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Strategic Arms Race Slowdown through Test Limitations

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International and bilateral conferences on the ways and means to relax the arms race and to prevent the proliferation of nuclear warheads and weapons systems began shortly after the end of World War II and by now have involved thousands of formal sessions and many thousands of trained and frequently dedicated individuals.

In recent years the leaders of the U.S.S.R. and the United States have repeatedly assured the populations of their countries and the rest of the world that the cold war was over, and that détente is the coming thing. Indeed the sharp bipolar confrontation between the United States and the U.S.S.R. has given way to a more complex and fluid international situation. Despite numerous political and scholarly voices raised in both countries to criticize the other for perceived breaches in standards of civilized human behavior, hostility has been relaxed in several ways. On the government level the minimal contacts of early days have developed into extensive dialogues of "policy-making" individuals. The early trickle of cultural and scientific exchange has grown into large programs, some involving protracted visits and effective scientific collaboration, as well as sharing of technological information. Trade relations, virtually absent in the not-so-distant past, possibly show signs of major growth.

However welcome these trends are, one must be realistic enough to recognize that they—and all the conferences on disarmament—have had only minimal effect on the technological arms race and on the multifaceted military confrontation of the superpowers. The nuclear arms race goes on relentlessly and undermines ever more the real security of the nations involved.

In the nonnuclear, that is, the so-called conventional arms domain, the long-drawn-out contest between bombers and air defenses in Southeast Asia was followed last year by another massive and destructive collision between a great variety of the modern land and air weapons of the United States and the U.S.S.R. in the Near East. The fact that to a large extent these collisions involved surrogate troops does not conceal the superpower confrontation. The lessons learned there about the battlefield performance are now being hastily applied to the development of the next generation of "conventional" weapons systems and one can only wonder where in the world this next generation will get its practical and bloody test. One must also wonder whether this next test will be the one that by accident or design will evolve into a tactical nuclear exchange and then a total nuclear war with its predictable disastrous consequences for the main contestants and for much of the bystander world as well.

The nuclear arms race has been the central topic of most recent arms control and disarmament conferences and of prolific military, diplomatic, and technical writings. It has also been dealt with in a number of treaties, the current and realistic significance of which we should consider before turning our attention to the future.

Recent Nuclear Arms Treaties

Among the treaties now in force is a group that defines certain nonnuclear zones. The first of these was the 1959–1961 Antarctica Treaty that demilitarized that entire continent and suggests by its continuing effectiveness that other arms limitation agreements should be possible. Following it in 1967 came the treaty making Latin America into a nonnuclear zone and prohibiting the storage there of nuclear weapons, obviously a very important matter for the nations of that part of the world. Also in 1967 outer space was declared to be a nuclear-free zone by a treaty forbidding the placement of weapons of mass destruction on celestial bodies or in orbit around the earth.

In 1971–1972 a treaty was added that prohibited the placement of nuclear weapons on or in the ocean floor, thus making the floor (but not the oceans) into a more or less nuclear-free zone.

We welcome the advent of these treaties, but we should not exaggerate their significance. Antarctica and Latin America are peripheral geographically to the nuclear arms race, and it is distressing that the creation of those nuclear-free zones has not led to their proliferation where it counts, ergo in Central Europe. The outer space treaty was preceded in the United States (and probably in the U.S.S.R.) by intense secret theoretical studies of the military uses of outer space which concluded that the actions forbidden in the 1967 treaty were generally pointless and in no case offered any strategic or cost advantages over nuclear deployment of the types already in effect. The seabed treaty, of course, puts no restrictions on submarines, but only on unattended mines and the like. The possibilities of peacetime accidents involving nuclear weapons implaced on the sea-

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bed or in orbit about the earth, and the likelihood of highly negative worldwide public reaction to their placement, were significant factors favoring these treaties. Furthermore, the massive and costly efforts to recover a nuclear weapon dropped accidentally into the Mediterranean Sea by an American B-52 bomber suggests strong concern that the placement of unattended weapons in internationally accessible spaces could lead to their theft and so to disclosure of technical secrets or to unauthorized use.

We may doubt whether these last two treaties really prevented anything that would have happened in peacetime anyway, but they have probably reduced the amount of military research and development dedicated to the subjects of these treaties. In addition, these two treaties may have helped to eliminate a few of the nightmares to which military planners are prone, about what the adversary is scheming to do.

