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Arms Control: 1960, 1990, 2020

IN LOOKING BACK OVER THE THREE DECADES since arms control was codified in the nuclear age,¹ it is clear that, both in concept and in practice, it has become a central feature of the military and political landscape. Nevertheless, it remains a conception in the service of policy, not an end in itself. As a concept it developed in two ways. One path has been theoretical, in that it refined and further developed the view that arms control embraces “all the forms of military cooperation between potential enemies in the interest of reducing the likelihood of war, its scope and violence if it occurs, and the political and economic costs of being prepared for it.”² The archetype of this approach has been the Antiballistic Missile Treaty of 1972, which has met all three of the above criteria.³ At the strategic nuclear level, “reducing the likelihood of war” evolved into the concept of increasing “stability” by making a first strike not worth the risk in times of crisis or to a potential aggressor.

The other path taken has been one focused on restraining the arms race in various ways, especially through negotiation of numerical limits on weaponry. SALT I and the unratified SALT II, as well as the draft START Treaty, illustrate this approach which is quantitative, often incremental, and essentially pragmatic in nature: it aims at addressing the above criteria by assuming that fewer weapons will reduce the incentive to resort to their use in times of crisis or war, in the limit of extreme reductions it would diminish the “scope and violence if war occurs,” and it would reduce costs in some degree. This approach has been criticized by some arms controllers⁴ who believe that mindless reductions could be destabilizing and the

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negotiations can become so prolonged as to become irrelevant. When valid, such criticisms hit home, but agreements that avoid these pitfalls are reachable and, in a succession of steps, could bring the "action-reaction" competition, which has led to such excesses in armaments, under control and thereby meet the original criteria. In actual practice negotiations have been dominated by this latter course and this seems destined to continue as conventional arms control, requiring much greater quantification, gets underway. Hence, despite occasional fissures in the arms control world, both approaches are by usage and public support part and parcel of arms control.

Each of these approaches begs the question of the extent to which they have succeeded. Against what could be imagined, they have fallen far short. But since nuclear war has been avoided and substantial reductions are underway, they have contributed to this beneficial outcome. This approach traps us in the wrong question; arms control is not an end in itself with a scorecard to be kept updated.

A more useful perspective arises if arms control is viewed simply as an instrument of policy affecting military deployments and developments between or among adversaries. Inevitably, such national policies would have their roots in the recognition that by 1960 the nuclear arsenals on both sides could grow to such extents that their use would be suicidal and that the critical role of a nuclear-capable military force had changed from winning wars to avoiding wars. To the extent that communications and diplomacy permit, rational actors will seek the traditional goals of arms control by whatever combination of unilateral or negotiated measures that seem likely to succeed without sacrificing central national interests. Clearly, the perception of common interests and the possibility of shared benefits will enlarge the arena of possibilities to be explored. Viewed in this way, arms control becomes the handmaiden to larger, broader policies and strategies that combine the avoidance of war with national purpose. In this way attention is transferred from judging the intrinsic merit of cooperative measures, reduction schedules, or modernization restraints to the use of such measures as aids to security improvement within what political relations permit. Viewed as this kind of instrument, one can then question how successful a policy has been, whether arms control measures and concepts had been well utilized in support of a particular policy, and to what extent such a policy has moved toward the goals set for traditional arms

control. One does not ask if the carpenter's tools have been successful or not in building a house but rather, have they been skillfully used, have tools been invented as needed, and has the architect used these tools effectively under the circumstances.

In commemorating the 1960 *Dædalus* issue, it may be useful, from this point of view, to trace arms control developments by comparing its embryonic state circa 1960 with the current situation and then to speculate on how things may change, thirty years hence. In each stage arms control can be seen, not as an end in itself, but as a means of locking in security-enhancing restraints when political developments permit.

1960

Most of the fifteen-year period from the end of World War II up to 1960 was steeped in intense East-West hostility. And yet, in the latter segment of this period, there gradually developed, on the part of the two blocs, a sense of the futility of major wars in the Nuclear Age and the beginnings of a meandering search for ways to respond to this new imperative. On-again-off-again negotiations during the 1950s produced no formal agreements except for the Antarctic Treaty (1959) which banned military deployments on that continent. Successive frustrations forecast an unending impasse; at best it was the beginning of a learning period.

