By Joshua Lederberg

Dr. Lederberg is a Nobel Prize-winning professor of genetics at Stanford University who is also a student of the arms race and efforts to achieve arms control.

The strategic arms limitation talks (SALT), which will resume next month in Helsinki, have been labeled the key to world survival through the next decade. Even if we frame the arms race as a byproduct of international politics rather than as a living, demonic being with independent existence, no one doubts the value of a critical search for practical limitations on the arms spiral.

Arms investment is shaped by dynamic interplay of domestic and international forces, actions and reactions, as much as by negotiated agreements. More than any other process, nevertheless, these explicit agreements require us to examine the assumptions that underlie our strategies of defense and of reconciliation.

My own view of the most important fact of the arms limitation conferences is their educational value for the participants. If the many internal policy-making forces within each country may better understand the full depth of their national interests, and how these may be pursued in the light of the perceptions of the other nations, it would then be a mistake, as Fred Halliday has suggested, to frame the arms race as a byproduct of international politics rather than as a living, demonic being with independent existence.

To paraphrase the still cogent arguments of the naval strategist A.T. Mahan, the peaceful borders between the U.S., Canada and Mexico are quiet just because there is no ambiguity about the distribution of military power. Had we solved the problems of cultural accommodation, as well as economic and political adjustment, among people of the continent, we could also consider the actual merging of sovereignty and of military power.

This is an ideal we must pursue with more realism than piety; but the harsh news of the day points the other way, that we may still fail to halt the division of the nations into blacks and whites, and Chicanos, or French and English. Even a threat of common doom may be insufficient to enforce the dissolution of national sovereignties against the resistance of economic disparity like those between India and the West. Both sides know that every chance of industrial modernization would evaporate if the world's capital were equally diffused and consumed in a population explosion. The "white man's burden" in contemporary terms is to find some way that does work for the effective sharing of capital for the development of the poor countries; if not, we will be relieved of that burden willy-nilly.

Economic Factors

In the eyes of the poor countries, our commitment to the arms race has drained the very resources that might finance international development. Their political pressure is an implicit threat that India might join the nuclear club is certainly among the main forces that have dragged the United States and the U.S.S.R. to the conference tables in Vienna, Helsinki and Geneva.

Whether the pattern of arms limitation now under negotiation within the SALT framework will result in much savings from arms budgets is problematic. This benefit may be a long-range consequence of the political stability that is the central aim of strategic policy. In the short run, there is more likely to be only a shifting of expenditures to the programs left out of the agreements.

The obvious, and in many ways desirable, content of the naval option. Despite its expense as a launch platform, the submarine has long been advocated as the way to separate the retaliatory force from floating cities, and to provide another resource for assured destruction of an attacker.

Missile-launching surface ships, despite their vulnerability, may also be underrated as inexpensive decoys and early-warning lures to dilute an enemy's first strike capability. The mix of cheap, vulnerable platform forms must, however, be carefully calibrated in order not to be confused with a force useful only for a first strike. There will be no lack of alternative proposals, some quite plausible, to buy more reliability and to plug potential gaps in systems dedicated to missile security.

Another stated argument for arms control is that the very accumulation of the stockpile, with its vast potential for overkill, makes it more likely that a nuclear war will break out. There is a core of rationality to this argument. The technology of nuclear weapons is likely to leak and proliferate in some proportion to the size of the respective arsenals. The nonproliferation treaty would have been unnecessary if every nonnuclear country had first had to finance a Manhattan project to learn to make bomb. Furthermore, the chance of an unauthorized psychotic or accidental firing with its potentially catastrophic consequences, is larger the more weapons abound, other things being equal.

However, the superpowers are technically and politically constrained to invest more effort in protective systems for their large stockpiles, and countries like France and China which are still developing their nuclear capabilities are the present more serious threats of significant accident.

As to "overkill," the metaphor makes sense for a first-strike capability — a small percentage of the stockpile of either superpower could wipe out civilization — but a credible deterrent must still be perceived as intact.
of the several jobs for which it is purported of which has been authoritatively documented in Dr. Herbert York's research in an imperfectly unified defense. To have any for ourselves, I believe, as I do, that the security of our nation in the technological "Race to Oblivion," the hostility was exploited with great potential: the greatest anxiety about the location of missile launch sites, the precision of guidance, the smallness of target selection, the curiously of command and control, and above all how well are we perceived by an enemy and by ourselves—these now are the measures to determine than an advertisement of crude numbers of missiles or of warheads. The cumulative effect of some arms is to ensure that they will never be used by either side, and that any threat of their use works to stabilize rather than to inflame the relations of competing nations.