The first treaty attempting to reduce the pace of the nuclear arms race itself was the partial test ban of 1963. It prohibited nuclear explosions in the atmosphere, under water, and in outer space. Neither France nor the People's Republic of China have so far chosen to subscribe to it. This treaty was preceded by about 5 years (and then followed by about 10 years more) of unsuccessful negotiations for a comprehensive ban that would have put a real lid on further developments of nuclear weapons technology. That the 1963 treaty did not have this effect in the slightest is shown, for instance, by the Stockholm International Peace Research Institute analyses of the annual rates of weapons testing by the U.S.S.R. and the United States before and after the treaty. As a matter of record, President Kennedy, in order to obtain the ratification of the treaty by the U.S. Senate, had to assure it that the development of nuclear weapons would not be impeded by it. The Soviet Union evidently adopted the same policy without making public declarations.

It does not take a great deal of cynicism to conclude that the partial test ban, far from limiting the arms race, has been almost counterproductive. Prior to 1963 the worldwide fear of radioactive fallout—and hence opposition to atmospheric weapons tests —was very strong. It was a major factor in inducing the test ban negotiations that began in earnest in 1958, foundered on military opposition to the cessation of nuclear warhead development activities, and finally produced the partial test ban treaty in 1963. That treaty banned nuclear tests which produced widespread radioactive contamination and fallout. Welcome as this was, it cut the ground from under public concern, eliminated nuclear tests as a burning public issue, and made the continuation of uninhibited weapons development politically respectable.

Also heralded as very important was the nuclear weapons nonproliferation treaty signed by the United Kingdom, United States, and U.S.S.R. in 1968. It might be thought of as creating numerous only partially nonnuclear national zones because it does not prevent the widespread use of the territories of nonnuclear allies for nuclear deployment by nuclear powers. By 1973 this treaty has been signed by nearly 80 other states. Unfortunately two nuclear powers—France and the People's Republic of China—and several other states which are politically important and technologically "near-nuclear" declined to sign. Therefore, its effectiveness as a permanent deterrent to proliferation is in doubt. Indeed, as this is being written India has carried out an underground nuclear explosion, ostensibly for "peaceful" purposes. The stimulus for other states to demonstrate their nascent nuclear weapons technology may have thus become irresistible.

One of the key provisions of the 1968 nonproliferation treaty which was insisted upon by the nonnuclear powers, was the commitment of the signatory nuclear powers "to pursue negotiations on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament. . . ." Despite this promise, there was no further movement in nuclear arms control, to say nothing of disarmament, until after the United States had made great progress in the development of multiple independent reentry vehicles (MIRV) and the U.S.S.R. was well into the process of building numerous hardened silos for very large intercontinental ballistic missiles (ICBM).

Finally in May 1972, further bilateral negotiations led to the signing of what are known as the SALT I (Strategic Arms Limitations Talks) agreements. They were heralded by the leaders of both countries as great achievements. One of the agreements is the treaty on the limitation of antiballistic missile (ABM) systems. It is useful, but it is not a big step in the efforts to limit the arms race. Its signing was preceded in the United States by a public debate which went back several years, and which concerned both the nonfeasibility of an effective defense against an ICBM attack and also the potentially destabilizing effects on the state of mutual deterrence between the United States and the U.S.S.R. of any large scale ABM deployment. The proponents of ABM, led by the Administration, were not very convincing. As a result, the U.S. Senate approved the funds for a limited deployment of the Safeguard ABM, justified in part also as a "bargaining chip" in the SALT talks, only by one vote. The very slow growth of the deployment of the large ABM system around Moscow suggested similar misgivings about the value of the ABM on the part of the leaders of U.S.S.R.

The joint lack of enthusiasm for ABM is especially clearly demonstrated by the failure of both parties to undertake the deployment of a second ABM system that was allocated to each by the treaty. Thus, the ABM treaty is to a large degree another agreement not to do something that both parties did not want to do anyway. Even so, the treaty does provide a modest measure of progress toward limiting the arms race by committing both parties not to undertake the development of new nonground-based forms of ABM or to upgrade the existing antiaircraft defenses into a countrywide ABM system. These restrictions inhibit certain kinds of military R & D and the suspicions that these would otherwise arouse.

The other part of SALT I, the interim agreement on Strategic Offensive Arms, set certain limits—very generous ones—on the further expansion of the deployment of such arms during the next 5 years. These limits permit approximately doubling of the total number and throw weight of operational land-based and submarine-based missiles deployed by the Soviet Union, and considerably more than doubling of the number of nuclear warheads deployed by the United States. In the American case, this increase comes about as a result of the installation of MIRV's on both the land-based and the submarine-based missiles, without changing the missile numbers, and results in a slight decrease in total explosive yield. Considering the huge overkill capability now deployed in

both arsenals, their further expansion allowed by the agreement does nothing except increase the possibility of their use as counterforce weapons. Hence, these increases in weaponry might increase the probability of a preemptive strike in a time of acute political tension, such as that which threatened to develop last October.