Looking beneath the surface, however, one can glimpse excursions into policy positions that tested the waters on both sides. Considering the vast differences in the political and military cultures of the two sides and their great asymmetries in forces and geopolitical advantages, it is unlikely that much common ground could have been found in these early years. Moreover, on the Soviet side, the first half of the period was dominated by an increasingly paranoid Stalin. This was then followed by several years of struggle for leadership and an intense effort by the Soviet Union to hide its striking strategic inferiority despite Sputnik. The western side experienced its own, albeit shorter and less lethal, excursion into paranoia induced by Communist takeovers in Eastern Europe and China, spy scares, exaggerated "un-American activities," and an alleged missile gap.

Despite this unfavorable climate, Eisenhower and Khrushchev did sense the need to seek measures that would lessen the danger of war

and reduce military costs. This was the first time that both heads of state seemed to have the political will to act. Although they failed, it is instructive to trace what happened and why. Doing so sketches the setting for the arms control concepts that date from 1960.

Near the outset of his presidency, Eisenhower lay bare, with unusual eloquence, his deep anxiety over an endless arms race:

Every gun that is fired, every warship launched, every rocket fired signifies in the final sense, a theft from those who hunger and are not fed, those who are cold and not clothed. . . . This is not a way of life at all, in any true sense. Under the cloud of threatening war, it is humanity hanging from a cross of iron.

In this mood, intensified by the first Soviet thermonuclear explosion (August 1953), he made his first initiative—his “Atoms for Peace” proposal before the United Nations—in which he urged the three nuclear powers to turn over fissile material from their weapons stockpiles to an International Atomic Energy Agency (IAEA), which—in addition to storing the fissionable material—would search for peaceful uses for it, especially in electric power production. The offer was unwelcome but it did lead to the creation of the IAEA in 1957.

Eisenhower tried again in 1955 with his “Open Skies” initiative. This would have required the two superpowers to exchange the location of their military bases and then to allow overflights to check these thereby allaying fears of a surprise attack. Again no Soviet interest, but the Soviets began to give on two points: to discuss verification requirements prior to reaching agreement on reduction schedules, and to begin informing their own people of the devastating scale of nuclear war and Soviet vulnerability to it.

By 1958 two technical conferences including the United Kingdom, the United States, and the Soviet Union were arranged. The first was to deal with preventing surprise attack in anticipation of the oncoming missile age. Again no progress was possible because of the Soviet insistence on not compromising its secrecy to permit any monitoring. The second dealt with monitoring nuclear testing: this was an important forerunner of the Limited Test Ban Treaty of 1963.

While 1959 saw the impasse continue, there were further stirrings. This was the year of the Sino-Soviet break which increased Khrushchev’s eagerness for an arms control treaty that would keep China and Germany from developing nuclear weapons. Eisenhower, too,

wanted such a treaty and agreed that this negotiation not be linked to other negotiations. In the fall Khrushchev introduced a detailed plan for “general and complete disarmament.” This was regarded in the West as largely polemical: it was in the tradition begun by Litvinov a generation earlier and continued by Gorbachev a generation later. In addition, the dialogue was advanced by their conceding that partial agreements, such as the test ban, might have to come first. By the Spring of 1960, a limited test ban seemed within reach but the general Soviet position insisting that verification only follow disarmament, not *vica versa*, blocked broader progress. This was part of the Soviet posture that put secrecy at such a high premium, but at the cost of encouraging worst-case strategic planning in the United States.

Another straw in the wind was the reduction of military forces on both sides in the late 1950s. Between 1955 and 1960, US forces dropped from 2.9 to 2.5 million. Much larger cuts were taking place in the Soviet Union: early in 1960 a law was passed requiring further reductions of 1.2 million. This was a great risk for Khrushchev; it is likely that military resentment at being discharged without regard to subsequent employment figured in Khrushchev’s ultimate demise. In retrospect, the West’s failure to react to this strong signal may have doomed a much earlier start on conventional arms control.

During the late 1950s Eisenhower kept a tight rein on the defense budget despite the heightened sense of threat and the popular anxiety over Soviet space successes. This was largely due to the results of reconnaissance flights by U-2 planes over the Soviet Union beginning in 1955. Their remarkable photographic monitoring accumulated increasingly convincing evidence that the Soviet missile programs were nearly stalled and that the missile gap was a Soviet condition, not an American one. However, these results were kept highly restricted. Meanwhile, Khrushchev visited the United States in 1959. In increasingly friendly chats with Eisenhower, no mention of these flights was made. Apparently, Khrushchev believed that Eisenhower was not informed of these flights. A sense of tentative trust seemed to be developing between these two principals and plans were made for a new beginning on arms control measures at a summit planned for June 1960.

