

THE DYNAMICS OF THE ARMS RACE

Edited by
David Carlton and Carlo Schaerf

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The Dynamics of the Arms Race

EDITED BY DAVID CARLTON AND CARLO SCHAEFER



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PREFACE

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David Carlton
Carlo Schaerf

SUMMARY OF PROCEEDINGS

J. Henk Leurdijk

Introduction

It should be recognised that this summary of the lectures and discussions is biased as to the selection of the items and may be unbalanced in its presentation. This is so for two reasons: first, no written records were made of the discussions so that the summary is a highly personal view of the course and the symposium, and second, the discussions often covered a wide range of subjects occasionally in a rather undisciplined fashion, whereas this summary tries to structure the discussions in a possibly artificially systematic way.

This summary is organised along the same lines as the presentation of the articles: first, the nuclear arms race in terms of its technological aspects and its political implications; second, biological and chemical weapons; and finally, theory of conflict and some regional case studies.

Nuclear Weapons

The main focus of the school and the symposium was on the nuclear arms race. Any full-scale discussion of this subject has to touch upon a number of interdependent aspects: the technological aspects of strategic and tactical nuclear weapon systems, and their political implications, that is the systematic exposition of ideas of how to use them (strategic and tactical nuclear doctrines) and how to control and eliminate them (nuclear arms control and disarmament). Often these aspects are treated separately, although fully to comprehend the phenomenon of the arms race and its relevance or irrelevance involves studying how they interact. Weapons and strategy interact because it is the quality of nuclear weapons that determines their strategic uses, while at the same time strategic thinking may be an important factor in weapon developments. In addition, it is necessary to consider how the efforts to control the arms race can be understood in terms of some organising principle which relates them with the on-going arms race, thereby making a certain pattern visible instead of treating arms control agreement as unique phenomena.

There is ample evidence that at present the nuclear arms race is strongly technologically determined. In his lecture on the origins of Multiple Independently Targetable Re-entry Vehicles (MIRVs), Herbert York explained that in this case almost all decisions were influenced by considerations of technology while the political implications did not enter into the process until it was too late to have any effect. Strategic nuclear weapon systems and their development were described in great detail by three American scientists. Kosta Tsipis dealt with the sea-based deterrent consisting of nuclear missile-carrying submarines (SLBMs) which he described as the ideal deterrent weapons for the future. Their mobility in a water environment makes them invulnerable to a pre-emptive first strike from an opponent and for the same reasons they are unsuitable for delivering a first strike against the enemy weapons. On the other hand, the land-based part of the deterrent (ICBMs) is becoming less important because the fixed position of land-based missiles makes them at the same time vulnerable to a pre-emptive first strike and suitable as a first strike weapon against the opponent as a result of the high accuracy of their delivery. Adopting a launch-on-warning posture would introduce destabilizing elements into the deterrent situation which arms control agreements are trying to prevent. The history of three weapon systems (ICBM, MIRV and ABM) was outlined by Herbert York, who described in great detail the interaction of strategic, political and technological motivations in their development. The most recent destabilizing factor in the offensive missiles race was the introduction and development by the United States of the MIRV. The development of this weapon was described by Herbert York as a result of the coincidence of different motivations held by different groups of people: some gave priority to the maintenance of the American deterrent as a means of dealing with the Soviet ABM system; the Air Force stressed the increase in the number of points that could be targeted with MIRVs in a counter-force posture; while the arms controllers in the American Government saw MIRVs as a device to prevent the building of more missiles.

General and complete disarmament being a rather elusive goal and conventional disarmament not being regarded as of urgent importance, most efforts for arms control and disarmament during the last decade have been concerned with nuclear weapons. But the little progress that was made along this road has been far outdistanced by the developments in the nuclear arms race. Anti-Ballistic Missiles (ABMs), ICBMs and SLBMs are now quantitatively though not qualitatively limited in the SALT Agreements of April 1972, which were evaluated by Jack Ruina as only important when seen as part

of a process of negotiating arms limitations. The main justification of the ABM Treaty was the recognition by implication that deterrence should be upheld as the strategic principle of the American-Soviet relationship. The positive effects of the offensive missiles limitation agreement could be found in the spin-off from the negotiation process that both parties went through. As next steps in the arms control process he advocated curbing the qualitative aspects of the arms race and negotiating a complete test-ban treaty and a ban on ASW techniques.

