

"CLIMATE OF OPINION" AND A DISARMED WORLD

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In the earlier of these conferences, emphasis was placed upon the necessity to create a "climate of world opinion" which would render both nuclear and conventional disarmament practicable, and where war can be outlawed effectively. More recently, this aspect of our objectives has become obscured by the manifold problems of the mechanisms by which immediate stability may be assured. In this paper I want to show how essential it is to reaffirm this necessary preliminary, and so to define the conditions which must be met when disarmament is achieved, that it becomes both a real and desirable objective.

The machinery of arms control and inspection is necessary in both the transitional stages and the disarmed world, and it is an essential basis of confidence in reaching political decisions; but it is machinery and not a goal. In the end, all governments reflect the will of the people, and people must be offered very real and attainable objectives if their choice of government is to make war impossible. Despite all that has been done, the present climate of world opinion does not encourage hope that disarmament negotiations can bear real fruit.

All governments bask in the glory of their armed services. The sovereign of a constitutional monarchy, like Britain, is surrounded with the panoply of war on every public occasion. The President of the United States is the Commander-in-Chief of the armed forces, and his high office is just as closely linked with military display. Mr. Khrushchev and his government take equal delight in displays of military might. Other nations, large and small, give similar emphasis to their armed services. In all countries, the highest honours are bestowed upon the chiefs of the military services. It is significant that, though the first intrepid astronauts were blasted into space with assurances that their exploits were contributions to peaceful exploration of the Universe, they were all military officers. Governments know that their peoples love much display of uniforms and the apparatus of war, and feel that it is essential to provide it.

Throughout human existence, leadership has tended to be determined by prowess in war. Even today, the heads of many governments are military men. Although some have placed themselves in power with the aid of their armies, others have been chosen by popular vote and clearly hold office by wish of the people.

No nation will tolerate a government which cannot demonstrate that its military defenses are sound. So long as international fear exists, armies and all the paraphernalia of war seem inescapable. The problem of disarmament is to persuade people that security can be achieved, with greater certainty and with far less expense, in other ways, and that the basic reasons for war can be removed. The details of arms control and of inspection systems belong to experts, and are no more understood by people as a whole than are the details of radar or of nuclear weapons. Removal of fear requires quite different contributions from men of science.

The reality of the fears which are generated through lack of tangible objectives in the present world tension, can be gauged by reading the speech delivered by Senator T.H. Dodd in the Senate of the United States on Thursday, May 12th, 1960. Speaking in the opposition to the moratorium on the testing of nuclear weapons, he reveals the depth of his distrust of Russia. He is convinced that the Soviet is not abiding by the ban, a belief for which he gives no reasons, and on this thesis builds skillfully a picture of a Western world left defenseless in a fool's paradise of its own making. His answer is a great expansion of American military might, the rapid acquisition of nuclear weapons by his allies, and an immediate end to the one-sided moratorium. Others, in both East and West, have put forward similar arguments for complete mistrust of the opposing camp. Such speeches, made with all the authority of responsible men, have far-reaching effects in stimulating the arms race. Indeed, they influence thinking men especially, for these are more aware that their own convictions are fallible, and tend to take the view that it is better to be safe than to risk domination. Their very real hatred of war and the devastating threat it holds for themselves and for their children, is overwhelmed by the fear that such war may be inevitable if they show any signs of weakness. They will not risk the obvious superiority of their nation, their way of life, their language and their social institutions, and come to accept the belief that these must be demonstrated through a military threat to those whom they name aggressors.

There are in the world many who are convinced that there are other, peaceful ways of ensuring the security of nations and of settling international disputes. Multitudes flock to meetings where these questions are discussed, though thereby they risk the labels of subversive fellow-travellers of an alien inspired movement or, at the least, of lily-livered pacifists ready to sell out to the enemy to save their own skins. However, the pressures exerted by such attitudes of abhorrence of all-out nuclear war, and demonstrations of the futility of defense, have given rise to the search for means to preserve the institution of war, while keeping its extent below the runaway level into a general conflagration. Many hoped that

the obvious futility of nuclear war would lead to serious examination of peaceful alternatives. Instead, they have seen develop the concepts of limited war for limited objectives, conducted with conventional arms reinforced with so-called tactical nuclear weapons. The spirit of Mars has not been extinguished by the spectre of the human slaughter and suffering, or the virtual destructions of civilization, which are the demonstrable results of a major war.

