Nuclear Terror: Ambling Toward Apocalypse

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Introduction: Carl Kaysen, MIT

Steven Weinberg was educated at Cornell, Copenhagen, and Princeton, and taught at Columbia, Berkeley, MIT, and Harvard. In 1982 he moved to the University of Texas at Austin and founded its Theory Group. At Texas he holds the Josey Regental Chair of Science and is a member of the Physics and Astronomy Departments.

Steven’s research has spanned a broad range of topics in quantum field theory, elementary particle physics, and cosmology, and he has been honored with numerous awards, including the Nobel Prize in physics and the National Medal of Science. He also holds honorary doctoral degrees from thirteen universities. He is a member of the American Academy, the National Academy of Science, the Royal Society of London, and the American Philosophical Society. Currently, he serves as a member of the board of editors of Daedalus, a member of the board of directors of the Federation of American Scientists, a senior adviser to the Mitre Corporation’s Jason Group of defense consultants, a national sponsor of the Committee of Concerned Scientists, and a member of the Council on Foreign Relations’s Independent Task Force on Homeland Security Imperatives.

In addition to the treatises Gravitation and Cosmology and (in three volumes) The Quantum Theory of Fields, he has written several books for general readers, including the prizewinning The First Three Minutes (now translated into twenty-two foreign languages), The Discovery of Subatomic Particles, Dreams of a Final Theory, and, most recently, Facing Up: Science and Its Cultural Adversaries. He is a regular contributor to the New York Review of Books. In 1999 he received the Lewis Thomas Prize, established by Rockefeller University to honor “the scien-
tist whose voice and vision can tell us of science’s aesthetic and philosophical dimensions.”

I recently read his 1992 book *Dreams of a Final Theory* and urge you to read it too. It may or may not give those of you untrained in physics the sense that you understand quantum mechanics, but it will give you a deep insight into how physicists think and what they mean by a scientific understanding of nature.

**Steven Weinberg**

It is always an honor and a pleasure to speak to this Academy, but it is a special honor for me to give a talk dedicated to two great men: Herman Feshbach and Victor Weisskopf. I knew them as senior figures at the Massachusetts Institute of Technology: Viki recruited me to the Physics Department, which he chaired, and Herman was director of the Center for Theoretical Physics, where I worked. Of course, long before I knew them, they had made their reputations as theoretical physicists. Among other things, both had made major contributions to nuclear physics, which in the 1940s became an important factor in world history. Herman’s Ph.D. thesis was on tritium, an isotope that later became an essential ingredient in hydrogen bombs. Viki was one of those at Los Alamos who designed the first atomic bombs, and he felt the heat of the first nuclear explosion at Alamogordo from ten miles away.

The experience of participating in the development of nuclear weapons gave a generation of physicists a sense not of guilt but of responsibility—of what Viki called “an obligation to inform the public about the awesome consequences of a nuclear war... our nightmarish vision of an actual nuclear conflict, based on our particular understanding of the power of the weapon we had made.” To carry out this aim, Viki and others created the Federation of Atomic Scientists. Later, in 1969, Viki and Herman and I joined thirty-eight other faculty at MIT in forming the Union of Concerned Scientists, of which Herman was the first chairman. In the 1970s Viki worked, through the Academy, at organizing conferences...
on arms control. During Herman’s first term as president of the Academy, the Committee on International Security Studies was established. These organizations have played an essential role in providing the public with independent scientific judgments about national nuclear policy and other matters.

I wish that I could say that with the end of the cold war, these efforts are no longer needed. Unfortunately, the reverse is true. Since September 11, 2001, we have been painfully aware that there are people in the world who hate America so much that they will give their lives to hurt us. If terrorists succeeded in exploding a nuclear weapon in one of our cities, it would kill so many people and do so much damage that it would make September 11 look like an ordinary working day. Given a hundred pounds or so of highly enriched uranium, it would be difficult to make a nuclear weapon and put it in an American city, on a truck or plane, or in one of the seventeen million containers that freighters bring into North American harbors every year.

Last fall I participated in the Hart-Rudman Independent Task Force on Homeland Security Imperatives, convened by the Council on Foreign Relations. Our task force concluded that “a year after September 11, 2001, America remains dan-
gerously unprepared to prevent and respond to a catastrophic attack on US soil.” For instance, we noted, the American Association of Port Authorities estimates that the cost of adequate physical security at our commercial seaports is about $2 billion, yet only $92.3 million in federal grants had been authorized and approved.

