The Decision to Drop the Bomb: Personal Observations, Studies, and Reflections

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I was eleven years old when World War II ended, its having gone on during many of the years of my childhood. The atomic bomb seemed pivotal to me and to many others in ending the war. In later years, after obtaining my Ph.D. in physics, I was a staff member at Los Alamos Scientific (now National) Laboratory during the years 1959-1964. My experience there aroused my interest in the history of the development and use of the atomic bomb. This article represents my thoughts, as a physicist, as a Latter-day Saint, and simply as an interested person, on those matters. I am not a professional historian, and many of the references used are secondary, not primary, sources. However, these observations and reflections form a significant part of this essay.

The literature on the use of the bomb is vast. No attempt has been made, nor could be made here, to

make a comprehensive survey. Several of the sources listed in the Bibliography may have similar information or comments about any one point; I havenot tried to list all sources for any point but have usually given sample references.

Prologue

The night had been rainy. It was not clear, despite the urgency in Potsdam to know results, whether the test would take place. [1] Finally the weather cleared and the test was given the go-ahead. Scientists and military people lay on the ground, heads away from the expected blast. Finally it came, together with a fireball that was described as intensely beautiful. [2] The director, J. Robert Oppenheimer, remembered two lines from the Hindu scripture, the Bhagavad-Gita: "… brighter than a thousand suns…" and "Now I am become death, the destroyer of worlds." [3]

Thus did Oppenheimer characterize his initial conflicted feelings about the successful test of the atomic bomb, on what we might call the first day of the Atomic Age, 16 July 1945. Such conflicted feelings were not present, however, when the news of the test and the later use of the bomb on two Japanese cities became public, because to the people in the nations of the Allies, it meant the war was almost over. Indeed, news of the war's end came within days. Reservations about the bomb's use came only later.

The understanding of the atom

Toward the end of the nineteenth century, the scientific success of Newton's laws of motion and gravitation and the various laws of electromagnetism led some scientists to conclude that discovery of physical laws was completed. But there were unexplained phenomena: the spectra of the various chemical elements, for example; for another, the puzzling result of Michelson and Morley that light speed seemed not to depend on motion with respect to the "ether", the material that was supposed to fill space.

The end of the century and the beginning of the twentieth century produced a succession of experiments that showed, by contrast, that our understanding of nature was still greatly incomplete. They included the discovery of the electron, the discovery of X-rays, and the discovery of radioactivity. After electrons had been found, the atom was thought to be an assembly of positive charge with embedded electrons, until it was shown that the positive charge resided in a tiny, dense core—the atomic "nucleus"-- surrounded by largely empty space, with electrons at comparatively large distance away. The smallest of these cores was considered to be a single particle, which received the name of "proton", and its unit positive charge was the same size as the electron's negative charge.

A tremendously significant development in the year 1905 was Einstein's theory of relativity, with implications for space and time that will not be treated here. But a famous result of that theory was the equivalence of mass and energy—energy equals mass times the square of the speed of light. Thus a small mass increment could be manifested as a large amount of energy. In a way totally unforeseen at the time by anyone, including Einstein himself, this discovery would later show that nuclear transformations—including fission, discovered many years later—could yield energies millions of times greater than the chemical energies typically released in ordinary explosives such as TNT. The first quarter of the twentieth century also saw the discoveries that led to quantum mechanics, the science that totally revised our understanding of the atom and its nucleus. Inquiry into the nature of matter and its constituents proceeded at a rapid and urgent pace. By 1927 much of the foundation of quantum mechanics was laid and scientists were standing on the threshold of a new and drastically

different understanding of nature. Those extraordinary developments fostered rapid efforts in research in the years following.

In 1932, James Chadwick found a third particle essential to the understanding of the atom: the neutron. Slightly more massive than the proton, it carried no electrical charge. It now became clear that atoms were made of tiny positively charged nuclei composed of protons and neutrons, with electrons present in the surrounding space. The number of protons determined the chemical element: hydrogen had one, helium two, and so forth, up to uranium, which had 92. In neutral atoms, the number of electrons was the equal to the number of protons. The neutrons in the nucleus added mass but not charge. The protons and neutrons in the nucleus were held together by the "strong force"; the electrons were held in the atom by electrical attraction. The electrical force was involved in chemical reactions; the much larger strong force was involved in nuclear reactions. It was realized that any chemical element could have nuclei of different masses—called "isotopes"—depending on the number of neutrons. Naturally occurring elements were stable; too few or too many neutrons would produce atoms that were radioactive, spitting out particles of very large energy which could disrupt ordinary chemical bonds—thus being dangerous to organisms, which were constructed of many chemical compounds.