I have spent some time in this discussion of the present situation, familiar though it is to all here, in order to show that the obstacles are real and that the magnitude of the task of creating a climate of world opinion in which disarmament negotiations can bear fruit, remains enormous. The obstacles are not created by wicked or callous men: they are part of human history. Niels Bohr's "open-ness" between nations, where it becomes scarcely necessary to worry about details of arms inspection and control, and which surely should be the natural state of humanity, can be realized only when men as a whole are convinced that there could be a better state of international stability. Man must be offered a world in which war is virtually impossible, where personal freedoms and national objectives are preserved. It is essential to build a rational picture of a disarmed world at the same time that we dissect the technological problems of inspection and control which provide security in the transitional period. It seems to me that the major questions to be answered are easily defined.

World Population and World Resources

A disarmed world will remain stably in that state only if it is the wish of the majority of men that this shall be so. We have seen that as between the East and the West, in the present situation, fear is the dominant reason for the arms race. For the great majority of mankind, which lives in the shadow of famine, pestilence and oppression, jealousy of the richer peoples, which is growing rapidly, becomes the motive for war. The lot of such people is so hard that they are far less deterred from war by its inevitable consequences. They will not be content until their standard of living is raised to near that of the advanced nations, and they have equal guarantees of the rights of individuals. This advance is practicable only if the resources of the nations, in food and materials, are matched at any moment by the number of people among whom these must be divided. The spectacular rate of growth of population revealed in the recent census of India, emphasizes that the desire for a better life, which is undoubted in that country, is not accompanied by a realization that the resources of India are limited, at any rate for the present. India, and other under-developed countries, are undoubtedly living far beyond their means, as irresponsibly as the

slum dweller on a minimum wage who produces 10 children.

It has been demonstrated over and over again, that the food surpluses of the richer nations can make no effective contribution to relief of the shortages which exist, if the objective is not continued existence, but a full and dignified life for all.

It is important to realize that the problem of increasing population is not confined to the under-developed nations. Some countries of Europe have avoided a fall in the standard of living to a level at least as low as that of India, only by exporting population to the Americas, Australia, and other areas which could produce the food required at home. However, the position is changing rapidly. In the first place, the new countries have proved reluctant to remain food producing areas and sources of raw materials for the industries of Europe. They have themselves become highly industrialized, upsetting the pattern of trade upon which the mother countries existed. What is more, their own populations are expanding at a rate which will make it impossible for them to remain for long net exporters of food.

So long as the myth persists that such questions as population are internal matters, and in no way the concern of other nations, it seems impossible for the efforts of science and technology to provide a solution. Sir Charles Darwin has pointed out in trenchant terms that the nation which breeds fastest must inevitably dominate the world. Decimation by famine, disease, or war, means least to the people whose number is greatest. A world over-run by the sheer numbers of an irresponsibly breeding race, is not a goal which will command the cooperative efforts of humanity. There is no hope of a stable and lasting condition of peace unless the population of the world is matched to its resources at an agreed common standard of living. It is clear that the level of population of a nation cannot remain a purely internal question, if for no other reason than that uncontrolled increase means that it must be fed and supplied by the rest of the world which has humanitarian instincts.

There seems to be only one solution to this central problem. This is to reach international agreement to permit access to the resources of the world, not in proportion to population, but in proportion to the actual (not potential) contribution made to these resources. In the interests of humanity as a whole, and to preserve the dignity of man, notice should be served on all sovereign states that, after a reasonable interval of time, supplies of food, technical aid, and material assistance will be dependent upon the initiation of effective steps to secure this balance.

This then, is the first, and by far the most important condition to be met in a stable, disarmed world. Determination of the

minimum standard of living to which all humanity should aspire at a given time, is a political measure to be made with expert advice. The assessment of the present capacity of a nation to contribute to world resources is a technical task of great complexity and some considerable delicacy. For instance, it has been argued that whereas countries like Britain, Switzerland or Japan, are relatively poor in natural resources, they have developed special skills in industry and fabricate raw materials which originate elsewhere. In this way, it is claimed, they contribute to the world pool of resources, one of the most valuable of which is human skill and ingenuity. There is no doubt whatever that this was true in the past: There are reasons for believing that it is unlikely to be true in the future. With the spread of scientific knowledge and technology throughout the world, it is becoming increasingly obvious that any nation which makes the effort can manufacture machinery, chemicals, textiles, cameras or watches. As automation develops, the proportion of a population which must be highly skilled in order to do these things, is falling rapidly. Complex industries can be established and operate efficiently long before national literacy is complete, or even when the rate of increase of population is such that there is a decrease in the standard of living relative to other nations.