Whatever we do to guard our cities, some vulnerabilities will always remain. We also have to guard against nuclear terrorism by working with other countries to control fissionable materials. Russia now holds about 150 tons of plutonium and 850 tons of highly enriched uranium. Since 1991 the United States has been committed to the Nunn-Lugar Cooperative Threat Reduction Program, which among other things aims to improve Russian control over these materials to keep them out of the hands of terrorists and other states, and to make them unusable for weapons. Our rate of spending on this program, however, is only about a third of what it should be. The planned upgrade of security has been completed for only about 40 percent of Russian nuclear storage sites, and less than a seventh of Russia’s stockpile of highly enriched uranium has been made unusable for weapons. Last year President Bush proposed to cut spending on this program by 5 percent; this year he has asked for only about 10 percent in additional funds.

We are not even adequately protecting our own nuclear weapons facilities. Energy Secretary Spencer Abraham has said that his department “is unable to meet the next round of security mission requirements” and has asked for $379.7 million to rectify that situation, but the White House has approved just $26.4 million. There are no technical obstacles here—only a shortage of funds.

One program did receive a flood of new funding after September 11: ballistic missile defense. Pressures for this project had already been revived when Korea fired a three-stage rocket on August 31, 1998, even though that rocket could not have carried a nuclear weapon. More for protection from Republicans than for protection from Korean missiles, President Clinton began tentative steps
toward a new antimissile system. During the sum-
mer of 2001, Senators Joseph Biden and Carl Levin
planned hearings of the Senate committees on for-
eign affairs and armed services, which might have
led to a termination or suspension of Clinton’s pro-
gram. After September 11, those hearings were can-
celed, and opposition to missile defense collapsed.

On December 13, 2001, President Bush announced
that the United States would abrogate the treaty that
since 1972 had banned the deployment of missile
defense by the United States or Russia. This past
December he announced the decision to deploy a
limited missile defense by October 2004. There is
$9 billion in the 2004 budget for missile defense—
a figure that will surely increase as the program
moves from testing and development to deploy-
ment. I have heard estimates that the total cost of
the missile defense program through 2014 will reach
a trillion dollars.

The irony in the contrast between support for
missile defense and for other programs is painful,
because attack by ballistic missiles is not only just
one of many ways that terrorists could use nuclear
weapons against us; it is the least likely way. Terrorists
may be willing to commit suicide, but the leaders of
the states that harbor them never are. Why should
anyone attack us with ballistic missiles, which
always reveal their source, rather than in any of the
many ways that do not?

Well, I can think of one reason. A rogue state that
is in the process of being put out of business by the
United States and that has nuclear-armed ballistic
missiles might, in extremis, launch them at us. But
if that would deter us from adventures in regime
change, how would it help if we had an antimissile
system of uncertain capability? According to the
2004 budget, the administration plans to deploy
an antimissile system that has had no realistic oper-
ational tests and does not have the high-frequency
radar that had previously been thought necessary.
Even if we can build a system and tune it up so that
it doesn’t keep failing tests, we will never know
what sort of decoys or other countermeasures it
might encounter. And even if we could protect
ourselves, depending on the scope of the missile defense program, we might be deterred anyway by the danger of a nuclear attack on our allies. As an audience mostly of academics, I think you will understand what I mean when I call our present missile defense program “pure missile defense”—that is, missile defense undertaken for its own sake, not for any application it might have in defending our country.

The real danger is not that a rogue state will launch nuclear-armed intercontinental ballistic missiles at us, but that it will use nuclear weapons in local conflicts or hand them over to terrorists. There is no easy answer to this. We may have to consider preemptive nonnuclear attacks on nuclear facilities, such as the nuclear fuel reprocessing plant in North Korea. On this I disagree with Senators Robert Byrd and Edward Kennedy, who have called on the United States to respect an absolute ban on preventive attacks. There have been times when preventive war would have been necessary and proper—for instance, in March 1935, when Germany announced that it was tearing up the Versailles Treaty and building a military air force.

It would help if the United States could act against nuclear proliferation with clean hands. Under the terms of the 1970 Nuclear Nonproliferation Treaty, we are committed to deemphasize the role of nuclear weapons and work toward their elimination. But there are signs that the Bush adminis-
The administration’s Nuclear Posture Review, on which I testified in the Senate last fall, has called for the development of Robust Nuclear Earth Penetrators—nuclear weapons for attacking underground facilities (even though such weapons can’t be used without creating severe nuclear fallout)—and the new budget contains a small appropriation for this purpose. The chair of the Defense Science Board has called for a study of nuclear-armed antiballistic missile interceptors. White House Chief of Staff Andrew Card has said that the United States would not rule out the use of nuclear weapons in Iraq. President Bush has announced that he will not seek to ratify the Comprehensive Test Ban Treaty. Leaders at the Los Alamos and Sandia weapons laboratories continue to press for a resumption of nuclear weapons testing, and the Bush administration has called for the repeal of the Spratt-Furse amendment, which bans development of low-yield nuclear weapons. For a nation with an overwhelming superiority in conventional arms, the development of nuclear weapons for actual use seems counterproductive to the point of insanity.