Plans were drawn up by a committee chaired by James Killian; its membership included Jerome Wiesner and myself. A number of ambitious and wide-ranging possibilities were examined. These even

included, for example, a staged approach to disarmament leading to a restricted world government along the lines of Clark and Sohn.⁵ The arms control discussions that had been underway in Cambridge (the Harvard-MIT Study Group on Arms Control) contributed in many ways. Much of this outlook is captured in Wiesner's contribution to the 1960 *Dædalus* volume.

The case presented by the U-2 flights was nearly complete. Releasing the conclusions of this work would strongly affect military programs; hence the temptation to make the argument as tight as possible. One more flight was envisaged and the argument was made to Eisenhower, who personally approved each flight. The conditions in early May were optimal; Eisenhower reluctantly agreed, knowing that it would precede the Paris summit by only a few days. The rest is well-known history. The U-2 was shot down near Sverdlovsk, the surviving pilot held in secret until Eisenhower put forward the "weather plane off course" cover, and then the revelation that the pilot and much of the plane was in Soviet hands soon to be on public display.

The result was that the summit was a shambles. Khrushchev, who had been basing a great deal on his new relations with the American president, was badly compromised at home, as were many who were urging improved Soviet-American relations. Khrushchev's instructions for the summit were clearly not to proceed unless he received a public apology from Eisenhower. None was forthcoming. And so were dashed the hopes that both sides had harbored for a start on controlling the arms race before Eisenhower stepped down. As was to happen many times in the future,⁶ the failure was not arms control but the political process that made its use impossible.

It was in these months of rising hopes and striking failure that much of the arms control work on the *Dædalus* volume was done. For real progress it seemed that two requirements stood out. First, the need to verify that agreements were being kept, particularly verifying what remained after negotiated reductions had been made became a cardinal issue. The collapse of "Open Skies" was overtaken by expectations that reconnaissance from cameras in orbit would soon be possible. In this lay the potential to erode the stubborn Soviet position on maintaining maximum secrecy. The second requirement was the recognition that the two superpowers could communicate despite differences and hostility and that this shared need to do so

could provide the basis for exploring the opportunities that arms control theory was developing.

Several private groups began such explorations in this 1960 period and continue to provide a testing ground for new ideas and to play a role in what might be called supplementary diplomacy to this day. The first to form was the Pugwash group in 1957, initially bringing together Soviet and American scientists. Its meetings soon attracted high government attention. The conference, held in December of 1960 in Moscow, was a breakthrough in opening up informal dialogues between leading figures on both sides. There were twenty-four Soviets including twelve leading academicians, as well as Admiral Isakov, General Talensky, and Emelyanov, the chairman of the State Committee on Atomic Energy. The twenty-one Americans included Jerome Wiesner and Walt Rostow who were to assume important positions in the Kennedy administration. Thirteen other countries were represented. The meeting lasted two weeks and allowed for very extensive exchanges, briefings of government officials, and follow-up discussions. The material in the *Dædalus* volume was presented in detail. The Soviets demonstrated that more thinking had gone into their three stage proposal for general and complete disarmament than had been appreciated. The Soviet fears of a devastating missile attack arising in a future crisis seemed real. Surprise attack was a shared concern. All in all, a number of lasting contacts were made and the next conference in Stowe, Vermont, held in the shadow of the resumption of nuclear testing by the USSR, nevertheless did carry understanding further. Pugwash Conferences continue to be held annually and provide a nongovernmental forum for many national representatives. However, their importance has probably been superseded by the Pugwash workshops that are held each year on specific security topics which provide useful interactions between nonestablishment experts and those with close governmental connections.

In this same period another, more broadly conceived, strictly Soviet-American group began meeting. It became known as the Dartmouth Conference after the place of its first meeting in 1959 and had the firm endorsement of President Eisenhower. It now meets biannually but it too has developed a series of workshops held several times between conferences for more specialized discussions. By 1965 the more technically inclined Soviet and American members of the

Pugwash group felt a need for more concentrated bilateral meetings. As a result, there began a Soviet-American Disarmament Study group that for ten years held quite useful discussions of strategy and arms control at an expert's level. It is widely thought that the willingness of the USSR to negotiate an ABM Treaty arose from the seminars that this group held. It disbanded in 1975 but was replaced by a more official group based in the national academies of the two countries and continues this type of activity under the present cochairmanship of W. Panofsky and R. Sagdeev (now replaced by V. Goldanski).

