PUBLIC POLICY
AND
NUCLEAR THREATS
TRAINING THE NEXT GENERATION

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Reflections on a Career in Physics
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Herbert York was tapped to work on the Manhattan Project the year he received his M.S. in Physics from the University of Rochester (1943). His illustrious career includes many distinctions, among them science advisor to President Eisenhower and first chief scientist and co-founder of the Advanced Research Projects Agency (ARPA/DoD). From 1979–81 York was an ambassador and chief negotiator at the trilateral Comprehensive Test Ban talks between the United States, Great Britain, and the Soviet Union, held in Geneva. His academic career included stints as the first chancellor of UC San Diego (1961–64), and founder and first director of IGCC (1983–88). He was also acting chancellor of UC San Diego from 1970–72. In 2000, he received three major awards recognizing his contributions to science.

The following is an edited transcript of a talk York gave to the first cohort of PPNT Fellows and Associates at the 2003 summer seminar.

I would like to briefly talk about what I did in my early days in regard to my involvement in the atomic bomb during World War II and afterward, my involvement in public policymaking. Then I can tell you what I learned from all those experiences and what might be relevant today to you young scholars in the beginning of your careers and in general.

I was born in 1921, right after World War I had ended. My first political memory traces back to 1932, regarding Franklin T. Roosevelt's electoral campaign. My second political memory involves radio broadcasting, generally international radio news, which gained increasing popularity. To be specific, I remember having listened to the announcement that Hitler was named as the chancellor of Germany in 1933. Even though I was too young to understand, I did acknowledge the news as somewhat important. Those were turbulent times. In 1934, there was Italy's invasion of Ethiopia, one of two independent countries that remained in Africa. I saw it from a newsreel at the theatre; there was this small guy (the emperor of Ethiopia) who was pleading for help in front of the League of Nations. But nobody did anything. A couple of years later, a civil war broke out in Spain. Most people killed there were civilians, and many of them were brutally executed. In Asia, the Japanese had started their invasion of China, and had set up a puppet regime in Manchuria.

Finally World War II broke out in September 1939. At the time the mainstream attitude of people in the United States was isolationist and it was common for Americans to argue that that it was about time for Europeans to take care of their problems themselves. As it was so soon after World War I, World War II was mainly viewed as the continuation of the previous war rather than as a separate event.

I started college in 1939, and while casualty totals became enormous; life in United States went on in a normal way. It was a period where the Great Depression still left a deep scar, and one never thought about careers when entering college. It was more about jobs, what could earn you enough money to support your family. I majored in physics, and through the subject I met some figures that influenced the course of my life. Among them was Victor Raiskov, my advisor and a refugee from Austria. By communicating with him, I began to learn about the European situation as well as the politics and scientific society on the continent.

The attack on Pearl Harbor in 1941 got United States into the war, finally. There were some opportunities for scientists under war situations in nuclear weapons and other secret operations like radar. Soon after nuclear fission was discovered, the idea of a nuclear weapon was conceived and considered possible for the first time. Among the several alternatives I had, I picked the radiation laboratory in Berkeley and I went there in 1942 when we were developing methods for separating U-235 in order to get fast reaction materials for nuclear bombs. Ernest Lawrence and Frank Oppenheimer were two of the famous nuclear physicists who were running the lab. I got to know both of them well.

The inspiration for an atomic bomb was mainly the fear that Germany, the country that had discovered nuclear fission first, might develop the bomb first. We couldn't let that happen. So that was the motivation before the attack on Pearl Harbor. After the attack, the reasoning was purely to win the war. For the record, United States didn't start the Manhattan Project before Pearl Harbor, even though a group of scientists had suggested the project earlier. They were convinced that a bomb was possible by the work being done in Britain at that time. In addition to Pearl Harbor and the fear of Germany, I'd like to emphasize the fact that from the outset it looked as if our side was losing the war. No one thought that we would lose the war, but if you looked at the paper or the newsreels, the territory held by the enemy continued to grow. So our attitude was a little bit contradictory but true. One didn't know how long it would take to end, but all those years between 1932 and 1943, the territory controlled by enemies got larger. The realization was that we were not winning the war in the short term, even one and a half years after Pearl Harbor. In the Pacific region, the Japanese kept their tight grip and kept expanding. 1942, when the Manhattan Project started, marked a change and things got turned around in 1943.

Going back to the Manhattan Project days, I was assigned to control and ensure the quality of uranium, the richness of U-235 per say, in a plant in Oakridge, Tennessee. Until June 1945, nobody was sure whether we were getting close to developing the bomb or not. Back then, no one was aware of the issue of how to use the bomb once developed. Lawrence, Fermi, and Oppenheimer were those who were concerned with the use, the rest of us just wanted to make it work. The question of using/not using was not of concern there. On August 7, 1945, I heard the news that "they dropped a biscuit in Japan." The

development of the plutonium bomb was finished about the same time. The whole notion was giving the Japanese the impression that the United States was ready to unload all those new weapons even if all of them were not available at that time.

Soon after the end of the war, the concern about the atomic bomb had morphed into different concerns such as: What's next? What does the atomic bomb mean in the world of the future? Of course, the dominant feeling was victory. After the war, the Berkeley laboratory continued running and the government/science partnership kept the money flowing. I went to Berkeley with a master's degree and after the war I became a graduate student. The academic energy and enthusiasm of students at that time were remarkable, and Lawrence and Oppenheimer tapped into this body of fairly young and eager physicists. Teller and Lawrence began to promote the idea of a second laboratory. We opened the test site in 1951 and I became involved in the very first experiment in Los Alamos. In January 1952, Lawrence decided to contribute a second lab due to the consequences of the Korean War. I served as director in this new project and hired a gang of thirty something physicists, mostly finishing grad students. Only Lawrence could have done that. With 40 physicists and about 50 other people, the Livermore Project started in 1953.

