

HAROLD BROWN

## THOUGHTS ON TECHNOLOGY AND NATIONAL SECURITY

In a wide-ranging colloquium at APL entitled "Technology and National Security," Harold Brown, former Secretary of the Air Force (1965-69), President of the California Institute of Technology (1969-77), and Secretary of Defense (1977-81), presented his views on how research and development affect the military balance between the United States and other nations. Because national security is composed of many technological, economic, political, and educational strands, his discussion went beyond the contributions of military technology. The following slightly edited excerpts summarize some of the main points of his argument and of his responses to questions.

John Yokelson, Director of International Business and Economics at the Center for Strategic and International Studies at Georgetown University, says that technology is perhaps the most dynamic factor affecting all the variables facing Western leaders. It has, for example, proved a decisive factor in the military sphere as an equalizer to Soviet numerical superiority. However, it also has a clear capacity to divide the Western alliance, cutting as it does to the heart of vital commercial interests.

Technology is a key, although not the only key, to the military balance. A more advanced technological infrastructure provides the United States with a potential advantage that is acutely needed in the light of other advantages that are available to potential adversaries.

The translation of technology into weapon system development and deployed military capability is a separate problem. Technology does not ensure that those steps will be wisely or effectively taken. But there can be no question that the United States needs its technological advantages in order to offset capabilities—numerical in part, systemic in part, geographical in part—that the Soviet Union has in the military balance. In the face of the balance of conventional forces and of approximate nuclear parity, the elements of this technological infrastructure need to be put together in a responsive way.

Let me begin with the strategic balance. As examples: missile accuracy; hardness of the basing of land-based missiles; quieting of submarine noise; antisub-

marine warfare using acoustic or nonacoustic methods; the capabilities of defense for detection, identification, and tracking; the jamming, deception, or saturation of antiballistic missile and anti-aircraft defenses—all of these show that technology is a key to the strategic military balance. The factors that count most across the board are data processing and sensors. It seems fairly clear that the United States has a significant advantage in that particular technological infrastructure.

If you look at the U.S.-Soviet conventional military balance, the United States cannot match the Soviet Union in manpower nor will it match the Soviet Union in quantity of equipment. The fact that the Soviets have been devoting an enormously greater part of their resources to building military equipment tends to produce a very substantial disparity. Because the Soviet leaders have been able to extract this degree of sacrifice in peacetime from their population, the Western allies have to rely in large part on technology for a comparative advantage.

What are some examples of how technology can be employed to offset to a degree these Soviet advantages? One example is better intelligence, especially tactical intelligence collected by technical means. The Western advantage in data processing, in sensors, and in assembling this material could produce better tactical intelligence, thus permitting a concentration of forces and a local reversal of the numerical disadvantage.

Another example is the need to achieve air superiority. Both the performance and the number of platforms can be multiplied very substantially by having superior air-to-air weapons. Because aircraft can be moved around quickly, superiority can be maintained by moving forces to a particular theater. But how can

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Dr. Brown is currently chairman of the Foreign Policy Institute, School of Advanced International Studies, The Johns Hopkins University, Washington, D.C.



you assure that western aircraft will do better in air-to-air combat? One way is better personnel training; another is air-to-air missiles superior in terms of range and in terms of the sensors' ability to allow a "fire and forget" mode. Another way is based on low observability—not just lower radar cross section but lower infrared and optical visibility as well. Also, superior tactical communications are needed so that the pilot can be told what to do by a controller who knows the tactical situation better than his own sensors allow him to know. The common themes in most of these examples are modern electronics and data processing capability, computer technology, and sensors.

The final example is the need to maintain sea lines of communication, which depends very clearly on our ability to stay ahead of the Soviets in antisubmarine warfare. The key is whether we can detect them at a distance greater than that at which they can detect us.

An issue that is often raised in the light of our lead in precision-guided munitions, cruise missiles, stealth technology, tactical intelligence, antisubmarine warfare, and air-to-air missiles is whether the United States has concentrated too much on high technology. In fact, new technology is often more reliable than old, but if one insists on getting the absolute peak performance from it, one is going to pay for it in unreliability.

Another fallacy is to believe that technology can solve all military problems. There is no basis for believing that technology is going to enable us to protect urban industrial areas successfully in the case of nuclear war. We are going to be stuck for a long time with a strategy of deterrence by the threat of retaliation.

That national security depends strongly on the state of the economy is now nearly universally accepted. The fact that the United States is no longer the predominant economic power of the world, though it still is the biggest and most important single economic power, has had a very important and rather limiting effect on U.S. national security freedom of action.

In our trade balance, as an example of the effects of technology on our economic state, two factors have been saving us in the past. One is agricultural exports; the other is high technology, such as computers.

Let me turn finally to the long-term health of technology in this country. To optimize U.S. technological development and continue to encourage the university/industry relationship that is unique to the United States will require a reconsideration of technical education. Those students best qualified to be high-class scientists or outstanding engineers are likely to do very well in the U.S. system. The next level of technologist/engineer—the product engineer, the systems engineer—is good in the United States although not necessarily excellent compared to the fine French or Japanese systems engineers. We have more trouble at the technician level. Perhaps our worst performance is in the general level of secondary school and college education in science and technology. Nontechnical people in the United States are more ignorant of tech-

nology than nontechnical people in other countries. Our diversity of secondary school education control hurts us. The United States misses the technological level of sophistication in the general population that could be provided by such a system.

This tour gets me back to where I began. Technology is multiply important to national security in complex ways. One needs to look at the context in which the technology is to be employed. Combining that context with scientific and technical content still requires experience and good judgment.