It is difficult to assess the value of such repeated informal meetings. The fact that leading individuals continue to invest their time in them is one indicator of their worth. Another is the training ground they have provided to persons destined to enter high government positions. Henry Kissinger, Cyrus Vance, and many others who became influential in the US government made their first visits to the USSR as members of these groups. Indeed, more than half of the authors of the 1960 *Dædalus* volume were (or became) active participants. Nearly all of Gorbochev's scientific and technical advisors have had similar "early training."

1990

Jumping over the quarter century since 1960, which included some landmark arms control treaties as well as setbacks and lost opportunities, we arrive at 1985, the turning point which has led to the remarkably changed world of 1990. By 1985 the Soviet Union had a new and different leader who sensed the scale of the plight into which his country had fallen, due in part to overcommitment to military expenditure. The revolutionary reforms which he set in motion over the subsequent five years, and Reagan's and Bush's willingness to respond to his initiatives have transformed the political and military structure of the Soviet Union and Eastern Europe, as well as East-West relations, beyond any previously imaginable extent. As a consequence, frank communications at all levels have expanded in the Soviet Union: citizens and visitors alike can move almost without restriction; most secrecy has vanished; and truly verifiable arms control, aimed at equalizing and reducing the armed force structures of East and West, has become negotiable.

The negotiations that have been set in motion and, in the case of intermediate range missiles, accomplished, dwarf any previous experience. The question arises naturally as to how this remarkable change came about (and so quickly). From the voluminous printed record of these times and from conversations with a number of informed Soviets, it would appear that at the beginning of his term in office, Gorbachev sensed the bankruptcy of the former system, the excessive drain on the economy of the military, and the lack of any intent of attack from the West. Moreover, the experience of Chernobyl drove home the destructiveness of nuclear weaponry in a compelling way. Initially, Gorbachev greatly underestimated the extent of restructuring that was needed but as this requirement grew, so did the need for a prolonged period free of external tension either from NATO or from repressed neighboring states. In the military sphere his need to reduce expenditures meant that the Soviet Union could not compete with the high level of defense expenditure that the Reagan administration had reached in 1986, nor could they compete with the modernization underway based as it was on a sophisticated electronics industry of which they had no counterpart. Even the United States' strategic defense plans (which by 1987 seemed unrealizable) nevertheless reinforced the futility of their pretending to compete. More important, the need to compete at such high levels of expenditure was fading as Gorbachev disowned the threat of an invasion from the West.

This radical change in the political relationship not only opened new opportunities for drastic arms reductions and the realization of the benefits long claimed for arms control but also focused world attention on success in this area as a measure of the reality of the political change itself. This unleashing of arms control was first noticeable in the sudden agreement on the Stockholm Accords of September 1986. These committed the NATO and Warsaw Pact (WPO) nations to measures that would reduce the likelihood of surprise attack such as prior notification of major military exercises, hosting military observers at major exercises, prior disclosure of annual schedules of military activities, and limiting military maneuvers to 40,000 troops.

The next event was the successful conclusion of the Intermediate-Range Nuclear Forces (INF) Treaty which became effective on June 1, 1988. This required the elimination by both sides of all ballistic

missiles with ranges between 500 and 5,500 kilometers within three years under on-site verification, as well as continuous monitoring of plants capable of producing such missiles. By the end of 1989, 80 percent of Soviet missiles (1842) and 50 percent of US missiles (896) had been destroyed, well ahead of schedule. Not only was this a testament to the Soviet's abandoning their traditional embrace of secrecy but it brought the military commands of both sides into the conduct of these operations and in so doing gave them a vested interest in arms control.

Negotiations on conventional force reductions began in early 1989. NATO aimed at achieving asymmetrical reductions to eliminate the preponderance of Soviet forces and then to make modest reductions on both sides once parity had been reached. This fragile goal was given life by two Gorbachev actions. In the fall of 1988 he proposed that the area of negotiation be expanded from Central Europe to "the Atlantic to the Urals" (ATTU) thereby enlarging the scope to truly meaningful proportions. In December 1988 Gorbachev took the further initiative of cutting back nearly a quarter of the USSR's force advantage prior to negotiations by announcing that they would unilaterally reduce their forces by 500,000 troops, and withdraw 50,000 troops, 10,000 tanks, 8,500 artillery pieces and 800 combat aircraft from the ATTU regions. Six of the tank divisions and half of the 10,000 tanks were to come from the Central Region and the remaining forces would be restructured along clearly defensive lines. Such withdrawals are proceeding on schedule.