As a result of the development of these highly sophisticated weapon systems, people gradually came to believe that nuclear weapons had the effect of creating a qualitatively new system of international politics. During the 1950s and early 1960s, with perhaps the Cuban missile crisis as the turning point, efforts were made to 'conventionalize' nuclear weapons. This was made possible by miniaturizing the nuclear warheads and improving the accuracy and reliability of their means of delivery. Arguing that nuclear weapons were just another kind of weapon, some strategists had thus sought to establish the political usefulness of nuclear weapons. Hans Morgenthau discussed such concepts as the 'clean bomb', massive retaliation, tactical nuclear warfare and strategic doctrines such as counter-force, population defence, damage limitation and first strike postures. These were, in fact, all 'winning-the-war' strategies whereby superpowers would aim not to go undamaged but, in Hans Morgenthau's words, 'to come out wounded but not dead'. Such thinking still is an important factor stimulating the invention and development of new weapons, such as Herbert York described in the case of MIRVs and Kosta Tsipis in the case of anti-submarine warfare (ASW). Developing MIRVs meant increasing the number of points that could be targeted which was welcomed by those, especially in the Air Force, who advocated a counter-force strategy. The improvement of ASW techniques would degrade the sea-based second strike force. But, in the view of most participants, in the nuclear age the aim should be avoidance rather than the conventionalization of nuclear war. With this objective in mind, two major points emerged from the discussion: first, it was contended that a controlled nuclear war is not possible either in the form of a tactical nuclear war or in the form of a counter-force exchange, and secondly, it was admitted that the concept of deterrence, although generally regarded as the only possible strategic nuclear relationship between the two powers in the present state of technology, has in itself major weaknesses.

The possibility of a controlled nuclear war was discussed in the context of the tactical use of nuclear weapons and of counter-force

warfare. Counter-force strategies require the possibility of distinguishing between conventional and military targets, which was regarded as impossible in view of the destructiveness of nuclear weapons, the geographical mix of conventional and military targets and the problem of classification of weapons in either of the two categories.

The concept of tactical nuclear warfare was discussed by David Carlton who stated that, if one started from the assumptions of NATO, one could put forward arguments for a variant of tactical nuclear warfare. This concept emphasises the usefulness of delivering 'teaching strikes' on targets in the enemy's heartland in a situation in which the credibility of the United States as a superpower is at stake or her own survival as an independent state. Most participants, however, discarded the possibility of tactical nuclear warfare if it were based on a distinction between tactical and strategic nuclear warfare, advancing three arguments:

1. the distinction between tactical and strategic nuclear weapons is not relevant in view of the destructiveness of even the smallest nuclear weapons. There are weapons that could, theoretically, be used in a tactical or strategic way but all would bring terrible destruction;
2. as soon as nuclear weapons are used, escalation to all-out strategic war is almost inevitable;
3. especially with regard to Europe where the concept of tactical nuclear war has its greatest applicability, the asymmetric geographical situation makes this concept extremely dangerous. The conventional unbalanced situation will create pressures for an early use of tactical nuclear weapons, while the high density of its population and industry will make it difficult to discriminate between the strategic and tactical uses of nuclear weapons in Western and Central Europe. It was pointed out that although it is often said that the presence of tactical nuclear weapons in Europe may have contributed to the stability of the situation in Europe, this could not be proved or disproved and, in any case, it has done so at the price of creating a dangerous situation: thousands of nuclear weapons are available in a politically fluid situation where, if the threshold between conventional weapons and tactical nuclear weapons were crossed, the crossing of the threshold between tactical and strategic nuclear weapons would be easier.

It was contended, then, that the threshold should be between conventional and nuclear weapons: the choice between a quick death (when strategic nuclear weapons are used) and a slow death (when tactical nuclear weapons are used) is a matter of taste, not of principle.

The general problems of nuclear armament and arms control were introduced from different perspectives of academic disciplines and diplomatic practice. But most participants were agreed that nuclear

weapons have had a deep impact on the practice and theory of international politics.

