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A N D A R M S
C O N T R O L
S T U D I E S
P R O G R A M

Annual Report • 1992-1993

MASSACHUSETTS
INSTITUTE
OF TECHNOLOGY



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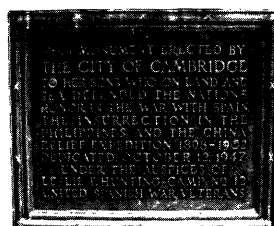
**DEFENSE AND ARMS CONTROL
STUDIES PROGRAM**

The Defense and Arms Control Studies (DACS) Program is a graduate-level, research and training program based at the MIT Center for International Studies. It traces its origins to two initiatives. One was the teaching on international security topics that Professor William Kaufmann began in the 1960s in the MIT Political Science Department. The other was the MIT-wide seminars on nuclear weapons and arms control policy that Professor Jack Ruina and Professor George Rathjens created in the mid 1970s.

The program's teaching ties are primarily but not exclusively with the Political Science Department at MIT. The DACS faculty, however, includes natural scientists and engineers as well as social scientists. Of particular pride to the program is its ability to integrate technical and political analyses in studies of international security issues.

Several of the DACS faculty members have had extensive government experience. They and the other program faculty advise or comment frequently on current policy problems. But the program's prime task is educating those young men and women who will be the next generation of scholars and practitioners in international security policy making. The program's research and public service activities necessarily complement that effort.

The Center for International Studies is a major unit of the School of Humanities and Social Science at MIT and seeks to encourage the analysis of issues of continuing public concern. Key components of the Center in addition to DACS are Seminar XXI, which offers training in the analysis of international issues for senior military officers, government officials, and industry executives; and the MIT Japan Program, which conducts research and educational activities to further knowledge about Japanese technology, economic activities, and politics.



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*COVER PHOTO: SPANISH WAR VETERANS STATUE
CONCORD AVENUE, CAMBRIDGE, MA
PHOTOGRAPH BY KELLY GREENHILL*

REPORT OF THE DIRECTOR

Truth be told, the United States took the Cold War more seriously than did any other of the war's major participants. With great expenditure, much trial and error, and more than occasional innovative analysis, the United States built a military that was by the war's end simply unsurpassable. The American military had the best equipment, the most professional leadership, the most sophisticated training, and most extensive logistical support of any in the world. It had these attributes because it was expected to be able to fight (and often did) far from its home bases in the difficult climates against the difficult opponents. The American military thought it had to be ready to meet the Communist challenge nearly anywhere on the globe it might conceivably appear.

In contrast our European allies came to view the Cold War as essentially a jobs program. Exhausted by the Second World War, they were quick to accept that threat posed by the Soviet Union could only be met by the United States and, with minor exception, organized their defense efforts to maximize local employment rather than, as America largely did, military utility. Their militaries often expressed preference for American equipment and practices, but were usually required to accept whatever systems national firms alone or in regional consortia could develop. The training of West European militaries suffered and their ability to project force at any distance from their borders was quite limited because European politicians were unwilling to impose significant burdens on their populations.

The Soviet Union, the other half of the Cold War, gradually slid into the same policies, allowing its once mighty military to become sclerotic while focusing its attention on expanding employment in a vast network of factories that produced great quantities of often obsolete weapons. Like the West European militaries, the Red Army saw little combat during the Cold War and had little influence in weapon procurement decisions. By the war's end the great ideological struggle between capitalism and communism was basically a jobs program for the Soviets as well. As a result, the economies of surviving republics are now burdened with industrial structures composed largely of arsenals and shipyards thoroughly accustomed to make-work orders.

Roles are now being reversed. Many of America's allies and former opponents seek to build capable militaries while America itself is beginning to consider defense as a jobs program. Chaos is growing along the borders and within the former Soviet Union. Ethnic and religious fissures, long paved over by Communist regimes, are reappearing, causing bloody conflicts and waves of refugees. Even when defense budgets are being reduced because of economic pressures, nations in Europe and Asia want the protection of militaries trained and equipped to fight. There is talk about shedding conscription to build professional forces, of acquiring

airlift capabilities, and of the need to purchase or develop high technology weapons like those used by U.S. forces. Delegation after delegation stop by for discussions.

At the same time, America's military needs are becoming less urgently felt. Bounded by two virtually unarmed neighbors and two very large oceans, America is far from most of the post Cold War chaos. The U.S. armed services have an abundance of modern weapons, much more than their likely force structures will be able to absorb. Politicians worried about the future of local shipyards and aircraft plants now make the argument for their continuation on employment grounds and rarely mention any strategic requirements that could justify additional production.

Finding a strategic rationale for maintaining large U.S. forces and busy weapon production lines will be difficult. Without a popularly accepted, overarching principle like anti-communism, proposed interventions must be argued individually. The budget deficit and a growing unwillingness to suffer (or inflict) casualties gives ready excuse to delay or not to intervene at all. Bad experiences are certain to occur in even our most humanitarian-oriented ventures. After they do, major foreign interventions will likely require a direct attack against the United States, just as World War Two did, in order to achieve sufficient popular support.

The MIT Defense and Arms Control Studies Program (DACS) has sought to stimulate debate about the security requirements of a post Cold War world. Two impressions stand out from this experience. One is the determination on the part of many officials and officers to avoid discussion of options. Their understandable, but unsustainable view is that past policies with only minor modification are sufficient. Thus, the continuing assertion that high states of operational readiness are required for U.S. forces and that proportional reductions among the services are best when cuts cannot be avoided. The new world situation, however, demands, it would seem, a total rethinking of force levels and military missions. Moreover, defense budgets that hardly have receded to those of the Carter years cannot

be said to be in fact post Cold War budgets. There are substantial changes ahead for the American military.

The second observation to note is how easily wishful thinking can replace clear thinking in the analysis of options. The attractive vision often offered in academic discussions that has nations cooperating to provide security to threatened peoples ignores much unpleasant reality. Nations do not line up to have their soldiers killed in distant locations unless the threat that they are meeting is persuasive to the parents of the soldiers as well as to politicians. The troops assigned to these duties will not long tolerate exposure to mortal danger unless provided the right to retaliate to attacks with overwhelming force. Forging a coalition of nations that regularly will take on the burdens of intervention is likely to exceed the capacity of even the most accomplished of diplomats.

Among us Barry Posen has taken the lead in outlining the strategic alternatives. His paper on U.S. grand national strategies which was based on testimony presented to the House Armed Services Committee is already considered a classic. In it he describes the premises, arguments, and force requirements for the three alternative national security policies prominent in U.S. public discussions — cooperative security, selective engagement, and isolationism. He has supplemented this work with related analyses of nationalism, military formats, and specific scenarios such as an intervention in the Bosnian conflict. He is also conducting fundamental research on the relationship between nationalism and war.

The intervention theme has also been explored by Carl Kaysen and George Rathjens in separate projects based at the American Academy of Arts and Sciences. Kaysen is leading a multi-stage study that brings together experts from around the world to examine the causes and consequences of past international interventions. Rathjens is involved in a parallel effort that is reviewing the United Nations' experience in peacekeeping and peacemaking activities.

My contribution to the debate has focused on the casualty issue. The use of force risks casualties, but is there the political will to take and inflict casualties in ventures where national survival is not threatened? Perhaps intervention would be more likely if non-lethal options were available. In June 1993 with the support of the Army War College and the Office of Net Assessment, DACS convened what possibly was the world's first conference on the use and consequences of non-lethal warfare technologies. Over 70 specialists participated in the sessions which were held in Lexington, Massachusetts and which produced a prescriptive list of uses for such technologies.

One conflict we often fear will not only be lethal but also nuclear is that between the Arabs and the Israelis. As part of his work on nuclear proliferation, Marvin Miller brought together several dozen U.S. and Israeli experts in discussion of nuclear weapons in the Middle East. The conference had the sponsorship of the Rockefeller Foundation.

Weapon technologies are certain to proliferate. Theodore Postol has been studying the defenses that can be raised against ballistic and cruise missiles carrying a variety of warheads. Aiding him in this effort are George Lewis and several visitors from Russia and Israel who are members of his Defense Technologies Working Group. A number of important papers have resulted including the definitive analysis of the Patriot/Scud engagements that occurred during the Gulf War.

A frequently expressed concern is that Russia will feed world instability by exporting either weapons of mass destruction or the knowledge how to make them. Stephen Meyer examined this and related problems in a symposium he organized on the status of Russian Military R&D that was held at the program in November 1992. The general conclusion of the participants was that Russian military R&D capabilities are rapidly deteriorating and that Russia's export temptations are constrained by its own proximity to conflicts and the need to maintain cooperative ties with the United States.

While some nations may be seeking nuclear status others are pondering their nuclear legacies. Jack Ruina has been considering the future nuclear arsenals of the United Kingdom and France, arsenals that have grown in relative prominence as those of the United States and the former Soviet Union have declined due to treaties and the attrition of peace. A related topic, interest in which several of us share, is the future of the laboratory complex that supported strategic systems in the United States. There is within these facilities extraordinary technical talent. What is of concern is how this talent can be effectively utilized while maintaining the reservoir of skills needed for nuclear deterrence.