The Conventional Force Reduction (CFE) talks are now in their third year and at recent summit meetings it was pledged that they would approve a draft treaty by the end of 1990. Great progress has been made on setting definitions and limits on tanks, artillery pieces, armored combat vehicles, aircraft, and helicopters. The exchange of data and verification protocols play a dominant part in this enterprise. Because twenty-three nations are involved in these bloc-to-bloc negotiations which cover a hundred thousand military items, it is obvious that nothing of this complexity has ever been attempted before and its successful realization will create the underpinnings of a new European order.

With the implementation of these reductions, withdrawals, and destruction of military equipment, the realistic possibility of an invasion of Europe from the USSR or vice versa, even after full

mobilization, has virtually disappeared. Many months of highly visible preparation would be required even to begin such an undertaking. Nevertheless, substantial military forces and equipment will remain and could constitute the nucleus of remilitarization at some future time. Therefore, further agreements must be reached to consolidate the era of security that is promised.

Such consolidation will most likely begin with a continuation of arms control negotiations aimed at a follow-on treaty to CFE, to be known as CFE II, a treaty reducing or eliminating short range nuclear forces (SNF) from Central Europe, and an extension of confidence-building measures that insure that military deployments and exercises do not have an aggressive potential.

But these further changes will be intimately connected to the central issue of how to recast the security situation in Europe with the Warsaw Pact essentially gone and Germany unified. Three structures are discernable and may represent the succession of steps that might occur. First, NATO and WPO may change their own natures to become political-military associations that carry on the evolution of security arrangements in Europe. A joint consultative body would be essential, composed of the Four Powers from World War II, a unified Germany, and representative smaller powers. Second, with inducements and encouragements, the remaining five non-German Central European nations may decide to form a collective and neutral security alliance so as to form a neutral zone which, in conjunction with Austria, Finland, Sweden, and Yugoslavia, would separate NATO and Soviet forces to such an extent that any East-West conflict would require many months of visible preparation. If this were combined with the negotiation of lowered national troop levels in CFE II, the German military forces would be restrained in a nondiscriminatory way. The result: Europe could at last have a robust security regime that should provide stability far into the future. Third, if the evolution of European security did not fully follow this path, there may develop in time a Pan-European security arrangement through the growth and transformation of the thirty-five-nation Conference on Security and Cooperation in Europe (CSCE), an outgrowth of the Helsinki Conference of 1975. This would provide full membership to all European powers, the Soviet Union, the United States, and Canada. With a still larger membership, a Security Council-like executive body with special powers,

perhaps composed of the grouping noted in the first alternative above, would be expected. Of course, such a broadly based association would experience the great bureaucratic difficulties associated with large national groupings, but it would afford clear membership in the enterprise to both of the ultimate guarantors for deterring war, the United States and the Soviet Union.

Still another arrangement would be for the Central European countries to join with the non-US NATO countries in the form of a Western European Union which would then negotiate security arrangements with the United States and the Soviet Union. The eventual success of the European community, which would provide Europe its long-sought identity, may favor this path but its weakness lies in the possibility that early European integration efforts may not survive the traditional cleavages and animosities of European life and that the exclusion of the United States and the Soviet Union may be adverse to Soviet interest in integration with Europe and to the traditional cultural, security, and economic ties of the United States with Europe.

Thus, 1990 will end with hope and promise far beyond any imaginable dreams of 1960 and the intervening years, but with unforeseen challenges obscuring the outlines of the distant shore to which the current momentum points.

2020

Speculation thirty years ahead is an exercise in fantasy even in normal times since neither political nor technological developments can be divined that far ahead; in the present state of East-West fluidity it may be a demented exercise. Yet it is in times of fluidity that analysis and insight may provide positive direction. In this sense the whole nongovernmental community of analysts, strategists, arms controllers, and visionaries have an opportunity to look well ahead, beyond the range to which governmental policy makers are, by the pressure of their work, confined. The shape of the world of 2020 may well reflect this kind of prior activity if it is imaginatively done and inserted into the tempering influence of public discussion in the intervening years.

Only some random suggestions are possible in these concluding remarks. It seems useful to consider first the next few years, up to ten,

for which the present provides some guide, and then the further future stretching up to 2020.

