job that it would interfere with our retaliatory capabilities.”⁴

Far from contributing to defense, the production of weapons increases peril. A quaint system has developed of announcing that some new horror will be available in three or five years’ time, so that if the other side is as hostile and aggressive as our propaganda pretends, they would be well advised to “take it out,” as the phrase is, before it can be installed.

Perhaps in the deepest sense we can never understand our own history, but it seems to me to be worthwhile to try to discuss how this dangerous situation has arisen. I suggest three aspects — the Cold War, the momentum of research and development, and the connection of armaments with the problem of employment. I will take up the last topic in my second lecture. The first two will be opened up today.

First, the Cold War. The kaleidoscope of history has brought into existence two great national powers, each with its troop of allies and satellites. This would in any case have been a cause of tension and rivalry, but it so happens that they support two different ideologies — so-called communism in the Eastern camp and so-called freedom in the West — which gives the conflict between them something of the character of the wars of religion. This makes conflict intractable. On both sides, propaganda and indoctrination are used to cover sectional interests, but at bottom there is a solid core of genuine conviction. In the West, we are taught that our side stands for noble ideals and *theirs* for evil. *We* must keep up the struggle to save the world from *them*. Any

⁴ Peter Goodchild, *J. Robert Oppenheimer* (London: B.B.C., 1980), p. 219; published in America as *Robert Oppenheimer: Shatterer of Worlds* (New York: Houghton Mifflin, 1981).

suggestion of relaxation or compromise, unless it can be shown to tell in our favour, is seen as treachery.

The conflict of ideologies smothers self-criticism. The wisest thing that ever was said about politics is, "Look for the beam in your own eye before a mote in the eye of your opponent." Where a clash of faiths is involved the instinctive response is, "But it is they, not we, who have a beam in the eye." This is most damaging to the side that professes freedom as its ideology, for obscurantism and self-righteousness are liable to tarnish that very openness and objectivity which is supposed to be the glory of the Western side.

The self-righteousness and mutual distrust induced by the atmosphere of a war of ideology has been an element in preventing agreement between the two halves of the divided world to eliminate atomic weapons. The very process of building up destructive power contributed to keeping ideological conflict alive. It is clear that for a nation that has an enemy, it is necessary to arm, but it is also true that if a nation has arms it is necessary to have an enemy. To justify armaments, fear and tension have been kept up and each side makes use of the other as a bogey.

The second, and perhaps the main cause of the situation we have got ourselves into is the momentum of research and development. When an idea has once been started it must be pursued without regard to consequences, and once a new weapon or means of attack has been perfected it is extremely difficult to prevent it being added to the stock of means of destruction. The clearest case of this that we have seen so far in the atomic sphere is one of the earliest — the bombing of Nagasaki.

The report that Hitler was developing an atomic bomb activated the Allies to reply in kind. General Groves was the military director of the project and Robert Oppenheimer was in charge of the scientific work. In 1944 it became clear that the German project had been abandoned. One of the American scientists at Los Alamos made the comment to another "If the Germans don't have the bomb then we won't need to use ours." "You don't know

Groves” was the reply. “If we have such a weapon, then we will use it.”⁵

In May 1945 Germany surrendered before the work on the bomb had been completed but there was still Japan. On 16th July 1945 a bomb was tested in the desert at Alamogordo. The story from that date till the surrender of Japan is the subject of a dispute that has recently been revived.⁶ The Japanese army had not been decisively defeated in the wide ranging war in Asia and was now concentrated in Japan. The Allies had decided that an invasion of Japan would be necessary to finish the war. One side in the dispute is based on the argument that the Japanese would have made a desperate suicidal defense which would have cost 500,000 to 750,000 American casualties. On this view, the surrender of Japan was due to the bomb on Hiroshima, which can thus be credited with saving American lives. Joseph Alsop, who supports this side of the argument, maintains that it saved Japanese lives as well because the casualties, military and civilian, caused by an invasion accompanied by “normal” bombing would have been greater than those caused by the atomic bombs.

In the other version of the story, supported by David Joravsky, the suicidal fanaticism of Japanese officers was due to personal loyalty to the Emperor which was threatened by the demand for unconditional surrender. There was a peace party in Japan, supported by the Emperor himself. An official mission had been sent to Moscow in the spring of 1945 to ask Stalin to negotiate terms of surrender. Stalin refused to help. He wanted to keep Japan in the war long enough to permit the invasion of Manchuria, which was set for August tenth, just as the Western allies needed to postpone the surrender until the bomb was ready to be used. On this version the Japanese peace party would have prevailed, at any time after the spring of 1945, provided they had been told that

⁵ *Ibid.*, p. 111.

⁶ *New York Review of Books*, October 23, 1980, and February 18, 1981.

“unconditional surrender” did not rule out retaining the Emperor. On this version, Hiroshima had nothing to do with it.

My friend and colleague Professor Tsuru, at that time a junior member of the Japanese foreign office, was on the unsuccessful mission to Moscow. He does not support Joravsky. His judgement⁷ is that resistance by the Japanese army would have been desperate and would have taken at least a month to overcome, with heavy casualties.

But the story was much more complicated than Alsop allows. The momentum of research was kept up by competition and rivalry *within* home arms production on both sides. Herbert York in the *Advisors* tells the story of the struggle between Teller and Oppenheimer over the hydrogen bomb, which Teller unfortunately won.