Hans Morgenthau, in his lecture on the political aspects of disarmament, stressed the discontinuity in the evolution of armaments as a result of the development of nuclear weapons that qualitatively changed the nature of international politics. Milan Sahovic, however, who spoke on disarmament and international law, stressed the continuing validity in the nuclear age of basic legal obligations concerning warfare and armaments such as the protection of inhabitants and belligerents under the Hague Conventions, the illegality of the use of weapons that cause unnecessary harm under the Geneva Protocol (1925) and the general obligation of states to observe the territorial integrity and sovereignty of the other states. Both, however, agreed on a number of points. The introduction of nuclear weapons into the international system fundamentally challenged basic concepts of international law and relations. The advent of nuclear weapons resulted in a new kind of relationship between the major powers based on the concept of deterrence, changing forever the notions of offense and defence. In a framework of deterrence defensive weapons may have offensive implications while offensive weapons are regarded as defensive if they threaten the opponent's population. There was agreement, too, on the need for a new approach in which the adoption of new and effective legal rules and obligations and a new kind of politics was suggested. While governments which are in possession of these new weapons emphasize that they are not subject to the legal obligations assumed previously, it is also evident that many statesmen and responsible politicians are still thinking in terms of the old concepts. They base their thinking on traditional notions such as 'defending the country', 'winning a war', 'balance of power' and the relevance of the distinction between victory and defeat, that may weaken and destabilize the relationship of mutual deterrence that is said to guarantee peace. A third point of agreement that emerged from the discussions was that the results of arms control efforts are rather disappointing. According to Hans Morgenthau, there is now objective room for agreements on arms control and disarmament because in the nuclear situation the quantitative relation between the number of possible targets and the number and destructiveness of weapons had changed to the advantage of the latter. While being functional and politically inspired in a conventional system, the arms race in a nuclear international system is disfunctional and technologically inspired. Nevertheless, it was stressed that most agreements on arms control were in fact treaties of non-armament and interpreted as efforts of the

armed to disarm the unarmed. Friedhelm Solms, in his lecture on some socio-economic aspects of disarmament, also stressed the close relationship between the arms race and technological innovations.

From this it is evident that the participants in the school regarded the international system as essentially bipolar in nuclear terms and the history of the disarmament negotiations, as reviewed by William Epstein, as an exercise in freezing this structure. William Epstein recognised a clear trend toward a bilateral framework for disarmament negotiations. During much of the history of such negotiations, however, this framework was multilateral in form and Roberto Caracciolo, in dealing with the accomplishments of the CCD (previously the ENCD) evaluated the role of the smaller powers as one of stimulating, mediating and catalyzing issues between the major powers. The co-chairmanship of the United States and the Soviet Union of this Committee testified to the substantially bilateral framework of the disarmament negotiations and Jules Moch emphasized his view that giving up this chairmanship is a fundamental precondition for the return of France to the negotiating table.

Although there are now five countries with nuclear weapons and a number of countries on the threshold of acquiring nuclear weapons, the world is still essentially bipolar. During the progress of the nuclear arms control negotiations, the bipolar nature of the international system became still more pronounced as a result of the nature of the nuclear agreements and the formal framework for the negotiations was accordingly adapted to this situation. The CCD is now running out of work and dealing only with marginal matters, while the Soviet Union and the United States have entered on a course of bilateral negotiations, leaving the other countries out in the cold. The impact of this state of affairs is strongly resented by the smaller countries but no solution to this problem emerged, most of the participants being rather sceptical about the prospects for a world disarmament conference. But at the same time there was much fear of what may be the only possible course that could basically change this situation: the build-up of nuclear armaments by the present small nuclear powers and the proliferation of nuclear weapons to non-nuclear weapon countries. Many voiced strong reservations on the deterrent possibilities of the nuclear forces of France and Great Britain, even combined. One major difficulty which was mentioned, among others, was that the political *raison d'être* of the independent French nuclear force is to sustain an independent French foreign policy which France is not likely to give up in the event of Franco-British nuclear co-operation. Francesco Cavalletti elaborated, in the context of his lecture on the contributions of Western Europe to disarmament, on the prospects for such nuclear collaboration. Reviewing the favourable technological,

financial and strategic preconditions for British and French nuclear co-operation which, in his view, far outweighed the obstacles, he nevertheless voiced his fears that collective European nuclear armaments would stimulate the arms race while aggravating global tension. Of major importance would be the outcome of the next stage of SALT because a continuing nuclear arms race between the Soviet Union and the United States would strengthen pressures for nuclear arms for Europe.