Again, our assumption is that military forces and arms control are the servants of national policy which in turn depends on the planned and unplanned developments within and among nations. Hence, what is possible in arms control remains hostage to unpredictable political developments. The present world is surely more secure from worldwide war with its inevitable nuclear climax than in any of the recent past. But it remains unclear if this improvement can be the basis for a more stable and fulfilling future. The political fluidity in Eastern Europe and the Soviet Union may lead to chaos, the Middle East may erupt, much of Asia may turn to ferment. Nuclear capability is likely to spread further with the potential for limited use. Only if these threats can be contained can an attractive future be projected. Taking this more optimistic option one can hope in the next decade to see the transformation of Europe and the Western Soviet Union from being, as it has been in the recent past, a tinder box of the the greatest concentration of destructive military power ever assembled, into a politically cooperative community with the economic advancement of its poorer parts well underway. In the rest of the world much depends on whether the initial broad cooperation through the United Nations in response to the Iraqi invasion of Kuwait will succeed in reversing this aggression and thereby lead to the increasing use of collective action to reverse military conquest.

To this end a number of rather obvious arms control measures would contribute substantially to improved security in Europe by lowering the threat of military use and the costs of maintaining excessive military establishments.

As a first step the current negotiations should be brought to a successful conclusion and their follow-on negotiations undertaken. CFE should achieve the reduction of forces in the ATTU region to parity at levels significantly below those now existing in NATO. CFE II should carry the reductions further, arranging for the withdrawal of Soviet troops to their homeland, reducing US forces in Europe to below 100,000, and severely limiting the size of the armed forces of individual nations as well. Such a drawing down of troops would remove most of the fears of a military resurgence in a unified Germany without the stigma of "singularization" and of a Soviet Union that could reverse its course so as to again threaten the West.

The post-CFE arms control agenda has been widely rehearsed. With the signing of the CFE treaty, follow-on SNF negotiations aimed at removing foreign-controlled land-based nuclear weapons from Europe are promised. START II should aim at reductions of actual warheads to levels approaching 3,000, one-third the levels of START I. The United States and the Soviet Union should agree to ban antisatellite weapons and reaffirm the ban on deploying strategic defenses inherent in the Antiballistic Missile Treaty of 1972 and include verification protocols that insure that both sides are complying. With the reduction in submarine-launched ballistic missiles that the above warhead reduction implies, it is critically important that the remaining weapons be made as invulnerable as possible so that there is less temptation to use them so as not to "lose" them if conflict breaks out. The possibilities of removing, in verifiable ways, nuclear weapons from surface ships should be studied and trial inspections undertaken. If these results were to be realized in the early years of the next century, important consequences would result. The reduced numbers of weapons would eliminate dangerous options such as exist today where submarines at sea or bombers in flight might be destroyed by targeting many nuclear weapons in the suspected area. While such a program of arms reductions would initially focus on the large Soviet and US nuclear stockpiles, it serves other useful purposes as well. For example, progress along these lines should provide the basis of bringing the other nuclear powers into full partnership in a new security regime in which nuclear weapons serve only to deter the use of nuclear weapons.

As another example, some progress along these lines could spur the continuing effort to stop the spread of nuclear weapons. The crucial date of 1995—when the Nonproliferation Treaty comes up for renewal, revision, or termination—is approaching fast. The failure of the United States and other nuclear powers to achieve any of their goals at the recently concluded Review Conference, because many Third World countries insisted on progress to ban nuclear tests, serves as a warning that the bargain struck in the original treaty is in jeopardy.

The addiction of most industrialized countries in providing arms to other less developed countries should be brought to an end. More than any other measure, such an act of cooperative restraint would greatly reduce the level of conventional warfare outside the industri-

alized world. The extent to which such profligate arms shipments to Iraq contributed to the current crisis in the Persian Gulf provides a graphic lesson in the error of this pursuit. Czechoslovakia, which had depended upon arms sales for half of its export trade, has recently decided to forego all such sales. With the Iraqi example of the folly of unrestrained arms trade and the Czech example of self-restraint in the face of a failing economy, a new item should be added to the arms control agenda: to negotiate a global ban on significant arms sales.

Finally, unusually effective diplomacy will also be required to bring the Chemical Weapons Convention to a conclusion within a year or two. As the East-West confrontation fades along with much of the weaponry supporting it, new initiatives will be needed to reduce the level of potential conflict in the rest of the world. The Chemical Weapons Convention ranks high in this effort. Moreover, it is clearly in the interests of Third World countries, who are very vulnerable to such weapons because they cannot afford the gas masks and protective clothing that can allow effective defense for more affluent nations. Success in getting the whole Middle East to join in this Convention should be the principal aim now that the Soviet Union and the United States have undertaken to greatly reduce their own huge stockpiles even without a comprehensive treaty.

