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AMERICAN ACADEMY
OF ARTS & SCIENCES

## Annual Fund Seeks to Top $1 Million Again

As this issue went to press, the Academy's 2001–02 Annual Fund was nearing its closing date of March 31. Development Committee Cochairs Robert Alberty and Louis Cabot were looking forward, with the help of generous Fellows and friends, to surpassing the $1 million mark with another record-setting total again this year.

If you have already made a gift to the Annual Fund, we are grateful; if not, we urge you to participate by March 31. The Annual Fund helps to support the planning stages of Academy projects and studies; publications, including the *Newsletter*, *Bulletin*, and annual report; and meetings and other activities across the country. Every gift counts toward reaching our ambitious goals. The Academy's fiscal year closes on March 31, 2002. Please be as generous as you can.

For assistance in making a gift to the Academy, please contact the Development Office at *dev@amacad.org* or 617-576-5057.

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## SPRING CALENDAR OF EVENTS

### Wednesday, March 13, 2002, 5:30 p.m.

1856th Stated Meeting—Cambridge

Communication: "John Adams and the Good Life of the Mind"

Speaker: **David McCullough**

"John Adams and the Good Life of the Mind" was the subject of a communication by author and essayist **David McCullough** at the March Stated Meeting held at the House of the Academy in Cambridge.

McCullough is the author of *John Adams,* the best-selling biography of the second president of the United States and founder of the American Academy. His books, which include *The Johnstown Flood, Brave Companions,* and *Truman*, have been praised for their narrative sweep, their scholarship and insight into American life, and their literary distinction.

McCullough is the recipient of the Pulitzer Prize and is twice winner of the Francis Parkman Prize of the American Historical Association and the National Book Award. In a productive career, he has also been an editor, teacher, and lecturer, as well as a familiar presence on television as host of *The American Experience* and narrator of numerous documentaries, including *The Civil War.*

### Thursday, March 21, 2002, 5:30 p.m.

1857th Stated Meeting—Library of Congress, Washington, DC

Communication: "Congress and the Supreme Court"

Speakers: **Senator Charles Schumer** of New York and **Judge J. Harvie Wilkinson III** of the US Fourth Circuit Court of Appeals, Charlottesville, VA

This spring the Library of Congress will host an Academy Stated Meeting in Washington, DC. The program will focus on the changing relationship of Congress and the Supreme Court and its implications for the balance of power in this country.

Among the topics to be considered are the emergence of the Court's new jurisprudence of federalism, which has begun to circumscribe congressional power, and the uncertainties regarding the confirmation process and the criteria for evaluating presidential nominees to the federal bench.

This Stated Meeting is part of a long-term Academy study of Congress and the Supreme Court (see "Academy Update," p. 10).

**Charles Schumer**, Senator from New York, is a member of the Judiciary Committee and has held congressional hearings on the confirmation process.

**J. Harvie Wilkinson III**, Chief Judge of the Fourth Circuit, has ruled in a number of cases involving the legality of congressional enactments and state statutes.

The meeting will begin with the program at the Library of Congress at 5:30 p.m., followed by a reception.

*For reservations, call Julia Nelson at 617-576-5034.*

## Wednesday, April 10, 2002, 5:30 p.m.

1858th Stated Meeting—Cambridge

Communication: "Education Reform: A Report Card"

Speaker: **Marshall H. Smith,** William and Flora Hewlett Foundation and Stanford University

Moderator: **Jerome Kagan,** Harvard University

Commentator: **Jerome Bruner,** New York University

The April Stated Meeting at the House of the Academy will focus on the evaluation of educational reforms at the primary and secondary level.

**Marshall H. Smith**, program director for education at the William and Flora Hewlett Foundation and professor of education at Stanford, has been a leader in the effort to advance this nation's education agenda. In the late 1980s and early 1990s he articulated a framework for standards-based school reforms. Smith has written extensively on national and state educational policy, educational equality,

and the use of technology for learning. He taught at Harvard University, the University of Wisconsin, and Stanford University, where he was dean of the School of Education. Throughout the 1990s he served as both undersecretary and acting deputy secretary of the US Department of Education.

**Jerome Kagan** is the Daniel and Amy Starch Professor of Psychology at Harvard University and an authority on the cognitive, social, and emotional development of children.

**Jerome Bruner**, formerly a professor of psychology at Harvard and Oxford Universities, is currently University Professor at New York University. He has made significant contributions to our understanding of perception, learning, memory, and other aspects of cognition in young children.

The meeting will also honor two distinguished Academy Fellows: **Howard Hiatt,** for his leadership of the Academy's Initiatives for Children program over the past decade, and **Fred Mosteller,** for a lifetime of contributions to the evaluation of education reforms.

The meeting will begin with the program at 5:30 p.m., followed by a reception and dinner.

*For reservations, call 617-576-5032.*

## Wednesday, May 8, 2002, 5:30 p.m.—Annual Meeting

1859th Stated Meeting—Cambridge

Speaker: **E. L. Doctorow**

This year's Annual Meeting will feature a communication by novelist **E. L. Doctorow**, the Lewis and Loretta Glucksman Professor in American Letters at New York University.

Doctorow served as senior editor of the New American Library from 1959 to 1964 and as editor-in-chief of Dial Press from 1964 to 1969. Since 1969 he has devoted his time to writing and teaching.

Doctorow is known for his skillful blending of fiction and fact into the reconstruction of eras in

American history. His first work was the Western novel *Welcome to Hard Times.* He won wide recognition for *The Book of Daniel,* based on the Rosenberg case in the 1950s. His other works include *Ragtime,* set in the decade prior to World War I; *Loon Lake,* portraying American life during the Depression; and *Billy Bathgate,* the story of Dutch Schultz and other Prohibition-era gangsters.

The meeting will begin with the program at 5:30 p.m., followed by a reception and dinner. *Black tie is optional.*

*For reservations, call 617-576-5032.*

## Saturday, May 18, 2002

1860th Stated Meeting—Irvine, California

Communication: "Global Climate Change and the Making of a Report to the President of the United States"

Speaker: **Ralph Cicerone,** Chancellor, UC Irvine

Commentator: **F. Sherwood Rowland,** Donald Bren Research Professor of Chemistry and Earth System Science, UC Irvine

In the spring of 2001, President George W. Bush issued an unusual special request to the National Academy of Sciences (NAS) for an analysis of current scientific thinking on global warming. The NAS selected **Ralph Cicerone** to chair the committee. By June 6, the report was finished, and Cicerone hand-carried it to the White House. At the Spring Stated Meeting of the Western Center, he will discuss the findings of the report in a communication entitled "Global Climate Change and the Making of a Report to the President."

An internationally known atmospheric scientist, Cicerone is the Daniel C. Aldrich, Jr., Professor of Earth System Science and Chemistry at UC Irvine, as well as its fourth chancellor. His research in atmospheric chemistry and climate change has involved him in shaping science policy at the highest level, with both national and international agencies.

In 1997 Cicerone received the prestigious United Nations Environment Program Ozone Award for his research on protecting Earth's fragile ozone layer. In 1999 the Franklin Institute honored Cicerone's contributions to the understanding of greenhouse gases and the depletion of the ozone layer by presenting him with the Bower Award and Prize for Achievement in Science; the prize also recognized his public policy leadership in protecting the global environment.

The commentator for the evening will be **F. Sherwood Rowland**, Donald Bren Research Professor of Chemistry and Earth System Science at UC Irvine. Mr. Rowland was the corecipient of the 1995 Nobel Prize in Chemistry for his research in atmospheric chemistry, particularly the formation and decomposition of ozone.

The meeting will take place at the Beckman Center on the University of Irvine campus.

*For information and reservations, call 949-824-4553.*

## Recent Academy Grants

The Academy conducts a varied program of projects, studies, and activities that carry forth its mission of advancing understanding of critical social and intellectual issues. Over the past several months, the Academy has received a record number of grants to support ongoing studies and to develop new initiatives.

### *Science, Technology, and Global Security*

**Reconsidering the Rules of Space** ($100,000, W. Alton Jones Foundation). This new study, conducted under the auspices of the Committee on International Security Studies (CISS), will examine the commercial and military uses of space, as well as the legal rules and procedures that should govern them. The scale and social importance of commercial space developments have increased markedly over the past decade in comparison with the initial focal points of space activity: military support and scientific exploration. To achieve a viable balance among these competing interests, the interested parties will have to adjust and elaborate on the current legal arrangements.

**John Steinbruner** (University of Maryland) is chairing the study, in consultation with **Richard Garwin** (IBM Thomas J. Watson Research Center), **Neal Lane** (Rice University), **Roald Sagdeev** (University of Maryland), **Carl Kaysen** (MIT), and others.

In the spring, CISS will sponsor a workshop on Chinese perceptions of US space development.

### *Social Policy and Education*

**Universal Basic and Secondary Education** ($800,000, William and Flora Hewlett Foundation; $20,000, Sergei Zlinkoff Fund for Medical Research and Education). Under the leadership of **Joel E. Cohen** (Rockefeller University) and **David Bloom** (Har-

vard School of Public Health), this project continues to develop an ambitious program of research on the prospect of providing every child in the world with a good basic and secondary education.

Last September the project convened an international group of experts to discuss a draft paper by **Ellen Lagemann** (Spencer Foundation) on the intellectual and programmatic history of efforts to advance universal education.

This spring, **Emily Hannum** (University of Pennsylvania) and **Claudia Buchman** (Duke University) will lead a workshop to review the results of research on the consequences of the expansion of primary and secondary education from the perspective of economists, sociologists, political scientists, demographers, and experts in the health sciences.

**Evaluation and the Academy: Are We Doing the Right Thing?** ($25,000, Carnegie Corporation of New York). This grant made possible the printing and distribution of an Academy report by **Henry Rosovsky** (Harvard University) and **Matthew Hartley** (University of Pennsylvania) on an Academy study of grade inflation and letters of recommendation (see *www.amacad.org/publication.htm*).

### *Humanities and Culture*

**Humanities Indicators** ($250,000, Rockefeller Foundation). The database task force of the Humanities and Culture Initiative has been working to establish a framework for systematic collection of information about the humanities. The Rockefeller grant will fund the Initiative's first publication, *Making the Humanities Count,* which examines the current state of data collection in the disciplines and sets forth the need for a better-coordinated approach to the development of comprehensive databases. The grant will enable the initiative to take the first steps toward shaping a research template that incorporates the best existing efforts and to build incrementally but soundly on that basis.

The Academy continues to convene meetings of the principal stakeholders in the humanities with inter-

ests in data collection and policy research to establish a cooperative working agenda.

### *Academy Archival Project and 225th Anniversary Celebration*

The Academy, in collaboration with the Boston Athenaeum, is developing an archival project to protect its critical documents for future generations and to share its historic legacy with a wider public throughout the Boston area and beyond. The Cabot Family Charitable Trust has awarded the Academy and the Athenaeum grants totaling $90,000 that will (1) support the beginning of a program designed to preserve irreplaceable records, manuscripts, photographs, and other memorabilia associated with the Academy's history, (2) advance the publication of the Academy's first complete membership directory, and (3) initiate planning for 225th Anniversary activities that will draw on Academy-related historical materials.

## New Academy Projects

In the past month, the Committee on Studies, chaired by **Robert McCormick Adams**, has approved two new projects that will carry the imprimatur of the Academy.

### *Congress and the Court*

This study will examine the changing relationship between Congress and the Court by focusing on three issues: the basis for congressional confirmation of court justices, the increasing judicial limitations on congressional power, and the question of statutory interpretation. In March there will be an initial conversation in Washington to examine these concerns with members of Congress and the federal judiciary, legal scholars, and political scientists. The study is led by **Jesse Choper** and **Robert C. Post** (both of UC Berkeley), with a committee including **Linda Greenhouse** (*New York Times*), **Judge Abner Mikva** (University of Chicago), and **Nelson W. Polsby** (UC Berkeley).

### *Watershed Protection in the United States and Western Europe in the New Millennium*

Under the leadership of **Charles Haar** (Harvard Law School), the Academy will hold a preliminary discussion of a potential study of the governmental arrangements needed to deal with the degradation of the environment in this country, in the European Union, and ultimately worldwide. Participants will consider what can be learned from successful transboundary watershed or resource management programs in these areas of the world and whether more innovative and effective regulations might be developed.

## New Academy Publications

### *Daedalus*

All Academy members have been mailed a copy of our redesigned quarterly journal, *Daedalus.* The special theme for this first issue is "Inequality." The new *Daedalus* also includes features such as poetry, short stories, commentaries, and a "Notes" section on topics reflecting the expertise of the Academy's broad membership. Forthcoming issues will focus on the following themes: "Intellectual Property" (Spring 2002), "Education After the Culture Wars" (Summer 2002), and "Beauty" (Fall 2002).

### *Occasional Papers*

In January the Academy initiated an Occasional Papers series that reports on the results of Academy studies. Reports will be published simultaneously in print and on the Academy's website at *www.amacad.org/publication.htm.* Printed copies can be obtained upon request from the Academy's Office of Publications.

**Now available:** *Evaluation and the Academy: Are We Doing the Right Thing? Grade Inflation and Letters of Recommendation*, by Henry Rosovsky and Matthew Hartley; *Trends in American and German Higher Education*, edited by Robert McCormick Adams.

**Forthcoming this spring:** *Making the Humanities Count: The Importance of Data*, with essays by Francis Oakley, Robert M. Solow, John D'Arms, Phyllis Franklin, and Calvin C. Jones; *Probing Human Origins*, edited by Morris Goodman and Anne Simon Moffat, with essays by Deborah L. Gumucio, Richard Potts, Derek W. Wildman, Lawrence I. Grossman, Morris Goodman, Roger S. Fouts, Mary Lee A. Jensvold, Peter J. Richerson, and Robert Boyd.

## Visiting Scholars Center

Significant progress has been made in developing the Visiting Scholars Center, scheduled to open at the House of the Academy in fall 2002. Guidelines and application forms were made available on the Web and issued in print. Because this is a new program, an effort was made to announce it broadly through notices in the *Chronicle of Higher Education,* the *New York Times,* and a number of learned journals. Fellows were informed of the program through e-mail broadcasts, the *Newsletter,* and the *Bulletin.* The Academy is grateful to those who encouraged students and colleagues to apply. Over one hundred applications have been received from postdoctoral candidates and junior faculty. Priority will be given to candidates whose work will be enhanced by an association with the Academy's current projects. A group of Academy Fellows and project leaders are currently reviewing the proposals. They will submit their recommendations in March to an oversight committee led by the chair of the Visiting Scholars Center, historian and *Boston Globe* columnist **James Carroll**.

Architectural plans have been developed to provide office space for the scholars at the Academy's House in Cambridge. The Academy is grateful to the forty colleges and universities who have provided advice and support for the development of the Center.

## 2001 INDUCTION CEREMONY

More than 400 members of the American Academy of Arts and Sciences, including nearly 65 percent of this year's class of 185 new Fellows and 26 new Foreign Honorary Members, gathered in Cambridge on October 13, 2001, for the National Induction Ceremony. An overview of the ceremony was published in the Fall 2001 edition of the Academy's *Newsletter*.