There were two different kinds of fission weapons being developed at Los Alamos. One using U235 and the other plutonium. “The design of the U235 bomb was based on particularly simple and straight-forward principles. The plutonium bomb was based on more novel design principles.” It was the plutonium bomb which was tested, successfully, at Alamogordo on July sixteenth. On August sixth Hiroshima was wiped out with the U235 bomb. Hiroshima has given its name to the horror of the epoch that we are now living in and it can be credited with precipitating the surrender of Japan. The plutonium bomb had been tested and was known to work. Why then was it dropped on Nagasaki? What was the point of this overkill?

At the time, several of the European scientists who had contributed to producing the bomb were quite unhappy. Niels Bohr in particular campaigned against its being used unannounced, but he was brushed aside. Otto Frisch, who came to England as a refugee from Hitler, discusses his own attitude.

Some of us said that scientists ought to put their weight behind what they felt to be the right course of action; others

⁷ In a personal letter.

took the line that the cobbler should stick to his last. I remember a story being told about the Greek sculptor Phidias who had completed a new statue of Zeus and hidden behind it to hear what the passing Athenians said. When he heard a cobbler say "The big toe is too large" he came back later at night and chipped a bit off the big toe. The next morning he saw the cobbler pass again, remarking that the toe had been improved but the elbow wasn't right. At that, Phidias stepped out from his hiding place and addressed the cobbler with the words, "When you talk about toes you talk about what you know, and I listen; but I pay no attention when you talk about elbows." The moral being, of course, that scientists should stick to matters of their own competence, and at the time I found that view very plausible. I am no longer convinced that this is always right. Scientists are trained to think objectively and dispassionately, an asset for making decisions of any kind.

We didn't know when the bomb would be dropped in earnest or where it would be dropped. Then one day, some three weeks after Alamogordo, there was a sudden noise in the laboratory, of running footsteps and yelling voices. Somebody opened my door and shouted "Hiroshima has been destroyed!"; about a hundred thousand people were thought to have been killed. I still remember the feeling of unease, indeed nausea, when I saw how many of my friends were rushing to the telephone to book tables at the La Fonda hotel in Santa Fe, in order to celebrate. Of course they were exalted by the success of their work, but it seemed rather ghoulish to celebrate the sudden death of a hundred thousand people, even if they were "enemies". On the other hand there was the argument that this slaughter had saved the lives of many more Americans and Japanese who would have died in the slow process of conquest by which the war might have had to be ended had there been no atom bomb. But few of us could see any moral reason for dropping a second bomb (on Nagasaki) only a few days later, even though that brought the war to an immediate halt. Most of us thought that the Japanese would have surrendered within a few days anyhow. But this is a subject that has been endlessly debated and never settled.⁸

⁸ Otto Frisch, *What Little I Remember* (Cambridge: Cambridge University Press, 1979) pp. 176–77.

It has not been settled yet. A clue lies in the date.⁹ August tenth, the day after Nagasaki, had been agreed on as the date for the Soviet invasion of Manchuria. The invasion was completely successful but all the limelight fell on the bomb. Here the two aspects of our situation, the wars of religion and the momentum of research, combine. In popular opinion, Japan was conquered by American technology, not by Russian military might.

From then on even the pretence of alliance and cooperation between the great powers was abandoned.

The era of the cold war had begun.

Robert Oppenheimer agonised over his responsibility for Hiroshima. In 1951 his rival, Edward Teller, was working on the next generation of means of devastation, the hydrogen bomb. Oppenheimer opposed it and, presumably for that reason, a case was fabricated for questioning his loyalty. He gave way, however, to the momentum of research. The new conception was “technically so sweet you could not argue about that.” “You go ahead and do it and you argue about what to do about it only after you have had your technical success.”¹⁰ Here is the clearest statement of the process which has brought us to where we are.

In 1945, unbeknownst to the West, the Russians were working upon a bomb of their own, a goal they achieved in 1949. (How much help they got from information passed to them by so-called traitors among the Western scientists is not known, but presumably they would have in any case caught up very soon.)

Lord Zuckermann, in his masterly analysis of the role of scientific advisors to governments,¹¹ laments their failure to inhibit the arms race. “It need not have happened but it did.” Zuckermann argues that the race started in 1946 with the refusal of the USSR

⁹ See P. M. S. Blackett, *Fear, War and the Bomb* (New York: McGraw-Hill, 1947).

¹⁰ Goodchild, *op. cit.*, p. 210.

¹¹ “Science Advisors and Scientific Advisors,” *Proceedings of the American Philosophical Society*, vol. 24, no. 4 (August 1979), reproduced as a pamphlet (London: Menard Press, 1980).

to agree to the Lilienthal plan for placing all nuclear technology — military and civil — under UN control.

Behind this refusal lay the force of the war of ideologies. The influence of the West in the United Nations was much greater than that of the Russians and they refused to accept a position of military and industrial inferiority, protected only by a treaty.