Far-reaching changes in the patterns of trade between the nations are inevitable. Economic unions are bound to be followed by political readjustments leading to real federations. It will be far easier to believe that such larger units can survive as independent national entities, with viable economics, than that the present splintered divisions can persist. However, the desirable groupings, and the populations they can support, can emerge only from dispassionate surveys of existing and potential resources, which are revised continuously as knowledge and techniques develop.

Detailed surveys may well show that the total resources of South East Asia, including India, are sufficient to provide a reasonable standard of living, if they are developed rapidly and are pooled through economic union. However, until this is demonstrated, and until the industrial development is achieved, it is essential to put an immediate and effective brake upon the rate of population increase. Here, and in other parts of the world, the pressures toward revolution and war, arising from over-population, could rapidly become far greater causes of instability than are the differences between the Soviets and the Western nations.

I have endeavoured to show that there is no ground for asserting that the question of the level of its population is a domestic issue to be determined, (or neglected completely), by each individual sovereign nation. On the contrary, it is perhaps the most important question which must be settled, if a stable, disarmed world is to be

realized. This essential degree of loss of national autonomy, implies no interference whatever with the basic national freedoms of the forms of government, education, language, religion and customs, which are the individual characteristics of nations.

An Open World

The second essential of a stable world is that no nation shall deny entry, or complete freedom of travel, to visitors from other nations. The only bars to complete freedom of movement of individuals should be a criminal record or active political agitation. Nor should any nation be free to prohibit travel by, or emigration to any country willing to receive, its citizens. This complete freedom of movement, combined with freedom of communication, is far more effective in detecting breaches of international faith, than is any conceivable system of formal inspection and control. Of course, inspection and control are an essential part of the approach to such open-ness, but once security is reasonably assured by those means, the natural and more effective freedoms should take over rapidly. Suspicion will be due because any nation knows that it is free to verify any aspect of another's adherence to its international obligations.

International Supervision and Planning

The third essential for a stable peace is the existence of a central organization which makes agreed decisions and sees that they are implemented. The most important of its functions would be to determine which national or economic units are recognized, what is the agreed minimum standard of living for mankind, whether any national or economic unit is violating an agreed code, and the sanctions required to redress the situation. Such an organization might well grow out of the United Nations, but it must be an evolving body whose principal characteristic should be ability to change and to make compromises as the world situation alters. A rigid constitution would soon render it ineffective.

However, this is an aspect of a peaceful world which must be worked out by political experts and social scientists.

The Role of the Scientist

The task of defining goals toward which all schemes for disarmament and world security must move, is necessarily complex and extremely difficult. Grenville Clark and Louis B. Sohn, in their comprehensive study for a revision of the United Nations Charter,

have shown how involved such detailed planning can be. However, while governments and lawyers will rightly be much concerned with the precise definition of every point, the ordinary man will be attracted only by simpler and much more general goals. He seeks a picture of a disarmed world which he can comprehend directly, and which does not require definition in a court of law. The generation of a climate of opinion where all men press for the elimination of war, depends critically upon the presentation of a clear and comprehensible, as well as attainable goal. When the objective is different, in quite revolutionary ways, from the existing state of the world, it must be made doubly clear, and extremely desirable, if progress toward it is to be rapid. In particular, the factual background for assertions must be unquestionable. The provision of this background is the task of science, in all its aspects. There are two major questions which science must answer. The first, the development of methods of inspection and control which will convince peoples that evasions of agreed measures of disarmament on a dangerous scale will inevitably be detected, has received a great deal of attention. The second, to make a survey of world resources, in relation to population and an agreed minimum standard of living, has been studied to a far less extent though, in the end, it is far more important and equally pressing.

Such a survey must be made internationally with that complete impartiality and cooperation which was achieved during the International Geophysical Year. It would be by far the greatest international task ever attempted, and would call for an immense effort of organization and of rapid digestion of data collected. In the first place, the survey would be of resources being exploited, and this would be followed by appraisals of known, but unused resources. Finally, there must be a continuing assessment of new resources, as they are discovered, and of the effects of advances in science and technology upon the value of existing resources.

Side by side with these physical facts, it would be necessary to make a critical examination of such basic factors as literacy and levels of technical education, upon which discovery and utilization of resources depends.