### Orientation

At the afternoon orientation session preceding the ceremony, Fellows were greeted by President **Patricia Meyer Spacks** (University of Virginia), Vice President **Louis W. Cabot** (Cabot-Wellington, LLC), and Executive Officer **Leslie C. Berlowitz**.

**Joel E. Cohen** (Rockefeller University), **John Steinbruner** (University of Maryland), **Matthew Meselson** (Harvard University), **Robert C. Post** (Boalt Hall School of Law, UC Berkeley), and **Patricia Meyer Spacks** (University of Virginia) outlined some of the Academy's current project activities. Their remarks follow.

**Joel E. Cohen:** The *Wall Street Journal* of Tuesday, October 2, 2001, carried a front-page story by Peter Fritsch, entitled "Lesson Plan: Religious Schools in Pakistan Fill Void—and Spawn Warriors," with the subtitle "An American Effort to Boost Secular Studies Failed; Now, a Militant Syllabus." Fritsch noted that the United States's substantial financial support of Afghanistan in the 1980s, which had included funding for education, dwindled after the Soviet occupation ended. In the years that followed, Muslim extremists filled the educational void, and many of their young male students became part of the Taliban movement that fought its way to power in Afghanistan.

From 1986 to 1994, according to Fritsch, the US Agency for International Development paid the University of Nebraska $50 million to produce texts for Afghan primary- and secondary-school students. These texts taught basic math skills by

Speakers at the Orientation Session: Robert C. Post (UC Berkeley), John Steinbruner (University of Maryland), President Patricia Meyer Spacks (University of Virginia), Matthew Meselson (Harvard University), and Joel E. Cohen (Rockefeller University).

prompting students to do arithmetic concerning dead Russians and Kalashnikov rifles.

In 1995 the United States branch of Save the Children replaced the Pakistani government as the source of primary education in Afghan refugee camps in Baluchistan. That program, with a million-dollar annual budget partly funded by the US Department of State, now educates 16,000 Afghan refugees with new texts from Germany. According to Fritsch, educators and aid workers maintain that such programs, if broadened, could be a powerful weapon against militant Muslims. The current million-dollar budget works out to only $62.50 per child per year. For comparison, the cost of the first night of bombing Afghanistan has been estimated at upwards of $2 million.

Andrew Wilder, director of Save the Children for Pakistan and Afghanistan, observed that relatively uneducated hard-line groups recognized the importance of education as a means of influencing the future much better than did the West. On CNN at the end of September, Fritsch reported, Pakistan's military dictator, General Pervez Musharraf, said that his country's 7,000 or 8,000 madrasahs comprise the biggest welfare organization anywhere in the world. They provide free education and living arrangements for up to 700,000 children, most of them poor.

What does all this have to do with the American Academy of Arts and Sciences? Since 1997 the

Academy has been quietly developing a task force to examine the rationale, means, and consequences of providing an education of high quality to all the world's children for 11 years, perhaps from the age of 6 to 16. For lack of a better title, we call this the UBASE project, using UBASE as an abbreviation for Universal Basic and Secondary Education.

With the encouragement, guidance, and support of the Academy's Executive Officer, Leslie Berlowitz, the project received start-up funding from the Academy, an anonymous donor, William T. Golden, John Reed, and Paul Zuckerman. In August 2001 the Hewlett Foundation in California awarded a grant sufficient to sustain the project for three years. The project is headed by David E. Bloom, professor of economics and demography at Harvard, and by me, with the support of Martin Malin and other colleagues on the Academy staff and the continuing help and guidance of Leslie Berlowitz. I'd like to summarize what we are doing and what we hope to do, and to invite your questions here and your help later.

We are looking forward a generation—perhaps 20 or 30 years from now—to a world in which all children receive 11 years of high-quality education. We are trying to figure out what that means precisely: what it would take to realize that world; what the tradeoffs and complementarities might be with other values; what the technological, financial, political, and cultural prerequisites might be; what the consequences might be; and how we would know if we had achieved our goal. We hope that an ambitious program of action-oriented research, pursued under the sponsorship of the Academy, will lead to the development of a global plan of action for UBASE and its subsequent implementation. The developers of a global plan will have to be scholars, program officers, educators, public servants, and business leaders from around the world.

The first phase of the Academy's initiative aims to generate the factual basis on which a realistic plan could rest. We aim to produce reports that could be widely published, followed by work directed

toward action, if these studies indicate that action is warranted. Our research plan concentrates on seven areas:

*Basic facts and data.* What is known about the state of education around the world? What new data and data systems are needed?

*Intellectual and programmatic history.* How did ideas of universal education originate? What lessons does the past offer us today?

*Consequences of achieving UBASE.* What would be the demographic, social, political, cultural, economic, and environmental effects of educating every child well?

*Goals and assessment of UBASE.* Where do we want to go, and how will we know if we are there?

*Means.* Delivery, implementation, and technology: how are we going to get there?

*Politics of educational reform and obstacles to UBASE implementation.* Why isn't high-quality universal basic and secondary education available now?

*Cost and finance of UBASE.* What will it cost, under various alternative models of education? Who will pay?

Study teams have been or will be formed to work in each area of focus. Workshops are being conducted to support the lead authors in each of the seven areas. In addition to our own planned efforts to publicize the results of our research, we hope and anticipate that others will use our results in their own efforts to advocate grass-roots support and high-level political will for universal basic and secondary education. We look forward to collaborating with others who can make a difference.

We face an enormous challenge. In 1999 the World Bank estimated that among people aged 15 to 24 years in the low-income countries, 23 percent of men and 41 percent of women were illiterate. If we are to do better in the next generation, we must reach today's children today. As of 1995 about 1.25 billion children in the world—more than one-fifth

of Earth's population—were 6 to 16 years old. Six in seven children of this "school-age population," roughly a billion, lived in the less-developed regions, where the annual per capita income is about $1,300 a year. The less-developed regions include all of Africa, Latin America, the Caribbean, Melanesia, Micronesia, Polynesia, and Asia, excluding Japan.

According to the 1998 medium projection of the United Nations Population Division, in the next 30 years the school-age population will drop by more than 20 percent in the more-developed countries but will increase by 71 percent in the 48 least-developed countries. The school-age population is a 10-year leading indicator of the population of military age.

The task facing the Academy's project is urgent. We welcome your thoughts on our efforts and your suggestions of how you might contribute.

**John Steinbruner:** In Washington and throughout much of the rest of the country, there is a sense that everything has changed since the events of September 11; but, of course, global circumstances have not been completely transformed by that experience. Very dramatic changes affecting all human societies have occurred over the past few decades, however. The challenge for the Academy's Committee on International Security Studies, and for the rest of the country as well, is to recognize the implications of these ongoing changes and to grasp their full significance. What is most important about September 11 is the global context in which it occurred.

The word *globalization* is now commonly used to refer to sweeping changes that encompass the entire world. Although that single word has no generally agreed meaning, it does encourage one to think about human activity as a whole. The process of globalization is driven by two major forces. The first is the remarkable progress in the development of information technology. From 1950 to 1995 the efficiency gains in handling information in many important applications increased on the order of

100 million times. In the same period we witnessed a dramatic surge in human population, as Joel Cohen just noted. Since 1950 we have added a billion people to the world population every 12 to 14 years, and that dynamic is expected to proceed until about 2025. Ninety-seven percent of that increase is occurring in the world's poorest communities.

Those simultaneously occurring processes present a whole series of unfolding problems. The pattern of economic growth associated with globalization is very uneven. Most of the income growth is occurring at the top of the spectrum, whereas the population increases are occurring at the bottom. Obviously, that presents inherent problems of social equity. And the recent terrorist events, unfortunately, remind us of the importance of those problems.

If we are to address these problems and keep our societies together, a basic requirement is that we ensure that human progress is broadly distributed to a sufficient degree. This simple requirement is very daunting. To accomplish it, we're looking at the need to increase economic growth worldwide by a factor of five in the course of 50 years to have any hope of providing improved standards of living for all segments of the increasing population. Energy production will have to triple, even if large efficiency improvements are achieved. Food production will have to double. And all of this must be done in an environmentally sustainable fashion—because we are being warned that the scale of human activity is reaching the point at which it is capable, in principle, of tipping global environmental balances.

As we work through this agenda, we should understand, I think, that we will have to go through a transformation in the pattern of international relationships—in their politics and organization—if we are to accomplish what we need to accomplish. If we don't do that, we will be in very great peril—not just from terrorist attacks but also from much larger-scale dangers.

If we are lucky and wise at the same time, the events of September 11 may remind us of this looming global agenda and galvanize new thinking about it. New thinking is certainly needed. Each of us would probably derive the implications of underlying changes in somewhat different ways. I'm going to give you my own view of some of the major security implications emerging from the terrorist attacks.

First, we must continue to recognize that the prevailing pattern of the deployment of nuclear weapons is inherently dangerous. Indeed, it is the gravest physical threat that this society or any other confronts. The damage that the organized nuclear weapons arsenals can do is of an entirely different magnitude than even the most destructive terrorist event imaginable. And this problem is not yet solved. The interaction is not the same as it was during the cold war, but the weapons are still there, and we do not yet have policies in place that will remove that danger. It is curious that there has been virtually no discussion of this issue in the broad public for nearly a decade. Everybody assumed that it went away because we declared the cold war over. There is a major agenda generated by this issue that has yet to be accomplished.

Second, a consequence of the globalization process is the dissemination of technologies that are capable of sustaining mass destruction. The managerial mechanisms that we are using to control these technologies are not sufficient to provide the standards of safety that we can achieve—and that we most definitely must aspire to achieve. Without going into great detail, I will simply state that the management of official materials that are able to sustain a nuclear explosion is scandalously loose. Managerial mechanisms need to be tightened globally. We do not have common accounting standards. At the moment, although national governments may know what their own holdings are collectively, the number of nuclear weapons out there is uncertain to within 5,000—a very large number. We also do not have common standards of physical security for this material.

Similarly, our methods of handling those pathogens capable of causing highly contagious disease are extremely inadequate at the moment. We are in the very early stages of learning how to exercise oversight of the basic research process that is generating the possibility of creating pathogens of this sort. It is a new situation. The power of modern biology to do good and evil is extraordinary. Technological advancements introduce the possibility of undertaking massive destruction with small-scale operations capable of evading detection, interdiction, or retribution. Since basic access to the technology in question is inexorably spreading and cannot realistically be prevented, it seems evident that sophisticated methods for regulating actual use will have to be developed. Technology for protective monitoring is available, but its effective application would require a substantial revision of existing attitudes and security relationships.

Third, it is prudent to recognize that the root causes of terrorism are probably connected to the problems of social equity that I referred to earlier—particularly to the endemic problems of civil conflict that exist in large parts of the world. The record of belated and not wholly effective international reactions to these episodes documents an obvious defect in prevailing policy. When we begin to put all these things together and identify underlying causes, I think we will come to understand that in this process of globalization, there is a severe threat to international legal order. What we mean by legal order must be articulated and defended on a global scale, and much more clearly than at present. The threat is one of legal degeneration and the physical consequences that follow. We haven't learned how to articulate this problem or how to organize ourselves to pursue it.

Finally, we are being warned by an international coalition of scientists that unless we hold human-induced carbon emissions to 500 parts per million annually by 2050, we are looking at the possibility of catastrophic global risks—risks of a magnitude that would threaten many human societies, perhaps the entire species. Even though the risks and conse-

quences cannot be specified with scientific precision at the moment, we know of their looming presence. And so we face the burden of taking prudential actions to prevent those risks before we can specify them exactly. At the moment, no institutional mechanism has recognized responsibility for that problem. There is no comprehensively organized effort to respond to it. Technologies exist that would be helpful, but they are not being developed at the pace that would be required to confront the problem in time.

Putting all these things together, one might say that we are in the midst of profoundly altered circumstances whose implications go far beyond the threat of terrorist destruction that we're now riveted on. What is required, almost certainly, is a new form of global organization—one that will have to be inclusive in character and collaborative in nature.

We will not successfully run this world through standard mechanisms of military confrontation. We will not be able to bomb it into submission. We will have to organize it prudentially and protectively. There is a very large agenda associated with those basic requirements, but the first step is to acknowledge them.

**Matthew Meselson:** Because people are thinking about bioterrorism now, it is appropriate to recognize that there are three different levels at which the problem should be addressed. The first is prevention—prevention of any hostile use of disease, whether bioterrorism or biological warfare. Should prevention fail, the next level is protection, shielding people from exposure. Failing prevention and protection, one should seek the capability to treat those who are exposed.

Treatment can be effective in some cases but by no means in all. We haven't eliminated the common cold, cancer, or AIDS, despite all the work that has been devoted to finding cures for those afflictions. And, depending on the situation, even knowing who to treat can become a serious problem.

Protection against airborne pathogens can be achieved by air filtration. Relatively simple modification of existing air circulation systems in many buildings, if done properly, is capable of filtering out not only pathogens but also other fine particles in the air we breathe that cause respiratory illness. But we can't filter the air everywhere. Air filtration can provide only partial protection.

Prevention, the most generic of the three categories of measures against deliberate attack with infectious agents, may be attempted by denying pathogens and certain dual-use equipment to those likely to use them for hostile purposes. Reducing the accessibility of particularly dangerous pathogenic microorganisms can be a useful measure, especially against their acquisition by individuals or unofficial groups. But clinical isolates from diseased humans or animals represent a source of dangerous pathogens that cannot be shut off. And any modern state can acquire the capability to produce biological weapons if it is determined to do so.

The most general level at which to attempt prevention is that of intent. For weapons that are relatively inexpensive to develop and produce, intent is a particularly important limiting factor. If nobody intended to use or even develop biological weapons, the problem would not exist. One of the factors influencing intent is the widespread norm against using disease and poison for hostile purposes. One can find it in the *Iliad,* in Islamic and Vedic law, and in modern law. There is a natural distinction between those weapons which resemble the human arm (whether a blow or a bomb, a hurled stone or a missile) and the ancient scourge of poison and disease. The only treaties in force that prohibit entire classes of weapons are those that prohibit hostile uses of poison and disease: the Geneva Protocol of 1925, the Biological Weapons Convention of 1972, and the Chemical Weapons Convention of 1993. The Biological Weapons Convention was made possible because of an immensely important thing done by President Richard Nixon in 1969—the categorical US renunciation of biological weapons. Without his initia-

tive, the United States might still have an offensive biological weapons program. That would have acted to legitimize such weapons and would have blocked US attempts to prevent their proliferation. In renouncing biological weapons, President Nixon used language that emphasized the threat of such weapons to human beings everywhere and to future generations, saying: "Mankind already holds in its hands too many of the seeds of its own destruction."