Some say that nuclear testing is needed to maintain safety and reliability, but both a committee of the National Academy of Sciences in 2002 and the Council of the American Physical Society in 2003 have concluded that it is possible to maintain confidence in the safety and reliability of the existing nuclear weapons stockpile without actually producing nuclear explosions. Indeed, when we tested nuclear weapons in the past, it was usually to develop new weapons.

Personally, I don’t think it would be so bad if nuclear weapons on all sides did become somewhat unreliable. We might not then be able to use them for preemptive attacks or bunker busting or missile defense—but what effect would it have on deterrence if there was a possibility that some fraction of our weapons would not achieve the nominal yield?
Meanwhile, nuclear proliferation continues: North Korea today, Iran tomorrow. Even in Brazil, a cabinet minister has called for a nuclear weapons program.

You may not realize it, but so far in this talk I have been looking on the bright side. A nuclear attack by terrorists or rogue states could do terrible damage and kill millions of people, but it would not destroy our country. Only one thing could do that: a mistaken attack on our country by the huge Russian arsenal of nuclear weapons.

It may seem terribly “retro” to mention this danger—akin to suggesting that a modern politician would worry about nineteenth-century issues like bimetallism or free love. Granted, in the present state of international relations, no one thinks that either Russia or the United States would ever plan a first strike against the other. Nevertheless, the strategic nuclear forces of both sides remain frozen in their cold war posture. Each is tasked with the responsibility of being able to respond to an attack by the other side before a single attacking nuclear weapon can reach its own land-based missiles and control centers. This means that the decision to attack must be made in minutes, before any nuclear weapons have actually exploded.

It takes only two minutes to launch our own land-based intercontinental ballistic missiles, and less than fifteen minutes to launch our submarine-based missiles. The pressure to decide quickly is more severe for the Russians than it is for us, because they have little left of the invulnerable part of their deterrent (their missile submarines rarely go to sea), and their land-based missiles are vulnerable to a relatively short-range attack by US submarines.

In January 1995 the Russian attack decision process was triggered by the launch of a US research rocket from a Norwegian offshore island to study the Northern Lights. The rocket firing was originally mistaken for a launch from an American submarine in the Norwegian Sea, with the separation of multiple stages perhaps giving the impression of an attack by several missiles. The Russian
response process was stopped only a few minutes short of their ten-minute deadline for a final decision. (Similar episodes occurred in the Soviet Union in 1983 and in the United States in 1979 and 1980.) The pressure on the Russians for quick decisions will become greater as the United States deploys and improves its antimissile system, which could be thought to have some capability against a ragged Russian second strike.

Defense Secretary Donald Rumsfeld has upheld the deployment of an ineffective missile defense system by saying that it is better than nothing, but in fact it is worse than nothing. Major General Pavel Zolotarev, past deputy chief of staff of the Russian Defense Council, has said that US missile defense plans make it harder for Russian nuclear planners to consider deep cuts in their arsenal coupled with de-alerting. Can we really assume that Russian judgments about whether they are under attack will always be made correctly, especially if relations between the United States and Russia sour in the future?

Several steps have been taken to ameliorate this danger, all sharing the common feature of being ineffective. In May 1994 Presidents Clinton and Yeltsin agreed that the United States and Russia would stop targeting each other’s territory. This is a bad joke; the targeting can be restored in seconds. In 1998 the presidents of the United States and
Russia agreed to establish a center in Moscow for the exchange of data on rocket launches. Plans for this center were completed, but it was never brought into operation. In March 2003 the Senate ratified the Strategic Offensive Reductions Treaty, which had been signed last year by Presidents Bush and Putin. It requires a reduction in the number of strategically deployed nuclear weapons on both sides, but the treaty will reduce the numbers only to about two thousand weapons on each side by 2012, and the delivery vehicles and thousands of weapons taken out of service will not need to be destroyed, only separated.

We need to reduce the number of nuclear weapons on both sides to hundreds, not thousands; to count all weapons, not just those that are strategically deployed; and to take these weapons off hair-trigger alert. Nothing is more important. In any one year, the danger of nuclear attack by mistake is small, and aside from the warnings issued by a few hardy souls (such as Bruce Blair, the director of the Center for Defense Information, and former senator Sam Nunn), it receives little attention. No president of either party has given this danger a high priority. But it is always with us, and in the end it may destroy us.

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