In the West, according to Zuckermann,

Fears of Russian capabilities and intentions became acute when the first Sputnik was launched in 1957, and, correspondingly, the Russians became increasingly fearful of the intentions of the West. Warnings that the Russians were well ahead of the U.S.A. in the size of their nuclear missile armoury — warnings of a so-called ‘missile gap’, which we now know did not exist — started to be fostered, and became a powerful political card in the run-up to the 1960 Presidential election. A race into space was launched. Throughout this period both sides were testing nuclear warheads in the atmosphere, with the U.K. participating on its own, but to a lesser extent. Very soon there was world-wide concern about the serious health hazards associated with radioactive fall-out. Formal diplomatic and technical talks were started in Geneva to consider an international agreement to ban all tests.¹²

Zuckermann, who was involved in the discussions, tells us that President Eisenhower and then Kennedy wanted a ban on all tests, and there were some signs that gave reason to believe that Khrushchev had the same goal in mind.

Unfortunately there was also acute opposition to any treaty. Regardless of the world-wide and, from the scientific point of view, thoroughly justified concern about fall-out, there were in fact many — including prominent scientists in the weapons laboratories — who were opposed to any ban on atmospheric tests, leave alone an end to the elaboration of new warheads. Their “hawkish” views carried considerable weight among the military, in congressional committees, and in some sections of

¹² Ibid.

the public, who soon became persuaded that there was something to be gained by continuing the nuclear arms race, and that anyhow the Russians would be bound to cheat, whatever treaty was agreed.¹³

It soon became clear that the Senate would not ratify a treaty for a total test ban unless humiliating terms (on-site inspection) were imposed upon the Russians, which they would obviously not accept.

Herbert York, an insider who, before he resigned, was Director of Defense Research in the Pentagon, wrote, in his powerful book *Race to Oblivion*, that one of the political prices that the President had to pay for even a partial test ban in 1963 “was a promise that the Atomic Energy Commission would embark on a programme of underground tests vigorous enough to satisfy all our military requirements’.”¹⁴

Zuckermann maintains that the top scientific advisors understood the situation very well but they have been continuously frustrated by the momentum of research. A system has developed in which the military chiefs merely serve as a channel through which the men in the laboratories transmit their views.

The pressure from the laboratories has been assisted by exaggerated accounts of the Soviet threat. York refers to a steady flow of “phony intelligence” from a variety of sources, and tells us that “those who had all the facts of the matter and knew there was no real basis for any of these claims [i.e., about Russian intentions and capacities] were hamstrung in any attempts being made to deal with them by the secrecy which always surrounds real intelligence information.”

Why then has all the authoritative testimony on these matters from respected and highly informed scientists been set aside over the past two decades? Why, instead, have the nuclear bomb enthusiasts been heeded? “The guilty men and organizations,”

¹³ Ibid.

¹⁴ Herbert York, *Race to Oblivion* .

writes York, “are to be found at all levels of government and in all segments of society: Presidents, Presidential candidates; governors and mayors, members of Congress, civilian officials and military officers; business executives and labour leaders, famous scientists and run-of-the-mill engineers; writers and editorialists; and just plain folks.” Their motives, he tells us, are various, but “nearly all such individuals,” he goes on to say,

have had a deep long-term involvement in the arms race. They derive either their incomes, their profits, or their consultant fees from it. But much more important than money as a motivating force are the individuals’ own psychic and spiritual needs; the majority of the key individual promoters of the arms race derive a very large part of their self-esteem from their participation in what they believe to be an essential — even holy — cause. . . . They are inspired by ingenious and clever ideas, challenged by bold statements of real and imaginary military requirements, stimulated to match or exceed technological progress by the other side or even by a rival military service here at home, and victimized by rumours and phony intelligence. Some have been lured by the siren call of rapid advancement, personal recognition, and unlimited opportunity, and some have been bought by promises of capital gains. Some have sought out and even made up problems to fit the solution they have spent much of their lives discovering and developing. A few have used the arms race to achieve other, often hidden objectives.¹⁵

On the Soviet side, perhaps, some elements in the psychological situation may be different, but apparently the consequences are much the same.

Zuckermann’s argument is unanswerable but it has not had much success.

“It seems all but incredible that the battle which the presidential science advisors have waged with those who participated technically in the race at operational levels below their own seems

¹⁵ *Ibid.*, p. 235 .

to have been a lost cause from the start. All the presidential science advisors and the Directors of Defense Research and Engineering with whom I have discussed the problem," he writes,

recognise that once the threshold of mutual nuclear deterrence has been crossed, there is no technical sense in the further elaboration or multiplication of nuclear weapon systems. But this is not the point of view that has got across. Instead, their opponents knew how to respond to the mood of the country, how to capture the attention of the media, how to stir the hearts of generals. They have been adept at taking the short-term view and in creating the climate within which political chiefs have to operate. The longer term view of the top advisors — that the arms race feeds itself, that there is no technical solution to the problem of defence against nuclear weapons — that view is too difficult to put across, strangely, I believe, not because it sounds soft and defeatist, but because it is too simple and too logical, and because the basic facts have become submerged in a sea of acronyms and numbers, a sea of MIRVs, of particle beams, of "throw-weights," and so on. And the political chiefs whom the chief science advisors serve, and who are only in office for brief periods, inevitably find themselves in situations that leave little room for manoeuvre — situations characterised by an inertia and a resistance to change which is only to be expected when hundreds of thousands of the electors on whom they depend are making their livings doing things which were promoted years before by their political predecessors. It is the past which imbues the arms race with its inner momentum.¹⁶

Under the partial test ban underground experiments went on and the stockpile of means of destruction in the world continued to grow, but alarm was reduced by the theory of a "balance of terror." It was obvious that neither side could conceivably survive the exchange that would follow a "first strike" and so both were "deterred" from striking.