Although during the discussions the political value of the recent SALT agreement was recognised, many doubted the substantive value of these agreements with regard to ending the arms race and arms control. But there is clearly a dilemma here, which was reflected in the contrasting opinions of the participants, some favouring the extension of the deterrence principle to at least three and possibly more political entities but most arguing in favour of a continuing bipolar relationship. In these discussions it was also suggested that France and Great Britain might assume a major rôle at the level of tactical nuclear armament, these weapons having a greater deterrent value than the British and French nuclear submarines.

The strategic nuclear forces of the Soviet Union and the United States consist of three weapon systems:

1. the Strategic Air Command (SAC) consisting of long range bombers. Although it was generally recognised that they only have a supplementary role in nuclear strategy because they are vulnerable to a surprise enemy attack and their penetration capability is seriously endangered by the active air defences of the enemy, it was stated that they are not unreliable enough to give up — they can at least complicate the task of the defences — while in the future they may be equipped with long-range missiles that can have a function comparable to the undersea missiles;
2. the land-based ICBMs which may become obsolete as a result of recent technological developments: the increasing accuracy — a 30-metre accuracy was mentioned — makes the fixed land-based missiles increasingly fit for counter-force options and if both superpowers settle on a strategic relationship of mutual deterrence, the ICBMs may become outdated as a result of both their technological superiority and their vulnerability;
3. the sea-based SLBMs which will in the future be the strategic weapon systems both of the major powers and of the minor nuclear powers.

The relevance of these weapon systems is a function of their strategic uses. In a world of two major powers having achieved a

comparable technological development, three symmetrical postures are possible:

1. if both powers adopt a defensive posture (defence, that is, in the traditional meaning of defending the population) their strategic relationship is based on the principle of defence;
2. if both powers adopt a counter-force posture (aiming at eliminating the opponent's nuclear weapons) their strategic relationship is based on mutual first strike capabilities; although there may be differences counter-force, pre-emptive first strike and damage-limiting first strike, the technological requirements are much the same and all are 'winning-the-war' strategies;
3. if both powers adopt a defensive posture by threatening to destroy the opponent's population only if the opponent attacks, their strategic relationship is based on the principle of deterrence.

It can be argued that, among equal nuclear powers exploiting the available nuclear technology, neither a defensive nor a first strike relationship can obtain so that of necessity their strategic relationship has to be based on deterrence. But this picture is more complicated in practice. First, there exist asymmetries in nuclear technology, the United States always having been ahead of the Soviet Union in nuclear weapons technology. Secondly, there are often pressures from the internal bureaucratic organisations in favour of further arms development and even in favour of bids for nuclear superiority. In short, a relevant superiority in defensive or offensive weapons may give one country a choice between all three postures, or a combination of them, placing it in a superior strategic position *vis à vis* its opponent.

Although not structured as presented here, the debate on the relative adequacy of these strategic relationships developed along the following lines:

1. A defensive relationship based on the defence of a superpower's own population rather than on the threatened destruction of the opponent's population is not possible in the nuclear age although the idea is, emotionally and ethically, quite attractive. It was pointed out that, in order to work, the population defence system should provide a 100 per cent reliability because a few out of thousands of missiles in an all-out attack can do unimaginable harm. A country will not dare to trust for its security on defensive weapons alone because it can never be sure that its untested system can handle all kinds of tricks the opponent may devise. There is clear evidence that in the interaction of offensive and defensive nuclear weapons development, offensive weapons always have the advantage. This is why a country will organize its defence in the conviction that it can more easily deter an enemy by making sure that the enemy will suffer than by making sure that his attack will fail. It was concluded that

the concept of defence in the nuclear age is a relic from the conventional past.