Here at the American Academy and at Harvard and in the United Kingdom, at the University of Sussex and Cambridge University, a group of us have asked if we can find an additional tool to deal with the problem of averting the hostile use of disease and poison. There are, of course, many tools, and one shouldn't expect any one of them to do the entire job. But the tool that we have been wondering about is international criminal law—the kind of law that endows national courts with "universal jurisdiction"—jurisdiction over individuals present in their territory who have committed certain designated crimes, regardless of the nationality of the offender or the place where the crime was committed. For example, there is a treaty creating universal jurisdiction over individuals who commit the crime of airline hijacking. Regardless of where a plane is hijacked, or the nationality of the hijacker, that person can be tried if found in any country that is a party to the treaty. Similar treaties exist for several other crimes, including airline sabotage, crimes against internationally protected persons, hostage taking, theft of nuclear materials, and torture. You all know the case of the former president of Chile, Augusto Pinochet. He is not a subject of the United Kingdom. No one accused him of crimes committed anywhere under UK jurisdiction. Yet, under the 1984 Torture Convention, the highest court in the United Kingdom affirmed its jurisdiction to extradite Pinochet to Spain for trial there. It is not relevant that, for compassionate health reasons, he was released and allowed to return to Chile.

With the advice of an international group of legal authorities, we have drafted a treaty [copies of which were distributed to the audience] that would define as a criminal offender anyone who knowingly directs, or knowingly renders substantial aid to, the stockpiling, production, use, or threat of use of biological or chemical weapons. Of course, there could be individuals undeterred by such law; law does not eliminate crime. But it does mean that any individual contemplating the prohibited activity, whether a private person or a state official, would have to take account of the possibility of trial and possible imprisonment if found in any country that supports the envisaged treaty. Even if such an individual remains in a state that supports his illegal activity or is otherwise unlikely to take action, there is the possibility of indictment in absentia as an international criminal. People who violate international criminal laws are called *hostes humani generis*—enemies of all humankind.

At the most general level, the problem is to prevent hostile exploitation of biotechnology. The record of other technologies is troubling. Essentially every technology humans have developed—stonework, metallurgy, internal combustion, electronics, etc.—has been used not only for peaceful purposes but also, energetically, for hostile ones. We are now at the threshold of an immense new technology that will eventually show us how to manipulate all the life processes, including cognition, development, reproduction, and heredity. So it is important for us as a species—not just as any particular nation—to take measures to ensure that this history is not repeated with biotechnology.

**Robert C. Post:** The Academy is beginning to develop a project that will focus on the governance structure of the United States. Historical and legal background is necessary to understand the timing and justification for the project.

The federal government, as you know, was originally created to possess only limited power. In the eighteenth century the states ceded some of their authority to the new national government, but they retained plenary police power. The states

could continue to govern in those areas that were not transferred to the exclusive control of the federal government by the Constitution of the United States. The federal government, by contrast, was conceived as possessing only that power given to it by the Constitution.

During the first 150 years of our national existence, therefore, the United States Supreme Court would from time to time hold that a particular federal statute was unconstitutional because it was beyond the power given to the federal government. So, for example, in the early twentieth century the Court held that Congress could neither tax child labor nor forbid the circulation of goods produced by child labor in interstate commerce, because the federal government never received the power to regulate child labor. That power remained in the states.

The Supreme Court initially resisted the radical expansion of federal authority proposed by Franklin Roosevelt to combat the Great Depression. Roosevelt struck back by attempting to pack the Court with young and sympathetic justices. To speak roughly, the crisis was resolved when the Court concluded that the extent of congressional power would no longer be a question for constitutional adjudication. The limits of national authority would be set by political processes. Congress would no longer be denied the power to enact legislation believed necessary to address national exigencies. The Court would instead police the field of constitutional rights, which means it would review *how* the federal government chose to exercise its power. From the time of the New Deal to the 1990s, the Court would not question the *existence* of federal power.

Over the past decade, the Rehnquist Court has begun to unravel this settlement. Most of us in this room have grown up with the notion that Congress has essentially plenary police power, that Congress has the authority to do what is necessary to govern the nation. We believe that Congress can exercise its power in an unconstitutional way because it can violate rights, but we do not question that Congress

has power to enact legislation. But since the mid-1990s the Rehnquist Court has begun, for the first time since the New Deal era, to strike down congressional legislation on the grounds that Congress is without requisite power. The doctrinal questions are complicated and subtle, but in essence the Court has instructed Congress that it is without power to regulate what is "truly local," such as violence against women or the possession of guns near schools, and that Congress is also without power to impose upon states laws that forbid discrimination based on age or disability. These are matters that states can regulate, because they have plenary police power, but not the federal government.

This has not been a matter of merely partisan politics; the resurgence of federalism and separation of powers has not neatly reflected divisions between conservatives and liberals. For example, Congress was virtually unanimous when it passed the Religious Freedom Restoration Act, which limited the ability of state and local governments to pass laws that adversely impacted religious practices. Senators Orrin Hatch and Ted Kennedy joined hands to sponsor the statute, which was supported by both the right and the left. When the Court struck down the law as beyond congressional power, therefore, it was not playing partisan politics. It was instead advancing a fundamental principle about the structure of our national government, about the separation of powers between its judicial and legislative branches. It was undoing the New Deal settlement.

This has been quite unnerving, to put it mildly, for those of us who deal in the world of constitutional law. It has posed a profound challenge to the Congress of the United States because the limits of congressional power are now uncertain. It is unclear how Congress must act in order to protect itself from judicial scrutiny. It is unclear what sorts of congressional findings will justify the exercise of congressional power. It is unclear what sorts of limits the Court will impose in the near future.

This uncertainty has ramifications for the confirmation process. The Court exercises control over

Congress by passing on the constitutionality of congressional legislation. But the Senate exercises control over the judiciary by deciding who shall be confirmed as federal judges. The Senate must approve the President's nominations to the national bench. The Court's new aggressive imposition of limitations on federal power challenges the Senate to decide whether it should defend its prerogatives by policing the confirmation process. Ought the Senate to take a presidential nominee's views of federalism into account before deciding whether to confirm? Senators are expressing a renewed and urgent uncertainty about how the nomination process should be run. And while some of this surely is imbued with partisan overtones, much is not. It is a question of how the relationship between federal courts and the federal legislature ought to be structured.

These new developments also have ramifications for the more everyday, ordinary dealings between the courts and Congress. This relationship is most typically evident in the realm of statutory interpretation. When Congress passes a law, it is up to courts to decide what the statute means. The question of how courts should determine legislative meaning is now hotly debated. It is in the interests of both courts and Congress that the signals of communication between the two branches be clear and unambiguous. Yet it is possible that the new tension between Congress and the courts may be affecting processes of statutory interpretation.

Several Fellows of the Academy—Jesse Choper, Linda Greenhouse, Abner Mikva, Nelson W. Polsby, and myself—have come to the conclusion that the time is now propitious to use the good offices of the Academy constructively to intervene in these issues. The Academy is able to serve as a neutral broker between Congress and the courts, and for this reason it might facilitate much-needed discussion. This March we are scheduling a Stated Meeting in Washington, DC, that will feature a dialogue between Judge Harvie Wilkinson III, who is the Chief Judge of the Fourth Circuit Court of Appeals, and Senator Charles Schumer of New

York, over the question of how courts and Congress should relate once the New Deal settlement has become unraveled. When the Court intervenes constitutionally to limit federal power, how should we understand the values of federalism and of separation of powers? How ought we to envision the relationship between Congress and the courts?

Our goal is, on the occasion of the Stated Meeting, to sponsor a very candid, very private, off-the-record dialogue between members of the judiciary and members of Congress. We shall create a setting where they can sit down and talk to each other in confidence about the parameters and implications of these constitutional developments. Our hope is that out of this private dialogue might come an agenda for scholarly research. If judges and members of Congress can identify issues of common concern that might be illuminated by serious and impartial scholarship, we could use the good offices of the Academy to intervene in these important controversies in a constructive way.

**Patricia Meyer Spacks:** The Academy's new humanities initiative is oriented particularly toward communicating more fully to the general public the meaning, value, and current situation of the humanities in the United States. I want to focus on one aspect of that initiative, the histories of the humanities, in order to talk about how the idea of such histories came into being, as well as why it's important to write them—and why it's so difficult.

Everybody knows that the incorporation of new knowledge continually alters the shape of the sciences. Even the social sciences, in the public mind, depend on information that changes. But subjects like history and literature and philosophy feel different. After all, history, by definition, is about the past, and the past doesn't change. The books that we read in literature courses in college are, in our experience, the great books; when our children and grandchildren read different ones, something must be wrong. We're all amateur philosophers, trying to puzzle out meanings in our existence; why should the philosophy now taught in universities be so changed from the philosophy studied fifty years

ago? In a sense, we all, professionals and nonprofessionals alike, consider the humanities our personal possessions. But in fact the humanities as studied now in institutions of higher education in many respects fail to resemble the humanities as learned by previous generations.

The humanities constitute our cultural memory. When that memory appears to be disrupted, it is natural to feel alarmed. In the realm of the humanities, as seen from outside the academy—indeed, perhaps even within the academy—the idea of the *new* has less value than it possesses for the sciences. The new, in fact, often feels dangerous.

The Academy, on several occasions over the past few years, has brought together groups of scholars to consider the current situation of the humanities and what aspects of that situation could profitably be addressed by intellectual investigation. The consensus that gradually emerged from these meetings resembled the view that I just sketched: a widespread perception holds that the humanities now, as professed in institutions of higher education, hardly resemble their counterparts of fifty years ago. To some extent, we agreed, this perception is false. Despite alarmist proclamations, Shakespeare is still taught everywhere, and students flock to study him. But the perception also contains significant truth: a great deal has changed. It would be worthwhile to study the processes of change, trying to understand how we have come to be where we are.

From the beginning, we understood that such study would not be a simple matter. We agreed that we should try to produce "histories" rather than "a history" of the humanities in the twentieth century, because we knew that every discipline in the humanities has its own story. Although we expected to find points of convergence, we assumed that conspicuous differences would also manifest themselves—that each story, each history, would be different from all the rest. We also agreed that the books containing our histories should be composed by diverse groups of scholars, not by single individuals, partly because no individual could grasp the multiplicity of narratives required by the variety of

disciplines, and partly because we considered it important to represent different points of view. We would try to avoid implying value judgments of the changes we recorded; the point would be to tell a series of stories, not to assess whether we reported progress or regress.

But the multiplicity of possible approaches proved more vexatious than we anticipated. Last winter the Academy hosted a gathering of people potentially interested in contributing to the first volume of histories. Before the end of that two-day meeting, it became clear that the multiplicity of narratives we faced—the reason we were dealing with histories rather than a history—involved not only differences among disciplines but differences in understandings of what constituted the history of any individual discipline. To mention just one area of disagreement: Was the story of change one of gradual evolution or of sharp divergence in response to specific stimuli?

As a result of that meeting, the plan for a single volume of histories changed to a proposal that we begin with *two* volumes of histories. One, which I am editing, will attempt to take a long view of twentieth-century developments in American history, American literature, philosophy, law (specified as one of the humanities in the founding document of the National Endowment for the Humanities), and composition, a field only recently acknowledged as a humanistic discipline. The other, edited by historian David Hollinger, will focus more sharply on twentieth-century changes brought about by the increasing diversity of population and of attitude in American colleges and universities.

Together, these two books should begin to convey both the complexity and the difficulty of explaining recent changes in the humanities. If they fulfill the aims of those who have collaborated in their conception, they will also enlighten their readers about how the humanistic disciplines, which sometimes seem remote from immediate social problems, themselves reflect and respond to cul-

tural change, preserving vitality, as the sciences do, by a constant process of rejuvenation.

*Upon conclusion of her remarks, Ms. Spacks asked Mr. Post to comment on the database project of the humanities initiative.*

**Robert C. Post:** Pat describes the humanities as the scene of division and disagreement. One consequence of this disagreement is that we do not now possess a useful database offering basic information about the state of the humanities in the United States. We don't know such basic data as how many people are receiving Ph.D.'s and other degrees in the humanities, in what fields, with what career paths, and with what compensation. The National Science Foundation's science and engineering indicators provide such information for the sciences. The indicators are the indispensable foundation for all public policy regarding science education. There is no analogous data set for the humanities, which means that we are flying blind when we attempt to construct public policy for the humanities in this country. We construct such policy in all kinds of settings, ranging from national initiatives to the specific decisions of particular universities about the allocation of resources in humanities education.

Data, of course, reflect cultural judgments and have political consequences. Past attempts to gather data about the humanities have accordingly been undermined by intramural divisions, as well as by the absence of a strong national center willing to offer a sustained commitment of time and resources to this function. The ecumenical character of the Academy, however, offers a great advantage in this regard. The Academy not only contains representatives of all humanities disciplines; it also contains representatives of the social sciences who are able to construct a useful database, as well as representatives of the sciences who can speak to the experience of developing, acquiring, and deploying data. The Academy, therefore, can serve as an honest broker whom all parties can trust. We can represent all humanities disciplines. We have the expertise to create a reliable and effective database

that can be used by those who want to make policy at the national and local levels. We have the opportunity to do something of tremendous importance.

I should stress, however, that this is a very difficult project. It is an expensive project that will require extensive funding. But if any organization can pull it off, the Academy can. An Academy working committee is now focused on developing a national humanities database. It is chaired by Francis Oakley and Jonathan Cole. We've recruited a new member of the Academy, Stephen Raudenbush of the University of Michigan, to help. Other active members of the committee include John D'Arms, Kenneth Prewitt, and Robert Solow. Cole and Solow were both key players in the development of the NSF indicators. We hope we have assembled the kind of expertise that can intervene to create an effective and useful database.

The singular and fractious politics of the humanities, however, remains a significant concern. The Academy is therefore striving to bring the relevant parties together, so as to broker an acceptable vision of the indicators. Data are not neutral; the questions you ask determine the data you receive. It is important that we ask the right questions. For that reason, we are developing informal partnerships with the American Council of Learned Societies, the National Humanities Alliance, the Consortium of Humanities Centers and Institutes, the NSF, and the National Endowment for the Humanities, as well as with other government agencies. We're also trying to meet with learned societies to discover what they would want to know about their particular disciplines.

We have tentatively scheduled for publication in February 2002 a report entitled *Making the Humanities Count: The Importance of Data*, which will present an analysis of the current state of data gathering in the humanities. At present there are several incomplete and partial data sets for the humanities. These data sets are incompatible with each other; they ask incommensurate questions and cover disparate areas. They define disciplines in dif-

ferent ways. But it is necessary to survey our present knowledge of these matters, and our first report will provide a useful map. We are also going to publish a bibliography of resources pertaining to the humanities in the United States that will help policymakers and scholars identify key existing humanities databases, major studies of the humanities, and major institutions interested in these issues. We shall put this information up on our website, and we shall make it widely available to researchers and to the general public. Our hope is that these publications will spur the creation of an ongoing data-collection process that will keep us informed about the development and health of the humanities in the United States.