Turning to the longer term future stretching to 2020, the outlook is, of course, much more problematic. There is more hope than in the recent decades that all-out nuclear war can be avoided. But the continuation of localized, conventional wars seems inevitable. One can expect that, with the ending of the Cold War, proxy wars fought with the aid of the two Cold War antagonists will end but other causes of conflict will invite recourse to force. Between these two extremes lies the new possibility of a crossover war in which smaller countries, having developed nuclear weapons, even if untested, will choose to use them if local conventional conflicts do not develop as they wish. Such nuclearized conflicts would almost certainly attract the involvement of some of the major nuclear powers and the old scenarios of escalation will threaten anew.

Even if one can foresee the liquidation of the Cold War and its accompanying overmilitarization of East and West in the 1990s, the following decades hold the potential for continued or intensified local wars that in a few cases may go nuclear. The risk of major nuclear war is unlikely to disappear altogether. However, against this rather

pessimistic view there are some more hopeful signs. Developments in Europe may set the pace for insuring peace with greatly reduced deterrent forces and a workable version of cooperative security. The rising tide of global communication can overcome misinformation that fuels conflict. The trend toward democratic forms of government is likely to continue. With each convert the chances for peace increase since there are very few cases of representative governments warring with each other. The broad support against aggression displayed by the United Nations in the summer of 1990 may hold and repeat itself in future crises.

Thus, the optimist and the pessimist have abundant inventories from which to draw arguments supporting their outlook. Within such inventories two developments that can go either way are certain to dominate the choices between catastrophic war and peace in the coming decades. We deal here with the challenge of seeing how these developments might contribute positively; contrary outcomes can occur through default along many routes too numerous to map.

One development is obviously the way nuclear weapons are managed: the extent to which they are rolled back and deemphasized by the present nuclear powers, and the extent to which they spread and are constrained by the new nuclear powers that may arise. With more than 95 percent of today's nuclear weapons belonging to the two superpowers, the reduction of the nuclear threat must begin here. The arms race that has led to the present stockpiles has been principally fueled by three circumstances: the mistrust generated by the Cold War which led to *worst-case, highly conservative planning*; the alleged need for many diverse weapons in large numbers to be used in *war fighting* should conventional weapons use fail; the desire to have sufficient strategic weapons, that is, *counterforce* weapons, to eliminate as much of the other side's nuclear forces as possible.

We now see that the first rationale is rapidly eroding, although it is widely believed that minimal forces must be retained for insurance. The war-fighting rationale is also receding as the realization spreads that even tactical use of nuclear weapons would be suicidal in the countries where they were used and that such use would escalate to a full-scale nuclear exchange.

The third rationale, counterforce, is losing its primacy because new generations of weapons—land-mobile missiles, cruise missiles, and perhaps low-observable (stealth) bombers—cannot be effectively

targeted. Although pressures to compensate for this development can be expected, only a very limited redress seems possible. Therefore, the situation is driven back to conceptions developed in the 1950s, that is, to seek security in highly survivable or invulnerable weapons that would be reinforced by cooperation between adversaries so that such weapons (second-strike) would not be put at risk. This view of a stable deterrent lost appeal as accuracy increased permitting destruction of silos and multiple warhead missiles lowered the cost of bombarding fixed targets. But if fixed counterforce targets fade in the coming decades and agreements on sharp reductions in numbers take over, there will be little incentive to use weapons in the counterforce mode where many weapons would be required to destroy one target. Thus, it is hardly likely that the high priority for counterforce capability can be sustained.

In this situation the advantages of returning to the earlier conception of cooperatively insuring the invulnerability of strategic forces may win out. In this case the major nuclear powers could abandon all counterforce developments and armaments. This would mean a mutual renunciation of much of the present strategic deployments: antisubmarine warfare; antiballistic missiles; and defenses against bombers and cruise missiles. In this way nuclear weapons could be reduced well below START II levels and deterrence will remain secure. Moreover, in this situation of completely secure strategic weapons, a new conception of nuclear weapons use could arise. This would be one in which strategies of “no first use” or “only last resort use” would be replaced by “no use without adequate warning for evacuation.” With weapons quite secure against preemptive attack, warning of several days could be given for any target—military, industrial, or urban—with the expectation that the population would be removed. The destruction of the target would only be carried out in the unlikely event that negotiations would not have taken place to resolve the crisis within the period allowed for warning. Obviously, such a transition would require a remarkable arms control effort, but it need not concentrate so much on “bean counting,” since, in such a secure environment, numbers of offensive weapons would not be so critical. Should history play out somewhat along these lines, nonnuclear countries would have less interest in acquiring nuclear weapons, since their usefulness and prestige value would largely vanish. Thus, developments can be sketched that would, over the next three

decades, roll back the “genie” of nuclear weapons to the point where their importance and lure would recede and, with greatly reduced numbers, their threat would no longer be civilization-wide.