The annual report provides public occasion to thank those who have been especially helpful in our work. Prominent among them must be several of our political science colleagues — Stephen Van Evera, whose theoretical suggestions continue to intrigue the many students we share with him; Richard Samuels, chair of the department and a leading expert on Japanese defense policies; and Ken Oye, Director of the Center for International Studies and a prominent specialist in international trade and security.

Also we offer our congratulations and best wishes to several MIT affiliates who accepted senior positions in the new Administration. Les Aspin, former chairman of the House Armed Services Committee, a PhD graduate of the MIT Economics Department, and MIT's 1992 Commencement Speaker, is the new Secretary of Defense. John Deutch, Professor of Chemistry and former Provost of MIT, is the Under Secretary of Defense for Acquisition and Technology. Sheila Widnall, Professor of Aeronautics and Astronautics and Associate Provost of MIT, is the Secretary of the Air Force, the first woman ever to head a military department. The Under Secretary is the Department of Defense official responsible for the Defense Production Act, the main mobilization authority for the nation, and, delegated though its Secretary, the Air Force manages implementation activity for the Act. With surely what was great foresight, just before either John Deutch or

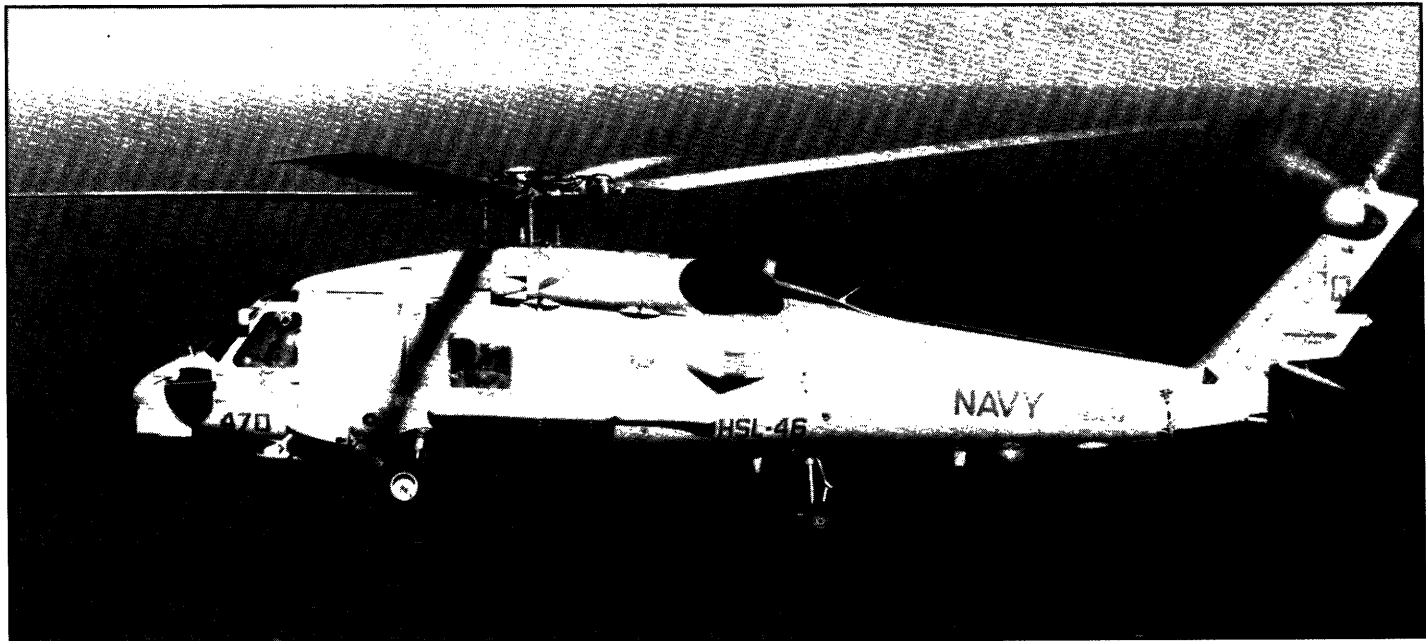
Sheila Widnall signed up for their jobs, DACS hosted a meeting on the 1992 Amendments to the Defense Production Act as part of a series organized by the Federal Emergency Management Agency and the Army War College.

**REPORT OF
THE DIRECTOR**

In addition to those sponsors mentioned earlier, my colleagues and I would like to thank sincerely the Carnegie Corporation of New York, the Ford Foundation, the John D. and Catherine T. MacArthur Foundation, the W. Alton Jones Foundation, the Plowshares Fund, the MIT Lincoln Laboratory, the Department of Energy, the Army Environmental Policy Institute, the MITRE Corporation, and the John Merck Fund for their support of our work.

Finally, we would like to thank Commander Greg Hoffman, USN, our first Navy Federal Executive Fellow, for his many significant contributions to the work of the program and that of our students. Greg joined us in the fall of 1992 not quite certain what to expect. He leaves a year later having convinced us of the value in having military fellows affiliated with the program. He was ever patient as he helped us to understand how the military functions and only occasionally laughed openly as we demonstrated to him how university faculties muddle through their many roles.

Harvey M. Sapolsky



Cdr. Hoffman on a prior assignment

HARVEY M. SAPOLSKY is Professor of Public Policy and Organization in the Department of Political Science and Director of both the Defense and Arms Control Studies Program and the MIT Communications Forum. Dr. Sapolsky completed a B.A. at Boston University and earned an M.P.A. and Ph.D. at Harvard University. He has worked in a number of public policy areas, notably health, science, and defense where he examines the effects of institutional structures and bureaucratic politics on policy outcomes. In defense he has served as a consultant to the Commission on Government Procurement, the Office of the Secretary of Defense, the Naval War College, the Office of Naval Research, and the RAND Corporation, and has lectured at all of the service academies. He is currently focusing his research on interservice and civil/military relations. In July 1989 he succeeded Professor Ruina as Director of the MIT Defense and Arms Control Studies Program. Professor Sapolsky's most recent defense-related book is titled *Science and the Navy*, and is a study of military support of academic research. A volume on telecommunications policy he co-edited has just appeared.



CARL KAYSEN is David W. Skinner Professor of Political Economy Emeritus in the Program in Science, Technology, and Society and a Senior Lecturer at the MIT Center for International Studies. Dr. Kaysen earned his B.A. in Economics at the University of Pennsylvania, and his Ph.D. at Harvard University, where he was an economics professor from 1950-1966. From 1966 until 1976, when he came to MIT, he was Director of the Institute for Advanced Study in Princeton and from 1961-1963 he was the Deputy Special Assistant for National Security Affairs to President Kennedy. He has served as a consultant to RAND, the Defense Department, and the CIA. A member of the Committee on Security Studies of the American Academy of Arts and Sciences, Dr. Kaysen is currently engaged in organizing a project under the Committee's auspices on emerging norms of justified international intervention.



FACULTY



STEPHEN M. MEYER is Professor of Defense and Arms Control Studies and Director of Soviet Security Studies at MIT. Prior to joining the MIT faculty in 1979, he was a post-doctoral fellow at Harvard University's Center for Science and International Affairs. He received his Ph.D. at the University of Michigan, Ann Arbor in 1978. Dr. Meyer's areas of particular interest are defense decision-making, military economics, force planning and

analysis, and arms control in the former Soviet Union. His current work examines the rise and fall of Soviet military power and the ways in which domestic organizations and institutions influenced Soviet defense policy. Dr. Meyer serves as an advisor on Soviet security affairs to several U.S. government agencies and has testified numerous times in open and closed hearings before the House Armed Services Committee, the Senate Armed Services Committee, the Senate Foreign Relations Committee and the Senate Select Committee on Intelligence.



MARVIN M. MILLER is a Senior Research Scientist in the Department of Nuclear Engineering and a senior staff member of the MIT Center for International Studies. After undergraduate work at the City College of New York he earned an M.A. in Physics from the University of Rochester and a Ph.D. in Electrical Engineering from the Polytechnic Institute of New York. Prior to joining MIT in 1976, Dr. Miller was an associate professor of electrical engineering at Purdue University working on laser

theory and applications. His current research interests are arms control, particularly nuclear proliferation, and the environmental impacts of energy use. He has studied proliferation issues since 1977, including both country-specific and generic problems. In the former, his main interests are in the Middle East and South Asia, while in the latter he has concentrated on international safeguards and export controls for sensitive nuclear technologies. From 1984 to 1986, Dr. Miller was a Foster Fellow with the Nuclear Weapons and Control Bureau of the U.S. Arms Control and Disarmament Agency (ACDA) and is currently a consultant on proliferation issues for ACDA, the International Technology Program of the Los Alamos National Laboratory, and the Technical Support Organization at the Brookhaven National Laboratory.