## Induction Ceremony

At the evening ceremony, each of the newly elected Fellows and Foreign Honorary Members in attendance was congratulated by the officers of the Academy and invited to sign the Members' Book. Academy Treasurer **Peter S. Lynch** (Fidelity Management and Research Corporation) then introduced six new Fellows who addressed the membership on the challenges facing the world and the Academy at the beginning of the twenty-first century: Former US Secretary of State **Madeleine Albright** of Washington, DC (Class V: Public Affairs, Business, and Administration), **Irwin Jacobs** of Qualcomm, Inc. (Class I: Mathematical and Physical Sciences), **Brigid L. M. Hogan** of Vanderbilt University (Class II: Biological Sciences), **Andrew Delbanco** of Columbia University (Class IV: Humanities and Arts), **Quincy Jones** of Quincy Jones Multimedia Group (Class IV: Humanities and Arts), and **Eli Broad** of SunAmerica, Inc. (Class V: Public Affairs, Business, and Administration). Their remarks follow.

**Madeleine Albright:** I used to say that I loved having Thomas Jefferson's job, but life for the United States today is quite different from what it was for Thomas Jefferson. As a result of the events of September 11, we know how life is now tragically different.

I listened actively to the presentations made here earlier today, and they reminded me of one of my favorite subjects: the very different roles and approaches taken by members of the government

Former Secretary of State Madeleine Albright (Washington, DC).

and by those who are in the general academy. When I was in the Carter White House, one specific event proved to me the disjointedness of these two communities. The Soviets had just invaded Afghanistan, and we in the government had brought together opinion makers from the academy, as well as from various organizations. There was a complete and total disconnect between the comments made by Secretary of State Cyrus Vance and National Security Advisor Zbigniew Brzezinski and the suggestions made by those who were in the audience.

I then moved to the academy myself, as a professor at Georgetown University. I read journals and I wrote for journals. And I despaired over the policies of the government and the mistakes that were being made, thinking that someone in academia could certainly have done a better job.

Then I became a member of the government, first as Ambassador to the United Nations and then as Secretary of State. I had the opportunity to make policy, and I tried to replicate the academy as best I could, with seminars and a variety of discussions—and remembered that as a professor, I had to have a conceptual framework for what I was thinking about.

When I was at the United Nations, there were 183 member countries, and I thought they could be classified into four groups. The largest group consisted of nations that believed in an international system of some kind, with treaties and diplomatic discourse. The second group comprised new countries that didn't yet have the institutions necessary to being part of that discourse. The third group included nations that were outside the system and tried to destroy it; we called them rogues (or states of concern, when we got more polite). The fourth group consisted basically of failed states that needed their heads held above water. We have now added another group, the nonstate actors, who are currently disrupting our lives.

Our hope had been to strengthen the nations in the first group by creating new treaties and new links among them; to provide institutional structures for the countries in the second group; to either isolate or reform the nations in the third group; and to do what we could to let the fourth group operate within the system. What happened, however, was that we didn't have enough money to do it. Whereas the defense budget was very large, the foreign affairs budget amounted to less than one penny out of every federal dollar. While we understood that foreign policy was more than security policy, it was very hard to bring that point forward. Today I'm outside of government again, and I'm watching what has happened since September 11. I hope very much that we will remember that US foreign policy has to be more than just plain defense and security policy, and that the security of this country depends on our understanding the nuances of the many aspects of foreign policy.

Although the membership of the Academy is divided into various sections, the truth is that all the issues the Academy deals with are now part of our foreign policy. Whether it's health issues or cultural diplomacy or scientific issues, it's all part of foreign policy. We need to remember that if this country is truly to be secure, we have to make sure that our foreign policy is about more than just fighting terrorism. I hope very much, now that I

am a part of this illustrious group, that it will be possible for us to work more closely together so that the people in this room can actually not be out of sync with the people in the government, and that the ideas that have been brought forward here can in fact become the ideas that inform what is going on. Perhaps, over the next years, we can find and continue that magical balance in our country between our unique birth and geographical isolation and our global responsibilities, between fear and hope, between an open society and security—never forgetting that democracy is our greatest security and that the most realistic foreign policy for the United States is one that recognizes that respect for the humanity of others is in our vital national interest.

**Irwin Jacobs:** I first came to Cambridge as a graduate student at MIT back in 1956. I wasn't really sure which career path I wanted to follow, but Claude Shannon, the father of information theory, was then teaching at MIT, and I was fortunate to take one of his classes.

Shannon was a master of elegant ideas. He began his pioneering work by studying the amount of information that can be transmitted through a noisy communication channel. On the basis of his

Irwin Jacobs (Qualcomm, Inc.).

investigation, he was able to set a theoretical upper limit to the number of bits of digital data that could be sent through a channel with high reliability in the presence of noise. In other words, he was able to show the remarkable fact that there is a lower bound to the amount of energy-to-noise required to communicate each bit of information reliably through a physical channel. He not only found that lower bound; he also provided a proof that signals or codes do exist with redundancy, similar to the redundancy we have in language, which allows one to communicate at any energy-to-noise ratio per bit above his lower bound while achieving an arbitrarily low probability of making an error.

Initially, Shannon's model was regarded as an interesting mathematical theory to teach at universities but lacking in practical value. Then people began to realize that indeed there was at least one practical application: reducing the amount of energy used in deep space communications. In space, energy is very expensive, so saving some energy while achieving reliable communications has a large payoff. People then kept working to develop more practical coding schemes and to implement them on both spacecraft and satellites, as well as on the ground.

At the same time, the wireless and cellular industries began to grow. Cell phones became quite popular, and ways to make use of Shannon's theory in the wireless industry were explored. A technology called code division multiple access (CDMA) was developed. CDMA allows many people to occupy the same radio spectrum by adding code redundancy to their signals; that is, even if you can't quite hear all the details because of noise and interference, you can still put signals back together and retrieve the original information. In the case of a wireless channel, with everyone sharing the same frequency at the same time, the interference is largely generated by the other users. With Shannon's method of reducing the amount of energy that each user requires to reliably transmit information, many more users can employ a given

amount of spectrum. Shannon's idea now has great economic importance. For example, in Europe recently, rights to use limited blocks of cellular radio spectrum for periods of 10 or 15 years have been auctioned for over 100 billion US dollars.

So a technology that once seemed purely academic has turned out to be quite practical; clearly, being able to provide voice communications is important to many people. And it turns out that this technology may have even greater applications in overcoming what is referred to as the "digital divide"—that is, making access to the Internet available efficiently and at low cost to many people in many countries and regions. Wireless voice telephony continues to spread rapidly; next will come wireless high data rate Internet access covering most populations.

Education is another key area in which wireless access will help. Now, for example, once a school has wireless capability, there is the additional ongoing expense of providing and maintaining computers, software, and the local network within the school. That expense, even in the United States, has limited availability for many students. Clearly, as we begin to try to provide a more universal education, this problem becomes an even greater issue.

The cellular telephone is actually a very powerful computer—probably as powerful as your desktop was just a few years ago. Furthermore, the telephone is rapidly obtaining high data rate, always-on wireless access to the Internet and could, with proper software also downloadable from the Internet as available, be used as a computer by many students. Wireless telephones are reliable and relatively inexpensive, and are gaining sufficient coverage to be used both in the classroom and at home. Issues of inconvenient data input and output due to physical size are being overcome by virtual keyboards, limited voice recognition, and various types of displays. It appears possible that the technical means to outfit all students at reasonable cost are rapidly becoming available, and we are left with the ongoing and difficult challenges of developing the software and finding ways to use this

technology to supplement and individualize teaching, at times in virtual classrooms.

Finally, I would like to address one other area, which is now on all of our minds: that of safety. One of the well-used capabilities of the wireless telephone has been to report emergencies by dialing 9-1-1. Typically, when you call from a wireless phone, the person receiving that call doesn't know automatically where you are and therefore can't determine the proper agency and dispatch the right person to help you. A global positioning system (GPS) satellite receiver is now being incorporated into the latest mobile phones to achieve precise position location automatically. Indeed, the wireless telephone can receive GPS more accurately in more locations than possible with a stand-alone GPS receiver, since the phone also obtains time, frequency, and rough location information from the cellular network. And the telephone does this at very little additional cost, because the necessary electronics all fits on the same chip of silicon used for other telephone and computing functions. In light of the terrorist attacks of September 11, I think this type of capability will become increasingly important for all of us.

The other side of this coin is the issue of privacy. Sometimes you want your position or other information to be known, but at other times you do not. There are great challenges in protecting our privacy, and this brings us to one more aspect of Shannon's early work: he was originally studying cryptography and how to keep communications secret when he came up with information theory.

I hope that some of these wireless techniques, as they evolve, will directly impact certain of the Academy's activities. In particular, wireless and digital technology could assist with the UBASE program to provide universal basic and secondary education. The challenge to all of us is to develop the right curriculum and software to maximize the potential of this increasingly powerful and broadly available technology.

Brigid L. M. Hogan (Vanderbilt University).

**Brigid L. M. Hogan:** Not far from here, in the Museum of Fine Arts in Boston, there is a beautiful painting by Paul Gauguin. It was created toward the end of his life, in Tahiti, and is entitled *Where Do We Come From? What Are We? Where Are We Going?* In the 100 years since the painting was made, advances in the biological sciences have revolutionized our ideas about the three questions that Gauguin posed. One challenge for the biologists here is to explain these remarkable discoveries to the general public in a way that is nonthreatening, nonjudgmental, and uplifting to the spirit. Moreover, we have to be prepared to deal with the complex ethical, social, and political issues raised by some of these discoveries so that their benefits can be made available to a wide sector of society.

So, what about the questions "Where do we come from?" and "What are we?" Each of us developed from a fertilized egg that gave rise to more than 250 different cell types, organized into beautifully proportioned structures such as the eyes, hands, heart, and brain. The British biologist Lewis Wolpert calls this achievement "The Triumph of the Embryo." Within a few years we will be able to describe precisely, in terms of genes and molecules, how embryonic cells gradually become specialized for different functions, and how they know where

they are and how they should behave in relation to the embryo as a whole. We will have this information not only for mice, fish, worms, and flies but also for a whole host of other organisms, from hydra to bats. Already, we know that many of the genes controlling embryo development in humans and mice are virtually identical, or closely related, to those used by worms and flies.

Biologists relish these discoveries. They also have no difficulty in understanding why one would want to make mutant flies with legs in place of antennae, or tadpoles without heads. Discoveries made with these kinds of experiments have led to the identification of human genes responsible for serious birth defects and cancer. The challenge is to explain to taxpayers, and to animal rights advocates who threaten to disrupt our work, that money spent on these seemingly perverse experiments will not only reveal the underlying unity of nature—a joy and beauty in itself, increasing our respect for all forms of life—but may also lead to new therapies for serious diseases.

A different sort of challenge has come with experiments related to embryonic stem cells, or ES cells. These cells were first discovered about 20 years ago in mice, when scientists found they could isolate from the early embryo—before it has implanted into the uterus and when it is barely visible to the naked eye—small clusters of cells that are not yet committed to a particular course of specialization.

These unspecialized cells multiply indefinitely in the laboratory. They can also be persuaded to differentiate into mature cell types—for example, into nerves, bone, blood, and muscle. Moreover, if these cells are injected into the corresponding tissue in an adult mouse, they behave quite normally. Initially, there was little impetus to exploit this remarkable finding because mouse cells could not be used to regenerate human tissues. This situation changed dramatically in 1998, when human ES cells were derived from spare embryos from in-vitro fertilization clinics. The therapeutic potential of these human cells is obvious, but major practi-

cal and ethical problems need to be overcome before it can be achieved.

The initial isolation of human ES cells was funded by the commercial sector, which meant that they were not freely available to all researchers. Scientists funded by the National Institutes of Health (NIH) could not make their own ES cells because a law forbids federal funding for research in which a human embryo is harmed or destroyed, even if it is donated by a couple and would otherwise remain in a freezer or be discarded. In fact, this law was in place several years before human ES cells were isolated and was introduced to block a move by the NIH to fund research related to infertility and failed pregnancies. It means that there has been a sustained and deliberate withholding of tax dollars for research that could relieve the suffering of infertile couples—a ban driven by the religious views of those who believe that human life begins at fertilization and that small clusters of embryonic cells should be afforded the same ethical and legal rights as a newborn baby.

At first only a small, but not insignificant, number of people were affected by this ban. However, the therapeutic potential of human ES cells for people with diabetes and degenerative disorders has greatly enlarged the population that could benefit from the fruits of federally funded research in this area. President Bush's decision that there can be funding for studies using a limited number of already derived cell lines is a compromise that will allow some work to go ahead.

Meanwhile, it is very likely that new advances will make the scientific arguments in favor of federal support grow stronger. One of the challenges facing scientists, ethicists, lawyers, and policy makers—including distinguished members of this Academy—is to ensure that the general public understands the science of embryonic stem cell research, how it differs from reproductive cloning, and the arguments for and against the therapeutic uses of ES cells relative to alternative strategies. It is my belief that only with education can complex issues be debated in a rational way, balancing

potential health benefits with respect for different moral views in a diverse society.

What it true today for ES cells will undoubtedly apply to other biomedical and reproductive issues tomorrow. As a group, we must not shy away from the need to explain to the public what we are doing and why. Only then, in response to the question "Where are we going?" can we truly say, "Toward an educated, tolerant, and just society, in which the fruits of scientific research are available to the greatest number of people."

**Andrew Delbanco:** Since September 11, I find myself returning to the opening passage of one of Melville's stories, in which a ship captain is awakened with the news that an unidentified vessel is approaching; whether with friendly or hostile intent is unknown. In the predawn darkness, he tries to make out its outline, but he is unable to distinguish the wings of gulls from the enveloping gray of sea, cloud, and sky. He sees nothing but "shadows present, foreshadowing deeper shadows to come."

As humanists, we are supposed to do better than that. We are supposed to carry in our heads exemplary precedents that help in times of crisis. But in my city, and certainly in my mind, this process of

Andrew Delbanco (Columbia University).

reflection is only just beginning. Whenever one feels a resurgence of the old New York jauntiness, the wind seems to shift, and we catch a hint—even far uptown, where I live—of that acrid smell in which one element is burning human flesh.

We are assimilating new images. There is the image, for instance, of a New York City cop lying half-naked on a table in a funky Greenwich Village tattoo parlor, having his skin imprinted with a memorial to his fallen comrades—the service provided free by a young woman with a lip ring and a nose stud, a belated reconciliation, perhaps, between the police and what's left of the counterculture that once would have called this man a pig. Some say we are witnessing the return of the working-class hero. Others say that postmodern irony has been discredited. Who knows? Who can say which will be the enduring consequences of these terrible events and which will turn out to be mere spasms of piety or propriety? The only thing of which I am convinced is that all our convictions are premature.