There remains the biological question how best to regulate the birth rate so that the population can be fitted to the available resources. Here, too, some way of distributing the efforts of biochemists, physiologists and others who can contribute to the rapid solution of this problem, and of facilitating exchange of information between them, would help greatly in reaching a rapid solution.

I am well aware of the many surveys and coordinated programs being conducted by the various organs of the United Nations, by the

defense departments of some nations, by national governments themselves, and by university departments, private foundations, and others. However, with some exceptions, the objectives of such activities are not those outlined here, they are scrappy and ill-coordinated, with much duplication of effort. Above all, they are neither world-wide, nor made with the sense of urgency and scientific completeness of the operation which I advocate.

I believe that the machinery for this international undertaking could be organized rapidly and effectively by adopting many of the methods employed in the I. G. Y. It is improbable that a mere stepping up of the work of existing bodies engaged in these fields would be satisfactory. Probably, the best answer would be a small and efficient organization within the United Nations, led by devoted men of science and administrators, who would enlist the cooperation of the various national academies of science. Financial assistance would be necessary in many areas, and much technical help would be required from the better equipped nations. The whole should be conducted at the highest possible level of scientific and technical competence, as a matter transcending all national programs of defense, industrial or academic importance. Too often, such aspects of the work of the United Nations and UNESCO, are left to retired men, those who can be spared from urgent national tasks, or opportunists.

The national academies should make their contribution to this constructive and overwhelmingly important undertaking, the most important of their activities for the period of the initial survey. The pattern of a permanent survey and its organization and methods, would emerge naturally from this first operation.

The reports of such surveys would enable a clear picture to be drawn of the future course of physical development of the world as a whole; would make evident where economic union or federation is inevitable; and would provide the basis for realistic political settlements. The operation would do more to create the climate of world opinion necessary for the design of a peaceful world, than any other collective action by men of science.

We must continue to discuss the techniques by which disarmament can be achieved with security for all. However, we must recognize also that this is a complex political question to which men of science can make only a limited contribution as experts. Disarmament is an immediate goal. On the other hand, science can contribute immensely to the creation of a climate of world opinion where both disarmament and a realistic basis for permanent peace, can be achieved.

THREE ARMAMENTS POLICIES FOR THE SIXTIES

by

John C. Polanyi

An Apologist for arms control or disarmament is well advised to preface anything he has to say with the admission that arms races in the past have not always led to war, nor have wars invariably been caused by arms races. By this admission he skirts a difficult question without in the least compromising his basic belief, which is simply that the present arms race is proceeding at such an extremely rapid pace (largely because of the rapid rate of obsolescence in weaponry) and involves weapons of such fearful destructive power that, by contributing to international fear and tension, it might easily be the cause of the next war--the most horrible in history.

This was forcibly brought home to me when I attended a discussion on arms control and disarmament with Soviet scientists, strategists, and others, in Moscow. Perhaps the most striking impression that remained after 10 days was that of the symmetry of fears on either side. Not infrequently one had the feeling that one was arguing with one's reflection in a mirror. It was as plausible that the Western powers might launch a surprise attack on the Soviet Union to forestall a surprise attack that they feared the Soviet Union was on the point of unleashing against them, as was the reverse occurrence with the Soviet Union as aggressor.

The surprising thing, of course, is not that this symmetry of fear existed, but that its existence was freely acknowledged. The mutual fear could be acknowledged because it was so evidently a consequence, not of our common criminality, but of our common predicament; namely involvement in a provocative and ever accelerating arms race.

As Lord Grey of Fallodon remarked in more leisurely times, ". . . each government feels it would be criminal and a betrayal of its own country not to take every precaution, while every government regards every precaution of every other government as evidence of hostile intent."

Today the mounting spiral of precaution, fear, increased precaution, increasing fear, is gaining momentum from the unparalleled scale of the "precautions" and of the consequent fears. The Russians are at work on a thermonuclear weapon with the equivalent power of 100 million tons of TNT. The appearance of a single bomber armed with such a weapon over a city would represent a threat equivalent to

a ten-million bomber raid in the last war, if one can conceive of such a thing.

The Rand Corporation has estimated that a major nuclear war in the next few years would be likely to cause, in the United States, the destruction of the 50 major cities and the death of around 90 million people.