BARRY R. POSEN is Professor of Political Science. His most recent book, *Inadvertent Escalation*, was released from Cornell University Press in Fall, 1991. His first book, *The Sources of Military Doctrine*, won the American Political Science Association's Woodrow Wilson Foundation Book Award for the best book published in political science in 1984, and Ohio State University's Edward J. Furniss Jr. Book Award for the best first book in the field of security studies. Dr. Posen did his undergraduate work at Occidental College and his graduate work at the University of California at Berkeley, where he earned an M.A. and Ph.D. Prior to coming to MIT, Dr. Posen was Assistant Professor of Politics and International Affairs at Princeton University. He has also held a number of prestigious positions: Guest Scholar at the Brookings Institution; Post-Doctoral Fellow at the Center for International Affairs at Harvard; Council on Foreign Relations International Affairs Fellow; Rockefeller Foundation International Affairs Fellow and Guest Scholar at the Center for Strategic and International Studies; and Woodrow Wilson Center Fellow, Smithsonian Institution. Dr. Posen's current activities include work on U.S. military strategy and force structure, regional military balance assessment, and nationalism.



THEODORE A. POSTOL is Professor of Science, Technology and National Security Policy in the Program in Science, Technology, and Society at MIT. He did his undergraduate work in Physics and his graduate work in Nuclear Engineering at the Massachusetts Institute of Technology. After receiving his Ph.D., Dr. Postol joined the staff of Argonne National Laboratory, where he used neutron, x-ray and light scattering, along with computer molecular dynamics techniques, to study the microscopic dynamics and structure of liquids and disordered solids. Subsequently he went to the Congressional Office of Technology Assessment to study methods of basing the MX Missile, and later worked as a scientific adviser to the Chief of Naval Operations. After leaving the Pentagon, Dr. Postol helped to build a program at Stanford University to train mid-career scientists to study developments in weapons technology of relevance to defense and arms control policy. In 1990 Dr. Postol was awarded the Leo Szilard Prize from the American Physical Society.



FACULTY



GEORGE W. RATHJENS became Professor in the Department of Political Science after service with the Institute for Defense Analyses, the U.S. Arms Control and Disarmament Agency, the Advanced Research Projects Agency of the Department of Defense, the Office of the President's Science Advisor, and the Weapons Evaluation Group of the Department of Defense. Dr. Rathjens received his B.S. from Yale University and completed

his Ph.D. in chemistry at the University of California at Berkeley. He is active in a number of associations, including the Council for a Livable World of which he has been Chairman and the Federation of American Scientists of which he is Sponsor, Councilor, and Past Chairman. Dr. Rathjens' major policy interests are nuclear arms issues, post-Cold War international security questions, and environmental problems, with special emphasis on conflict and the environment.



JACK RUINA is Professor of Electrical Engineering. Dr. Ruina was an undergraduate at the City College of New York and did his graduate work at the Polytechnic Institute of Brooklyn, earning his M.E.E. and D.E.E. there. He taught at Brown University and the University of Illinois; at the latter he also headed the Radar Division of the Control System Laboratory. While on leave from the University of Illinois, he served in several senior posi-

tions at the Department of Defense, the last being Director of the Advanced Research Projects Agency. He also held the post of President of the Institute for Defense Analyses. At MIT, he has held the position of Vice President for Special Laboratories and is currently Secretary of the MIT Faculty. He was instrumental in establishing the Defense and Arms Control Program and was its first Director. Dr. Ruina's special interest is in strategic weapons policy.

The seven working groups of the MIT Defense and Arms Control Studies Program bring together, on a weekly basis, faculty and students interested in examining a topic through individual and collaborative projects. Group sessions include research reviews, thesis presentations, guest speakers, and research design efforts. All groups report on their progress in the spring at a DACS symposium.

**FUTURE OF THE AEROSPACE
INDUSTRY**

Harvey Sapolsky
Working Group Leader

CONVENTIONAL FORCES

Barry Posen
Working Group Leader

**DEFENSE/ENVIRONMENTAL
STUDIES**

Harvey Sapolsky
Working Group Leader

DEFENSE POLITICS

Harvey Sapolsky
Working Group Leader

**NEW DIRECTIONS IN
INTERNATIONAL SECURITY AND
DEFENSE POLICY**

**George Rathjens, Jack Ruina
and Carl Kaysen**
Working Group Leaders

SOVIET SECURITY STUDIES

Stephen Meyer
Working Group Leader

**TECHNICAL STUDIES IN DEFENSE
AND ARMS CONTROL POLICY**

Theodore Postol
Working Group Leader

SELECTED PUBLICATIONS • 1992/1993

- Lisbeth Gronlund and David Wright, "Depressed-Trajectory SLBMs: A Technical Assessment and Arms Control Possibilities," *Science and Global Security*, Vol. 3 (1992).
- Lisbeth Gronlund, "From Nuclear Deterrence to Reassurance: The Role of Confidence-Building Measures in Military Development," *Arms Control* (May 1993), and in Ivo H. Daalder and Terry Terriff, editors, *Rethinking the Unthinkable: New Directions in Nuclear Arms Control* (London: Frank Cass, 1993).
- Carl Kaysen, book review of Michael R. Beschloss, *The Crisis Years: Kennedy and Khrushchev, 1960-1963*, in *Political Science Quarterly* (Spring 1992).
- Carl Kaysen, Robert McNamara, and George Rathjens, "Nuclear Weapons After the Cold War," in Joseph Rotblat, Jack Steinberger, and Bhalchandra Udgaonkar, editors, *A Nuclear-Weapon-Free World: Desirable? Feasible?* [Pugwash monograph] (Westview Press, 1993).
- Eric J. Labs, "Do Weak States Bandwagon?" *Security Studies* (Spring 1992).
- George N. Lewis and Theodore A. Postol, "Long-range Nuclear Cruise Missiles and Stability," *Science and Global Security*, Vol. 3 (1992).
- George N. Lewis, "The Future of U.S. Nonstrategic Nuclear Forces," in Michele A. Flournoy, editor, *Nuclear Weapons After the Cold War: Guidelines for U.S. Policy* (New York: HarperCollins, 1992).
- George N. Lewis, Lisbeth Gronlund, and Steven Fetter, "The Iraqi Missile Attacks on Israel: Why Were Casualties So Low?" *Nature* (28 January 1993).
- Stephen M. Meyer, "Environmentalism Doesn't Steal Jobs," op-ed piece, *The New York Times*, March 26, 1992.
- Stephen M. Meyer, "The Military," in Timothy J. Colton and Robert Legvold, editors., *After the Soviet Union: From Empire to Nations* (NY: Norton & Co., 1992).
- Marvin Miller and Avner Cohen, "How to Think About — and Implement — Nuclear Arms Control in the Middle East," *The Washington Quarterly* (February 1993).

- Marvin Miller and Jack Ruina, "The Breakout Problem," in Joseph Rotblat, Jack Steinberger, and Bhalchandra Udgaonkar, editors, *A Nuclear-Weapon-Free World: Desirable? Feasible?* [Pugwash monograph] (Westview Press, 1993).
- Marvin Miller, Frank von Hippel, Harold Feiveson, Anatoli Diakov, and Frans Berkhout, "Eliminating Nuclear Warheads," *Scientific American* (August 1993).
- Barry R. Posen, "A Test for the New World Order," *The Boston Globe*, July 14, 1992.
- Barry R. Posen, "A Balkan Vietnam Awaits 'Peacekeepers' (Perspective on Bosnia), op-ed piece, *Los Angeles Times*, February 4, 1993.
- Barry R. Posen, "The Security Dilemma and Ethnic Conflict," *Survival/The IISS Quarterly*, Vol. 35, No. 1 (Spring 1993).
- Barry R. Posen, "Nationalism, the Mass Army and Military Power," *International Security* (Fall 1993).
- Theodore A. Postol/Robert M. Stein, "Correspondence: Patriot Experience in the Gulf War," *International Security* (Summer 1992).
- George W. Rathjens, "The Go-It-Alone Illusion," *Bulletin of the Atomic Scientists* (May 1992).
- George W. Rathjens, Thomas F. Homer-Dixon, and Jeffrey H. Boutwell, "Environmental Change and Violent Conflict," *Scientific American* (February 1993).
- George W. Rathjens, "Nuclear Deterrence: Where Are We Now?" in Trevor Findlay, editor, *Arms Control in the Post-Cold War World: With Implications for Asia/Pacific* (forthcoming, 1993).
- Laura W. Reed and Carl Kaysen, editors, *Emerging Norms of Justified Intervention: A Collection of Essays from a Project of the American Academy of Arts and Sciences* (Cambridge, MA: AAAS, July 1993).
- Jack Ruina, book review of William J. Broad, *Teller's War: The Top Secret Story Behind the Star Wars Deception*, in *Arms Control Today* (May 1992).
- Jack Ruina, book review of Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford*, in *Nature* (17 June 1993).
- Jeffrey I. Sands, "Realizing the New Maritime Strategy: A Historical Dimension (The Zumwalt Lessons)" -- CNA briefing paper, #93-0330.00 (Alexandria, VA: Center for Naval Analyses, 22 February 1993).
- Harvey M. Sapolsky, book review of Chris Demchak, *Military Organizations, Complex Machines*, in *American Political Science Review* (June 1992).
- Harvey M. Sapolsky, *The Telecommunications Revolution*, edited with R. Crane, R. Neuman, and E. Noam (London, UK: Routledge, 1992). Japanese edition 1993.
- Harvey M. Sapolsky, "The Greening of DOE: Political Change in the Nuclear Weapons Complex," MIT Energy Laboratory, March 1993.
- Harvey M. Sapolsky, "Democratic Society and the American Way of War," in S. Sarkesian and J. Flanagan, editors, *United States Domestic and National Security Agendas* (Greenwood Press, 1993).
- David Wright, Lisbeth Gronlund, and Lora Lumpe, "Third World Missiles Fall Short," *Bulletin of the Atomic Scientists* (March 1992).
- David Wright, "Missing the Target: SDI in the 1990s," Technical Report, Union of Concerned Scientists (April 1992).