So I ask myself what I can reasonably say about my own work as a practitioner of the humanities since the world changed on September 11. One thing I know is that the events have given me a teaching opportunity—or, I should say, a responsibility as a teacher of American literature. I have found it a renewed challenge to present to my students the texts of early America—a culture that had its own elements of messianic religious fervor, even fanaticism. Yet I find my students strikingly receptive to certain texts that they may have found puzzling in the past. The Calvinist theologian Jonathan Edwards, for instance, seems less strange to them this year when he describes human beings, like so many bugs, each suspended by a slender filament over the fires of hell—dangling at the mercy of an inscrutable God who, with a flick of His finger, may toss them into the pit. And I have had no trouble convincing them to read *Moby-Dick*—a book about a suicidal charismatic whose religion is all about hate and who regards anyone who tries to deflect him as a blasphemer.

I am less certain how the larger intellectual context in which we teach and write has changed. I wonder, for instance, if the quotation marks may be falling away from the word *civilization.* It has been a main work of the academic humanities in the last quarter-century to insert implicit quotation marks around that word in order to signify that we no longer regard our civilization as perched atop a pyramid of lesser predecessors or rivals. Humanistic scholarship has been driven by the laudable motive of recognizing multiplicity and relativity in human experience—of looking at the world, one might say, horizontally rather than vertically.

It was striking to me, therefore, that the first response from our political leaders about the meaning of the September 11 attack was to call it an attack on civilization—a word used in the singular, yet with the intent of comprehending a great many cultures and societies, including some we deem hostile to our own. Maybe—just maybe—the word *civilization* will emerge from this crisis restored to dignity as a term sufficiently flexible to comprehend human difference, yet sufficiently delimited to mark the boundary between tolerable distinctions and what we can call, without apology, intolerable barbarism.

I wonder, too, what effect these events will have on our relation to the idea of progress. Among academic humanists, this idea has become suspect. We are uneasy with the eschatological religious traditions from which our own disciplines ultimately derive, but we also feel apart from the methods of modern science, by which truth builds incrementally toward more truth. We would do well to ask ourselves what it might mean to believe in progress in our changed world. Is liberalism, in the broad sense of the word, exportable? Is globalism an inevitability or an illusion? If humankind is moving forward, toward what is it moving?

Perhaps most important, the events of September 11 surely demand that we defend anew the foundational value that the humanities and science ultimately share: the value of thinking. Thinking can be distinguished from dogma by the fact that

thinking entails self-doubt. It implies the continuous recognition that whatever thought we articulated a moment ago has become instantly inadequate and stands in need of extension and revision. As a general proposition, I suspect this is something about which we can all cordially agree.

The difficulty comes when we turn to the moral dimension of thinking and say that thinking is fundamentally inconsistent with brutality, because brutality requires the reduction of other human beings to the condition of dispensable objects or instruments—something that cannot be achieved by a person with even a minimal sense of his own fallibility. The theological word for this achievement is *evil.*

Here, I suspect, our cordiality of agreement begins to break down. There are good reasons why it should—reasons to be even more wary of the word *evil,* with its metaphysical and absolutist force, than of the words *civilization* and *progress.* But serious writers on the problem of evil have always insisted that the obligation to resist it entails a responsibility to acknowledge the capacity for it within ourselves. The critical moments in the history of a civilization are those that require us to resist evil without emulating it. I think many of us believe that such a moment is now at hand. If this is so, then the challenge for the humanities in the contemporary world will be to illuminate the difference between doubting ourselves when we should and trusting ourselves when we must.

**Quincy Jones:** In my more than 50 years in the music business, I have been fortunate enough to witness firsthand the power of the arts to tear down cultural boundaries and bring the people of the world together.

Martin Luther King, Jr., once said that "the ultimate measure of a man is not where he stands in times of comfort and convenience, but where he stands at times of challenge and controversy." Today our nation and the world have come together in mind and spirit in a way that has never been seen before. And although the circumstances that

Quincy Jones (Quincy Jones Multimedia Group).

brought forth this spirit of togetherness were tragic, they offered us the opportunity to truly display our ability to overcome adversity—and to show by example that we can put aside our differences and come together for the betterment of humankind.

This new spirit of unity throughout the world is a state of mind that is very comforting and encouraging to me. It is an ideology that I have always been a proponent of, and what I believe is the most valuable reward that the arts have to offer: the ability to bring people together. I look forward to working with my fellow inductees to assist the Academy in the furthering of this new and long-overdue idea of global unity.

The artists, the scholars, the scientists, and the leaders from the realms of public affairs, educational and cultural administration, and business and civic life who are members of this Academy embody the best American and international ideals. As members of this Academy, we have an opportunity to speak to a wide public, here and abroad, about the value of employing our creative faculties—our intellects, our expressiveness—to overcome the hatred and suspicions that have proved to be so dangerous and deadly. We have an opportunity to build bridges of understanding to other nations and other peoples.

**Eli Broad:** I was asked to speak this afternoon about how corporate leaders can improve American life through their involvement in the civic, educational, and cultural affairs of our nation.

As a business leader, I recognize the deeply rooted obligation that I and other business leaders owe to our country. I was born in New York City, the son of Lithuanian immigrants who came to America with a strong desire to make a good life for themselves and their family. To achieve their goals, they relied on perseverance and seized the opportunity that our nation's free enterprise system offers. They instilled in me the value of hard work and gave me the gift of education.

When I moved to Los Angeles in 1963, I didn't have the right family, social, political, or religious background. Like Madeleine Albright, Quincy Jones, and the others you heard from tonight, what I did possess were ideas and a willingness to work hard and take risks.

As a business leader, I believe there is a unique role I and other corporate leaders can play. Although we may not be skilled statespersons or diplomats like Madeleine Albright or possess the musical virtuosity of Quincy Jones, I believe business leaders can make a significant difference by using their skills in civic and cultural activities and in philanthropy.

Involvement, I believe, should be more than simply writing a check or donating a large sum of money to an institution. It should be much more than simply handing over financial resources to a well-meaning organization in the hope that someone else will use the money to solve our society's most pressing problems. Involvement should be about investing one's self—along with one's resources. It is about committing our time, skills, and energy—and our money—to a cause we believe in and in areas where we passionately want to make a difference.

Business leaders in America have spent considerable time and talent building our great nation. Through ingenuity and perseverance, our country's

Eli Broad (SunAmerica, Inc.).

business leaders have taken bold action and brought their ideas to life in the business world. When success in business life takes hold, business leaders have seen the rewards from it. Their hopes, dreams, sweat, ambition—their early-morning strategy sessions and late-night negotiations—all have been targeted to the goal of succeeding. This is the free enterprise system at work.

I have participated in that system—and I am pleased to say that my ideas were accepted, my proposals were funded, and I was able to create two large and successful businesses. Now I believe it is my turn to commit the energy to solving our nation's challenges through involvement in civic and cultural affairs and philanthropy. I choose to focus my time and energy on improving our nation's K–12 urban public schools, cultural institutions, and revitalizing downtown Los Angeles.

Conventional thinking did not create the great industries that flourish today. They were inspired dreams that came to life through devotion, hard work, ingenuity, and entrepreneurship. We will not solve the systemic and entrenched challenges that society faces through conventional thinking.

A unique opportunity exists for corporate leaders to speak with a voice that promotes untried and unconventional ideas when confronting our

nation's toughest challenges. Business leaders are often free from the vested interests that inhibit government and established institutions. Many business leaders already follow the courage of their convictions and find ways to give back to a society that has given so much to them.

Last Tuesday and Wednesday I attended an education summit hosted by Lou Gerstner of IBM. In attendance were 35 of our nation's governors and 50 of our nation's business leaders. Lou Gerstner and other business leaders are committed to the vital task of reforming urban K–12 education.

We must challenge the status quo, take bold action, and offer new solutions and untried methods so that we can solve our nation's most entrenched problems. Solutions are not always quick to emerge—but with the skills and talents honed in the business world, corporate leaders can help solve some of the most pressing and intractable problems in our society that government and other institutions will not or cannot tackle.

There are no people better prepared to take risks in order to eventually succeed than the business leaders of America. Our free enterprise system rewards new ideas that begin as risky ventures with monetary gain. Our philanthropic system rewards risky ideas that succeed with a stronger and better society, which is the greatest wealth that one can bestow.

Today we are celebrating what is possible in America. Many of us have backgrounds that in other countries would prevent us from being involved in certain business, civic, educational, or cultural activities. But not in America. Because America is a meritocracy, there is great opportunity for cultural, educational, government, and corporate leaders—regardless of where they come from—to contribute to a better society.

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# The Changing Climate for Nuclear Power in the United States

***Richard Meserve,*** Chair, US Nuclear Regulatory Commission

Introduction: ***Ernest Moniz,*** Professor of Physics, MIT

**Ernest Moniz**

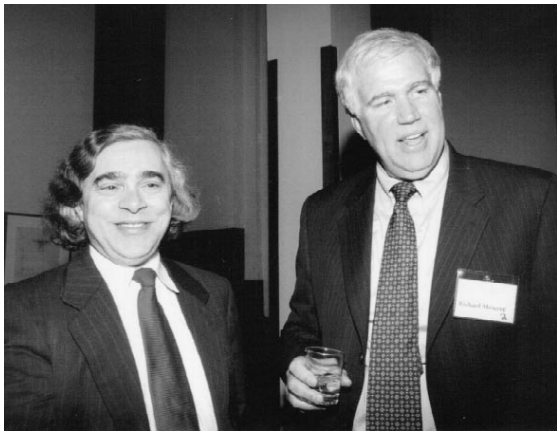
It is a great pleasure to introduce Richard Meserve. Our relationship goes back thirty-five years, from our undergraduate years to our graduate education and then, finally, to a shared term in the Clinton administration.

Our earliest interactions occurred during the first of the summers we spent at AVCO Everett Research Laboratory, working on supersonic flowing gas lasers. Much of the job entailed setting off rather large bangs in our immediate vicinity. Only later did we realize that this was early training for our service in government.

We both went on to Stanford in physics. Much later, I went to the Department of Energy, where I had overall cognizance of nuclear issues—nuclear nonproliferation, nuclear power, nuclear weapons. Many of those issues brought me into contact with Mr. Meserve, as he became chair of the Nuclear Regulatory Commission (NRC), trying to work with the sometimes unruly Department of Energy and, of course, doing other tasks as well.

Earlier, Mr. Meserve was the counsel in the Office of Science and Technology Policy, under Science Advisor Frank Press. He was there during the acci-

*This presentation was given at the 1846th Stated Meeting, held at the House of the Academy in Cambridge on April 11, 2001.*



Ernest J. Moniz (MIT) and Richard Meserve (US Nuclear Regulatory Commission).

dent at Three Mile Island—one of those events that continues to cast a large shadow over the development of this field.

Mr. Meserve has been involved in many important activities relevant to a broader set of nuclear issues than we will hear about tonight. For example, in chairing and joining the various committees of the National Academies and in working with the Department of Energy, he led very important reviews of the weapons complex, with important consequences such as shutting down the very old Savannah River reactor that had produced plutonium.

He led a committee reviewing the issue of controlling nuclear weapons and materials in Russia—a major activity undertaken by our government over the past decade. Despite the considerable success of that effort, much work remains to be done, and Mr. Meserve's report helps keep our government's focus on this crucial security need. Mr. Meserve also headed a secretarial advisory committee at the Department of Energy that sought to define the parameters of openness: How does one go about declassifying materials? What are the right boundaries to draw? How do you eliminate nonsensical classification and put fences around things that need to be protected? When Mr. Meserve was nominated to chair the NRC, the Secretary of

Energy awarded him the gold medal for exceptional service to the department and to the nation over many years.

Tonight we will hear Mr. Meserve's reflections on what is a very interesting time in the nuclear business. On the one hand, despite the lack of commitment to building new power plants for many years, there are stirrings of a possible rejuvenation in that area, with environmental issues such as climate change serving as impetus. On the other hand, different environmental issues, including those related to nuclear waste, are still viewed as major impediments to going forward.

Let me touch briefly on the connection between nuclear power development and nonproliferation—not only in the traditional sense of people worrying about nuclear power issues spilling over into weapons, but also in the sense of nuclear power's role in helping to eliminate some cold war legacies—for example, the disposal of plutonium, which could lead the NRC to be faced with the issue of licensing plutonium fuels. The disposition of plutonium dioxide from nuclear power plants in the United States is an example of the kind of challenge that Mr. Meserve may face as issues regarding energy, environment, and security come together in the next few years. He is uncommonly qualified as a scientist, a lawyer, and a public servant to lead in the resolution of these pressing issues.

### Richard Meserve

The United States is currently in a period of growing interest in nuclear power. The report of the Vice President's interagency task force on energy highlights the importance of nuclear energy as part of the country's electric power portfolio. Also, several bills pending in Congress deal with matters related to nuclear energy. My comments will focus on the current situation with regard to nuclear power in the United States and some of the issues bearing on it.

The Nuclear Regulatory Commission (NRC) does not have a role in the promotion of nuclear energy;

decisions about construction of power plants are made elsewhere in society. The NRC's role is to ensure that if a decision is made to proceed on a nuclear path, nuclear power plants and other related facilities are operated so as to provide adequate protection of public health and safety and adequate protection of the environment. Nonetheless, the agency does have an obligation to ensure that its regulatory requirements do not impose needless impediments. As a result, the NRC has sought to examine its regulatory activities to ensure that they enhance the agency's capability to protect public health and safety.

### *Nuclear Power in the United States and the World*

Other countries rely on nuclear power to provide a large fraction of their electricity. For example, France and Lithuania obtain over 70 percent of their electric generation from nuclear power. By contrast, the United States relies on nuclear power for only about 20 percent of its electricity. In fact, when compared with other developed countries that employ nuclear power, ours is near the bottom in terms of the percentage of electricity generated by nuclear plants. The United States has alternative indigenous fuel supplies, principally an abundance of coal, which is not the case in many other countries. Natural gas is a fuel of increasing importance as well.

Although the contribution from nuclear plants in the United States as a percentage of electrical generation is relatively small compared with that in many other countries, the number of operating power plants is large. Currently, 103 nuclear power plants are licensed to operate in the United States, with a generating capacity in excess of 97,000 megawatts (MW). (This does not include Unit 1 of the Browns Ferry plant, which holds an operating license but was shut down in 1985 and cannot resume operations without the NRC's permission.) Ours is by far the largest commercial nuclear power program in the world; France, with the second-largest program, has 57 reactors, with a capacity of about 60,000 MW. Overall, there are about 440 commercial

power plants around the world, with a total capacity of about 350,000 MW, so more than one-fourth of the world's nuclear electricity is generated by plants in the United States. The contrast between percentage and actual numbers reflects our huge reliance on electric power.

It is striking to note the growth in the amount of electric power that US plants generate. In 2000 the United States produced about 750 billion kilowatt-hours (kWh) of electricity from 103 nuclear plants. In 1990 the total generation was about 550 billion kWh from 111 nuclear plants. In other words, during a period in which there has been a decline in the number of nuclear plants, the total energy produced has increased substantially. The increment in power generation between 1990 and 2000 is the equivalent of about 23 additional standard (1,000-MW) plants. This increase in nuclear power production of nearly 40 percent over the last decade has come about as a result of significant improvements in plant operation.