¹⁶ Zuckermann, *op. cit.*

During the 1970's research and development continued. Technological advance went into improving the accuracy of aim of rockets and the secrecy with which a sudden attack could be launched. These new devices are designed for aggression. The notion of defense has faded from the scene. In particular, the neutron bomb, which is designed to wipe out the defenders of a city with a minimum of damage to buildings, seems to be designed for the requirements of a conqueror.

Now, instead of deterrence we have competition in terror. Each invention introduced on one side has to be copied on the other. In public discussion this reaches the height of absurdity when there is a rumour that the other side is disregarding an agreement not to produce poison gas. If *they* are going to do so, *we* must do so. In 1938 and 1939, every man, woman, and child in the United Kingdom was issued a gasmask. This would be a more intelligent response to the threat if it turned out to be actual. It seems that the technicians regard agreements that limit their activities as a nuisance and eagerly seize upon any excuse to abrogate them.

The title of the last chapter in York's book is "The Ultimate Absurdity":

The actions and processes described in this book have led to two absurd situations.

The first of these absurdities has been with us for some time, and has come to be widely recognized for what it is. It lies in the fact that ever since World War II the military power of the United States has been steadily increasing, while at the same time our national security has been rapidly and inexorably decreasing. The same thing is happening to the Soviet Union.

The second of these absurdities is still in an early stage and, for reasons of secrecy, is not yet so widely recognized as the first. It lies in the fact that in the United States the power to decide whether or not doomsday has arrived is in the process of passing from statesmen and politicians to lower-level officers and technicians and, eventually, to machines.

Machines such as the warning system which I mentioned that was set off by a flight of geese.

Official pronouncements made in the West and discussed in the media seem to be mainly aimed at providing soothing syrup to discourage the general public from forming any opinion in this situation; when some warnings are emitted, they are mainly confined (apart from Mountbatten's) to the loss of life that could be caused by nuclear war. This seems to be a kind of collective egoism. What is at risk is not just the lives of the present generation of the inhabitants of the northern hemisphere or of the whole globe, it is, as Mountbatten recognised, the continuance of our civilization. No doubt that civilization, East and West together, is imperfect, bloodstained, full of injustice, but all the same it is a great achievement and full of new possibilities. We surely should be concerned not to throw it away? Supposing that we squeak through the present era of crisis and manage to survive for twenty or fifty years, we should still leave the world in peril of a future disaster. Unless mankind can give up the habit of making national wars, it seems that sooner or later it will destroy itself.

After such knowledge, what forgiveness? Think now
 History has many cunning passages, contrived corridors
 And issues, deceives with whispering ambitions,
 Guides us by vanities. Think now
 She gives when our attention is distracted
 And what she gives, gives with such supple confusions
 That the giving famishes the craving. Gives too late
 What's not believed in, or if still believed,
 In memory only, reconsidered passion. Gives too soon
 Into weak hands, what's thought can be dispensed with
 Till the refusal propagates a fear. Think
 Neither fear nor courage saves us. Unnatural vices
 Are fathered by our heroism. Virtues
 Are forced upon us by our impudent crimes.
 These tears are shaken from the wrath-bearing tree.

T. S. Eliot, *Gerontion*

II

In my first lecture I tried to open up the discussion of two aspects of the perpetuation of the arms race: the element of a war of religion in the conflict between so-called communism in the East and so-called freedom in the West and the momentum of research and development which seems to be making it impossible to halt and reverse the process even when it has become obvious that there can be no end to the dispute except mutual destruction. The third aspect to be discussed is the connection between the arms race and the principle of effective demand.

The Keynesian revolution in economic theory which emerged from the great slump of the 1930's is often identified merely with a policy of running a budget deficit to reduce unemployment; but it was more than that. It was a great gain in insight into the manner of operation of a capitalist industrial economy. The *principle of effective demand* means that the accumulation of capital in the sense of productive capacity is not directly due to saving in terms of money — finance — but to investment in creating physical means of production. It can be discussed in terms of the old distinction, drawn by Alfred Marshall, between short- and long-period effects.

At any moment, in each country, there is in existence a certain stock of means of production and transport — factories, railways, shipping, and so forth; housing and commercial and educational establishments, a certain distribution of finance, and a labour force of certain skills and capacities. These are the long-period factors. The level of utilisation of this productive capacity depends on short-period influences, in particular on the overall level of expenditure. In a modern industrial economy, there is almost no production for self-consumption except housework within the home, and even that is growing less and less. Everyone's income, therefore, depends on other people's expenditures. If there was no expenditure this month except out of last month's income, the system would quickly run down. Not all income is spent. Some is

used to pay off debts and some is saved to add to private wealth or financial reserves of businesses. On the other hand, some expenditure this month is covered from wealth earned and saved earlier and some is financed by borrowing — by businesses, households, and government institutions. The aim of business investment is to provide an enlarged capacity for earning more profit in the future. When it is successful it becomes an addition to the capital of the business. But even investment which does not turn out to be profitable supports employment while it is going on.

In the slump of the thirties, the advocates of public loan expenditure were mocked by the argument that they were advocating the policy of paying workers to dig holes in the ground and fill them up again. They replied that wages are spent on goods and services. The excess of what a family can buy when the breadwinner is earning over what they spend when he is on the dole calls into being a genuine increase in real national income.

But Keynes himself gave a confusing account of the point. He sometimes seemed to argue that unproductive investment is actually to be preferred to useful investment.