WORKING PAPERS

George N. Lewis, Steve Fetter, and Lisbeth Gronlund, "Casualties and Damage from Scud Attacks in the 1991 Gulf War" (DACS WP #93-2), March 1993.

Barry R. Posen, "Competing U.S. Grand Strategies"--Statement accompanying testimony before the House Armed Services Committee, Washington, DC (DACS WP #93-1), March 3, 1993.

Harvey M. Sapolsky, "Health and Defense: A Policy Comparison" (DACS WP #92-3), September 1992.

Sharon K. Weiner, "Environmental Concerns at U.S. Overseas Military Installations" (DACS WP #92-2), July 1992.

RESEARCH JOURNAL

Breakthroughs Vol. II, No. 1
Spring 1992

Breakthroughs Vol. II, No. 2
Winter 1992/93

RESEARCH NOTES

Soviet Defense Notes

A publication of the Soviet Security Studies Working Group.

DACS SEMINAR NOTES

Summaries of the DACS Seminar Series presentations.

OUTSIDE PROFESSIONAL ACTIVITIES • 1992/1993

CARL KAYSEN

- Was among a group of economists who participated in the Conference on Russian Economic Policy, held in Moscow, July 12-16, 1992. The meetings grew out of an earlier conference with the same Soviet officials (then researchers at various Soviet academy institutes) on the problems of moving from a command to a market economy.
- Delivered a paper on "The Test Ban Treaty of 1963" at the European University Institute conference held October 8-9, 1992 in Florence, Italy.
- On October 21, 1992, lectured at van Leer Institute in Israel on "Is Peace Possible?--Is Peace Likely?"
- Held the first conference for the project he is directing, "Emerging Norms of Justified Internal Intervention," on January 4-6, 1993 at the American Academy of Arts and Sciences in Cambridge, which developed the interdisciplinary, multi-year study.
- "Oral Memoirs of World War II and the Kennedy Era" was the subject of his brown-bag lunch talk on January 27, 1993 during MIT's Independent Activities Period (IAP).
- Spoke on "Nationalism and Economic Development" at a conference on Theories of Nationalism, held at Prague Central European University Foundation, March 19-20, 1993.
- Attended a conference on Sovereignty and Democracy in Latin America sponsored by the Inter-American Dialogue, at the Aspen Conference Center in Wye Woods, Maryland, April 2-4, 1993.
- Participated in meetings organized by Cornell University's Institute for European Studies, held April 16-17, 1993, on International Organizations and Ethnic Conflict.
- On May 5-7, 1993, was in Los Angeles for the UCLA Center for International Relations conference on The Emergence of New Norms in Personal and International Behavior.

STEPHEN M. MEYER

- On May 5-6, 1992, attended the inaugural meeting of a 4-year joint project of American and Japanese scholars studying the aftermath of the fall of the Soviet Union.
- Delivered several lectures in September, 1992 to the intelligence community on the shaky basis of Russian defense policy.
- Organized a conference on Russian Military R&D: Problems and Prospects, hosted by the Soviet Security Studies Working Group, November 19, 1992.
- Gave a paper on "The Political and Military Disintegration of the Russian Republic" at a conference on Russia sponsored by the Department of Energy, held December 9/10, 1992 in Washington, DC.
- Was in Kobe, Japan for meetings of a joint American/Japanese Working Group on Russia and Asia, held February 28-March 3, 1993.
- Took part in a 3-day (March 8-10, 1993) Department of Defense workshop in Washington, DC on Forecasting Russian Futures.
- Participated in two Washington, DC conferences on the changing political and military situation in Russia: one on March 10, 1993 sponsored by the intelligence community and another on March 22, 1993 sponsored by the Department of Defense.
- Made a presentation to the New Hampshire State Economic Summit on "The Environment and the New England Economy," March 29, 1993.
- Led a panel at an intelligence community conference on The Russian Economy on May 19-20, 1993 in Washington, DC.
- Presented a paper at a Washington, DC conference on The Russian Military, May 22-23, 1993.
- On May 25, 1993, gave a talk on "Russian-Ukrainian Security" at the U.S. State Department.

MARVIN M. MILLER

- Went to Israel in August, 1992 to talk with members of the new Israeli government and other officials about the prospects for nuclear arms control in the Middle East. While there also gave a press briefing.
- In December, 1992, traveled to the former Soviet Union to attend an international conference in Moscow on arrangements for the storage and disposition of plutonium from nuclear weapons, and to give talks on reactor burning and glassification of weapons plutonium and the efficacy of IAEA safeguards at reprocessing and plutonium fuel fabrication plants. The meeting was co-hosted by the Center for Arms Control, Energy, and the Environment of the Moscow Institute of Physics and Technology (MPTI), the Russian Parliament Committee on Environmental Protection, and the Federation of American Scientists. The trip also included a seminar on nuclear security in Kiev and a visit to the Chernobyl nuclear power station.
- Presented an IAP seminar on “The Disposition of Weapons Grade Materials” during MIT’s Independent Activities Period on January 15, 1993.
- On February 10, 1993, visited the U.S. government Savannah River site in South Carolina, where high level waste from weapons production is being glassified, and gave a talk there on “Options for Disposal of Plutonium from Nuclear Weapons.”
- With Avner Cohen, organized the U.S.-Israeli Seminar on Arms Control in the Middle East, held February 18-19, 1993 at the American Academy of Arts and Sciences in Cambridge.
- From March 17-April 15, 1993, was a scholar-in-residence at the Study Center of the Rockefeller Foundation at Bellagio, Italy where he worked on a book about the responsibility of scientists in minimizing the risk of the spread of weapons of mass destruction.
- Attended a workshop on Sources of Conflict in the Middle East, held April 15-18 in Istanbul, Turkey, sponsored by the American Association for the

Advancement of Science, and gave talks there on “The Middle East Arms Race.”

- Delivered four lectures in a summer school on Security, Technology and Arms Control in South Asia, held in Muree, Pakistan from May 20-29, 1993.

OUTSIDE PROFESSIONAL ACTIVITIES

BARRY R. POSEN

- On April 10, 1992, gave a presentation on “Military Formats and Regional Balance Assessment” at the National Security Fellows/Faculty Seminar Program, Harvard University. The series is organized by General Trainor’s National Security Program at the Kennedy School.
- Was on the campus of University of Northern Arizona to give a talk on “Future U.S. Military Force Structure” at the Arizona Honors Academy, June 9, 1992.
- Spoke on “Realist Theory and Ethnic Conflict” at the Conference on National Strategy organized by the Harvard Center for Science and International Affairs, held June 11-14, 1992 at the Wianno Club on Cape Cod.
- Participated in a summer study workshop in Newport, Rhode Island, August 2-12, 1992, sponsored by the OSD Office of Net Assessment. Working groups focused on innovation, DOD core competencies, and the nature of future major power relations.
- On October 15, 1992, took part in a panel discussion at Boston University on “How Much is Enough?: Future Directions for Defense” — part of the conference on Military Spending After the Cold War, a dialogue between the public and academic, political, and community leaders organized by students from six area colleges.
- Addressed a group of visiting cadets from the U.S. Military Academy’s Domestic Affairs Forum on “Future U.S. Strategy and Force Structure,” October 22, 1992.