The second seminal development is more broadly based. It is the myriad of problems—at all levels, including the military—that will accompany the catastrophic impact of adding nearly five billion new inhabitants to the earth’s fragile biosphere by 2020. Without wholly new and vigorous means of reducing population growth that can be introduced quickly—and this seems unlikely—this burden will descend upon the earth creating problems that will radically recast human priorities. A highly predictable result will be the sobering realization that most of the world’s inhabitants cannot attain minimal living standards represented by roughly \$1,500 GNP per capita per year. One argument lies with energy use. Were the energy use of the industrialized world to level off at present values and the remainder brought up to the \$1,500 level by 2020, at least six times as much energy would be required worldwide. Yet there is no foreseeable way in which this could be provided at tolerable costs—either economically or in terms of environmental degradation.⁷ Moreover, this minimal living standard is roughly the level at which developing countries voluntarily decide to limit family size to near replacement numbers. With this route of population control largely unattainable, the outlook is bleak indeed.

The purpose of this digression is to indicate the scale of the population growth problem in the three decades under consideration. One likely consequence is that the world will become compartmentalized into regions ranging from sufficient to moderate living standards and into much more populous regions of abject poverty and famine. In the viable regions the spread of democracy and economic sufficiency may have led to such political integration that security within such regions is well established with arms control playing its traditional role or even moving toward its optimal destiny—its demise, since it would no longer be needed as it is not today among nations with a tradition of nonaggression, economic integration, and trust based on experience.

In this more benign outlook, the industrialized world will be beset with severe environmental crises and the inability of twentieth-century approaches to deal with the spreading famine that attends uncontrolled population growth. Surely such a radically different

world will find the internecine warfare and commitment to military power of the past century irrelevant to the new challenges. It is hard to conceive of starving populations mounting effective assaults on the developed world, but the stage will be set for ideologically motivated groups to devise devastating terrorist attacks on people or assaults on the infrastructural fabric of the developed world. Even more likely will be the flood of immigration from the impoverished world into the developed world creating new dimensions of conflict. In time the developed world, though much less affluent than today, must turn its talents to reducing population growth both to preserve a viable biosphere in which to exist and to affirm its claim to a humanistic spirit that values the quality of life. Whether the beginning response can be made to this challenge by 2020 cannot be foreseen, but the stresses that will develop from either its remedy or its neglect will surely generate new dimensions of conflict. It is difficult to imagine any policies that could cope with this dilemma without arms control playing a supporting role in a vastly different environment.

Perhaps most important of all will be the necessity of turning much of the world's technology to sustaining a marginally viable biosphere and a desperately poor population until in some way the stress of burgeoning population on the world's "commons" will be relieved. In such an era the technology resources that have been devoted to military purposes will have a special call to higher purpose; this may change the military environment of 2020 well beyond what we can now imagine.

Of course, the world may not develop in this way or may not do so this quickly. But so far as one can see, these two challenges will dominate the generation that will give thought and guidance to the early twenty-first century. Surely these will far outstrip those of our generation who may lay claim to having averted the destruction of civilization by avoiding nuclear war.

A fitting tribute to the 1960 *Dædalus* volume in the year 2000 would be one in which the response to these major challenges essential to survival in the twenty-first century might be joined.

ENDNOTES

¹See *Dædalus* 89 (4) (Fall 1960); T. C. Schelling and M. H. Halperin, *Strategy and Arms Control* (New York: Twentieth Century Fund, 1961); and Hedley Bull, *The Control of the Arms Race* (New York: Praeger, 1961).

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²Schelling and Halperin.

³For example, M. H. Halperin, *Arms Control in Retrospect* (unpublished); and A. H. Chayes and P. Doty, *Defending Deterrence: Managing the ABM Treaty Regime into the 21st Century* (Washington, D.C.: Pergamon-Brassey, 1989).

⁴For example, T. H. Schelling, "What Went Wrong with Arms Control?" *Foreign Affairs* 64 (2) (Winter 1985–1986): 219.

⁵G. Clark and L. B. Sohn, *World Peace Through World Law* (Cambridge: Harvard University Press, 1958).

⁶For example, the blocking of the start of SALT I by the Soviet invasion of Czechoslovakia and the failure of SALT II ratification by the Soviet invasion of Afghanistan.

⁷See, for example, J. P. Holdren, "Energy in Transition," *Scientific American* 263 (3) (September 1990): 156–63.