In the absence of any qualitative restrictions, this numerical SALT agreement does not really restrict the arms race; it merely channels it into such directions as each side perceives to be militarily most advantageous. Indeed, the recent American R & D budgets involve, among other matters, the rapid deployment of MIRV's, a speedup in the Trident submarine, the high priority development of the B-1 bomber, and further refinements in missile guidance technology. According to the statements of the U.S. Secretary of Defense, the Soviet Union is engaged in an intense development of new missiles and of its own MIRV's. These actions are hardly indicative of a limitation of the arms race. In the meantime, the new round of bilateral conferences that was promised to lead to a SALT II agreement before the end of 1974 appears to have bogged down and will probably terminate with much summit oratory and minimal substantive progress.

Perhaps the most valuable contribution of SALT I is the formal commitment (Article V of the Interim Agreement) not to interfere with "national technical means of verification," that is, with intelligence satellites, and the like. This agreement, which was tacitly in effect now for more than a decade, does reduce somewhat the opportunities for those arguments of military planners which are based on extreme "worst case" assumptions about what the other side is up to and about what the "necessary" countersteps must be.

Assessment of Future Prospects

This account of the past and present, which to some readers may appear as excessively pessimistic, is, we believe, simply realistic. The agreements reached so far have produced some beneficial effects through various commitments to refrain from this or that militarily unimportant action. But despite these agreements the main arms race continues in full force, and the number of nuclear warheads in the hands of the five nuclear powers continues to grow toward the 100,000 mark.

Perhaps the most dangerous elements of the current deployments are the advances in the precision of guidance for the multiple reentry warhead vehicles, making them into counterforce weapons, and the tens of thousands of "tactical" nuclear warheads, some with an explosive power only one to two orders of magnitude larger than the conventional blockbusters. The forward deployment and alert status of this essentially continuous spectrum of weapons by the chief nuclear powers, alleged to be the main deterrent against conventional aggression, greatly increases the probability of an unplanned amplification of the local conflict into an unrestrained nuclear war.

An optimistic view of the future might be that nibbling at the periphery of the arms race by the arms limitation agreements will, with time, become more effective and eventually bring it to a halt. According to this view, the next phase would then be a gradual reduction of nuclear arsenals until they are gone.

The question of whether future reality will correspond to this more optimistic view, or whether humanity will experience total nuclear war, is something that cannot be resolved now. It should be pointed out, however, that the concept of a gradual reduction of the numbers of deployed nuclear warheads by agreement may be intrinsically unrealistic as long as military R & D is allowed to proceed without severe restrictions. The point is that the possession of large numbers of warheads in a variety of delivery modes (for example, the American "triad" of strategic weapons) virtually eliminates the possibility that an opponent may make a dangerous surprise innovation. This notion has, of course, already been pointed out by others. A reduction of the strategic arms by, let us say, one or two orders of magnitude would still preserve the capacity to inflict "totally unacceptable" damage on the opponent. However, such large decreases may well challenge each side to gain superiority over the other, and they surely increase the technological feasibility of doing so. Hence, in the absence of strictly monitored agreements limiting R & D, the fear of the unknown but assertedly possible technological moves by an opponent may kill all chances for significant nuclear force reductions. Any major reductions, then, would have to wait for a totally changed political climate, devoid of present tensions. Unfortunately the technological arms race fed by the military R & D has acquired long ago a life of its own and is itself a continuing source of tensions, as has been suggested very recently by the events following the supply of massive quantities of modern conventional weapons by the U.S.S.R. and the United States to the combatants in the Middle East.

Arms Race De-escalation through Reduction of Field Testing

This less-than-reassuring estimate of the future leads us to make a not entirely original suggestion which may well be unrealistic but which, we believe, deserves a serious consideration that will not be given it without public intervention before Congress and the Executive. In these activities the American technical community needs to take a more active role than it has taken in recent years on other issues of disarmament. We propose that, in addition to seeking further peripheral agreements as in the past, negotiations also be undertaken on a gradual slowdown of military R & D through agreed gradual reductions in the numbers of field tests of the kinds that can be monitored by nonintrusive national means. The point is that field tests are the indispensable step that must follow R & D before new weapons can be produced and deployed. If tests can be controlled, the incentives for doing the R & D that precedes them, and which it is realistically not possible to monitor, will be severely reduced.