**OUTSIDE
PROFESSIONAL
ACTIVITIES**

- On November 12, 1992, spoke on “Military Formats” at a session of the joint MIT/Harvard seminar series on The Future of Warfare.
- Gave a talk on “The Security Dilemma and Ethnic Conflict” at the Olin Institute for Strategic Studies, Harvard University, on November 16, 1992.
- Discussed “Security Threats: What are the Security Issues Facing the Post Cold War United States?” at the January 20, 1993 session of the MIT IAP seminar series on The U.S. in the New World Order, sponsored by the Center for International Studies and the Political Science Department.
- Participated in conference on Common Security Regimes in the Balkans,” January 29-30, 1993, Cambridge.
- “What If Iraq Had Had Nuclear Weapons?” was the subject of his talk at the U.S.-Israeli Seminar on Arms Control in the Middle East, held February 18-19, 1993 at the American Academy of Arts and Sciences in Cambridge.
- Gave testimony on “Competing U.S. Grand Strategies” — an interpretation of the major positions in the current U.S. grand strategy debate — before the House Armed Services Committee, U.S. Congress, on March 3, 1993.
- U.S. strategy and force structure was the subject of the interview National Public Radio conducted with Professor Posen on March 5, 1993 (“Morning Edition” segment).
- Was a panelist at the inaugural session of the MIT CIS seminar series on The Crises of Democratic Transitions, organized and moderated by Kenneth Oye. The March 8, 1993 meeting dealt with “Crisis in Bosnia: Security Implications and Potential Solutions.”
- On March 15, 1993, gave a talk on “Old Ways of War; New Ways of War: Is There a Dominant Solution?” at Lincoln Laboratory, sponsored by the Advanced Concepts Committee.
- Took part in an April 16, 1993 breakfast meeting on “The Future Security Challenge” with General Carl Mundy, Commandant of the Marine Corps, organized by Harvard University’s National Security Program.
- Spoke on “Comparative Grand Strategy” at the MIT-Japan Program’s Global Political/ Economic Simulation Exercise, May 14, 1993.
- Was a participant in Policy and Strategy War Game VII (U.S. Marine Corps) — “The Balkan Dilemma,” May 25-27, 1993 in Quantico, Virginia.
- Gave a talk on “U.S. Grand Strategy” at conference on Greece, Turkey, and the United States in the Emerging International System, Panteion University, Athens, Greece, June 18-20, 1993.

TEODORE A. POSTOL

- Was on the Stanford University campus, April 10-11, 1992, to speak on “The Strategic Forces of Russia and the U.S.” at the Center for International Security and Arms Control and the Medical School.
- Lectured on “The Gulf War Experience with Patriot” at Fermi National Accelerator Laboratory, May 20, 1992.
- Attended the conference on “U.S.-Japan Defense Technology Collaboration” sponsored by the MIT Japan Program, held at the MIT Museum on June 18, 1992.
- Gave talks on Patriot missile performance at Lincoln Laboratory (October 15, 1992) and at physics colloquia at Cornell University (September 14) and the University of Minnesota (October 23).
- Lectured on Patriot at the History and Sociology of Science Department at the University of Pennsylvania on November 2, 1992 and at Princeton University’s Woodrow Wilson School on November 13.
- Attended the “Workshop on Technical Expertise and Peace and Security Studies in the Post Cold-War Era,” held November 6/7, 1992 in Washington, DC, sponsored by the Social Science Research Council.

**OUTSIDE
PROFESSIONAL
ACTIVITIES**

- “Ballistic Missile Defense” was the subject of his presentation at the U.S.-Israeli Seminar on Arms Control in the Middle East, held February 18-19, 1993 at the American Academy of Arts and Sciences in Cambridge.
- On April 13, 1993 at the Harvard-Smithsonian Center for Astrophysics and on May 12 at the Princeton Plasma Physics Lab, gave talks on Patriot.

GEORGE W. RATHJENS

- In June, 1992, gave talks on “Nuclear Deterrence: Where Are We Now?” at the Australian National University (Peace Research Centre) in Canberra and at the University of Western Australia (Indian Ocean Centre for Peace Studies) in Perth.
- Was a lecturer and scientific committee member at the Second International Summer School on Global Security, Arms Control and Disarmament, held in Bologna, Italy on July 5-16, 1992, sponsored by Bologna University and the Union of Scientists for Disarmament. Spoke on “Nuclear Weapon Proliferation.”
- On October 15, 1992, took part in a panel discussion at Boston University on “How Much is Enough?: Future Directions for Defense” — part of the conference on Military Spending After the Cold War, a dialogue between the public and academic, political, and community leaders organized by students from six area colleges.
- Attended the first conference for Carl Kaysen’s project on “Emerging Norms of Justified Internal Intervention,” January 4-6, 1993 at the American Academy of Arts and Sciences in Cambridge.
- Was a participant at the U.S.-Israeli Seminar on Arms Control in the Middle East, held February 18-19, 1993 at the American Academy of Arts and Sciences in Cambridge.

JACK RUINA

- Attended a Pugwash-sponsored workshop in June, 1992 on “Nuclear Weapons and European Security,” convened in Geneva, Switzerland.
- Was a lecturer and scientific committee member at the Second International Summer School on Global Security, Arms Control and Disarmament, held in Bologna, Italy on July 5-16, 1992, sponsored by Bologna University and the Union of Scientists for Disarmament. Spoke on “Nuclear Weapons Technology and Testing” and “Current Technology and Role for Defense Systems.”
- Was in Berlin, Germany to attend the Pugwash Annual Conference on Science and World Affairs, held September 9-11, 1992.
- Spent January, 1993 in San Diego as a visiting scholar at the University of California’s Institute on Global Conflict and Cooperation (IGCC).
- Took part in a Pugwash Workshop on Conversion in London, England, February 13-14, 1993, as part of a group of British, Russian, and American authors preparing a book on the subject.
- Participated in a conference at the University of California/San Diego on The Future of British, French, and Chinese Nuclear Weapons, June 2-3, 1993.

HARVEY M. SAPOLSKY

- Attended an authors’ conference in Washington, DC on June 17, 1992 for the *Health Affairs* special issue on government and health and presented an analysis comparing the health and defense sectors.
- Participated in a summer study workshop, sponsored by the OSD Office of Net Assessment, August 2-12, 1992 in Newport, Rhode Island. Working groups focused on innovation, DOD core competencies, and the nature of future major power relations.
- As chair of the American Political Science Association’s Woodrow Wilson Prize selection committee (best book on government, politics, or

international relations published in 1991), made the award presentation at the APSA annual meetings in Chicago, September 3-6, 1992.

- Presented a paper on “Democratic Society and the American Way of War” at the Workshop on U.S. Domestic and National Security Agendas: Into the 21st Century, sponsored by the National Strategy Forum, the Robert R. McCormick Tribune Foundation, and the U.S. Army War College. The meetings were held September 17-19, 1992 at Cantigny, Illinois.
- Spoke on “War Without Casualties” at the inaugural session of the Future of Warfare seminar series, held October 8, 1992, co-sponsored by DACS and Harvard’s Olin Institute for Strategic Studies.
- Participated in the MIT Campus Visit Program of October 22-24, 1992 with a presentation on “Changing National Priorities.” The ‘Visit,’ sponsored by the MIT Development Office, invites small groups of alumni and their spouses to the campus to explore new facets of the Institute.
- Took part in the “Workshop on Technical Expertise and Peace and Security Studies in the Post Cold-War Era,” held November 6/7, 1992 in Washington, DC, sponsored by the Social Science Research Council.
- Chaired a panel on “Defense Policy Making” at the 24th Annual Meeting of the Northeastern Political Science Association and Northeast International Studies Association, held November 12-14, 1992 in Providence, Rhode Island.
- Attended the conference on Naval Forward Presence and the National Military Strategy, held at Tufts University on November 18-19, 1992, co-sponsored by The Fletcher School’s International Security Studies Program, the Office of the Chief of Naval Operations, and the Institute for Foreign Policy Analysis.
- Gave a talk on “War Without Killing” at MIT’s Lincoln Laboratory on December 21, 1992.
- Was a participant at the U.S.-Israeli Seminar on Arms Control in the Middle East, held February

18-19, 1993 at the American Academy of Arts and Sciences in Cambridge.

- “Innovation in the Military” was the subject of Professor Sapolsky’s testimony before the Emerging Technologies Task Force of the Chief of Naval Operations Executive Panel in Washington, DC on March 18, 1993.
- On March 26, 1993, gave a talk on “Aerospace: America’s Industrial Policy Success Story” at the Conference on Politics and Production: Industrial Policy in Twentieth-Century America, organized by the Center for the History of Business, Technology, and Society, of the Hagley Museum and Library in Wilmington, Delaware.
- Spoke on “The Future of the Defense Aerospace Industry” at a meeting of the MIT Workshop on the Lean Aircraft Initiative sponsored by the MIT Center for Technology, Policy and Industrial Development, held March 29-30, 1993.
- As the guest of the U.S. Military Academy on April 13-14, 1993, delivered the annual address to new politics majors (“War Without Killing”), gave a presentation on “America’s Casualty Constraint” to West Point Officers, and spoke to defense politics students on “America’s Traditional National Security Strategy.”
- Organized the world’s first conference on Policy Implications of Non-Lethal Warfare Technologies, held June 2/3, 1993 in Lexington, Massachusetts.
- On June 5, 1993, was a panelist on “New Naval and Maritime Missions,” part of the annual MIT Technology Day Program — a 3-day event which had as its 1993 theme, Riding the Wave of Innovation: The Ocean and MIT, in honor of the 100 anniversary of the founding of the MIT Ocean Engineering Department.

**OUTSIDE
PROFESSIONAL
ACTIVITIES**

DACS SEMINARS. The DACS seminar series provides a forum for discussing current security topics and the varying disciplinary perspectives on security studies. They also provide an opportunity for scientifically knowledgeable individuals to join with DACS members in examining technical topics of current policy relevance. The sessions are open to the wider MIT and Boston area communities. Each is followed by a reception which allows graduate students and faculty members to meet informally with the speakers.