2. A strategic relationship based on counter-force postures was considered unlikely for the following reasons:

- (a) while it is possible to wipe out one missile, it is unthinkable that all of thousands of missiles could be destroyed in a very short time;
- (b) it is difficult to think of a scenario that can eliminate in a surprise attack all these components of a nuclear force at the same time without giving adequate warning time to one of them;
- (c) it is always possible to adopt a launch-on-warning posture although it would be very dangerous to do so and it was argued that to avoid such an unstable posture should be a major aim of arms control negotiations.

3. According to many interpretations of the SALT agreements, the Soviet Union and the United States have agreed to settle their relationship on the basis of deterrence. But while a deterrent relationship seems to be the inescapable result of the strategic arms race, we have to be aware of the weaknesses of the doctrine of deterrence and of the relative importance of the SALT agreements. Joseph Kashi, for example, discussed loopholes in current theories of deterrence, while George Rathjens, evaluating the SALT agreements, elaborated on the possibility of a limitation on missile testing as an arms control technique.

Joseph Kashi suggested a number of reasons why deterrence can break down during a crisis as so nearly happened during the Cuban missile crisis of 1962, as a result of bureaucratic inertia in large organisations and the serious defects of the rational actor model of decision-making in deterrence theory. During the discussion a broad range of arguments was raised, questioning the stability of a strategic relationship based on mutual deterrence between the two superpowers:

- (a) The state of nuclear technology in the two countries has never been equal and a superior nuclear power may try to maintain or, perhaps, exploit its superiority for political purposes by adopting a counter-force posture. It was suggested that the introduction of an element of 'irresponsibility' in deterrence is very dangerous because someone may call the bluff and non-nuclear weapon countries may decide to acquire nuclear weapons to avoid nuclear blackmail. Many political leaders from different countries were quoted to the effect that they would not settle for less than superiority, some of them minimizing the consequences of a nuclear war. But doubt was expressed whether this should be interpreted a rhetoric or as an of counter-force postures
- (b) There seems to be an internal inconsistency in the logic of

deterrence, interpreted as a game of chicken where both can end up on the losing side by behaving rationally: deterrence means the conscious manipulation of risks because it only works if you can make your opponent believe that you are really determined to use nuclear weapons or you may calculate that your opponent will act 'rationally' by backing down in face of a nuclear catastrophe.

(c) The technological dynamics behind the arms race, that is the possibility of a technological breakthrough that reduces the confidence of a country in the invulnerability of its forces and the long lead-time for the development and deployment of counter-weapons, may cause the adoption of counter-force postures which may give incentives for a first strike.

(d) There is a great potential for miscalculations as a result of possible misperception of enemy actions and interactions; the lack of information about how to find the optimal solution to a problem; the overloading of a decision-maker's emotional and intellectual capabilities; and the adoption of rigid postures. Leaders can behave irrationally in a situation where the control of the use of nuclear weapons is highly centralized and they have to act in a situation of stress.

(e) There is a bureaucratic inertia which can interfere with the smooth operation of deterrence.

During the discussions references were often made to the SALT agreements. It seems possible to evaluate the importance of these agreements on three levels and opinions mainly differed about which level should be regarded as most important. Some emphasized the political relevance of the results of the talks between the two superpowers which involved the first agreed limitations on the further expansion of their own armaments and which may point the way to further agreements. It was pointed out that these agreements were concluded in opposition to strong internal pressures. But at the same time there was a consensus that the two superpowers had only formally fulfilled the conditions of Article VI of the Non-Proliferation Treaty (NPT) to pursue negotiations in good faith on effective measures for nuclear disarmament and had not done so in practice because of the lack of substantive results on other levels. On the strategic level some stressed the importance of the implied agreement on deterrence as the guiding principle of their strategic relationship. But others tended to the conclusion that although both superpowers had given up the option of an ABM defence of the whole population, there remained the threat that the relationship of deterrence may give way to efforts to attain superiority, since the two powers had not addressed themselves to the question of nuclear