The classic case is that of the nuclear test ban. The American opponents of a comprehensive test ban have maintained in the past that the cessation of tests will result in the atrophy of the weapons laboratories. Indeed, a sudden and total test cessation would be a disaster from the weaponeers' point of view and that is one of the reasons the comprehensive test ban seems as unattainable now as it was 15 years ago. In those early years a treaty setting an upper allowable limit on the strength of the seismic signals from underground tests (a "threshold treaty") would have introduced meaningful limitations on the arms race. At present, the technology of large yield weapons is highly advanced. A threshold treaty would still allow the development of

new, sophisticated small weapons for tactical uses and thus would again do little to decrease the arms race, although presenting an image of a major political accomplishment.

The opportunity for an agreement on a meaningful test ban becomes perhaps much better in the case of a treaty for a gradual programmed reduction in the frequency of tests, starting from the current rates. For instance, one might take as a base the average number of tests conducted in a recent period, such as during 1970–1972. The treaty on gradual reduction might stipulate that each side reduce its underground tests by 20 percent of the average per year for 5 years. At that time, each side would then be permitted not more than, say, one test annually for several years, whereupon the treaty will come up for reconsideration and hopefully for a total ban. In the meantime some test program which is now going on, and which is claimed by weaponeers to be "absolutely essential" to national security, could still be completed. Later a real emergency concerning the performance of some particular stockpiled weapon could still be taken care of by the residual annual test. Hopefully, these provisions might greatly weaken the political force of the arguments against the ban, including the force of arguments about evasion by the opponent. The suggested provisions would probably not accommodate Plowshare, the peaceful uses of nuclear explosives. Considering the present state of this project the loss would not be great. However, the treaty perhaps could be phrased so that some peaceful uses under conditions like those spelled out for nonnuclear powers in the nonproliferation treaty might be feasible.

The second type of field tests for which an agreement for graduated reduction is essential to slow down the arms race is the launching of long-range ballistic missiles. In such tests the burning phase of the rockets extends well into the ionosphere, and their detection is quite feasible by nonintrusive means. Again the starting point might be the averages of the numbers of launches of the last few years by both parties, and again there might be an annual reduction of 20 percent per year for 5 years followed by a period in which only a very small number of annual tests would be allowed. The number in this final period might be barely adequate for confidence testing of deployed missiles. As in the other case, the missile treaty would come up for extension a few years after the final, constant level was reached.

The problem of the reduction of missile testing is more complicated than that of underground weapons tests because of the need to launch satellites and space probes fairly frequently. These include several types of intelligence satellites as well as those needed in peaceful space programs. Because of the essential national role of these activities, they cannot be sacrificed the way Plowshare might have to be. The issue, however, is not impossible to resolve by such measures as agreements on prior international notification of launch, on the types of telemetry installed on the propulsion stages of the vehicles, on the reentry vehicles, and so on.

The development of the satellites and space probes themselves need not suffer from these agreements, but the development of the lower stages of their boosters might be slowed down somewhat. There is in this class one project that might have to be delayed, namely, the space shuttle—because of its relation to the terminal guidance problem—but the consequence of this would hardly be a great loss to the United States.

The imposition of a strong deceleration on missile development would make it important to accomplish similar objectives for long-range bombers and missile-firing nuclear submarines whose flight tests and test cruises respectively are also accessible to national means of monitoring. Here, unfortunately, a fixed annual reduction in the frequency of tests does not seem to be applicable. In these cases, the complete test programs, of the B-1 bomber and the Trident submarine, would have to be negotiated against the not quite equivalent programs of the Soviet Union, and further prohibitions would have to be worked out for similar weapons systems beyond those now in the works. These agreements might be even more difficult to reach than the purely numerical restrictions on underground weapons tests or missile firings, since the latter restrictions leave more technological freedom of choice to the testing party.

However, these difficulties should not be the reason to reject the discussion of such measures and the other efforts to have them come to pass. The tensions generated by the strategic arms race are inextricably coupled to the military R & D and would subside greatly if the latter were to slow down.

Robert Oppenheimer long ago compared the United States and the U.S.S.R. to two scorpions locked in a bottle. The scorpions since then have grown much bigger but scarcely less aggressive. The aim of this article is to argue that the effort to miniaturize the scorpions, while they stay keen and prone to strike, is not the only way, and possibly not the best way, to avoid the final suicidal battle. Perhaps a more promising road to our survival is to let them stay big but cause them to age and get flabby, and thus become devoid of the urge to strike. Their stings then might even atrophy with time.