If — for whatever reason — the rate of interest cannot fall as fast as the marginal efficiency of capital would fall with a rate of accumulation corresponding to what the community would choose to save at a rate of interest equal to the marginal efficiency of capital in conditions of full employment, then even a diversion of the desire to hold wealth towards assets, which will in fact yield no economic fruits whatever, will increase economic well-being. In so far as millionaires find their satisfaction in building mighty mansions to contain their bodies when alive and pyramids to shelter them after death, or, repenting of their sins, erect cathedrals and endow monasteries or foreign missions, the day when abundance of capital will interfere with abundance of output may be postponed. “To dig holes in the ground,” paid for out of savings, will increase, not only employment, but the real national dividend of useful goods and services. It is not reasonable, however, that a sensible community should be content to remain dependent

on such fortuitous and often wasteful mitigations when once we understand the influences upon which effective demand depends.¹

This suggests that there is only a certain amount of productive equipment that is worth having and that accumulation beyond this point is actually worse than useless. This argument was part of the old theory from which Keynes had “a long struggle to escape” — the concept of a static “schedule of marginal efficiency of capital.” In real life investment creates new outlets for itself by technical inventions and the introduction of new commodities. (The great slump of the thirties was partly relieved by the massive demand generated by the revolution in means of transport set going by the motor car.)

Moreover, even in the wealthiest country, there are families who feel themselves to be living at too low a standard of life who would be happy to spend more money on goods and services if only they had it.

Keynes was thinking narrowly in terms of the problems of the industrialised West. Nowadays we are becoming conscious of the enormous needs of the impoverished Third World. In Africa in particular the growth of numbers ahead of agricultural development is posing a huge problem which from time to time comes to the surface in outright famine here or there in that continent. There is no lack of need for investment or of know-how for designing it. The impediments that stand in the way are political and financial, not technical or economic.

It is not a limitation of useful ideas or schemes for investment projects but the religious belief in *laissez-faire* in the Western world that stands in the way of systematic employment policy.

In the 1930's, unbeknownst to Keynes, the principle of effective demand had been discovered independently in defeated Ger-

¹ John Maynard Keynes, *The General Theory of Employment, Interest and Money* (1936), pp. 219–20

many; not only discovered but actually put into practice. Nicholas Kaldor was recently celebrating the eightieth birthday of an unknown prophet, H.-J. Rüstow, whom he places with Maynard Keynes and Michael Kalecki as one of the independent discoverers of what we now know as the theory of employment.

The German economy, still groggy after the great inflation of 1923, was hit by the full force of the Great Depression in 1931. In the words of H.-J. Rüstow,

At that time there were a number of businessmen, economists with practical experience and some non-academic theoretical economists who maintained that such large-scale unemployment could only be overcome by large-scale public works; members of this group repeatedly put forward concrete plans for stimulating the economy by such means. The academic establishment, on the other hand, asserted, almost without exception, that the inherent equilibrating forces of the market economy would cure the disease, whilst any interference with this "natural recuperative process" would serve to make the situation worse, and the adoption of any of the proposed programmes for putting the unemployment to work would cause renewed inflation.

...

Gradually, investment dropped to only one-third of its previous level and was no longer sufficient even to maintain existing productive capacity intact, let alone generate any accumulation of capital out of profits. This situation led to a cumulative shut-down of less efficient plants and to mass redundancy of labour . . . so that by 1932 no less than 40% of previously employed workers were unemployed. In fact, the true number of unemployed was estimated to be at least one million larger than the six million registered at the labour exchanges. I disagreed with the generally accepted view of the academic profession that the crisis could, or would, be overcome with the normal instruments of a market economy. For even with a very low rate of interest — the level of interest was still at 7% at the beginning of 1932 — entrepreneurs would not have had the incentive to invest on the scale necessary to bring about a

substantial reduction in unemployment. Nor could the problem be effectively tackled by government work-creation schemes, even if drawn up on a grand and generous scale. For that purpose, the schemes would have had to take on a dimension that would have taken them far beyond the range of projects normally regarded as falling within the scope of public works?

Rüstow worked out a scheme for subsidising investment through tax credits and at the same time instituted work-creating schemes which were expanded after Hitler came to power.

Despite the fact that, in many cases, existing production was larger than what could be sold at prices which covered costs, the low net cost of employing additional labour was an attractive incentive. Those entrepreneurs who did not use the scheme faced the prospect of being undercut in competition by those who did. Moreover, the production undertaken by newly employed labour would mostly be in the nature of stock-building. It would take many weeks, or even months, before the new output yielded finished consumer goods; the addition to employment, meanwhile, brought about an immediate increase in purchasing power. Thus there would be an improvement in the cost/receipts relationship in the consumer goods sector, which would lead to the re-activation of unused capacity, raise profits and stimulate increased investment, leading to a further improvement in the cost/receipts ratio and thus in the level of employment. [p. 415]

Brüning as Chancellor was too much concerned with reparations to be willing to give it a trial, but when von Papen became Chancellor the scheme was put into operation.