One measure of this improvement is the capacity factor—the ratio of the actual power produced to the power that would be produced if the plant were operating 100 percent of the time. In 1990 the aggregate capacity factor for all US nuclear plants was about 60 percent, whereas in 2000 it increased to nearly 90 percent. Most plants in our country operate on a refueling cycle of 18 to 24 months and must shut down for several weeks to accomplish that task. As a result, a 90 percent capacity factor is only slightly less than the practical maximum. The vast improvement in performance by US nuclear plants has enabled the nuclear sector to maintain its share of the electrical market over a period in which the demand for electrical power has increased considerably. The nuclear industry has achieved this improved performance through better management, maintenance, training, and attention to detail.

### *Current Trends in the Nuclear Power Industry*

The improved industry performance has been accompanied by a decline in the cost of nuclear-

generated electricity. The average production cost of electricity from nuclear plants—which includes essentially all costs except for amortization of the plant—was about 1.71 cents per kWh in 1999. Although nuclear plants have high capital costs, many older plants have been fully amortized, so production cost is a relatively accurate measure of the power costs. Nuclear power's low production cost means that it is among the cheapest sources of electricity in the United States. Coal is slightly more expensive than nuclear energy, and while natural gas prices have fluctuated greatly over the past year, the fuel costs alone for US gas plants average several cents per kilowatt-hour.

The impressive economic performance of nuclear plants has proved very important as a result of retail price deregulation of electricity. Of course, in the traditional regulated market, the costs for the construction and operation of a power plant are part of a rate base; the utility company is allowed to recapture its costs plus a slight profit. Under deregulation, the competitive market determines the selling price of electricity—irrespective of the costs of generation—and the revenue of the generating company. Because nuclear plants are the low-cost producers, the business world now sees nuclear plants as very good investments.

Nuclear plants have other attractive features from the generators' perspective. Fuel costs are a comparatively small part of the overall cost of nuclear electricity, and they are generally predictable over the long term—quite unlike natural gas, for which the price has recently been highly volatile. Nuclear plants also are not affected by increasingly stringent emissions requirements, which have become important with regard to the use of coal. Moreover, the growing concern about greenhouse gas emissions is causing society to reassess the importance of nuclear power, which does not contribute to those emissions. The renewed interest in nuclear power was not anticipated as recently as a few years ago. Many pundits in the energy sector predicted that electric price deregulation would result in the premature retirement of nuclear plants because

they could not compete economically, and that the US nuclear industry would decline. The actual situation is considerably different. There is now an aggressive market in "used" nuclear plants.

The restructuring of the market has yielded consolidation in the electric generation business, particularly with respect to nuclear power. The NRC currently has just over 30 different licensees for the 103 nuclear plants, a number that changes frequently as a result of plant sales, company mergers, establishment of joint operating companies, and other such industry activities. This is down from over 40 licensees just a few years ago. The expectation is that within five or ten years, there may be only about ten nuclear generating companies.

The NRC watches this process of consolidation with cautious optimism. The agency expects that licensees with a nuclear focus may be able to bring greater management expertise to the table, have greater capacity to identify and resolve problems, and be able to provide better employment opportunities for skilled individuals than licensees with more limited investment in nuclear assets.

Along with the positive aspects of consolidation comes one concern: that pressures on generators to reduce operating costs could affect plant safety. To date, however, the NRC has not seen indications of this sort of trend. The NRC tracks a number of indicators of plant performance and safety, such as automatic shutdowns (referred to as "scrams"), safety system actuations, plant events that are considered to be safety-significant, and collective occupational radiation exposure. Each of these indicators shows a trend toward safer operation over the past decade.

In short, the data show that nuclear electricity has become very competitive with alternative forms of electrical generation and that safety trends are improving in parallel with operating trends. The NRC believes that there is a logical reason for these parallel trends: A safe plant is a reliable plant for the simple reason that safety requires consistent, predictable performance. And for good economic

performance, a plant must be on line, producing electricity. Thus, safety and good economic performance are inextricably linked through the common dependence on reliability.

While the nuclear power industry deserves much credit for improving both safety and economic performance, some of these trends can also be attributed to NRC initiatives. As nuclear plants were designed and built in the 1970s and 1980s, the NRC's focus was largely on design and construction issues. In the last decade or so, however, there has been a fundamental shift in emphasis toward operational issues. The NRC has identified issues requiring resolution by licensees, and the agency's increased attention in this area has also stimulated licensees to address operational concerns.

### *Recent Initiatives: License Renewal*

Several major initiatives under way at the NRC bear on the overall issue of the contribution of nuclear power to the US electrical supply. The first of these is license renewal. The Atomic Energy Act limits the term of a license for a nuclear plant to 40 years. The choice of that duration was not a consequence of any technical judgments made by Congress; rather, it was driven by antitrust and financial concerns. There was optimism that nuclear power plants were going to produce large amounts of very inexpensive power, and Congress sought to limit the long-term dominance that a licensee might obtain. The statute did allow, however, for the NRC to consider license renewals in increments of 20 years.

The current fleet of nuclear plants began operations largely in the period from the mid-1970s to the mid-1980s. If plants were to shut down as they reached the end of their operating licenses, with no new construction and no license renewals, the United States would maintain its nuclear capacity near the present value of 97,000 MW until about 2010. Then, as plants were retired, a rather steep fall-off would occur until the last shutdown in about 2035. As a matter of national energy policy, this trend could be of concern, particularly if alter-

native sources of power are needed to deal with greenhouse gases and other fossil plant emissions.

The improved operational and economic performance of nuclear power plants has encouraged an enormous upsurge of interest in continuing to operate plants beyond the expiration of their initial 40-year licenses. Consistent with its statutory authorization to consider license renewal, the NRC has developed a process for the review of renewal applications. That process includes an extensive analysis that focuses primarily on aging issues, to ensure that the margin of safety of the plant will continue over the extended period of operation. To date, almost half of US nuclear plants have formally indicated their intent to pursue license renewal.

Review of applications for 20-year license renewals began in 1998, and three such applications, covering a total of six nuclear units, have been approved: Calvert Cliffs in Maryland, Oconee in South Carolina, and Arkansas Nuclear One. Seven applications are currently under review, and we know that many more will be submitted over the next four years. However, the NRC's license renewal rule generally does not allow an application for license renewal to be submitted unless the plant's remaining licensed operating period is less than 20 years; thus, plants licensed in the mid-1980s are not yet eligible. Based on statements of various industry leaders, the NRC expects that almost every operating nuclear plant in the United States will ultimately apply for license renewal.

### *Recent Initiatives: Advanced Reactor Designs*

The industry's response to the possibility of license renewal has the potential to extend the period during which nuclear power can make a substantial contribution in the United States to around the middle of this century. However, if nuclear power is to retain a significant role in our nation's energy portfolio, new plants will eventually be needed. Consequently, another NRC initiative involves consideration of advanced reactor designs.

The agency has established a process for licensing new designs, called design certification. The traditional two-step licensing scheme used for all the plants now operating in the United States involved granting a construction permit and then, after the plant was built, issuing an operating license. Each step involved public hearings and potentially extensive litigation, which could put at risk the operation of a plant upon which billions of dollars had been spent. In contrast, the design certification process provides for early review of a standardized design in a publicly accessible process. If the design is approved, it can then be referenced in future license applications without the need to relitigate issues resolved during certification. The license that can be issued under this process is a combined construction permit and operating license. When it is completed, the plant may begin operation after the applicant demonstrates, through a structured regimen of inspections, tests, analyses, and acceptance criteria, that the plant, as constructed, conforms to the certified design.

Three designs have been certified: the General Electric (GE) Advanced Boiling Water Reactor (ABWR), the Combustion Engineering (CE) System 80+ (now owned by Westinghouse through the acquisition of both Westinghouse and CE by British Nuclear Fuels, Ltd.), and the Westinghouse AP600. All three designs are based on existing US water-cooled reactor technology. While the ABWR and System 80+ represent evolutionary improvements in conventional plants, the AP600 takes a "passive" approach to safety, in which the safety systems operate by natural means (gravity or pressure), without reliance on pumps or AC electrical power. However, there has been no move to construct one of these three designs in the United States, although ABWRs are operating in Japan and are under construction in Taiwan.

In recent months, interest in new plant designs has grown substantially. A task group sponsored by the Nuclear Energy Institute (NEI), an industry trade organization, is developing a business plan for new plant deployment. The president of NEI has

announced an initiative called "Vision 2020," which involves deployment of 60,000 MW of new nuclear capacity in the next 20 years. About 83 percent of that total is to come from new plants, while the remainder comes from increasing the power output of existing plants. Concurrently, the NRC is in the early stages of review of four new reactor designs. One is Westinghouse's AP1000, similar in concept to the certified AP600 design but with an increased power output. The other three are small reactors, generically referred to as "modular," and represent a departure from conventional reactor technology.

Two of the modular reactors are cooled by helium rather than by water, and they depend on graphite to moderate (i.e., to slow down) neutrons in the reactor to keep the atomic chain reaction going. Both designs also use a gas turbine to produce electricity, rather than one that runs off of steam. One of the designs uses graphite-encapsulated fuel, in the form of spheres about the size of tennis balls. These spheres are called "pebbles," and the reactor is called a pebble-bed modular reactor (PBMR). The electrical output of this design is around 130 MW, or about one-tenth the amount of the most modern large water-cooled reactors. The basic design of the PBMR was developed in Germany more than 30 years ago, and an updated version of the design is being considered for deployment in the Republic of South Africa (RSA). Exelon, a US nuclear operating company, is a partner in the RSA project and has announced that if the RSA initiative is successful, it will apply to license the PBMR in the United States.

A second gas-cooled design, the gas turbine modular helium reactor (GT-MHR), is being developed by General Atomics, a US reactor vendor. This plant is somewhat similar to the PBMR, but its prismatic core is composed of stacks of hexagonal graphite blocks, which incorporate the graphite-coated fuel material. The electrical output of the GT-MHR design is about twice that of the PBMR.

The third advanced design being examined by the NRC is a water-cooled concept, but one that has a

novel plant configuration. It is called the International Reactor Innovative and Secure (IRIS), developed by Westinghouse. The fuel and core design are similar to those of conventional reactors, but the IRIS design puts the steam generators—heat exchangers in which heat from the water that cools the nuclear fuel is used to boil nonradioactive water to run the turbine and produce electricity—inside the reactor pressure vessel, rather than having them as separate components. This makes the design much more compact than conventional plants and eliminates large-diameter pipes. The power output of the IRIS design has not been fixed but is expected to be in the same range as the PBMR and GT-MHR.

As noted previously, these designs are referred to as "modular." Existing nuclear plants are very large, with electrical outputs exceeding 1,000 MW, and require most of the construction to be performed at the construction site. Although economies of scale tend to favor large plants, modular plant designs may provide an opportunity for large portions of a plant to be factory-constructed, transported to the site, and installed, greatly reducing construction time and cost. Small plants may also have an advantage when the effects of price deregulation are considered. Deployment of a 1,000-MW plant could result in a supply of power that greatly exceeds demand, which would tend to depress the price. Deployment of a smaller unit allows a generating company to tailor the size of the unit to the demand. As demand grows, additional modules can be deployed with relatively short construction times, with revenue from the operating modules offsetting the cost of the new construction.

It must be emphasized that the NRC is in the very early stages of reviewing these plant designs. None has been formally submitted either for design certification or for a license, and the issues and economics associated with modular reactors are speculative. However, it is significant that serious discussions of these issues are occurring, particularly because the

demise of the nuclear power industry was widely expected only a few years ago.

### *Recent Initiatives: Risk-Informed Regulation*

For the last several years, the NRC has been working to modernize its approach to reactor regulation, using insights based on over 2,000 reactor-years of nuclear plant operation in the United States and improvements in methods of evaluating the risk of nuclear power plant operations. This is referred to as "risk-informed regulation" and represents one of the most far-reaching initiatives that the NRC has ever undertaken.

Most of the regulations that apply to nuclear power plants are relatively old and reflect the NRC's knowledge base at the time the rules were developed. The underlying philosophy was to ensure ample margins in engineering analyses; extensive quality assurance and control in design, component fabrication, and plant construction; and diversity and redundancy in plant systems, especially those believed to be important to safety. This overall approach, called "defense in depth," was designed to prevent the occurrence of an accident but also, if one occurred, to provide for mitigation of its effects.

While this regulatory system has worked well over the years, the accumulation of operating experience has shown that some design and operating margins are unnecessarily large. Moreover, great strides have been made in methods of quantifying the risk associated with reactor accidents. This technique, called probabilistic risk assessment (PRA), is a systematic evaluation of the plant to determine potential accident sequences and assess their frequencies by looking at the probabilities of failure of systems and components. The first significant application of this methodology to nuclear power plants was a project sponsored by the NRC and its predecessor, the Atomic Energy Commission (AEC), in the early 1970s. The study was led by Norman Rasmussen of MIT, and the publication of his report, the *Reactor Safety Study* (more commonly known by its report

number, WASH-1400), was a watershed event in nuclear reactor safety analysis.

Since 1975, refinement of PRA techniques, augmented by an extensive database derived from plant operational experience, has turned PRA into a powerful tool for assessing nuclear plant safety. Risk-informed regulation involves using PRA as one of the bases, but not the only one, for improving the safety focus of the NRC's regulations. As risk-informed techniques are applied, regulations that are not safety-significant can be modified or eliminated, and excessive margins can be reduced. On the other hand, risk insights may also show that some regulatory requirements need to be enhanced.

The NRC's initial efforts in risk-informed regulation have yielded some early successes. The agency's reactor inspection program, carried out primarily by inspectors stationed at the plant (resident inspectors) and in the NRC's regional offices, has been completely revamped to provide a better focus on plant safety, and also to make the results of those inspections more easily understood by those outside the NRC, the agency's "stakeholders." The success of this program can be gauged by the fact that it has been endorsed by the NRC's licensees *and* by critics of the industry. However, it must be acknowledged that there are challenges as the NRC proceeds along this path. Risk-informing the existing regulatory structure has proven to be difficult because of the intricate—and sometimes subtle—relationships among various regulations. Changing one rule may impact others in unforeseen ways, and conflicts that arise in this manner must be resolved. While the NRC is committed to continue with its efforts to risk-inform its regulations, it recognizes that the process will sometimes be difficult.

### *Nuclear Waste*

No discussion of nuclear power in the United States would be complete without mentioning the issue of nuclear waste. Many people are worried not only about the safety of the plants but also

about the disposition of the spent fuel that results from nuclear plant operations. At present, spent fuel is held in pools at the reactors or in independent spent-fuel storage installations—giant casks, typically located at the plant site, that hold the fuel (loaded several years after removal from the reactor) and cool it by air convection.