A Credible Threat

Strategic thinking (as it is called) on this problem appears to be taking three distinct directions. The first proposal would involve an attempt to blunt the blow from an all-out thermonuclear war by means of civil defense. The objective would be to reduce anticipated casualties to a sufficiently low level that the threat of thermonuclear war could be credibly used in order to deter the Soviet Union from undertaking any extremely provocative acts (acts which threaten vital Western interests). This view is set out at length in an important study by Herman Kahn of Rand, On Thermonuclear War.

He argues that the consequences of nuclear war without civil defense are so ghastly that the United States can credibly threaten such war only if its homeland is threatened. (Threats used in order to deter an enemy from attacking the homeland, he refers to as Type I deterrence.) The United States is therefore without an effective deterrent against highly provocative acts short of a threat to the homeland. (Attempts to deter highly provocative acts, short of a threat to the homeland, he classes as Type II deterrence.)

Kahn and his colleagues have calculated that a minimum civil defense program, costing about \$500 million, would reduce casualties from the figure of 90 million quoted above, to around 50 million. The corresponding times for economic recovery are 60 years as against 15 years. Minimum civil defense is largely a matter of fallout protection. In addition Kahn's proposal includes a program for 70 per cent evacuation of all major cities in moments of crisis. With this major evacuation the casualty figure should drop to around 15 million (and the time for economic recovery to seven years), he calculates. The Soviet Union suffered 20 million casualties in the course of the last war, so a threat on the part of the U.S. to risk 15 million casualties should, he suggests, strike them as a credible threat. (However, they did not suffer these casualties on one day, nor risk them on one throw of the dice.)

A Credible Calculation?

Mr. Kahn is to be commended for having the courage to take a hard and objective look at the world as it would be after a nuclear war.

Not only is the calculation enormously difficult, it is also enormously distasteful. Moreover, anyone who dares to point out that 50 million dead are better than 90 million, and 15 million better than 50 million, must expect to be accused of being an unfeeling and inhuman monster. Mr. Kahn expected to be so accused, and he has not been disappointed.

Kahn is not inhuman, as his critics suggest. But neither is he superhuman as his disciples unconsciously imply. Because he has attempted to substantiate his arguments by numerical calculations, his conclusions have been hailed, with varying degrees of naiveté, as constituting "scientific proof"; if not of his thesis, at any rate of his figures. It seems to be necessary to point out that when one says that Mr. Kahn has been "scientific," one is merely saying that one believes his conclusions to follow from his premises.

However, his premises consist of a simple model of reality, a model with sufficiently few elements as to render it susceptible to calculation. The problem in reality is one of staggering complexity. Nuclear weapons of the size and type--let alone the number--he is postulating have never been employed against any city. The effects of fallout, of blast and of fire are problematical in the extreme. Indeed they must vary from city to city and from one day to the next. The effect on the national economy of the sudden removal of these cities from the map is, strictly speaking, quite incalculable. A city is a socio-economic unit, a nerve center in the body of the nation. What is the effect of removing the 50 major ganglia? And beside the social and economic effect, what of the psychological effect?

Kahn and his colleagues at the Rand Corporation were forced to reduce this complex reality to a simple model. Their conclusions derive from this model. The only test we have of the validity of their model is the plausibility of their conclusions.

It may be asked what is the value of their elaborate and painstaking calculation if we are forced, ultimately, to rely on an intuitive assessment of the reasonableness of their conclusions. This question has many answers at various levels of profundity--most of them beyond my reach. It will be enough to note that the intuitive assessment is not made in vacuo but will undoubtedly be influenced by the calculation it is meant to assess. It is valuable to have a body of self-consistent data, even if it all stems from a shaky premise, that is to say from a greatly oversimplified model. Though the absolute results (90 million U. S. casualties from an attack in the next few years) of the calculation are subject to very considerable error, relative figures (about one half saved by minimum civil defense) could be sufficiently reliable to act as a guide in our thinking.

Even this, of course, is far from certain since important new assumptions are involved in a calculation with civil defense that

were not part of the calculation without civil defense. Moreover, ultimately our thinking will be based on absolute, not relative, figures, since it is the absolute number of casualties that determines the suffering of a nation, and hence determines the credibility of any threats the nation makes which imply willingness to tolerate such suffering. So much depends on the reliability that we place on calculations of this type, and the reliability that we may reasonably suppose our opponents will place on similar calculations, that it is worth giving a couple of illustrations of the degree of unreliability to which they are subject.

