CHAPTER 4

HOW WILL THE NUCLEAR WEAPONS STORY END?*

Victor Gilinsky

Most know the story of nuclear weapons. The United States developed them to protect against a possible German program; then the Soviet Union built them to match America, then Britain, France and China, then Israel, South Africa, India, and Pakistan, and, most recently, North Korea.[1] A competitive spiral keeps nuclear countries locked in and attracts new members to the nuclear club, slowly perhaps, but nevertheless continually. Where this will end, none of us knows. It is a subject to which we should pay more attention.

CAN WE KEEP THE BOMBS ON THE SHELF INDEFINITELY?

We sometimes contemplate the possibility of a worldwide nuclear breakdown, but I think we do so only on an intellectual level. We do not really believe it can happen. If we did, we would behave differently. Meanwhile, there is no sign that any of the current nuclear countries are ready to give up their arsenal, and the number of nuclear bombs in the world is still in the tens of thousands.[2]

---

*Remarks of Victor Gilinsky prepared for The 10th PIIC Beijing Seminar on International Security, Xiamen, China, September 24-29, 2006, available from *www.npec-web.org/Presentations/20060924-Gilinsky-BeijingRemarks.pdf*. Adapted slightly for publication.

The subtitle of this seminar is "Harmony Makes the World Stable and Secure." In a world of so many nuclear weapons, can we count on harmony to restrain use *indefinitely*? Can we rely on so-called rational behavior (so-called because it is not always clear what "rational" means)? And, in any case, people often do not behave in their best interests, at least not in their collective best interests, and sometimes humanity displays a self-destructive streak. Did it make sense, for example, to build more than 100,000 nuclear weapons during the Cold War?

A pressing reason to look ahead more seriously than we do is that once one country breaks the taboo on nuclear weapons use, it is likely that restraints against further use will weaken. At that point, the organizing principles of the world will have to change. Our cities, our economic systems, and our civil societies, will all become anachronisms. Of course, the number of warheads and the dangers of a worldwide catastrophe are now reduced from what they were during the Cold War. A great deal of writing is devoted to explaining how to maintain nuclear stability in a world of many nuclear weapons. Optimists argue that, since even at the most dangerous time of the Cold War the antagonists did not use nuclear bombs, the nuclear future is "manageable."

But to me, the Cold War experience suggests a different conclusion—that the nonuse of nuclear weapons since 1945 had less to do with these theories and more to do with simple human awe that made everyone hesitate to open Pandora's Box, an awe that will not last forever. (If you remember the story, Pandora could not resist opening the Box and unleashed human misery.)

We were also just plain lucky, especially in the

early years of the Cold War. Up to the mid-1950s, there were many bombs that one person had the ability to detonate, and some of them were small enough for one person to carry. Fortunately, none got into the wrong hands.

We were lucky in other ways. To protect against a Soviet surprise attack, the U.S. Air Force took to keeping some bombers fully loaded with nuclear weapons in the air at all time. Some of these planes suffered accidents and dropped their bombs. Altogether, about a dozen dropped thermonuclear bombs were never found. Fortunately, none detonated. I am sure other countries had similar accidents.

THE CUBAN MISSILE CRISIS

The great nuclear crisis of the Cold War was, of course, the 1962 Cuban missile crisis. At that time, we experienced some scenes that could have come straight out of the movie, *Dr. Strangelove* (1964). We discovered since then that the situation during the crisis was even more dangerous than it seemed at the time. I do not think we should flatter ourselves to think that we are much smarter today and that we could not get into a similar dangerous situation. Basic human nature hasn't changed much in the last half century. One thing that surely has not changed is the cult of toughness in high-level decisionmaking. It is always safer to be thought "hard" than "soft." This is a problem that has been with mankind since ancient times.

One of the experiences along these lines that affected me greatly was a talk after the Cuban crisis given by a Strategic Air Command (SAC) major general who had led U.S. bombers during the crisis on what he believed at the time was an attack on the Soviet Union.

The general, a kind and thoughtful man, told us how difficult it was to say goodbye to his wife before his mission. He described in detail the extensive planning, the long training, and the tremendous discipline required. During the initial stages of the flight, he had time to reflect on his orders. The crews understood perfectly that each plane carried many megatons of nuclear explosives whose use would have awful consequences. When the bombers reached a certain point over the Arctic, they were to continue to their targets if they got a coded "Go" signal, and to return home if they did not.