Although the spent fuel at plant sites is safe, there is a limited amount of room for such storage, because these plants were constructed with the expectation that the federal government would establish a permanent, centralized repository for spent reactor fuel. The Department of Energy (DOE) operates a program to evaluate such a potential repository at Yucca Mountain, in Nevada. This project has been proceeding slowly for a number of years, with a very complex legal and technical system for site assessment and, ultimately, repository operation. Under current law, the DOE will be responsible for constructing and operating the repository. The Environmental Protection Agency is responsible for establishing standards that will govern the site. The NRC is the licensing entity for both construction and operation. There is a role for the President, in approving whether to go forward with the site once the DOE makes a formal recommendation to proceed, and a role for Congress as well. The current schedule calls for the Secretary of Energy to make a recommendation to the President by the end of 2001.

All the parties involved in the process must confront several challenges as it proceeds. There is no doubt that there will be stringent opposition, particularly by Nevada. The state has indicated that it intends to litigate at every available opportunity to prevent the repository from being sited at Yucca Mountain. Only time will tell if the United States is on a path for disposal of spent fuel.

### *Public Confidence in the NRC: An Essential Element*

One of the biggest challenges that the nuclear power industry confronts is the concern of the public for the safety of its enterprise. The NRC tries to address the foundations for these concerns

through its comprehensive regulatory program. The NRC believes that the industry is best served if the agency is—and is perceived to be—a tough regulator. Such a philosophy protects each licensee from the negative impact that would occur if another licensee were to fail to meet its obligations, resulting in a serious accident.

The NRC has an extensive program for public outreach and makes an effort to engage the public in all activities, in recognition of the fact that the public has a legitimate stake in the matters that come before the agency. We recognize that any decision that is made behind closed doors will be viewed as suspect. Ultimately, however, society must decide whether to encourage or discourage more extensive reliance on nuclear power. A quiet renaissance of interest in nuclear power is in progress in the business community. It remains to be seen how the climate for nuclear power in the United States may evolve in the future.

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## Scandal and Privacy: Two Eighteenth-Century Women

***Patricia Meyer Spacks,*** President of the Academy and Edgar F. Shannon Professor of English, University of Virginia

In the twenty-first century, discussions of privacy tend to turn quickly to concerns about government interference or the databases held by large, vague institutions. In the eighteenth century, people worried instead about individual others gaining illegitimate knowledge about them. Yet points of contact exist between our contradictory ways of confronting our problems of privacy and those of our predecessors. Take, for instance, the attitudes that we hold here and now in the United States. Collectively, we love to watch Oprah, to read *People,* even to contemplate the twenty-four-hour-a-day lives of strangers on television. But we also obsess about the privacy of our e-mail and yearn for secluded Caribbean beaches. If we're rich enough, we may inhabit walled and gated communities. It's true that not all these *we's* are the same *we,* but the society as a whole contains many such contradictions.

A comparable situation existed in eighteenth-century England. It too was a period preoccupied both with peeping into intimate secrets, especially sexual ones, and with privacy. Its newspapers abounded in advertisements for sexual services; elaborate reports of lurid divorce trials appeared frequently; pornographic and semipornographic fiction, verse, and pictures flourished, much such material imported from the Continent but some home-

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grown. The personal letters that have survived contain numerous stories about sexual scandals. In other words, sexuality provided matter for publicity. At the same time, the architecture of private houses was changing in ways that suggest increasing concern for privacy, and novelists like Samuel Richardson wrote books that made clear the new importance of personal privacy.

Sexuality epitomizes the kind of material conventionally reserved to the realm of privacy. The eighteenth-century conjunction of interest in other people's sex lives and interest in privacy may remind us that desire to penetrate other people's privacies does not logically preclude protection of one's own, and a determination to remain personally inviolate may only intensify the urge to infiltrate the normal secrecy of others. A conflict of values inheres in the very idea of privacy. As soon as it exists, it challenges other people's desire for knowledge; conversely, our will to know about others contends with their inclination to secrecy. Secrets invite unraveling; privacy stimulates encroachment. In "Privacy Is Not an Isolated Freedom," sociologist Arnold Simmel writes, "We live in a continual competition with society over the ownership of our selves" (in Pennock and Chapman, eds., *Privacy* [1971], p. 72). "We think of privacy as a situation of calm and security from strife," he adds. "But it

exists only by virtue of a temporary settlement of a conflict" (p. 87). This vision of an undying competition over "ownership," of privacy as a condition wrested with difficulty and precariousness from an ever-encroaching society, articulates the familiar dynamic between desire to know and desire to protect. And this odd dynamic is complicated by the fact that some people appear perfectly happy to reveal—in other words, not to protect—what most of us might consider intimate secrets. In our culture, they tell all to Geraldo or Dr. Laura on national television, or they write autobiographies about their love affairs. Are such people violating their own privacy? Is it *possible* to violate one's own privacy? If privacy is, as most philosophers believe, necessary to human beings, how do people preserve a sense of privacy while also exposing intimate facts about themselves? How does the tension between desire to reveal and to conceal play itself out in print?

That's the set of issues I want to talk about this evening. I'm interested in them as literary questions, questions about literary modes of self-representation. I'm going to consider two eighteenth-century memoirs by women, one of them fictional, the other purportedly factual. My texts are *Fanny Hill,* still one of the most famous English pornographic novels, and a less well-known work called *Memoirs of Laetitia Pilkington,* published at exactly the same time. The narrators of both make scandal about themselves the substance of their stories. Yet both find devices of self-protection even while they appear to reveal everything. It's those devices that I will focus on, concentrating in particular on one surprising fact: a technique that proves especially useful for the preservation of privacy is emphasis on the narrator's sensibility.

*Sensibility* is a word we still use, but not with the weight or the specific meaning that it had two or three centuries ago. In the eighteenth century, it meant extraordinary sensitivity to emotional stimuli, expressed often through such physical manifestations as weeping, blushing, and fainting. It was much celebrated as a characteristic of men and

women alike because it was thought to suggest responsiveness to the needs of others through an intense capacity for sympathetic identification. Its connection to privacy is by no means obvious. By definition, at least by eighteenth-century definition, sensibility implies self-exposure rather than self-concealment, because feelings convey themselves, for the man or woman of sensibility, so openly in the body, thus declaring to every onlooker the sensitivity and susceptibility of their possessor. But the display of emotion, I want to argue, also emphasizes an inaccessible interior realm. That's the claim I will make, to start, for Fanny Hill, a fictional narrator who tells the reader everything she does, but never conceivably everything she feels.

*Fanny Hill,* of course, belongs to the category of pornography, a category by definition strongly associated with private experience. The novel as genre opens the private to public view; the pornographic novel emphasizes its privacies. As Steven Marcus puts the point in *The Other Victorians* (1966), "In a world of private experiences, [pornographic novels] represent a further withdrawal into the arcane, and the only thing more secluded and secret than they is the inside of one's head" (p. 247). Marcus here alludes to the intensely private material narrated in pornographic fiction. But one might equally well maintain that pornography, far from representing a "withdrawal," implies the publicizing of the private, an imaginative violation of boundaries. Pornography intrudes into the bedroom. It exposes what conventionally remains concealed, and its excitement derives from its exposures. When it adopts the mode of first-person narration, it intensifies the illusion of forbidden revelation, giving secret pleasure to the reader by uncovering the narrator's secrets.

I want to suggest a perspective for looking at *Fanny Hill* through two illuminating but essentially contradictory observations on privacy by relatively recent commentators. First, a familiar set of ideas, from an essay entitled "On Privacy" by Ernest Van Den Haag: "Privacy is the exclusive access of a per-

son . . . to a realm of his own. The right to privacy entitles one to exclude others from (a) watching, (b) utilizing, (c) invading (intruding upon, or in other ways affecting) his private realm" (in Pennock and Chapman, p. 149). This is in effect a definition, and a fairly routine one. An essay on "Privacy and Autonomy" by legal expert Hyman Gross, published in the same collection as Van Den Haag's, answers the question, "Why is privacy of the person important?" in a less predictable way. Privacy, Gross writes, constitutes one of the requirements for maintaining "an integrated personality in a social setting. Although we are largely unaware of what influences us at the time, we are constantly concerned to control how we appear to others" (p. 173). Privacy, in other words, depends on the control of appearances.

I juxtapose these quotations because in conjunction they suggest a way of thinking about the complex bearings a work like *Fanny Hill* has on questions of privacy. Wildly popular in the eighteenth century, John Cleland's book, first published in 1748, allegedly earned more than ten thousand pounds for its publisher, who successfully defended it against prosecution for obscenity on the ground that it contained not a single indecent word. Its diction, indeed, belongs to sentimental fiction, but much of its substance would conform to virtually any definition of the pornographic. Its self-consciously "literary" aspects, though, separate it from pure pornography and give it special interest for the literary reader.

*Fanny Hill* tells the story of a young woman from the country who successfully makes her way in London. The account belongs in a sense to the same fictional subgenre as Samuel Richardson's *Pamela:* poor girl makes good and rises in the world. It might even adopt, with some irony, the subtitle of *Pamela: Virtue Rewarded.* Fanny Hill's chief virtue is fidelity (of heart, not body), but she has other admirable qualities as well, including almost unfailing cheerfulness and adaptability, willingness to try anything, and an amiable desire to make others happy. She is by profession a whore.

Fanny is represented as having, in Van Den Haag's sense, no awareness of a right to privacy. Watching and being watched compose much of her most pleasurable activity, and her narrative invites the reader into comparable functioning. We watch her watching and being watched and are implicitly urged to share her guilt-free enjoyment. The notion of privacy as freedom from being watched, intruded upon, or used by another is quite meaningless here, in a context where people seem to exist for one another's use—or perhaps I should say that the systematic violation of this concept of privacy drives the narrative. Indeed, the abandonment of such a standard supplies the prerequisite for Fanny's pleasure and perhaps for the reader's as well.

Cleland effectively redefined privacy in terms corresponding to Gross's. According to the theory that privacy defines the conditions for maintaining an integrated personality in a social setting, Fanny, whose sense of herself remains firm through all her vicissitudes, quite consistently sustains her privacy. Gross suggests that control of appearances is the basis for privacy. Cleland's fantasy of Fanny Hill reveals just how subversive an idea this is—and how incompatible with the more conventional notion advanced by Van Den Haag.

Let me push this point a bit. If the integrated personality depends on control of appearances, perhaps only hypocrisy guarantees integrity. The word *hypocrisy* derives from a Greek root whose first meaning is "the acting of a part on the stage." A whore's professional success depends on her acting of an off-stage part. Fanny, after her first naive and straightforward pleasure in lesbian exchanges, in watching heterosexual intercourse, and in her defloration by young, handsome, charming Charles (the object of her undying love), becomes a consummate actress—but not with Charles. Reunited with him at last, after a long separation, Fanny repeatedly invokes the word *sincerity,* most significantly, perhaps, in her allusion to "that sincerity which, from me to him, was so much a nature in me" (p. 222). When she goes to bed with Charles, she appears to

have regained her psychological virginity: "a sweet sensibility, a tender timidity, love-sick yearnings, tempered with diffidence and modesty, all held me in a subjection of soul incomparably dearer to me than the liberty of heart which I had been long, too long! the mistress of" (p. 218). Sincerity is her nature, but only with Charles. Sensibility, timidity, and the rest characterize her now but have not characterized her before, except in her first sexual encounter. The integrity of her personality has survived, as it were, beneath a thick carapace of pretense and of kinds of feeling that she now disowns.

Now Fanny has her privacy, despite the openness of her confession. It is the privacy of her inwardness, the feelings that can be named but not fully communicated. Her account of the physical lovemaking breaks off: "oh!—my pen drops from here in the ecstasy now present to my faithful memory! Description, too, deserts me and delivers over a task, above the strength of wing, to the imagination; but it must be an imagination exalted by such a flame as mine, that can do justice to that sweetest, noblest of all sensations . . ." (p. 220). The incommunicability of her sensations, despite her efforts at unreserved confidence, declares her unviolated and inviolable privacy. She can tell us everything about her encounter with a sadomasochist, but she cannot tell all when it comes to her relationship to Charles.

The fictional character Fanny Hill openly acknowledges both that her "sincerity" depends on her interlocutor and that there are crucial facts about herself that she does not, because she cannot, communicate. Reminding us of the necessary limits of revelation, she alleviates the reader's potential discomfort at knowing, "seeing," entirely too much. What we vicariously see is less important than what we cannot see. Fanny's extended career of hypocrisy has enabled her to preserve herself, it seems, morally and psychologically intact. Her "vice" doesn't matter even to Charles, who readily excuses it on the basis of economic necessity. What matters more, and is clearly intended to matter to the reader, is her capacity for that metaphorical

new virginity: the emotional integrity she has miraculously sustained.

The fantasy aspect of *Fanny Hill* as a novel emerges vividly in all its aspects, from its rhapsodies over the size and wonder and power of various male "machines" to its depiction of the prostitute's life as quite free from essential degradation, from Fanny's lack of any real sense of guilt to her constant encounters with equally cheerful, equally beautiful, equally forthcoming (verbally and physically) fellow-prostitutes. Cleland's fantasy about privacy may be most important of all. It justifies the pornographer's activity by declaring it nonessential. One can watch, utilize, and intrude upon others (to return to Van Den Haag's terms) by reporting in lavish physical detail the actions and the appearances of sexual activity, which we conventionally consider to epitomize the material of privacy. Still, the pornographer interferes with no privacy because he defines it as existing elsewhere. He imagines his central character as reporting on herself, as well as on others, and as untouched by the reportage because mere action and appearance have no bearing on real privacy, inherent in the uninvadable sensibility. Fanny implicitly insists on a personal essence quite independent of behavior, an essence incapable of being watched or invaded, a locus of integrity and therefore of privacy.

To be sure, Fanny's psychic processes are fairly uncomplicated and largely unexplained. Emotional anesthesia overtakes her, plausibly enough, when she makes the transition from sexual relations with Charles to connections with men who purchase her favors, and her subsequent responses seem fairly superficial. One might argue that her generally good spirits derive from repression, but Cleland offers so little detailed psychological data about her, and her language is so conventionalized and repetitive, that it would appear ludicrous to apply psychoanalytic terminology to the character. Yet her intermittent performances of "sensibility" serve as conventional signs of inner experience, reminders of the realm of privacy that the novel—meaning both this particular piece of fiction and the eigh-

teenth-century novel as genre—insists on preserving for its characters. For Fanny as for many novelistic protagonists after her, private sensibility preserves a realm for which public judgment proves irrelevant. It serves as the implicit standard in a work of ostensible full exposure.

In its pornographic abundance, *Fanny Hill* constitutes one extreme on the continuum of self-revelation. Its manifest fictionality helps protect the reader from discomfort at its protagonist's verbal self-violation. No eighteenth-century actual (as opposed to fictional) autobiography that I know of offers a comparable degree of salacious detail, but some autobiographical texts, by men and women alike, draw considerably on sexual material. They do not report the minutiae of what Marcus wonderfully calls "organ-grinding," but they repeatedly call the reader's attention to the existence and function of organs. A case in point is *Memoirs of Laetitia Pilkington,* a work that probably mingles fiction and fact, although it purports to be a literal account of its author's experience. Published in three volumes in the mid-eighteenth century (the first two volumes a few months apart in 1748, the third volume posthumously in 1754) and, like *Fanny Hill,* popular in its own time, it belongs to a genre of scandalous narratives by women that had wide eighteenth-century readership. Pilkington's narrative becomes increasingly incoherent as it continues. Yet it displays great energy and gusto as it delineates a perplexed attitude toward privacy and a purposeful deployment of scandalous self-revelation. The common distinction between "memoir" and "autobiography" turns on the memoir's emphasis on the public rather than the private. But Pilkington's *Memoirs,* concerned almost entirely with domestic and sexual matters, implicitly claim that the dark underside of public appearances deserves primary attention and argue for the need to attend to the inequities of the female situation.