sufficiency. Least important are the results on the arms race level. As regards the ABM agreement it was mentioned that ABM would not work in any case with the present state of defence technology while the text of the Agreed Interpretations on ABM did not rule out the possibility of a defence based on other physical possibilities and hence the obvious need to negotiate this issue as technology improves will constitute a permanent danger to the ABM treaty. The quantitative freeze of the Offensive Weapons Limitation Agreement was considered hardly more relevant because both powers had only negotiated on what they would have done unilaterally in any case. And as no qualitative limits were agreed upon, it was clear to the participants that pressures would develop for a qualitative arms race that might endanger the relative stability of the deterrence relationship. Especially, as all indications point to a future deterrent, mainly sea-based, the failure to deal with anti-submarine warfare (ASW) techniques may prove to be the major weakness of the SALT agreements. Although ASW may not be able to deny the SLBMs their deterrent value, it may endanger its credibility and so stimulate the arms race. This may be a major negotiating issue for a subsequent phase of SALT. The sea-based deterrent could be stabilized, as Kosta Tsipis suggested, by forbidding the installation of large acoustical arrays capable of tracking missile-carrying submarines and designating areas in the oceans accessible only to submarines of one nation. In this context it was noted that the failure of SALT to limit qualitative improvements in weapons would prevent the conclusion of a complete test ban agreement.

The evident consequence of the offensive missiles limitation part of the SALT agreements is that the qualitative arms race will continue, which may threaten the future stability of the relationship of mutual deterrence. Although it is generally recognised that the ABM Treaty, with its ban on population defence, implies acceptance of the deterrence doctrine by both sides, the qualitative arms race in offensive missiles may lead to 'war fighting' capabilities. To develop a 'war fighting' capability, however, requires extensive missile testing in order to develop the necessary high accuracy, confidence and reliability of the offensive weapons. In his lecture, George Rathjens suggested that an agreement on limiting missile testing to an agreed number could prevent such a development and curb the arms race. He argued that if both countries really wanted to adopt a deterrence relationship such an agreement might be a very good vehicle of arms control because (a) in contrast to a counter-force posture, the deterrence relationship is compatible with a large measure of uncertainty with regard to one's own missiles (there is little difference between retaliation being 90 per cent or 99 per cent effective) and

(b) extensive testing is required to build an effective 'war fighting' capability and this can easily be observed without intrusive inspection. This is why there are important reasons for trying to limit the qualitative arms race which is still going on at the testing stage, an opportunity which was missed in the case of MIRVs.

Arms control agreements, and especially the SALT agreements, which did so little to control the arms race, raise important questions as to why they are negotiated anyway and why the arms race is so important that it cannot be stopped by arms control agreements. Answers to these questions were sought by Thomas Schelling in his lecture on the interest structures that may underlie arms agreements or understandings and by Kosta Tsipis who compared the arms race with the practice of posturing. The SALT agreements had a quite sceptical reception in many quarters in that they were seen as agreements not to stop the arms race but to channel it into certain other directions and they may even have been designed to have this effect, or as agreements that merely reflected what the Soviet Union and the United States wanted in any case.

Thomas Schelling analyzed several bargaining situations as interest structures underlying arms control agreements between two parties based on the many possible combinations of their preferences and motives and he gave several reasons why it is important to have a treaty even though it only reflects what parties would do anyhow in the absence of a treaty. He recognised that in arms control agreements there may be elements of posturing, a practice which was described by Kosta Tsipis with regard to the arms race as a stable and credible channel of non-combative resolution of conflict between two nations of comparable technological development.

In the discussion, two aspects of Thomas Schelling's thesis received particular attention: the degree of specificity that is desirable in a treaty and the value of the negotiating process itself. Thomas Schelling emphasized that the deliberately vague wording of an agreement might inhibit the participants from challenging or endangering the spirit of the treaty and Herbert Scoville argued that in respect of the complexity of arms control matters this vagueness often is a prerequisite of agreement. Others argued, however, that these views did not take into account the mutual distrust among opponents and their different frames of reference which might require a very specific agreement. It was also pointed out that agreement results from a complicated pattern of internal and international compromises. The negotiating process could also be differently evaluated: positive aspects might be that parties undergo, while negotiating, a learning process, that they resolve differences where they disagree or can find out what is relevant or irrelevant. Others emphasized the negative aspects

of the negotiating process. Support for negotiations can be counter-productive because it may be an argument for inaction in the field of arms control while at the same time the arms race continues to create 'bargaining chips'.