The course which developments subsequently took was fully "according to plan." At the beginning of September, the emergency decree implementing the plan came into force, and

² H.-J. Rüstow, "The economic crisis of the Weimar Republic and how it was overcome— a comparison with the present recession," *Cambridge Journal of Economics*, vol. 2, no. 4 (December 1978), p. 414.

during September and October employment increased by 270,000, whereas during the same two months in 1931 it had fallen by 650,000. Entrepreneurs were full of hope, and share prices on the stock exchange shot up. Relative to the production of consumer goods, investment-goods output increased threefold during the first 12 months and sixfold in the first 24 months. Thus the investment/output ratio increased considerably, and the cost/receipts relationship also improved, giving entrepreneurs the profit necessary to sustain a higher level of employment. The re-absorption of the unemployed was so rapid that by October 1934 three million unemployed were back in work. [p. 416]

The plan was still in force when Hitler seized power and it was Hitler who took all the credit for overcoming unemployment.

The gradual increase in the scope of public works programmes undoubtedly had a beneficial effect in accelerating the pace of economic recovery. But the legend that Hitler's construction of motorways (undertaken for military purposes) and the thousands of millions spent on a speedy rearmament programme were the factors which succeeded in abolishing unemployment is unfounded and false in every respect. When Hitler seized power, the economic recovery was already so well advanced that his huge outlays for military purposes were inflationary and could in no way be said to have initiated the disappearance of unemployment. [p. 416]

Rüstow comments, "It is tragic that Brüning did not succeed in eliminating unemployment; had he done so it is almost certain he would not have been overthrown, and not only Germany but the whole world, would have been spared the indescribable misery which National Socialism brought us. But in the last resort, it is not the politicians, but the economic theorists who are to be blamed for the adoption of the wrong policies" (p. 417).

After 1945, it almost seemed for a time as though the lesson had been learned. There was a long run, in the West, of high

accumulation, at first set going by Marshall Aid and then taking off on its own. But what about inflation — the continuous rise in the price level in terms of the national currency that nowadays afflicts both rich and poor countries, to a greater or lesser degree? And what about stagflation — the combination of underemployment with rising prices which seems to afflict all the Western industrial nations in lesser or greater degree?

It is important to keep in mind the distinction between the short-run and long-run aspects of the analysis. The short-run aspect concerns the level of employment in a given situation and the degree of utilisation of existing productive capacity while the long-run aspect concerns the change that is going on in the stock of productive capacity and the technique which determines the level of output per man employed.

Understanding has advanced since the *General Theory* was written, though some new confusions have also been introduced. One confusion, which nowadays fortunately seems to be losing its grip in public discussion is *monetarism*, the notion that rising prices and incomes are directly caused by increases in the stock of money — notes, coins, and bank accounts on which checks can be drawn. It requires years of education in economics to grasp this idea, for any sensible person can see that it is merely mistaking a symptom for a cause — when demand is slack, unemployment prevalent, and over-all earnings relatively low, there is less money in circulation at a given level of prices. It is the lack of expenditure which keeps down the quantity of money in circulation, not a limited stock of money that keeps down expenditure.

Another superstition has come up recently — supply-side economics — which seems to suggest that cutting public expenditure will leave more room for private profit-seeking investment, but this is even harder to believe in than monetarism.

Elementary economic teaching is still haunted by the primitive theory of supply and demand. A rise in demand tends to raise prices and increased supply to lower them. It is found nowadays

that this is a very misleading account of how industrial prices behave. Richard Kahn summarised the modern analysis:

Flexible prices are found in those markets for a limited range of primary products where products are homogeneous, demand to the individual producer is almost perfectly elastic, and costs rise with output due to fixed natural resources.

. . .

Fixed or 'sticky' prices are found in manufacturing and distribution, where products are not homogeneous and labour costs are constant or decreasing up to the limits of capacity. The result, which has been well confirmed by various empirical studies and is widely known as Okun's Law, is that productivity in industry increases with short-run increases in output, while prices are sticky.³

Prices of manufactures, broadly speaking, are formed by adding a gross margin to the direct costs of wages, materials, and power to cover overhead costs and yield a net profit. When sales are running at levels within the range of expectations, prices are sticky. When demand is such that output runs up to capacity, gross profits are abnormally high but there is not necessarily a rise in prices. It may be more prudent for the manufacturer to enjoy the benefit of good business without grabbing any extra advantage by raising margins. But when demand falls to the point where the pre-fixed margin fails to cover average cost, it becomes necessary to raise it. Thus it is often a fall in sales, rather than a rise, that causes prices to be raised.

This applies to the element in prices that accounts for short-run profits, but the major influences on prices in the short run are wages and material costs. A rise in wage rates leads directly to a rise in prices; when the cost of living, that is, the prices of goods that workers' families consume, is rising, raising wage rates is necessary, for a business cannot keep its labour force working if

3 In "Malinvaud on Keynes," *Cambridge Journal of Economics*, vol. 1, no. 4 (December 1977).

real wages (the purchasing power of money wages over consumer goods) are cut below a certain limit. Thus rising costs raise prices and rising prices raise costs. At the same time, so long as a capitalist economy is prosperous, capital accumulation and technical progress are raising real output per man-week of work. This partly or wholly counter-balances the rise in the money-wage bill. In the prosperous years in the West, inflation was very moderate while real-incomes were rising. It was with the growth of unemployment in the seventies that inflation, set off by the oil crisis in 1973, became a serious nuisance.

There used to be a famous theory — or rather a historical generalisation, known as the Kondratiev cycle — that in the capitalist world there had been a strong tendency, since the late eighteenth century, for the alternation of fourteen to twenty years of high employment and relatively rapid growth and twenty years of slow growth and stagnation.