In 1942 a committee of distinguished scientists, experienced in strategic calculations, attempted to calculate for the British government the damage that would be caused by mass bombing of Germany. The results of their calculations showed a spread equal to about five times the lowest estimate. The problem, of course, was far easier than the one Kahn has tackled. The British scientists were speculating about conventional explosives, which had been used again and again under wartime conditions. Moreover, they had control over the amount of explosive to be used and the targets on which it would be dropped. (It has been alleged that the committee member who made the highest estimate, Frederick A. Lindemann, later Lord Cherwell, was biased. If this is indeed the effect that prejudice can have on the calculations of an eminent scientist, then we should take careful note of the fact. Since we have no guarantee that the Russians will share our prejudices, it would appear that we have no guarantee that they will share our conclusions as to risk, credibility, and so forth.)

Estimates of the time, or cost, of recovery, which figure largely in Kahn's argument, must be subject to additional uncertainties. It is hard to find a precise analogy, but the example quoted (in another context) by Albert Wohlstetter of the Rand Corporation suggests the sort of spread that cost estimates can have, when there is uncertainty as to the number, nature, and cost of the items that contribute to a complex whole. The estimated cost of a missile when calculated in 1949 came to \$35,000 per missile. When recalculated in 1957 the figure came to \$2,000,000. "The less we knew," Wohlstetter remarks, "the more hopeful we were."

Kahn and his colleagues have attempted to hedge against this danger by making the more pessimistic assumption wherever there was an evident choice. Consciously or unconsciously they would, of course, have to set a strict limit to their pessimism. Otherwise the uncertainties in their calculations (as indicated by the much simpler calculations referred to above) would surely have led them to conclude, pessimistically, that a major nuclear war, with or without civil defense, would involve losses of such a

magnitude as could only credibly be risked in defense of the homeland (Type I deterrence).

Credible to Whom?

I have been at pains to underline the uncertainty in Kahn's calculation, not because I would think it proper to reject it out of hand but because I fear the nonscientific reader may feel that he is under some compulsion to swallow it wholesale.

A rather extreme example of what I have in mind is evident in the reaction of an experienced military commentator who reported that as a result of a "thorough scientific enquiry conducted by the U.S. Rand Corporation" it had been established that, provided certain basic preparations are made, economic recovery would be 60 per cent complete within one year of a nuclear war in which the U.S. lost its 50 largest cities.

If science claims to have proved this, science is an ass. Kahn is not, for he says (page 629), "we concede that the uncertainties are large enough to raise the question of sheer survival, and the problem gets more severe in later time periods."

I have already suggested, parenthetically, a further important reason for taking note of the uncertainties in this type of calculation; a great deal depends on the degree of assurance that we can have that our opponents will believe our calculation, or even will believe that we believe it.

This point merits closer examination. The main burden of Kahn's argument, it will be recalled, is that by evacuating all our major cities at moments of international crisis we can simultaneously (a) demonstrate our intention to fight an all-out nuclear war if need be, and (b) protect our population to such a degree that the threat appears credible.

Walking on a Tightrope

The difficulty with this policy is that it forces us to walk on a tightrope; our pre-attack mobilization must be credible enough that our opponent decides to cease his provocative behavior, but not so credible that he panics, believing that his security will shortly be threatened, and attacks us while we are still vulnerable, that is to say while evacuation of our cities is in progress. The precise location of this tightrope is dependent on the results of a Kahn-type calculation, not necessarily made by Kahn. For it is not enough that we convince ourselves that we are standing on the tightrope; we

must convince our opponents.

A number of factors over which we have no control could make the opponent prefer to attack rather than back down; internal politics, a belief that vital interests are at stake, national pride, the feeling that once he submits to "nuclear blackmail" (in our own phrase) he is lost, an exaggerated idea of the efficiency of our civil defense (that is to say, an exaggerated idea of the shift of balance of power that will result from our evacuation; this is where the uncertainty of the Kahn-type calculation is so important), and the fear that we may have developed an anti-missile device with which to supplement our civil defense.

Alternatively he may evacuate all his major cities and provoke in us the response to which I have just alluded (a desire to preempt) for the reasons I have just outlined. One thing is sure: if we permit the Soviets to evacuate their cities then Type I deterrence will, by our own calculations, be at an end. They can now attack our homeland without suffering an unacceptable retaliation.