As the Cold War unfolded soon after, re-instituting the Manhattan Project was discussed. Oppenheimer was working on the question of arms control in the United Nations and in Washington, D.C. There emerged two problems: one being the Russian threat and the other being the nuclear bomb itself. Others considered the nuclear bomb a solution but Oppenheimer didn't think so.

Now let me go to the period of development of the hydrogen bomb. By coincidence, the temperature produced in the middle of making a fission bomb is about the same as that needed to start off a fusion bomb. It was first thought of during World War II, but what spurred the development of the H-bomb was the Russian's successful first atomic bomb test. That was followed by Chinese Communist Party leader Mao's visit to Russia in 1949 and the ensuing Korean War in 1950. In theory, the hydrogen bomb was possible, but it took us another year and a half before it was successfully developed. The attitude towards the hydrogen bomb was about the same as towards the atomic bomb: We couldn't let the Russians do it first.

Meanwhile, I was invited to serve on a Science Advisory Committee to President Eisenhower. As a member of the science advisory committee, some of the questions being asked of us were:

- What is Sputnik and what does it mean? As a consequence, we began NASA and the first space programs.
- Where do we stand in regard to missiles?
- Would the test ban be in the best interest of the United States and can it be monitored?

Eisenhower was of the opinion that the only feasible way to solve Russian threat for the short run was nuclear weapons and technology. In the long run, however, he thought that nuclear weapons are also a

problem to be taken care of. This contradiction produces the situation where you are building weapons while working on arms control. Regarding the question of "Can it be monitored," in our opinion, it probably could. Given the huge energy release of nuclear explosions, one could monitor a nuclear test ban. Regarding the question of "Is it in the best interests of the United States," the rest of members voted positively while I remained stoic. It was not a matter to be left in the hands of scientists, I contended. Nonetheless, those were the days when there were not so many experts who are learned on both sides of issues (the political side as well as technical side). When I expressed my reservations, I was told, "You're all we've got."

Q and A

Q: I would like to ask further about controversies associated with dropping the bomb, especially the issue of racism. If the bomb were developed before the Nazis were defeated, would the United States have dropped the bomb in the same way as we did in Japan?

Certainly, race and racism were issues everywhere. Mind that the major participants in the war—Europeans, Japanese Chinese and Soviets—were more racist than the United States, so in a sense, the question was more universal.

Q: Did you and your colleagues know how the atomic bomb would be used?

I was not surprised about its use. Anyway, most casualties from every war are civilians. The objective in utilizing the atomic bomb was to create a grand, major-scale event in Japan to shock them. The Japanese military, uniquely, never surrendered in battles—meaning they literally fought to the last man. If the battle of Okinawa set the norm, the United States . . . figured only atomic bombs could affect the mind set of Japanese leadership.

Q: In regard to the hydrogen bomb, how differently did people felt about its development?

Hydrogen bombs were considered in much more of a political fashion. They were more for use in deterrence, which was based upon the implicit assumption that it would not be used, but it had to be created in order to prevent future war. Therefore, it was different from the atomic bomb where everyone assumed that it would be used.

Q: When the Cold War was first unfolding did you have the sense that peace was fragile?

The general view was that the peace with Russia was fragile. The Korean War was another shock and people were worried about the duration and fragility of peace. The short-run solution was nuclear superiority and other technical superiority. The idea of deterrence existed right in the beginning.

Q: Tell us more about the Oppenheimer brothers and Teller and other members of Berkeley scientific society—in particular, about Robert Oppenheimer's security hearing.

It was bad timing and probably it shouldn't have happened. It was done without much discussion and we didn't talk about the hearing much. The fact that the Russians were the only country that had confronted the Germans during the Spanish Civil War, made Oppenheimer sympathetic to the Soviet Union. It started off from Spanish Civil War Relief, then one thing led to another, and he became a member of Communist party. Before he went to his hearing, Frank told his colleagues that there was no truth to the allegations that [Robert] was a Communist, but the next day he admitted his membership in Communist party at his hearing. This alienated Frank from both sides of the affair, and it was not until years later that he remerged as an academic.

Q: After the death of Stalin, how did the views of people you had worked with change?

I did think in 1952 that the death of Stalin would lead to changes. After Stalin, Khrushchev was changing things. The Sino-Soviet bloc seemed to come apart, but mainstream opinion in America was that it was just a trick, mere pretense. Consequently, despite all apparent changes, we had to prepare and be aware of enemies.

Q: How would you describe the current state of arms control of the United States? Is it relevant to address long-term concerns and any prospects for future?

On top of American rejection of the ABM treaty, personally, I feel the worst thing is the appointment of Bolton as the current head of the arms control agency. As you may have noticed, he has made a life-long career out of opposing arms control. He's one of those folks who denied any room or use for negotiation in regards to arms control up front.

Q: You had served under Eisenhower when there were mostly scientists involved in missile-related decision-making processes. Since then, the group dynamics changed quite a bit: more of a nonscientific population, leaving scientists as a minority. Any thoughts?

I can safely say that it was during those singular periods where quick decision making and expertise were required when we, scientists, could play some important roles: Sputnik, the atomic bomb, and the Space Race. These stark surprises mandated that we prepare big plans in response. In current times, issues we need to deal with are less critical and non-scientists play a larger role in shaping policy.