The expected signal did not come, and at the last moment the general gave the order for the planes to turn around. (What a relief, I thought.) The general drew himself up, paused, looked out across the audience, and told us that having to give the order to turn around was the most disappointing(!) moment of his entire life.

It did not change my opinion of him as a good person. It did, however, give me new insight into human nature. The point I want to make is that no one, no matter how decent, can spend a lifetime training for something and not have some part of them want to apply their training, no matter how awful the consequences.

I do not want to leave you with the impression that this is a comment on the United States or the U.S. Air Force. It is a comment on human nature. It sometimes pulls us in the wrong direction.

WHAT ABOUT THE SCIENTISTS?

Just like the military want to apply their training, scientists like to see their ideas work in the real world.

When the Los Alamos, New Mexico, scientists heard of the Hiroshima, Japan, atomic bomb detonation, many cheered. In retrospect, of course, that was a dreadfully inappropriate reaction. But it was only human nature. They were not cheering the deaths; they were cheering the first successful uranium explosion.

The lesson we need to remember is that most people cannot work on something with all their heart, not even an awful bomb, and not want to see it work. But as we know, that tendency can have unfortunate consequences.

Herb York, a former director of the Livermore Laboratory, wrote in his 1970 book, *Race to Oblivion*, that the problem of controlling nuclear weapons activities was made more difficult because those devoted to pursuing them were mostly sincere persons acting in good faith. They really believe in what they are doing. At the same time, he writes, the real motives for this work are not necessarily what they are represented to be.[3]

The line between genuine concern for the defense of one's country and unchecked personal ambition is often unclear. The real driving force is often the sense of importance, and sometimes real prominence, that comes from working on powerful weapons.

The U.S. and Soviet weapons scientists became powerful figures. The same is certainly true in other weapons states. Last month, for example, the Indian Prime Minister had to publicly mollify the top scientists in the Indian weapons establishment to get support for his nuclear deal with the United States. Or consider the privileged status in Pakistan of A. Q. Khan, despite such misdeeds as divulging nuclear weapons secrets to North Korea.

THERMONUCLEAR WEAPONS

Sometimes the irresistible attraction of the weapons is scientific. Physicists, especially, are enthralled with the idea that their scribbles on the blackboard can change the world, whether it is for better or for the worse.

Robert Oppenheimer, who initially opposed the U.S. development of the thermonuclear bomb, was ultimately won over by the Teller-Ulam idea that made it work. Oppenheimer called the idea "technically sweet."[4] The phrase betrays the seduction of interesting scientific problems, even if they are associated with weapons for mass killing. The same pull operated among physicists in other countries, perhaps even more strongly.

I should say that not all were seduced by temptation nor anxious at all costs to maintain their status with the powerful. Of the famous scientists who took part in the American debate over thermonuclear weapons in 1950, I am most impressed with Enrico Fermi and I. I. Rabi. When the question of building the thermonuclear bomb first arose, they took a firmer stance than Oppenheimer. They said, "The fact that no limit exists to the destructiveness of this weapon makes its very existence and the knowledge of its construction a danger to humanity as a whole."[5] Their advice was ignored, and we now live with that danger.

By 1952, the United States detonated a many-megaton thermonuclear device, the so-called Mike shot, on an island in the Pacific Ocean. Eventually the scientists learned to make small thermonuclear devices, too. But the main thing was the possibility of powerful warheads. The military liked big bombs for use in massive attacks because in those days bombers

and missiles were highly inaccurate. You had to have high yield in order to have a high probability of destroying a target a continent away. Years later, when the accuracy of weapons was increased by orders of magnitude, there was no corresponding reduction in weapons yields. Warhead yields remain outrageously high in all countries.

SOVIET BIG BOMB

The Soviets, too, launched a crash program to develop thermonuclear weapons, and eventually overtook the United States in numbers. When Nikita Khrushchev wanted a huge bomb with which to intimidate the West, a Soviet team led by Andrei Sakharov produced a 100-megaton bomb—the largest bomb ever designed or used. The Soviets detonated it in 1961 with an intentionally reduced yield of 50 megatons, because anything higher would have destroyed the plane that dropped it. Sakharov received a "Hero of Socialist Labor" award for it.