Will Stalemate Last?

The ARMS RACE has progressed to an effective stalemate, which has worked better than anyone could have hoped 25 years ago, its main argument openly leveled by the President Kennedy's plans to enhance the gravity of intelligence about the location of missile launch sites, the precision of guidance, the smallness of target selection, the curiously of command and control, and above all how well are we perceived by an enemy and by ourselves—these now are the measures to determine than an advertisement of crude numbers of missiles or of warheads. The cumulative effect of some arms is to ensure that they will never be used by either side, and that any threat of their use works to stabilize rather than to inflame the relations of competing nations.

At one level, this leads to the mutual reinforcement of distrust about each side's intentions and plans. At another it provokes the constant search for the technology to do it first here. The main argument openly leveled by most academic physicists against the ABM option is that it will not do any of the several jobs for which it is purportedly designed. The real force of their anxiety is that a long-range program of ABM research might eventually develop methods that are credible offers a prospect of antimissile defense. Needless to say, it would be comforting to know that in the 1960s we had a real margin over attack, but how do we get there except through closely monitored mutual agreements? In the process, the existing balance will be undermined and nuclear war, if not avoided, may still be possible. How to do it first here. The main argument openly leveled by most academic physicists against the ABM option is that it will not do any of the several jobs for which it is purportedly designed. The real force of their anxiety is that a long-range program of ABM research might eventually develop methods that are credible offers a prospect of antimissile defense. Needless to say, it would be comforting to know that in the 1960s we had a real margin over attack, but how do we get there except through closely monitored mutual agreements? In the process, the existing balance will be undermined and nuclear war, if not avoided, may still be possible. How to do it first here.

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Effective defense against missiles evidently remains quite remote, but it might be possible to do the job at the far end of an extensive program of trial and development, of which Defu- gue's book is the first step. This is a technologial "Race to Oblivion," the history of which has been authoritatively documented in Dr. Herbert York's re- search program of ABM research might eventually develop methods that are credible offers a prospect of antimissile defense. Needless to say, it would be comforting to know that in the 1960s we had a real margin over attack, but how do we get there except through closely monitored mutual agreements? In the process, the existing balance will be undermined and nuclear war, if not avoided, may still be possible. How to do it first here.

I believe, as I do, that the security of the country depends only in part on technical innovation, and that we must address our greater efforts to stabilizing the security of the world if we are to have any for ourselves. But we cannot overlook the need for technological creativity, which will raise the problem of whether or not if we do not offend the sources of the cynicism of our youth about the legitimacy of our national goals. By building so heavily on technological bases of security, while neglecting the causes of internal dis- affectation, we have impaired our military security far more than any missile deficit would imply.

Sputnik Overrated

Mutual Misperceptions of the threat suggests an underestimation of the danger that could smother the ability to conduct a deterrent, but the naval option and a multiplicity of threats and other variables answers as any foreseeable ABM. As far as arms control is concerned, the potential for MIRV was under- estimated for critical reasons because any verifiable control over its further development. Indeed, the need to play this out this act so that both sides could work out solutions of MIRV may have compelled the postponement of SALT until now. If we separate the components from the parable, "The Greatest Cities," we can see that the naval options may give us the greatest room for mutual advantage. Ironical schemes can be composed that point to the absurdities of the world system. For example, it would be more to our ad- vantage if Soviet submarines refueled at Portland, Maine, rather than at Cienfuegos, Cuba; and we might offer to exchange base privileges on U.S. shores for their equivalent on the Black and Baltic Seas. But even if such superrealistic ex- changes could be negotiated, they would raise untrivial misbehavior through disinformation, the guaranteed free access on which they would have to be based. Better that we seek out the facts as we can, and especially if this is based on the clear understanding that any solution must provide for a zone of strategic security on both sides, or nothing but desperate maneuvering can follow.

Working Out the Bugs

The greatest anxiety about a surprise attack in the next decade—for both sides is that the nondeployment of a Potential weapon is the key to a deterrent, but the naval option and a multiplicity of threats and other variables answers as any foreseeable ABM. As far as arms control is concerned, the potential for MIRV was under- estimated for critical reasons because any verifiable control over its further development. Indeed, the need to play this out this act so that both sides could work out solutions of MIRV may have compelled the postponement of SALT until now. If we separate the components from the parable, "The Greatest Cities," we can see that the naval options may give us the greatest room for mutual advantage. Ironical schemes can be composed that point to the absurdities of the world system. For example, it would be more to our ad- vantage if Soviet submarines refueled at Portland, Maine, rather than at Cienfuegos, Cuba; and we might offer to exchange base privileges on U.S. shores for their equivalent on the Black and Baltic Seas. But even if such superrealistic ex- changes could be negotiated, they would raise untrivial misbehavior through disinformation, the guaranteed free access on which they would have to be based. Better that we seek out the facts as we can, and especially if this is based on the clear understanding that any solution must provide for a zone of strategic security on both sides, or nothing but desperate maneuvering can follow.