Pilkington tells a long story of marital and post-marital distress. Descended from a family of some distinction, she was courted by an impecunious young clergyman, Matthew Pilkington. By her

account, she remained entirely "passive" during the courtship and accepted Pilkington at last because she thought her parents wanted her to. Soon after the marriage, the couple became friendly with Jonathan Swift, who encouraged Mrs. Pilkington in her poetry writing and, she says, aroused her husband's jealousy by praising her intelligence and her poetic gifts. At any rate, after several children, the marriage went sour. Pilkington took a mistress and openly lavished gifts on her, even while his family lived in poverty. In Mrs. Pilkington's version of things, he tried to lure or trick his wife into committing adultery. Finally, he alleged (and found witnesses to attest), he caught her in the act (she claims she was only looking at a book in the company of a young man). In 1738 he divorced her in consistory court in Dublin on grounds of adultery. Mrs. Pilkington, pregnant, remained in Ireland for a few months, gave birth to a daughter, then fled to London.

The precariousness of her economic position (her husband refused to pay the support authorized by the court) led to hard times in London. At one point, she was imprisoned for debt. She published proposals for a volume of poetry but attracted no great support. A proposal for a memoir proved more successful, and the first volume won considerable popular interest, mainly, it seems, on two grounds: it provided much intimate information about Swift, and it offered many scandalous or near-scandalous stories, almost entirely about the two Pilkingtons. (The subsequent volumes increasingly provide scandalous episodes about other people; in the third volume, the author claims that many have offered her money for a promise *not* to tell stories about them.)

Matthew Pilkington, his wife maintains, was sexually loose. She herself was not. Her typical story about herself belongs to the genre, made familiar by *Pamela,* of the narrow escape tale: she finds herself in a sexual situation of great danger but in the nick of time manages to preserve her honor. Thus she provides titillation without self-condemnation. She never actually acknowledges sleeping with any-

one, although she certainly arouses the reader's suspicions. But the intimate details that she reports appear to violate her privacy in fundamental ways.

A sample passage, which I shall quote at some length, will suggest the kinds of question raised by Pilkington's account:

> I could reckon up numberless Instances of Mr. *Pilkington's* Aversion to me; one in particular I cannot pass over. One Day, at Dinner, the Pin in the Robing of my Gown, pricked my Breast; as there was no body but my Husband and Children present, I made no Scruple of uncovering my Bosom, to examine what had hurt me; upon which Mr. *Pilkington* rose from Table, and said, I had turn'd his Stomach. As I really had a fine Skin, and was then a most remarkably neat Person, I thought he only jested; and merrily told him, he should kiss my Breast, and make it well: But, alas! It was not like *Prior's Lover's Anger* . . . . [Here Pilkington quotes a poem about a woman's hurting her breast and exposing it to a man who sees it as a "Seat of Delight" that makes him forget what he was going to say.] For he told me, he was sure he should faint if I came near him; and either pretended to throw up his Dinner, or did it in reality. After which polite Compliment, he drank a large Glass of Cherry-brandy, to settle his Stomach; and repaired to his usual Haunt, *i.e.* to buxom *Joan* [his mistress]. (1: 85)

This episode strikes me as shocking in its intimacy and in the humiliation it reports—more shocking, in fact, than most of the sexual stories. It belongs emphatically to the sphere of privacy. The narrator stresses the fact that only because she was alone with her husband and children did she expose herself physically. The question remains of why she chooses to expose herself verbally.

For Pilkington at the dinner table with her husband and children, privacy in the form of intimacy implies not security but oppression and danger. To recur to Simmel's phrase, she has no ownership of herself. Private association with another man holds at least as many dangers as privacy with her husband. She reports, for instance, weeping in the summerhouse over the death of one of her children. A "fine Spark" opens the door and comes in,

saying that Mr. Pilkington has sent him. They return to the house and drink coffee; the man forcibly attempts to make love to her. When she says she will tell her husband, he laughs and explains that Mr. Pilkington "describ'd you to me, as a Lady very liberal of your Favours, and begg'd I would be so kind as to make him a Cuckold" (1: 80, 81). Similar episodes abound, both before and after she leaves her husband. The privilege of solitude seems rarely attainable to her, and a privacy of two implies threat.

The context established by such stories suggests a reason for Pilkington's deliberate self-exposure and helps to account for its literary energy. Self-exposure constitutes defense and expresses anger. A married woman in the mid-eighteenth century might have abundant reason for anger. A divorced woman would undoubtedly have more. Having experienced the powerlessness of the married woman, Pilkington then had to endure the greater powerlessness of the divorcée. To uncover the actualities of domestic privacy and of the privacy of the unprotected woman provided her only opportunity for revenge.

In her account, Pilkington emphasizes ways in which others—her parents, her husband, the men and women she meets—take advantage of her. Yet her stance is not that of victim: anger emerges more strongly than self-pity. She stresses her economic difficulties more even than her sexual ones—they too provide cause for rage. But she tacitly and explicitly emphasizes also the wonder of her self-sufficiency. The act of writing such a book as this is one of extraordinary self-assertion. By it, Pilkington acquires both money and revenge. The self-exposure of her privacy constitutes an aggressive tactic. When she tells of her husband's vomiting, or pretending to vomit, at the sight of her bare and beautiful breast, she tells of her own intimate humiliation, but she also exposes his brutality. To reveal his efforts to have himself cuckolded degrades him more than her. To report her sexual and economic danger in London reproaches the man who left her destitute, childless, and unprotected. She restores

her self-ownership by taking public possession of her story. Only her violations of her own privacy, in other words, protect her privacy in the deepest sense.

One does not ordinarily think of anger as a product of "sensibility," which associates itself more readily with softer emotions. But sensibility, given its connotations of intense emotional responsiveness, can express itself not only in sympathy but in rage at inequity and injustice. If anger impels Pilkington to ignore the conventional limits of her own privacy, it also authoritatively justifies her self-violation.

Pilkington relies on deliberate self-exposure as an aggressive and defensive tactic. Her jaunty prose suggests that she has risen above the painful experience that she relates from the apparent distance of a journalist or a sociologist. Yet, like Fanny Hill, she alludes to a literally unspeakable stratum of feeling that makes her what she is and makes her unique. In an atypically abstract formulation, she summarizes: "I am, in short, an Heteroclite, or irregular Verb, which can never be declined, or conjugated" (1: 273). A heteroclite, according to the dictionary, is a word that does not operate by established rules. Pilkington's metaphor suggests that she remains finally uninterpretable, that more exists than she can reveal. She reports her experience in lavish detail, perhaps fictionalizing it in the process, and uses her sensibility in the form of anger to justify her self-revelation. Yet her power to signify depends, rather, on what she refrains from reporting, on another aspect of sensibility—what cannot be declined, conjugated, or known.

The literary enterprise exemplified by Pilkington's writing, like the project of pornography, depends on putting the reader into the position of voyeur. The memoirist constructs her account as an invitation to forbidden knowledge. The promise and the appearance of intimate revelation keep the reader reading. Yet the narrative success of such works as Pilkington's memoirs depends on their ability also implicitly to justify their own enterprise and to protect the reader from the discomfort of excessive knowledge.

Fanny Hill's announcements of the inexpressible, Pilkington's verbally enacted rage and her resistance to interpretation—both help to justify and to qualify revelations of private matters. These stories and many others depend heavily on the infinite regress of privacy. Every revelation implies a further concealment, each bit of knowledge uncovered generates the desire for more. Yet such desire, the reader's desire, must coexist with a shadow of guilt, the corollary to the invention of privacy as privilege and ultimately as right. Narratives of scandalous self-revelation can at once feed the reader's desire and alleviate the guilt of such desire. Their revelations of sexuality and their concealments of sensibility productively counterbalance one another.

## Improvising Mozart

***Robert Levin,*** Dwight P. Robinson, Jr., Professor of the Humanities and Head Tutor, Music Department, Harvard University

*Editor's note:* The following summary of Mr. Levin's presentation was prepared by Leon Eisenberg, Communications Secretary of the Academy.

Professor Levin was a student of Louis Martin and Stefan Wolpe in New York and of Nadia Boulanger in Paris. He is world renowned for his restoration of the classical-period practice of improvised embellishments and cadenzas. Among other books, he has authored *Who Wrote the Mozart Four-Wind Concertante?* This, I assure you, is not a trick question like "Who is buried in Grant's tomb?" The provenance of the *Four-Wind Concertante* is uncertain, and Levin's treatise takes a fresh look at the evidence.

The topic he addressed for us was "Improvising Mozart." He illustrated his points at the piano. Those privileged to be present will recognize that these minutes are a paltry representation of the excitement and enjoyment we experienced that evening.

Mozart's rhetoric is amazingly mercurial; with tongue in cheek, the speaker suggested that Mozart perhaps suffered from attention deficit disorder, citing the rapidity of changes every few measures in the accompaniment. The point was demonstrated with the first movement of Mozart's Piano Sonata in B-flat, K. 333. Professor Levin focused on the relationship between the notes for the two hands. The excitement goes over the top in the right hand

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President Patricia Meyer Spacks, Speaker Robert Levin, and Secretary Emilio Bizzi.

in combination with the left. The point was illustrated by successively "dumbing down" the left and the right hand. Mozart's style is amazing. Suddenly the left hand stops dead and precipitates a flurry of activity on the right.

In Mozart's time, his reputation was based first on his skill in improvisation, second on his skill as a performing pianist, and only third on his compositions. We know nothing about the cadenzas he actually performed in the concerti he wrote, because they were different every time he performed them, and he didn't perform any individual concerto very often. The excitement is trying something in which one can fail. Mr. Levin illustrated the point. In improvisation, nothing can be anticipated. The only semblance we can capture of what Mozart might have sounded like when he improvised is provided by pseudo-improvisations he wrote down for his sister Maria Anna (Nannerl). Nannerl could not produce such modulating preludes spontaneously; she requested them from her brother so that she could memorize them in a simulation of improvisation.

Where did the musical rhetoric come from? Carl Philipp Emanuel Bach wrote a chapter on the free fantasy that illustrates the process. It requires imagination prodigious enough to come up with unexpected things again and again, even when the premises are simple.

Mozart was able to take a "hit tune" (something written by somebody else or a folk melody) and

subject it to remarkable variations. A mechanical exercise like the Twelve Variations for Piano on "Ah! vous dirais-je, Maman" (which we know as "Twinkle, Twinkle, Little Star") becomes brilliant with the imaginative approach Mozart employed. Mr. Levin played it for us delightfully well.

What characterized Mozart's greatness was his ability to remember the spirit of childhood. He was able to plumb the depths of terror (illustrated by Mr. Levin). From Mozart's Fantasy in C Minor, K. 475, Mr. Levin segued to the "Liebestod" from *Tristan,* showing the similarity of chord progressions. Mozart explored the darker side of the human psyche in his later compositions, such as *Don Giovanni.*

Mr. Levin invited the audience to suggest Mozart melodies as a basis for improvisation in the style of Mozart's time. Individuals proposed four arias: Papageno's "Der Vogelfanger bin ich ja" and the Queen of the Night's "Die hölle Rache" from *The Magic Flute,* "Se vuol ballare" from *The Marriage of Figaro,* and "Ach, ich fühl's," once again from *The Magic Flute.* With this stunning improvisation, the formal presentation came to an end amid warm and prolonged applause.

In the discussion period, Donald Hornig asked about the mental process that makes these achievements possible. Mr. Levin replied that one has to have a deep understanding of the syntax and grammar of music. He linked classical improvisation to jazz in the swing era. Improvisation is very different from an actor reading a prepared text. Stilted pedagogy often distracts us from the mastery of syntax to the virtuosity of the surface. Performers become risk-averse. He illustrated, with passages from the first prelude of J. S. Bach's *Well-Tempered Clavier*, that the listener may think he's home, but he's not at all, because there is more to be said. He compared the deep grammar of Bach with Coleman Hawkins's *Body and Soul*. There has to be a feeling of achieving truth within the performer. He recalled what Paul Valéry had said of Nadia Boulanger: "[She] ordains enthusiasm with discipline."

Mozart played most of his concerti only once. Mr. Levin has played them dozens, if not hundreds, of times. He doesn't write his own cadenzas down, lest he be trapped into repeating himself. One of the things that distinguished Mozart was his spectacular musical memory. Mr. Levin described a contest held in 1781 before the emperor by two hot-shot pianists: Clementi versus Mozart. Most observers felt that Mozart had won. Clementi had technique, but Mozart had taste and feeling in addition to technique. Mozart wasn't at all nice to Clementi and derogated his performance; nonetheless, he learned from him and later wrote a set of variations employing Clementi's technique. One of Clementi's published sonatas has a frontispiece noting that Mozart was present when it was performed at this contest. Ten years later, in 1791, Mozart used its first theme as the principal theme of his overture to *The Magic Flute.*

Mozart's memory was so sensational that after hearing the performance of the *Miserere* by Allegri in the Vatican, he was able to write the notes down hours later. The feat seemed so impossible that it was thought he had smuggled copies out of the guarded room. The nine-year old Mozart examined a sonata by Johann Schobert that he transcribed into a movement of one of his early piano concerti. Years later, its material appeared in his Piano Concerto no. 21 in C Major, K. 467. Mr. Levin illustrated the point by playing excerpts from the two pieces.

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## FORTHCOMING STATED MEETINGS

### House of the Academy

**Apr. 10, 2002** Speaker: **Marshall S. Smith** (William and Flora Hewlett Foundation and Stanford University) on "Education Reform: A Report Card"

Moderator: **Jerome Kagan** (Harvard University)

Commentator: **Jerome Bruner** (New York University)

Honorees: **Howard Hiatt** (Brigham and Women's Hospital) and **Fred Mosteller** (Harvard University)

**May 8, 2002** *Annual Meeting*
Speaker: **E. L. Doctorow** (New York University), Annual Meeting Address

**Oct. 5, 2002** *National Induction Ceremony*

### Western Center

**May 18, 2002** Speaker: **Ralph Cicerone** (UC Irvine) on "Global Climate Change and the Making of a Report to the President of the United States"

Commentator: **F. Sherwood Rowland** (UC Irvine)

### Washington, DC

**Mar. 21, 2002** **Senator Charles Schumer** (New York) and **Judge J. Harvie Wilkinson III** (US Fourth Circuit Court of Appeals, Charlottesville, Virginia) on "Congress and the Supreme Court"

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