As to the arms race as a practice of posturing it was pointed out that it has many dangerous aspects: the arms race is a race in nuclear weapons which in itself makes all the difference between this and earlier examples of posturing; the element of bluff and counter-bluff in a deterrence relationship; the American-Soviet rivalry outside the framework of the arms race can interfere with the process of posturing; and, finally, posturing requires a common frame of reference. It was recognised that the arms race as a practice of posturing does not necessarily imply a judgment in terms of good or bad because it serves as a substitute for war, but it makes us understand what in fact is difficult to comprehend: the senseless accumulation of weapons. And it is definitely not a contribution to the resolution of conflict in terms of its settlement or solution.

A special session was devoted to the question of nuclear-free zones, introduced by Jozef Goldblat and William Epstein. Jozef Goldblat was rather pessimistic on the prospects of concluding relevant agreements on nuclear-free zones. He pointed to the Treaty of Tlatelolco which, while creating a nuclear-free zone for Latin America, does not bind the two largest countries in Latin America, Argentina and Brazil, which are precisely the two countries in the area with any nuclear weapons potential and aspirations. Moreover, the main arguments in favour of nuclear-free zone arrangements have lost much of their validity:

1. the prevention of the acquisition of nuclear weapons by the threshold countries is now being covered by the Non-Proliferation Treaty (NPT) on a universal basis;
2. the prevention of deployment of nuclear weapons in non-nuclear weapon countries by outside nuclear powers is no longer of urgent importance following the development of long-range missiles and a sea-based deterrent;
3. the removal of existing nuclear weapons from the territory of non-nuclear powers is the only relevant remaining objective but this is the most difficult to achieve. It was, in fact, considered unlikely that a nuclear-free zone arrangement will be the appropriate instrument for the removal of foreign nuclear weapons from the only region where they actually are, namely Central Europe.

Proposals for a nuclear-free zone have been made for many areas in the world and most of the arms control agreements concluded thus far are in fact nuclear-free zone arrangements (Latin America, space, Antarctica and the sea-bed, the last three regions being uninhabited).

William Epstein argued that nuclear-free zone arrangements could be relevant for the prohibition of the use of nuclear weapons against non-nuclear weapon countries. The NPT does not deal, to the dismay of the non-nuclear weapon countries, with the use or non-use of nuclear weapons, mainly as a result of opposition from the United States. The most quoted reason for the unwillingness of the United States to forego 'no-use' or 'no-first-use' options is the unbalanced situation at the conventional level in Europe which nuclear weapons are said to balance. The United States, however, had accepted a no-use formula in the context of the Latin America Treaty which the Soviet Union refused to endorse. Jozef Goldbalt pointed out that a universal declaration on the prohibition of the use of nuclear weapons would deal with the above-mentioned third purpose for which a nuclear-free zone might be negotiated.

An issue that come up in most discussions on conventional, biological, chemical, and nuclear disarmament is the problem of verification. This problem has been a major stumbling block in the negotiations since the Second World War and it was thus appropriate that a veteran participant in these negotiations, Jules Moch, introduced the subject. He reviewed the differences between the Western and Soviet positions on verification which diverged on two fundamental issues. First, there was the fact that, while the United States stressed the need for on-site inspections as a fundamental arms control principle, the Soviet Union strongly insisted on the adequacy of national means of verification. Secondly, there was the problem of what should be verified: while the United States emphasized the need to verify what was present before and after disarming, the Soviet Union wished to see the verification restricted to what was being destroyed.

It is appropriate at this point to make a distinction between three forms of inspection: first, self-inspection, meaning verification by a state within its own territory such as is mentioned in the Biological Disarmament Convention as the only means of verification; secondly, national verification, meaning the use of national means of verification by a country to observe another country; and thirdly, international means of verification.