Fall 1992

September 23 — JACK FARRELL
The Boston Globe (Washington Bureau)
U.S. Military Support for Iraq before the Gulf War

September 30 — LAWRENCE KORB
 Senior Fellow, The Brookings Institution
Planning the Defense Budget for the Next Decade

October 7 — BETH OSBORNE DaPONTE
 Visiting Assistant Professor, Heinz School of Urban and Public Affairs, Carnegie Mellon University
Iraqi Casualties from the Gulf War and its Aftermath

October 14 — ROBERT ALVAREZ
 U.S. Senate Committee on Governmental Affairs
Disarmament and the U.S. Nuclear Cleanup

October 21 — JOSEPH CIRINCIONE
 U.S. House Government Operations Committee
Congressional Oversight of Defense Programs

October 28 — WILLIAM KAUFMANN
 Senior Fellow, The Brookings Institution; Professor of Political Science, Emeritus, MIT
How Much is Too Much?

November 4 — MICHAEL BROWN
 Senior Fellow, International Institute for Strategic Studies
Flying Blind: Weapons Acquisition and the U.S. Strategic Bomber Program

November 18 — MICHAEL TELSON
 U.S. House Budget Committee
How the Congress Makes the Budget

December 2 — JOSHUA EPSTEIN
 Senior Fellow, The Brookings Institution
Imperfect Collective Security: Why a Little Cooperation Might Make a Big Difference

Spring 1993

February 17 — GEORGE PERKOVICH
 Program Officer, W. Alton Jones Foundation
Revamping South Asian Nuclear Policy

February 24 — DAVID ROSENBERG
 Professor of History, Temple University
The Impact of the Berlin Crisis of 1958-1962 on American Nuclear Strategy

March 3 — MARVIN MILLER
 Senior Research Scientist, Department of Nuclear Engineering, MIT
The Disposition of Plutonium from Nuclear Weapons

March 10 — V.S. ARUNACHALAM
 Senior Visiting Professor, Department of Materials Science and Engineering, Carnegie Mellon University
Self-Reliant Security — The Indian Experiment

March 17 — CHARLES DUELFER
 Analyst, Political/Military Affairs, U.S. State Department
Military Arms Exports

March 31 — RICHARD K. BETTS*
 Professor of Political Science, Columbia University
The Balance of Power in East Asia

April 7 — DONALD SCALES
 Director, Aerospace & Defense Practices, Arthur D. Little, Inc.
The American Aerospace Industry in the Year 2000

April 14 — RON O'ROURKE
 Foreign Affairs and National Defense Division, Congressional Research Service
Naval Force Structure Planning: New Environment, Old Habits of Thought

April 21 — LAURIE MYLROIE
 Fellow in Arab Politics, Washington Institute for Near East Policy
Iraq Since the Gulf War

April 28 — JON T. SUMIDA
 Professor of History, University of Maryland
Radical Innovation in Twentieth Century Naval Warfare Technology: Dreadnoughts, Submarines, and Carriers

May 5 — ALEXEI ARBATOV
 Research Fellow, Center for Science and International Affairs, Harvard University
Some Remarks on the Ongoing Russian Roulette

*Co-sponsored by the MIT Japan Program.

THE FUTURE OF WAR SEMINARS

This is a joint seminar series with Harvard University's Olin Institute for Strategic Studies. The organizers believe that the end of the Cold War has reduced greatly the likelihood of a major power war, but do not doubt that there is a future for war nevertheless. The series was created to explore how wars are likely to occur and to be fought in the coming decades. MIT hosted the sessions during the Fall 1992 semester; Harvard was the host site for Spring 1993.

October 8 — HARVEY M. SAPOLSKY

Professor of Public Policy and Organization and Director, MIT Defense and Arms Control Studies Program
War Without Casualties

SPECIAL SEMINARS

ALBERT BOTTOMS — October 14, 1992

U.S. Senior Executive Service (ret.)
U.S. Industrial Base Issues and National Emergency Responsiveness
(co-sponsored by the MIT-Japan Program)

MG SIDNEY SHACHNOW, USA — December 3, 1992

Commander, JFK Special Forces School, Fort Bragg
Nationalism and Ethnic Conflict in Europe

January 12, 1993 — ANDREW MARSHALL

Director, Office of Net Assessment, OSD
The Military/Technological Revolution

Vice Adm. LEIGHTON W. SMITH, Jr., USN — March 2, 1993

Deputy Chief of Naval Operations for Plans, Policy and Operations
Navy Plans

November 12 — BARRY R. POSEN

Professor of Political Science, MIT
Military Formats

December 10 — WILLIAM P. DELANEY

Assistant Director, MIT Lincoln Laboratory
"Technology and the Future of War"

February 18 — ANDREW MARSHALL

Director, Office of Net Assessment, OSD
The Development of Strategic Thought at the RAND Corporation in the 1950s

April 22 — ELIOT COHEN

Professor and Director of Strategic Studies, SAIS, Johns Hopkins University
The Gulf War Air Power Survey

ADAM ROBERTS — April 1, 1993

Montague Burton Professor of International Relations, Oxford University
Humanitarian War: International Intervention and Human Rights

MAXIM TARASENKO — April 8, 1993

Physicist, Moscow Institute of Physics and Technology
The Soviet Space Program After the Breakup of the USSR

MICHAEL RANCE — April 8, 1993

Counsellor/Defence Science and Equipment
British Embassy
Defense Technology Issues

MARK PEATTIE — May 21, 1993

Professor of History Emeritus, University of Massachusetts/Boston
Japanese Naval Strategy and Technology in the Years Before World War II

MG STEVEN L. ARNOLD, USA — May 24, 1993

Commanding General, 10th Mountain Division (Light Infantry)
New Roles and Missions

SEMINAR
SERIES

CONFERENCES AND SYMPOSIA, 1992-1993

FAREWELL TO THE COLD WAR BANQUET

June 19, 1992 — MIT Faculty Club

DACS professors offered reflections on the causes and consequences of the Cold War's end and explained the DACS program's approach to security questions to two dozen Institute faculty representing wide-ranging disciplines, political perspectives, and ages.

WORKSHOP ON EVOLVING TECHNOLOGIES AND NAVAL MISSIONS

October 13, 1992 — Cambridge Marriott Hotel

Intended to explore the impact that the changing U.S. security and budgetary situation will have on the use and design of naval ships. (co-sponsored by the MIT Ocean Engineering Department)

CONFERENCE ON RUSSIAN MILITARY R&D: PROBLEMS AND PROSPECTS

November 19, 1992 — MIT Center for International Studies

Part of a series on security issues in the Russian Federation sponsored by the National Defense University. The 40 participants included representatives from the Central Intelligence Agency and Defense Intelligence Agency, as well as the Office of the Secretary of Defense, the armed services, the State Department, and private industry.

U.S.-ISRAELI CONFERENCE ON ARMS CONTROL IN THE MIDDLE EAST

February 18/19, 1993 — American Academy of Arts and Sciences

The second annual U.S.-Israeli Conference brought together American and Israeli officials, scholars, scientists, and policy analysts to wrestle with the problems of nuclear proliferation, chemical weapons, and arms control in a volatile region of the world. The first half of the conference was devoted to an overview of the proliferation of weapons of mass destruction, in global and regional terms. The issue of nuclear arms control in the Middle East and its relationship to the political process was addressed on the concluding day. Recurring themes that emerged and received repeated comment among the 30 participants included the potential threat posed by Iran, the "lessons of Iraq," and the heightened level of uncertainty in a post-Cold War world as to both the U.S. role in international politics and the nature of security threats.

DEFENSE PRODUCTION ACT ROUNDTABLE

March 4, 1993 — MIT Faculty Club

The first in a series of workshops that FEMA (which shares mobilization responsibilities with DOD) is seeking to establish at universities. The day-long session explored the possible policy and organizational impacts of the 1992 Amendments to the basic mobilization law. National security, under the Amendments, is explicitly linked to the nation's general economic well-being, with the Department of Defense and its delegate, the Air Force, given broad powers to use defense acquisitions to promote U.S. industrial competitiveness.

DACS ANNUAL RESEARCH SYMPOSIUM

April 2, 1993 — MIT Center for International Studies

The third annual symposium included four main topics: The Future of Defense Politics, Russia's Future, American Future Strategy, and Defense Technology's Future. After a report on the Program's future by Director Harvey Sapolsky, CDR Greg Hoffman, the Navy Federal Executive Fellow assigned to DACS, discussed the policy pressures that push toward an interest in non-lethal warfare options. Professor Stephen Meyer addressed Russia's future, noting that the media calls the crisis in Russia "...a contest between the forces for democracy and those for dictatorship" when the conflict is actually a much more prosaic struggle for personal political power. Professors Barry Posen and George Rathjens led a lively examination of alternative national strategies for the United States, championing Selective Engagement and Cooperative Security, respectively. The problems of theater ballistic missile defense was the focus of Professor Theodore Postol's report on the activities of the DACS Defense Technology Working Group. George Lewis, a DACS research fellow, closed the session with an analysis of why the Gulf War SCUD attack casualties were so low. The keys, we discovered, are warning, reinforced concrete, and luck.