Dr. York recounts how the arms race mentality was exploited with great skill and mendacity in the 1960s to fund redundant and useless weapons systems, and to encourage the use of services in an imperfectly unified defense establishment would be pleasured. He believes, as I do, that the security of the country depends only in part on technical innovation, and that we must address our greater efforts to stabilizing the security of the world if we are to have any for ourselves. But we cannot overlook the need for technological creativity, which will raise the problem of whether or not if we do not offend the sources of the cynicism of our youth about the legitimacy of our national goals. By building so heavily on technological bases of security, while neglecting the causes of internal dis- affectation, we have impaired our military security far more than any missile deficit would imply.

An Overdrawn Parable

In 1961, the late Lise Mead wrote a fictional parable, "The Greatest Cities," wherein the superpowers had exchanged the capabilities of assured destruction by allowing the major cities to be mined by the other side. "This war has been revived to the time to date—"but like Rep. Craig Hos- mer's suggestion that we multiply world security by giving every country four 150-megaton bombs. Is this an impor- nant metaphor the worst injustice to take it too literally. The parable does point out that our cities are hostages to one another, whether the bombs are underground or need to be delivered by a 30-minute rocket flight. (This reasoning also makes one question whether Moscow and Washington will be cities to be shielded with ABMs, when the potential would be the most credible hostages.) Mr. Laird contends nuclear war would come in a total squand. And where would we fit the French and the Chinese?

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Working Out the Bugs

The greatest anxiety about a surprise attack in the next decade—for both sides is that the nondeployment of a Potential weapon is the key to a deterrent, but the naval option—is that new technology may impair the invulnerability of the submarine. It is absolutely inconceivable that antiboars' detection and warfare could provide for the reliably removing the bulk of a retaliatory force in a single surprise attack, without having first been widely exercised and tested. Mutually advantageous agreements to limit this activity should be fairly amenable to verifi- cation. They could be a logical extension of the existing ban on testing nuclear weapons under water.

There is also a danger that units of the naval strategic force may become involved in tactical conflicts, with a consequent erosion of the line that marks nuclear warfare off from all others. This will require very careful attention to our own doctrine.

The problem of surprise attack can be formulated in more precise, quan- titative terms than any other aspect of defense strategy. There are still many uncertainties, for example the opera-
and the level of nuclear retaliation that would be an "unacceptable" to a potential attacker as to deter him. Nevertheless, the analyst can make a fairly simple model of the way of forces, and ignore the complexities of mass psychology and serpentine recalculation that blur the scientific predictability of any political confrontation.

The simplicity of the problem to the rational analyst, and its appeal to the paranoia of the antirational, have captured our attention and resources out of proportion to the role of surprise attack in world conflict. By overdesigning our solutions to that problem, we leave ourselves ever less prepared to cope with the actual difficulties of today's world.

The nuclear deterrent can play no direct role in dealing with the Soviet penetration of Africa, harassment by air pirates, or the re-enslavement of Czechoslovakia. These have no easy answers, but they clearly require the rebuilding of a sense of community with our allies and friends, who are inevitably isolated by a historic trend of unilateral force commitments and defense investments typified by Vietnam and by the ABM.

We must do:

ALL SIDES ARE approaching the conclusion that mutual defense against surprise attack needlessly consumes an inordinate portion of world resources. We seek a new pattern of reciprocal arms disposal whose very momentum would be the best assurance that it was not merely a gambit for strategic advantage. This would be hard to construct, merely against the fears, angers and entrenched interests of important elements within both superpowers.

A simple moratorium on the emplacement of strategic weapons has been suggested, but it is likely to be entangled in contentious differences over whether it should embrace aircraft, tactical missiles, and so on.

From a technical standpoint, the most amenable place for controls is testing; a comprehensive freeze on all missile tests would be most easily verified, and would provide the utmost assurance against the perpetuation of a costly technology race.

It would complicate some peaceful applications of space technology.

However, none of these require precise re-entry after a brief, high velocity flight. Furthermore, nothing would be lost in requiring a definite pattern of international participation in space missions to assure that these were a net benefit to the whole earth from which they have embarked.


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A number of confusing typographical errors and editorial deletions (to fit the article into available space) have been restored in this version.

J.L.