In the 1970's this theory was revived, but there is no need to be fatalistic. If the economy is going to need a Keynesian boost we should be thinking, rather, to what use our resources should be put. Such views, of course, are abhorrent in the West and seem to throw doubt upon the cult of *laissez faire* and so-called "freedom" which is the credo of that side in the wars of religion. The preferred method of combating inflation is to cut public expenditure.

The Keynesian thesis is now (in 1981) being illustrated the reverse way round in the U.K. Cutting central and local government expenditure and keeping the sterling exchange rate high so as to encourage imports is increasing unemployment and inhibiting growth.

In so far as increasing unemployment weakens the position of labour in wage bargaining so that rising money-wage rates lag further behind rising prices than when the level of unemployment is higher, this means that some check to rising money prices is won by a sacrifice of real output and growing inequality and bitterness in industrial relations.

I hope you are going to make a very thorough study of the consequences of Mrs. Thatcher's policies in the U.K. before you allow President Reagan to pursue them here.

On the opposite tack, we may ask, is the employment motive playing a part on the Western side in maintaining the arms race? Are we back at the policy of digging holes in the ground to maintain jobs?

Of course the danger of confrontation between the armed giants and the international tensions that it breeds are far and away more important than the problem of unemployment, however grave that may be, but perhaps the problem of employment is playing a minor part in keeping tension alive? To call off the arms race does not require any prior agreement between the two sides. It is open to either great power to state that enough is enough. The initiator has sufficient power to destroy the other side several times over and does not propose to add any more to its stockpile of redundant weapons.

Such an outbreak of common sense in international relations is not to be expected in this mad world, but just for the sake of argument we might enquire whether such a move would have a tendency to precipitate a slump. Some care would have to be taken to prevent a sudden drop in profits and jump in unemployment. Where contracts were broken or legitimate expectations disappointed, the firms concerned should be offered credits on favourable terms and encouraged to switch r and d to constructive forms, in particular the search for new sources of energy. After perhaps a short period of confusion, the effect on employment should be highly favourable. Present policy which combines cutting public expenditure with increasing military investment has introduced a serious distortion into development. From a short-period point of view, man-power, including the most expensively trained scientific man-power, is shifting from services such as health and education and the production of civilian goods in general into production of war-like stores.

Research conducted by one of the big trade unions involved appears to show that when a certain flow of finance is deflected from civilian to military production there is a reduction of employment. The cost of materials handled and allowance for profits is higher per man employed on the average than in civilian branches of industry, so that cost per unit of employment is greater.⁴ Moreover, part of the cost is for mining the earth's crust for rare minerals and embodying them in forms that can be used only for destruction.

A switch-back of resources to civilian uses should have correspondingly favourable effects from a short-period point of view.

From a long-period point of view the loss due to the arms race is literally incalculable, for we cannot know what benefits would have been derived from applying the mental and material resources involved to constructive ends.

What form would increased civilian employment take? Emma Rothschild has made a very interesting analysis of the tendency of the structure of employment in the USA to shift from manufacture towards services:

The 1970s were a time of startlingly rapid expansion in employment in the American economy. In the period of the economic crisis alone, from 1973 to 1979, almost 13 million new nonagricultural jobs were created of which almost 11 million were in the private economy.

The new American jobs were concentrated, however, in two sectors of the private-economy-services and retail trade-and, at least in the early 1970s, in one public sector, state and local government. By 1979, 43 percent of all Americans employed in the private nonagricultural economy worked in services and retail trade. The two sectors together provided more than 70 percent of all new private jobs created from 1973 to the summer of 1980.

Even within these two vast sectors, the growth in employment was further concentrated. Three industries each provided

⁴ "The Impact of Military Spending on the Machinists' Union," Marion Anderson Employment Research Associated (Lansing, Michigan, U.S.A.).

more than a million new jobs during the 1973–1979 period: “eating and drinking places,” including fast food restaurants; “health services,” including private hospitals, nursing homes, and doctors’ and dentists’ offices; and “business services,” including personnel supply services, data processing services, reproduction and mailing and the quaintly named “services to buildings.” These three industries together accounted for more than 40 percent of the new private jobs created between 1973 and the summer of 1980. In that period their employment increased almost three times as fast as total private employment, and sixteen times as fast as employment in the goods-producing or industrial sector of the economy.

The three “new” industries loom very large in total employment. Mr. Reagan’s “fundamental manufacturing industries” are insignificant by comparison. Thus the increase in employment in eating and drinking places since 1973 is greater than total employment in the automobile and steel industries combined. Total employment in the three industries is greater than total employment in an entire range of basic productive industries; construction, all machinery, all electric and electronic equipment, motor vehicles, aircraft, ship building, all chemicals and products and all scientific and other instruments.”⁵

Emma Rothschild sees in this a symptom of decay. These are low-wage activities giving little scope for technically progressive investments.

I do not see the force of this argument. If what the consumer most wants is to be freed from the chores of cooking and cleaning at home why is it less progressive to meet this demand than demand for objects made out of metals or chemicals? If they are low-wage occupations, the remedy is to unionise the workers and push up wages so that it would be profitable to mechanise the services, making fast food all the faster. This is certainly not a recipe for gracious living, but if it is what is wanted, why should it not be provided?

⁵ Emma Rothschild, *Paradise Lost: The Decline of the Auto-Industrial Age* (New York: Random House, 1973).