**CONFERENCES
AND SYMPOSIA**

CONFERENCE ON THE POLICY IMPLICATIONS OF NON-LETHAL WARFARE TECHNOLOGIES

June 2/3, 1993 — The Sheraton Tara Inn, Lexington, Massachusetts

The world's first conference on this subject examined the pressures leading to more use of non-lethal technologies, the technological opportunities, the historical experience, and the likely operational effectiveness of increased use of these technologies. Special attention was paid to environmental and arms control issues. Colonel John A. Warden III, USAF, Commandant of the Air Command and Staff College, gave the keynote address in which he speculated on high technology wars of the future. The other speakers included academic specialists in security studies as well as military and civilians directly involved in the planning and development of the technologies. Over 70 people attended including representatives from the United Kingdom, the U.S. armed services, industry, and the Departments of Defense and Justice.

The program's courses—what MIT prefers to call subjects—are open to all students eligible to attend classes at MIT, including cross-enrollers from Harvard and Wellesley. Most of the subjects are offered at the graduate level and through the Political Science Department.

Political Science doctoral candidates may use Defense and Arms Control Studies as one of their fields of concentration. Within that context, defense and arms control studies has two principal objectives: first, it introduces the student to the study of American defense policy, including the policy process, arms control, force structure, and military budgets. Second, it introduces the student to the study of the role of force in international politics and how countries have historically pursued their security interests. Students are expected to develop competence in the methods of systems analysis, technology assessment, and strategic reasoning that shape the size and composition of U.S. strategic nuclear and general purpose forces. The international military competition, the prospects for arms control and their implications for U.S. force planning receive special consideration in several subjects. Others examine some of the same issues by contrasting U.S. experiences and approaches with those of rivals and allies.

Students who plan to offer Defense and Arms Control Studies for the general examination take two subjects from those listed below in the Forces and Force Analysis section, and one subject each from the listing in the Defense Politics and in the Comparative Defense Policy sections. Competence in technical analysis is required. A background in economics to intermediate level with particular emphasis on macroeconomics and public finance is advisable. The subjects in the Forces and Force Analysis section will provide sufficient review of the technical approaches to be examined.

The write-off requirement is three subjects with equal distribution among the three sections preferred although approval for alternative distributions may be granted in consultation with field faculty. A number of substantive fields in the Political Science Department deal with important determinants of U.S. defense programs and expenditures. Among the most closely related are: Science, Technology and Public Policy; American Politics; International Relations and Foreign Policy; and Soviet Studies. Students of defense policy are also encouraged to take subjects in economics.

FORCES AND FORCE ANALYSIS

17.476 Analysis of Strategic Nuclear Forces (Postol)

Introduces the assessment of strategic nuclear forces. Emphasizes the development of force requirements and methods of analyzing alternative force postures in terms of missions, effectiveness, and cost. The history of U.S.-Soviet strategic competition provides the backdrop against which the evolution of nuclear strategy and forces is considered.

17.477 Technology and Policy of Weapons Systems (Postol)

Examines in detail the technology of nuclear weapons systems. Topics include nuclear weapons design, effects, targeting, and delivery; ballistic and air breathing missile propulsion and guidance; communications and early warning techniques and systems; and anti-missile, air, and submarine systems. Combines the discussion of technical materials with the national security policy issues raised by the capabilities of these technologies. Considers security issues from the distinct and often conflicting perspectives of technologists, military planners, and political leaders.

17.482/483 U.S. General-Purpose Forces (Posen)

Based on the concept of Grand Strategy as a system of inter-connected political and military means and ends. Topics covered include U.S. grand strategy, the organization of the U.S. military, the defense budget, ground forces, tactical air forces, naval forces, power projection forces, and the control of escalation. Particular episodes of military history that offer insights into current conventional forces issues examined. Graduate students are expected to pursue the subject at greater depth through reading and individual research.

17.486 Nuclear Weapons and Arms Control: Technology and Policy Issues (Rathjens and Ruina)

Reviews weapons systems developments and efforts at arms control. Focuses on the interaction of technological factors with strategic concepts, intelligence assessments, and political judgment. Topics: nuclear weapons technology and effects, nuclear weapons proliferation, strategic defensive and offensive weapons, and analysis of current strategic arms programs. To the extent possible, experts who have played key roles in the topics covered are invited to give guest lectures.

AMERICAN DEFENSE POLITICS

17.460 Defense Politics (Sapolsky)

Examines the politics affecting U.S. defense policies. Includes consideration of intra- and inter-service rivalries, civil-military relations, contractor influences, congressional oversight, peace movements in historical and contemporary perspectives, and U.S. defense politics before, during, and after the Cold War.

**TEACHING
AT DACS**

17.471 American National Security Policy (Meyer)

Introduces the student to the problems and issues confronting American national security and the process by which American national security policy is formulated. The nature of the international system (post-World War II), the theoretical requirements for deterrence and defense, and alternative strategies for implementing American national security policy are discussed. The roles of the President, National Security Council, Department of Defense and armed services, the Congress, and public opinion in formulating national security policy are examined.

TEACHING

AT DACS

COMPARATIVE DEFENSE POLICY

17.462 Innovation in Military Organizations (Posen and Sapolsky)

Explores the origins, rate, and impact of innovations in military organizations, doctrine, and weapons. Emphasis on organization theory approaches. Comparisons with non-military and non-U.S. experience included.

17.484 Comparative Grand Strategy and Military Doctrine (Posen)

A comparative study of the grand strategies and military doctrines of the great powers in Europe (Britain, France, Germany, and Russia) from the late 19th to the mid-20th century. Examines strategic developments in the years preceding and during World Wars I and II. What factors have exerted the greatest influence on national strategies? How may the quality of a grand strategy be judged? What consequences seem to follow from grand strategies of different types? Open to undergraduates with permission of instructor.

ADVANCED AND CROSS-FIELD OFFERINGS

17.465 The Nuclear Age (Rathjens and Ruina)

Based substantially on the 13-part public television series "War and Peace in the Nuclear Age." Includes the history and technology of nuclear weapons, including the discovery of fission; the development of fission and fusion weapons; nuclear testing and efforts to control the technology; problems in the proliferation of weapons; advanced nuclear weapons technologies; changing perceptions about the role of nuclear weapons in world affairs. [Engineering school-wide elective]

17.479/480 Technology, Politics, and Weapons Choice (Postol)

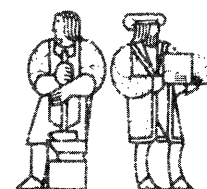
Analyzes decisions to develop or acquire new weapons systems that had, or could have had, a major influence on the arms race. Examines the interplay of political and technical factors in the decision-making process. Representative weapons systems include the hydrogen bomb, the nuclear-powered submarine, tactical nuclear weapons, the Polaris submarine-launched ballistic missile, the B-1 bomber, MIRVs, the Moscow anti-ballistic defense, the U.S. Safeguard/Sentinel missile defense, and others. Graduate students are expected to pursue the subject at greater depth through reading and individual research.

17.492 Research Seminar in Post-Soviet Security Studies (Meyer)

An advanced seminar that examines historical and contemporary issues in Soviet and post-Soviet defense planning. Students select individual research topics and work with original source materials.

DACS - AFFILIATED DEGREE RECIPIENTS • 1992/1993

- Steven Flank**
PhD in Political Science, June 1993
Reconstructing Rockets: The Politics of Developing Military Technology in Brazil, India, and Israel
Thesis Committee: George Rathjens (Chair), Theodore Postol, and Thomas Hughes (University of Pennsylvania)
- Gregg F. Martin**
Interdepartmental PhD, September 1992
Turning 'Green': Organizational Change in the Army Corps of Engineers, 1962-1991
Thesis Committee: Harvey Sapolsky (supervisor), Fred Moavenzadeh (chair/Civil Engineering Dept.), Daniel Kaufman (U.S. Military Academy)
- Brian Nichiporuk**
PhD in Political Science, February 1993
Learning the Lessons of War: The Impact of World War I Upon the Interwar Great Powers
Thesis Committee: Barry Posen (Chair), Harvey Sapolsky, Stephen Van Evera
- Kevin B. Oliveau**
PhD in Political Science, June 1993
The Future of the U.S. Military in Space
Thesis Committee: George Rathjens (Chair), Harvey Sapolsky, and Leon Trilling
- Christopher J. Savos**
PhD in Political Science, June 1993
The Irresistible Force vs. The Immovable Object: Civilian Attempts to Force Innovation on a Reluctant Military
Thesis Committee: Harvey Sapolsky (Chair), Barry Posen, Stephen Van Evera