The debate on verification procedures centred very much on the problem of on-site inspection. The debate in the international negotiations during the past twenty-five years has reflected the inadequacy of detection mechanisms; the different social conceptions of the two major powers; and the relative power position of the great and smaller powers. Over the years, however, many things have changed. Detection mechanisms have improved so that we now have available radars, satellites and computers to process information. As a

consequence, we can rely on national detection mechanisms which are not regarded as intrusive by the other party, reducing the need for on-site inspection. As a result of this improvement in long-range inspection techniques it was possible, for instance, to conclude the Partial Test Ban Treaty (1963). Both the ABM Treaty (Article 12) and the Offensive Weapons Limitation Agreement (Article 5) recognised the applicability of national means as a way of verifying the observance of these international agreements. Nevertheless, it may be possible for a country to interfere with the opponent's verification mechanisms, sometimes with dangerous international complications as occurred with the shooting down of a U-2 spy plane in 1960 just before the planned Summit Conference and with the shooting down of a U-2 over Cuba at the height of the Cuban missile crisis of 1962. It is, therefore, extremely significant that both the Soviet Union and the United States have now formally recognised the importance of the improvement in detection techniques for arms control agreements in undertaking, in the SALT agreements, not to interfere with the national technical means of verification of the other party.

Although the positions of the Soviet Union and the United States have approached each other, there remains a clear difference of emphasis reflecting different types of social organisation. But it was pointed out during the discussions that inconsistent elements are present in the arguments of both sides. There is a basic contradiction in the Soviet insistence that, on the one hand, a country can place trust in the self-inspection of another country because an agreement is there to honour and, on the other hand, its position that it for its part could not accept international verification because of fear of industrial espionage. In the context of the discussion on chemical weapons, however, the Soviet Union has proposed an international programme to supervise the activities of national verification commissions. As regards the United States's position, it was pointed out that there were limits to what even on-site inspection can achieve. The Mirving of missiles was mentioned as one example and Herbert York took nuclear underground explosions as a further example. He argued that it is not possible to attain 100 per cent reliability of detecting and identifying nuclear explosions below a certain threshold; but that the use of on-site verification will make it possible to introduce the risk of detection and identification of very small nuclear explosions.

It was suggested that, as a result of these considerations, a combination of national and international inspection procedures might be acceptable. In this context, it was noted that at the CCD a change of attitude could be observed: the emphasis was no longer on

absolute but rather on adequate verification, the objective no longer being to detect violations but rather to deter violations. What is important is the reduction of the risks of evasions involving programmes of military significance to acceptable levels.

While the positions of the Soviet Union and the United States are obviously approaching each other, the improvement of detection techniques has created uneasiness among the smaller powers. As was pointed out in the debate, these techniques are now so sophisticated that they are the monopoly of the major powers and so the smaller powers are excluded. This is why they emphasize international procedures rather than national means of verification. In the NPT the non-nuclear powers had to agree to international control of their peaceful applications of nuclear energy in order to get assistance from the nuclear weapon countries. In the Latin American Treaty they even accepted a right of transit of nuclear weapons over their territory. The same applies to the sea-bed treaty in which the smaller powers take great interest.

Chemical and Biological Weapons

Substantial attention was devoted to the problem of biological and chemical weapons. While the present agreements in the nuclear field are in fact treaties of non-armament, the Biological Disarmament Convention stands out as the only real disarmament undertaking. Jozef Goldblat showed that this convention, in which parties undertake not to develop, produce, stockpile or otherwise acquire or retain biological agents and toxins, has major deficiencies. Slautcho Neytcheff spoke of the application of micro-organisms in biological warfare.

In the field of chemical disarmament not much progress has been reported although chemical weapons have occasionally been used in war. The problem of definition is a major obstacle. Oleg Reutov discussed the question whether limiting the control of the production and accumulation of chemical weapons to organo-phosphorus substances would not make possible the uncontrolled accumulation of toxic substances belonging to other chemical classes. He concluded that both should be limited as both could be used as warfare agents, favouring as the most rational system of verification a system of self-inspection.

The state of negotiations on chemical weapons was reviewed by Jozef Goldblat who focused on the scope of non-production and non-stockpiling commitments which would be appropriate. He mentioned as the major difficulty the inadequacy of definitions when it comes to determining whether a particular chemical product should be classified as a warfare agent.