The other two groups of services, concerned with health and finance, both require an increase in educated employment and should provide a large increase in professional jobs. How long will it take the economists in this country to see through the supply-side fallacy and return to a path of continuous growth?

Looking at the problem from a world point of view, W. W. Rostow, in your excellent *Economic Forum*, outlines a policy for supply-side development that makes sense. The threat to prosperity in the West comes essentially from the imbalance between demand and supply for energy. "The driving force in the sustained expansion the world economy requires in the 1980's should be enlarged investments in energy and energy conservation."⁶

But we have strayed too far into imagining what resources released from the arms race might be used for. Meanwhile the arms race is still going on and merely to point out that it is irrational will not stop it.

Professor Robert Neild in his forthcoming book *How to Make Up Your Mind About The Bomb* asks us, in a European setting, to estimate the unpleasantness of Russian hegemony (which he puts very high) and the likelihood of its being imposed in the absence of a nuclear deterrent (which he puts fairly low) and to decide in each country which has nuclear arms whether we consider that we have made a good bargain. But once we have got into this groove it is not easy to back out of it.

Alva Myrdal, who attended the Geneva discussions on SALT (Strategic Arms Limitation Talks) as the representative of Sweden, remarks upon the cost of *not* limiting arms:

The arms race has brought costs to levels that are ruinous to the world economy. Even countries that are rich and technologically advanced are hampered in economic growth. After World War II, Germany, for a crucial period, and Japan until now were prohibited from spending their resources on arma-

⁶ Vol. 11, no. 2, p. 30.

ments. This undoubtedly is part of the explanation why these countries had a growth rate that motivated analysts to speak of a miracle. Other developed countries in the postwar era would have shown a higher economic growth rate if they, too, had abstained from participating in the arms race; under-developed countries would have had a greater chance for development.

As the defense expenditures in the national budgets mount, it will become harder to obtain financing for the civilian purposes of health, education, housing and all other kinds of social needs. Public expenditures for such needs would, if well planned, increase productivity, as they are tantamount to investment in human capital which would raise the productivity of labour and prevent future remedial costs for individuals and society. In the long run, the arms race holds down civilian public expenditures, becoming thus an additional cause of stifling the rate of economic growth.

In underdeveloped countries, the allocation of scarce financial resources for the production or purchase of armaments will clearly have even more adverse effect than in the rich countries, having already hampered their economic development, grossly in some instances.

Military expenditure also plays a fateful role in the interrelations between richer and poorer nations. For example, there has been, globally speaking, a growing reluctance on the part of the richer, donor countries to give aid for development. One of the causes of this is the financial difficulties in the developed countries, and those are partly related to high expenditures for armaments.⁷

She gives a fascinating and horrifying account of how representatives on each side played into each other's hands to *prevent* a halt in the arms race which would cut down profits and employment in the arms industries.

Once a country is engulfed in the arms race, continuing it often appears as a means of preserving employment and the level of industrial production. Considered from the point of

⁷ *The Game of Disarmament* (New York: Pantheon Books, 1976), pp. 8-9

view of an individual armament-producing region of a country or of a particular armament industry, this idea has a semblance of truth, although arms production has been shown to represent relatively low demands for labour. To be sure, any reallocation of resources always has initial difficulties and costs. These should, however, not be over-estimated. They can be reduced if conversion plans are outlined and established well in advance.

The arms race has become politically connected with the vested interests that President Eisenhower termed “the military-industrial complex.” In military matters, no limit is set by market forces, by competitive demand or by prices. Every new plant for military production, every new production contract, increases the weight of these vested interests. In democratic countries these interests, both labour and business, often become rooted in the parliaments and the provincial assemblies, whose representatives are expected to defend local interests. In authoritarian countries, these vested interests should be easier for a government to control, but apparently they are not. [P. 10]

Moreover, there is an arms race within the arms race between the three services — army, navy, and air force.

Industrial interests and imaginative scientists may have a natural inclination for new inventions, but there are within the military R&D establishments also strong bureaucratic pressures to advance further. One reason for this is the interservice competition for shares of the military budgets, leading to an arms race within the arms race. This is difficult to control “because of the sheer complexity and variety of modern specialized weapon systems,” which complexity supports the military establishment in its opinion that only it is competent to decide the size and character of the national security effort. The situation is then “exploited to support claims for higher military spending.” If one service fears that its tasks are about to be reduced, the pressures become considerable. [Pp. 11–12]

Robert Neild comments:

The SALT talks are an interesting example of inter-service rivalry. All the rival military services are represented in the

negotiating teams of both sides and one can see that the agreements made so far have been so constructed that they do not oblige the two countries to make any marked change in the balance between strategic weapons operated by rival services. even though a change from vulnerable land-based missiles to submarine-launched missiles would make sense — and is permitted voluntarily. The representatives of the two superpowers from the armed services operating land-based missiles must have felt a common interest in avoiding obligatory reductions in that type of weapon. One wonders whether they, or their colleagues in other matching services, have ever explicitly acknowledged their common interest, in the conference chamber or outside it.⁸

Perhaps this complicity between the military, East and West, gives us a gleam of hope. Could they not agree to have a peace settlement *before* fighting a war? If they leave it till afterwards there will be nothing much left to settle.

⁸ *How to Make Up Your Mind About the Bomb*, forthcoming.