GRADUATE STUDENTS • 1992/1993

PH.D. CANDIDATES — POST-GENERALS

Nicholas Beldecos	Princeton University (Politics)	Daniel Lindley	Tufts University (International Relations/French)
Dean Cheng	Princeton University (Politics)	Gregg Martin	United States Military Academy (Civil Engineering)
Owen Cote	Harvard University (Social Studies)	Brian Nichiporuk	University of Chicago (Political Science)
Steven Flank	Cornell University (Physics)	Kevin Oliveau	Massachusetts Institute of Technology (Computer Science)
Randall Forsberg	Barnard College (English)	Kevin O'Prey	Grinnell College (International Relations)
Sybil Francis	Oberlin College (Chemistry)	Matthew Partan	Harvard University (Physics)
Eric Heginbotham	Swarthmore College (Political Science)	Laura Reed	Harvard University (Sociology/Anthropology)
Wade Jacoby	University of Bonn (European Studies) Brigham Young University (European Studies)	Jeffrey Sands	Amherst College (American Studies)
Jane Kellett	Oberlin College (English)	Christopher Savos	Dartmouth College (Political Science)
Shannon Kile	Rice University (History)	Taylor Seybolt	Haverford College (Political Science)
Eric Labs	Tufts University (Political Science/Classics)	Michael Shirer	University of Iowa (History) University of Maryland (National Security)
Jonathan Ladinsky	University of Chicago (Political Science)		

PH.D. CANDIDATES — POST-GENERALS

Robert Snyder	United States Military Academy (Social Science)	Judyth Twigg	Carnegie Mellon University (Physics) University of Pittsburgh (Political Science)
Jeffrey Starr	University of Illinois (Mathematics/ Biology, International Relations)	Jeanette Voas	University of Virginia (Russian Studies) University of Michigan (Soviet Studies)
Brian Taylor	University of Iowa (Political Science) London School of Economics (Soviet Politics)	James Walsh	Brown University (Philosophy)
Trevor Thrall	University of Michigan (Political Science)	Sharon Weiner	Northeast Missouri State University (Political Science/Economics) Lancaster University, England (Strategic Studies)
		Robert Zirkle	University of Illinois (Physics, Political Science)

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Dana Isaacoff	Cornell University (Labor Relations) New School for Social Research (Media)	Richard Wilcox	The Citadel Georgetown University (International Studies)
		Hong Xue	Peking University (International Politics) Nanjing University-The Johns Hopkins School (International Relations/US Defense Policy)

VISITORS • 1992/1993**Avner Cohen***Visiting Scholar*

Avner Cohen, co-director (with Dr. Marvin Miller) of the project on Nuclear Arms Control in the Middle East, has written for over a decade on nuclear weapons-related issues, primarily the question of nuclear deterrence and morality. He has taught philosophy at Tel Aviv University, been a visiting faculty at various American universities and a fellow at the Harvard Center for Science and International Affairs. Dr. Cohen earned his PhD in 1981 from the Committee on History of Culture of the University of Chicago.

Lisbeth Gronlund*Visiting Scholar*

Lisbeth Gronlund is a Senior Staff Scientist at the Union of Concerned Scientists, a public interest research group based in Cambridge, MA. After receiving a PhD in theoretical physics from Cornell University in 1988, she made her first foray to DACS, spending two years as a postdoctoral fellow. She then became a senior visiting scholar in the Center for International Security Studies at the University of Maryland, College Park, and is currently on the Executive Committee of the American Physical Society's Forum on Physics and Society. Dr. Gronlund's research has focused on technical aspects of arms control, and she has written on the issues of depressed-trajectory ballistic missiles, space-based and ground-based ballistic missile defenses, and the proliferation of ballistic missiles. She is completing a case study of the role of the scientific and academic policy community in the controversy over Patriot missile performance in the Gulf War.

Commander Gregory Hoffman, USN

Navy Federal Executive Fellow

Commander Gregory W. Hoffman brings with him to MIT extensive naval experience. He is a 1975 graduate of the U.S. Naval Academy and holder of an MBA from Florida Institute of Technology. As a helicopter pilot whose specialty is anti-submarine and anti-surface warfare he has had numerous operational at-sea assignments including deployments to the Mediterranean, Western Pacific, Indian Ocean, and Persian Gulf. In addition, he gained experience in amphibious operations while serving as navigator aboard an amphibious assault ship. Shore assignments include a tour of duty as an operational test director in the Navy's Airborne ASW Test and Evaluation Squadron. He also served in Washington, DC as Executive Assistant to the Navy Chief of Legislative Affairs during the 101st Congress. Cdr. Hoffman's most recent assignment was Commanding Officer of Helicopter Anti-Submarine Squadron Light Four Six, an SH-60B Seahawk Squadron in Mayport, Florida which supports ten Atlantic Fleet ships.

VISITORS

Timur Kadyshev

Post-Doctoral Researcher

Timur Kadyshev received his PhD in mathematics and physics from the Moscow Institute of Physics and Technology (MPTI) in 1991. His work has focused on resource allocation problems, and he has investigated defense policy issues from this point of view. Dr. Kadyshev has analyzed the related questions of how to best deploy reduced nuclear arsenals, what are the lowest levels which provide a stable strategic balance, and what are the safest ways to achieve greatly lower numbers of nuclear weapons. More recently, he has applied this approach in modeling of strategic anti-ballistic missile defenses, and has developed a model that can be used to analyze the required capabilities of defense system components in order to meet different military requirements. His current work involves the role of ballistic missiles and attack aircraft in the Middle East.

George Lewis

Post-Doctoral Fellow

George Lewis spent five years as a research associate in Cornell University's Department of Applied Physics after receiving his PhD in experimental solid state physics from there in 1983. Prior to coming to MIT in 1989 he was a fellow in the Peace Studies Program at Cornell and at the Center for International Security and Arms Control at Stanford. His research has included studies of arms control and verification for sea-launched cruise missiles and other non-strategic nuclear weapons, air surveillance and early warning systems, and the effectiveness of tactical missiles and of defenses against such missiles (with an emphasis on the performance of Patriot in the 1991 Gulf War). Dr. Lewis is now beginning studies on the proliferation of advanced military aircraft, and the technical prospects for boost-phase intercepts of tactical ballistic missiles.

Reuven Pedatzur

Research Fellow

A fighter-pilot in the Israeli Air Force reserves, Dr. Pedatzur has taught Israeli Defense Policy at the I.D.F. Military Academy and at Tel Aviv University, where he was a Research Fellow at the Jaffee Center for Strategic Studies. For the last ten years he was a defense analyst for *Haa'retz* daily newspaper and more recently the Israeli correspondent for *Jane's Defence Weekly*. Dr. Pedatzur, who earned his PhD in political science from Tel Aviv University in 1993, has been writing on ballistic missile defense and has just completed a study on the Arrow -- the Israeli defense system. He is currently examining Patriot's Gulf War performance.

Alexei Romanov*Post-Doctoral Researcher*

Since 1985, Dr. Romanov has specialized in automatizing the reception of remote sensing data, computer processing of these data in quasi-real time, the organization and carrying out of airborne and ship-truth field experiments on remote sensing data validation and verification, the design and construction of hardware and software for receiving NOAA and COSMOS - METEOR APT satellite data, and the joint processing of space, oceanographic, and shipboard optics information. He received his PhD in 1984 from the Moscow Institute of Physics and Technology (MPTI) in technical sciences. Recently, Dr. Romanov has begun to investigate space industry conversion problems from the perspective of the need to monitor ocean and earth surfaces for ecological studies. He is currently studying the capabilities of space-based sensors to detect, identify, and track missile launches.

Vitaly Tsygichko*Visiting Scholar*

Col. (ret.) Tsygichko is a former artillery officer who joined the Soviet General Staff in 1964 and later headed the Theater Force Modeling Department within the institute of the General Staff that provided quantitative analytical support to the Ministry of Defense. He holds the posts of Senior Analyst at the Institute for Systems Studies and Director of the Center for National Security and Strategic Stability Studies at the Russian Academy of Sciences. A Doctor of Technical Sciences, Col. Tsygichko came to MIT under the auspices of DACS's Soviet Security Studies Working Group to work with Professor Stephen Meyer and doctoral candidate Matthew Partan on a study of Soviet approaches for modeling theater-level military operations. The project (based on a Soviet perspective) will also analyze the potential military applications of such models for future planning in the Russian army.

David Wright*Visiting Scholar*

David Wright received his PhD in theoretical condensed matter physics from Cornell University in 1983, and held physics research positions until 1988. He received an SSRC-MacArthur Fellowship in International Peace and Security to retrain in international security issues, and spent two years in the Center for Science and International Affairs at Harvard University. Thereafter he joined the staff of the Federation of American Scientists as a Senior Arms Control Analyst and has been a Senior Staff Scientist at the Union of Concerned Scientists. He is a member of the Social Science Research Council's Committee on International Peace and Security. Dr. Wright's recent research has included depressed-trajectory SLBMs, strategic defenses after the Cold War, and the proliferation of ballistic missiles and nuclear weapons. At DACS he has focussed on the distinction between tactical and strategic missile defenses and an evaluation of the proposed Theater High Altitude Area Defense (THAAD) system.

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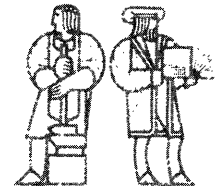
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THE MIT CENTER FOR INTERNATIONAL STUDIES

Established in 1952, the Center for International Studies is the principal research center within MIT dealing with international relations and comparative area studies. Located within the School of Humanities and Social Science, the Center draws faculty and staff from throughout MIT and its activities are intended to serve the Institute as a whole.

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