What are the chances of extricating ourselves from this tangle without being driven by pride or fear over the brink into war? What are the chances of extricating ourselves once? Twice? An indefinite number of times? (Kahn envisages an evacuation every few years.)

It is essential to bear in mind that these exercises in brinkmanship will occur in a world where constant efforts must be made to keep the path over the brink smooth and slippery. Otherwise, our opponent will surely be tempted to call what he believes to be our bluff--with disastrous consequences.

Competition in Civil Defense

An important factor contributing to international tension under these circumstances will be the emergence of a new type of arms race; that is, a competition in civil defense. This will be far more conspicuous and therefore more dangerous than the present arms race. It is impossible to have effective civil defense--including provision for speedy evacuation of all major cities--without the full cooperation of the civilian population. This cooperation can be obtained partly by coercion. Largely, however, it must be obtained by convincing the population of the reality and the imminence (for where horror is concerned only the imminent seems real) of the danger. International tension is seen to be not simply a concomitant of effective civil defense, but a prerequisite.

We come back to the same question that I posed earlier; how long could we hope to continue making use of such threats in a world far more tense than that of today, without finding ourselves either having to concede that the threats are empty (failure of Type II deterrence) or having to implement them and accept the consequences (failure of Type I deterrence)?

If the answer is, as I think it must be, a few years, then we must ask ourselves whether we are willing to sacrifice in the region of 15 million people every few years in order to ensure the integrity of the free world.

If there are people who can take such a question seriously, then the process of "moral deturpation" that Wayland Young has described, is moving apace.

I cannot leave Mr. Kahn's proposal--which one might characterize as the strategic use of civil defense--without commenting on the likely future of civil defense. As the sixties proceed, civil defense requirements will become more stringent in proportion as the nuclear threat becomes more massive. Kahn himself discusses this, and concludes that the policy he outlines is feasible for the next few years only.

It may be asked why one should trouble to refute his argument if it will, before long, die a natural death. The answer is that policies suggested for the next few years are still being suggested for "the next few years," more than a few years later. The strategist, having submitted himself to the lengthy and painful process of indoctrination (On Thermonuclear War has 651 somewhat disheveled pages) is in no mood to let his mind be changed in a hurry.

In opening these remarks I observed that strategic thinking today appears to be taking three distinct directions. I have mentioned only one of these directions. It is actually a retrogressive policy, since it seeks to tame all-out nuclear war in order to make it serve, as has warfare in the past, as an instrument of diplomacy. This appears in the short view to be highly dangerous, and in the long view completely irresponsible.

What remains? The two remaining paths, partial arms control and complete disarmament, both involve agreement between potential opponents that they will limit the permitted range of military competition.

These too are in the military sense "retrogressive" policies since they attempt to stop the armaments clock, or turn it backwards. The objective in this case, however, is not to restore all-out war to its classic role as an instrument of diplomacy, but simply to make it

less likely to occur, or, ideally, to make it impossible.

I shall use the term partial arms control, or simply arms control, to describe any measures that may tend to stabilize the balance of power, excluding complete disarmament. Complete disarmament is the particular measure of arms control that seeks to stabilize the balance of power at a very low level indeed, namely the level of forces required by each nation for internal security.

Partial Measures

Until quite recently such proposals, which in effect require that parties to a disagreement agree as to the fashion in which they may disagree, have been regarded by all but professional dreamers as being utopian. Today this is changing. Agreement on partial measures of arms control is regarded as a definite possibility. However, complete disarmament is still regarded by the majority of professional and quasi-professional Western strategists as a chimera.

The extent to which partial arms control has achieved respectability is illustrated by the following quotation from an article by George A. Kelly in the Military Review of January 1961 (as it was reprinted in Survival of May-June 1961): "it now appears that an unlimited arms race must, sooner or later, produce either technological breakthrough, favoring the potential attacker out of all due proportion, or else lead to such conditions of hostile suspicion and political disequilibrium that a total war would become inevitable. The alternative to this mounting spiral of menace would seem to be some kind of limitation or 'freeze' on the essential strategic weaponry of the antagonists." The burgeoning of interest in partial measures of arms control has not, however, been accompanied by any appreciable softening in the attitude of disdain for the disarmament expert, who is described by the same writer as "apt to be a bit of an idealist or a pacifist, in few cases . . . with a grasp of the bewildering complexities of technological war."