I mention this because we associate Sakharov's name with human rights, not mass destruction. Of course, his role as a heroic opponent of the Soviet government came later. But the interesting thing is that when he wrote his *Memoirs* in 1990, he was still proud of designing the Big Bomb, just as Robert Oppenheimer, for all his later reflections, remained proud of having built the first fusion bomb.

I saw a copy of the Big Bomb in the bomb museum at Russia's Chelyabinsk 70 weapons laboratory. An Italian woman in our group asked the old laboratory director, "How could you build such a horrible bomb?" He smiled and said, "When the orders come down from the Kremlin, for some funny reason, you do it."[6]

What I am saying is that the state's drive for big weapons is only part of the story, whether in the Soviet Union or anywhere else. From my own observation, it is more often the scientists and the weapons laboratories that entice the powerful in government with new ideas for bombs, rather than the other way around.

WHAT SHOULD ONE DO?

What about individual scientists? How is a scientist to act? Let me say a word especially to those whose careers are ahead of them. We have to think of our country's defense because if we do not, who will beyond the military establishment itself? But—to paraphrase the ancient Jewish sage and teacher, known simply as Hillel—if we think *only* of our own country, what are we? There are ethical/moral lines we should not cross, even for our motherland.

Each person has ultimately to wrestle with himself as to what is legitimate defense and what crosses the line. The important thing, it seems to me, is to bring to your work your sense of what is right, and to ask yourself: What if everyone around the world did as I do? Is that acceptable behavior? And you need to ask this *during* your professional career, when your decisions matter, not to wait until they are merely of academic interest.

HOW LONG CAN WE TICKLE THE DRAGON'S TAIL?

I bring all this up because the importance of nuclear weapons seems again to be on the increase. The stated reasons for developing them or upgrading nuclear

forces have supposedly to do with national defense, but I think the factors I have mentioned—the importance it gives to the participating individuals and weapons laboratories—also plays an important role in urging governments in this direction. The governments seem to hold to the optimistic notion that they can brandish the weapons and gain psychological and political advantage without risking that the weapons will actually be used. We assume we can do nuclear shadow boxing so carefully that no one gets hurt.

This reminds me of an experiment Los Alamos scientists conducted during World War II that was called "tickling the dragon's tail." The aim was to determine the critical masses of nuclear explosives by tapping two subcritical masses toward each other with a screwdriver, all the while measuring the neutron count. The idea was to control the dangers by tapping slowly and carefully so as to cause only very tiny movements. One day the experimenter's screwdriver slipped and the two pieces got knocked too close together, and before the physicist could knock the pieces apart, he got a lethal dose and died a horrible death.[7]

We may be underestimating the worldwide dangers in the same way.

ENDNOTES—CHAPTER 4

1. South Africa built bombs but dismantled them and became a Nonproliferation Treaty signer.

2. The United States and Russia have reduced their stockpiles significantly and apparently will reduce them further, one should note, something for which they should get more credit than they do. But they both intend to hang on to a pile of these weapons indefinitely.

3. See Herbert York, *Race to Olivion: A Participant's View of the*

Arms Race, New York: Clarion Press, 1970, pp. 224-239, available from *www.learnworld.com/ZNW/LWText.York.Race.Access.html*.

4. See *A History of National Security: Mike Shot*, Los Alamos, NM: Los Alamos National Laboratory, April 6, 2010, available from *www.lanl.gov/history/postwar/mikeshot.shtml*.

5. See Enrico Fermi and I. I. Rabi, "An Opinion on the Development of the 'Super'," in *The General Advisor Committee to the Atomic Energy Commission Majority and Minority Reports on Building the H-Bomb*, Washington, DC: The U.S. Atomic Energy Commission, October 30, 1949, available from *www.atomicarchive.Com/Docs?Hydrogen?GACReport.shtml*.

6. Recollection of events by the author of this chapter.

7. See Bryan Hubbard, "A Critical Accident 'Tickling the Dragon's Tail'," *Military.com*, April 7, 2010, available from *www.Military.Com/Content/More Content1/?file=cw_nuclear_slotin*.