**Question:** One topic you did not mention was conflict resolution with the Soviet Union, in particular on energy. Perhaps there are ways of using technology to avoid points of contact with the Soviet Union. If one were able to produce liquid fuel, for example, one could stop worrying about the Indian Ocean and the Saudi Arabians. And would it not be a great thing to invest a trillion dollars in finding liquid sources of fuel rather than worrying about being unable to salvage some from the Middle East?

**Brown:** This is one place where the market may work, but it does not take into account political disruptions. Success in what you suggest would ease the problem in a location that I most worry about as a locale for a U.S.-Soviet confrontation, namely, the Persian Gulf region. For that reason, I am sorry to see the synfuels program cut back as far as it is. I agree that if access to the Persian Gulf were not a problem, a shortage of fuel for the United States for the rest of the century would be unlikely. The possibility of political disruption could in part be answered by a much greater U.S. liquid fuel capability.

But the conflict between the United States and the Soviet Union in the Middle East/Persian Gulf area is more complicated in its sources than simply a competition for oil for ourselves and them. What would be useful to them would be to have their hand on the valve so that they could have a political effect on Europe and Japan.

A quite separate way in which technology might be able to ease U.S.-Soviet conflict is to improve the ability to verify arms control agreements.

**Question:** Could you comment on the relationship of SDI [Strategic Defense Initiative] to technology and national security?

**Brown:** I have done that at great length in an article that appears in the current issue of *Survival*, the magazine of the International Institute for Strategic Studies. There are some interesting new technologies that improve the possibility for ballistic missiles to penetrate such defenses. It is always a question of how that ladder of measure/countermeasure/counter-countermeasure goes. In the past, it has been the case that the factor of a million in destructiveness that has been achieved in going from chemical explosives to thermonuclear explosives has outweighed anything that anybody has been able to come up with on the defensive side. The traditional offense tactics of picking your targets, saturating, deceiving, decoying, and suppress-



ing the defense that have been around for decades still apply. I have not seen anything that convinces me that the balance has shifted in the direction of the defense.

**Question:** Would you comment on the converse or possible circular issue of national security's effect on technology export control restriction on various types of research?

**Brown:** No doubt there is a leakage of U.S. technological advantage out of the country, both to commercial competitors in the industrialized countries and to military competitors in the Soviet bloc. It is a matter of judgment whether it has been a leak or a massive hemorrhage, and it is also a matter of judgment as to just how much help it has been to the other side, both industrially and militarily. I think it has been significant.

To the extent that you tighten up the flow of the leakage, you also tighten up the legitimate flow to allies and the legitimate flow within the technical and industrial communities in the United States. A balance has to be struck between staying ahead by doing more and communicating better and staying ahead by holding things to yourself. The balance is different depending on the nature and stage of a particular technological development. In the end, the Chinese were not able to maintain their technological preeminence past the 16th century by preventing its export to the West. The West, which was more open, experienced a scientific revolution, and it left the ancient Asian societies far behind.

**Question:** Aside from Western Europe and the Middle East, would you care to comment on where you think the vital interests of the United States are involved?

**Brown:** There are two places. East Asia is clearly such a place. We have economic interests of enormous size there now; our trade with Asia has been bigger than with Europe for three or four years. The Middle East/Persian Gulf is an area of vital interest to the United States and perhaps the most dangerous one because there is a less clearly defined East-West line there than in the other places. There is also greater local conflict in that region.

Beyond that you get into the complicated question of the Western Hemisphere. In a way, it is our backyard, although Buenos Aires is farther away than Paris. The dangers are intrinsically less because we are closer than the U.S.S.R. and our potential military capability in the region is very great. The political problems are more severe because it is the smaller countries close to a superpower geographically that experience political conflict with it.

Thus, we can get along with the Yugoslavs even though they are Marxist-Leninist because they are close to the Soviet Union and they worry much more about the Soviet Union doing something to them than about the United States. Cuba may have, fundamen-

tally, a very great interest in having good relations with the United States for economic and political reasons, but there is such a history of U.S. influence, dominance, and conflict in Latin America and the Caribbean that even countries dominated by right-wing regimes find reasons to be unhappy with the United States. So we have to tread very carefully. Yet, if unfriendly regimes supported by the Soviet Union gradually gain power in an area moving up toward the United States, that would be plenty for us to worry about. The question is: How do you keep that from happening, and what combination of political, economic, and military behavior minimizes the chance of that adverse evolution of events?

**Question:** What are your views on the impending cutback in military expenditures?

**Brown:** I would have been a lot happier to have seen a steady growth over the period 1978 through 1990 at the rate of 3% a year in real terms. That is what had been started and was projected. The Reagan administration had been elected to office in part on the promise to do something about a perceived decline in U.S. military capability relative to that of the Soviets, and to do so quickly and massively. That consensus is now dissipated, and the public focuses more on military waste.

As long as a military weapon system works, it is better than not having any at all. A separate question is how effective and efficient that increased infusion of resources was. But there is no question that it increased U.S. military capability.

Security is more than military capability, and its political components also have to be considered. The United States cannot afford to have a flat or decreasing military budget over the next five years. I say that despite my objections to the priorities or lack of priorities over the past four or five years, despite my objections to some political attitudes of the Reagan administration, despite my revulsion, which I share with everybody else, at the inefficiencies and overpricing. The United States still has to maintain its military capability. It cannot do so on a flat military appropriation over the coming years. A 3 to 4 percent real annual growth in appropriations through the end of the decade is what I would consider prudent.

Politically, that is going to be very difficult to accomplish, and my own guess is that it is not going to happen. The result is likely to be less useful than the expenditure of the same total amount of money would have allowed if it had been done more smoothly because we are now locked into massive expenditures for big systems. You are going to see the same thing that has happened often in the past from a stop-and-go approach—many systems that are not ready, are not reliable, and are not manned by adequately trained people.