It is an encouraging thing to read a statement like this one on arms control in a military magazine, and to feel the educational process at work, even if one believes, as I do, that education will have to be followed by re-education. For, as I shall try to show, though the notion of complete disarmament today may be utopian, the policy of partial arms control, regarded as anything but a very short-term palliative, is likely to be even more utopian. Complete disarmament would require an act of will; and an act of will so improbable that we might characterize it as a miracle. (In this sense the abolition of slavery was a miracle.) Effective and enduring arms control, on the other hand, would appear to require a sustained display of diplomatic skill and mutual understanding between fully armed opponents

that would be tantamount to an unending sequence of miracles.

The difficulty with complete disarmament until now has been that nobody sufficiently wants it. Not East or West, and still less the other compass bearings. For the political price of complete disarmament is high.

A disarmed world, it has been formally agreed by the Soviet Union and the U.S., would not long be a world at peace, without an effective international police force. Such a police force could not be effective unless there were a supra-national organization to control it according to an agreed code of behavior. (The most detailed attempt to describe such an organization is to be found in World Peace Through World Law by Grenville Clark and Louis B. Sohn.) This is the political price; the surrender of a substantial amount of national sovereignty to an international agency. It is a price that no nation has yet shown real willingness to pay since all seem convinced that survival can be assured more cheaply.

The prevailing view, certainly until the failure of the test ban negotiations, has been that partial measures of arms control represent the greatest hope for survival at a political price which is not exorbitant. The political price, in this case, can be measured in terms of the amount of veto-free inspection, or other infringements of sovereignty, that the measure entails.

Whether or not the price does turn out to be exorbitant will clearly depend not only on the price itself but also on the likely gain in security from the partial measure under consideration. There is reason to doubt whether this gain will appear great enough to justify the payment of any but a small price. If this is correct, it will make it extremely difficult to reach agreement on partial measures. I shall attempt to give substance to these fears in what follows.

Partial Arms Control

The philosophy of partial arms control can best be illustrated by reference to the large and growing literature on the subject. An excellent general introduction is to be found in a volume of essays entitled Arms Control: Issues for the Public, edited by Louis Henkin. The point of view of the book is summarized by Robert R. Bowie (Assistant Secretary of State until 1957, now director of the Center for International Affairs at Harvard University) at the close of his contribution. He says, "This article has explored the relation between political tension and hostility, and cooperation for arms control under current conditions. Its conclusion is that the underlying hostility does not exclude measures for arms control which would reflect existing mutual interests in avoiding unintended war or futile arms burdens or dangerous arms competition. Yet any such measures

will have to be designed for adoption and operation within a framework of intensive struggle and conflict among the participants."

Here is the crux of the matter. Can we really hope to reach and maintain agreements which have sufficient substance that they significantly diminish the "dangerous arms competition," and yet are so neutral, that they do not run afoul of the "intensive struggle and conflict among the participants"? I fear that we shall encounter great difficulty in doing so. I propose to elaborate on these difficulties; not because I wish to argue that it is pointless to seek agreement on partial measures of arms control, but because I believe that these considerations have a relevance to our search for such agreements. They may determine whether we seek partial agreements while paying lip service to the idea that further steps (political and military) are essential, or whether we really believe that these further steps are essential.

Partial measures of arms control will, I believe, be hard to obtain and hard to maintain in force, for two reasons. The first is that mutual reassurance against the dangers of cheating will be extraordinarily difficult to achieve in a world of intensive struggle and (military) conflict. The second reason has to do with the changing military requirements in a fully armed world; a world in which technological revolutions follow one another with unprecedented rapidity. These military requirements are of two kinds: requirements for the maintenance of effective tactical forces (limited war forces) and requirements for the maintenance of invulnerable strategic forces. The latter constitute the essential element in stable deterrence; a concept which lies at the heart of arms control.

I shall discuss in turn the problems of mutual reassurance against cheating, and the problems involved in reconciling changing military requirements with arms control.

Partial Inspection

Mutual reassurance will be based largely on mutual inspection. Unfortunately it is extremely hard to design an inspection system which provides a satisfactory assurance to side A that side B is not cheating, without at the same time presenting an unacceptable risk to side B that side A is spying.

One should perhaps inquire at this point why it is that spying is resented. The answer, of course, is that secrecy is a weapon of war. For one thing it enables a power to achieve a military advantage by exaggerating its might. In addition it makes it possible for the opponents to protect military installations, simply by keeping their locations secret. The Soviet Union, because of the nature of its society, makes great use of secrecy. But this is not to say that