The discovery of nuclear fission and the possibility of nuclear chain reactions

After the discovery of the neutron, a number of discoveries led to the possibility of a bomb powered by nuclear energy. In 1933, Leo Szilard, while waiting for a stoplight in London, suddenly conceived the idea of a nuclear chain reaction, in which neutrons would trigger reactions which would release other neutrons to perpetuate the process. He recalled, "…if we could find an element which is split by neutrons and which would emit *two* neutrons when it absorbs *one* neutron, such an element…could sustain a nuclear chain reaction." [4] However, the actual realization of this process would not come until the discovery of nuclear fission. Szilard filed for a patent on his idea the following year.

Enrico Fermi saw that neutrons could be used as probes to investigate atomic nuclei, since they have no electric charge and would not be repelled by nuclei. In 1934 he used neutrons to bombard nuclei of successively greater mass, all the way up the periodic table, and explored what came out. At uranium, element 92, the last naturally occurring element, he inexplicably found that materials that emerged included elements of much lower mass like krypton and barium. He published these results, not understanding what was happening. [5] However, a German chemist, Ida Noddack, studying them, realized that the uranium nucleus was being split into smaller nuclei and published her conclusions. [6] But readers did not understand them and thus ignored them. The concept of nuclear fission—which was accompanied with a large release of energy—was only to come later, after more understanding of nuclei had come about. Had it been clearly identified in 1934, coming from work by an Italian and a German, like Robert Frost's alternate road in the yellow wood, the world would likely be very different.

In succeeding years, Niels Bohr developed a model of atomic nuclei that treated them like drops of liquid. [7] In late 1938 the German scientists Otto Hahn and Fritz Strassmann rediscovered fission but still did not quite understand what was happening. At Christmas time Lise Meitner, a German scientist who had fled to Sweden because of her Jewish background, with the assistance of her nephew Otto Frisch, correctly identified the process as a splitting of the uranium nucleus, using Bohr's liquid drop model to provide theoretical understanding. They named the process "fission", seeing it as similar to biological cell division. [8]

The news produced tremendous excitement in Europe and in America in January 1939 when Bohr visited and told American physicists about fission. [9] Fermi and Szilard, now both at Columbia University, conducted a simple experiment to see whether fission yielded spare neutrons, thus enabling the possibility of a chain reaction, with enormous production of energy. Neutrons would produce flashes on a television tube (oscilloscope.) Szilard later described the event: "We turned the switch and saw the flashes. We watched them for a little while and then we switched everything off and went home…That night there was very little doubt in my mind that the world was headed for grief." [10]

Much research on fission was done and many papers were published in the next few months, especially a paper about the same time as the German invasion of Poland, by Bohr and Princeton physicist John A. Wheeler, laying out the theoretical basis for fission. [11] The other significant event of that summer was a letter, written by Szilard and taken by him and a Princeton physicist, Eugene Wigner, to Albert Einstein, vacationing on Long Island. Szilard and Wigner had trouble finding Einstein's residence and finally were directed to it by a small boy. Their request to Einstein was that he would send the letter, over his name—since that name certainly would arouse attention—to President Franklin D. Roosevelt, urging US research into nuclear weapons because of the possible danger of Nazi Germany's development of them. Indeed there was an indication that Germany was already importing uranium from the Belgian Congo. [12]

Growth of Third Reich and Japanese militarism

In the 1930s, during the development of nuclear physics in Germany, France, Britain, the USA, Italy, and other countries, Germany, under the leadership of Chancellor Adolf Hitler, was rearming and preparing to conquer Europe. The world was fairly indifferent to his rise, figuring that there could never be such an awful war as the great world war of twenty years earlier. Only after the occupation of Austria and Czechoslovakia in 1938 did the western countries start to wake up. The German threat became fully real when Germany and the USSR signed a non-aggression pact in August 1939, promptly followed by Germany's invasion of Poland.

In 1934, many scientists still remained in Germany. As noted above, had fission been recognized in that year, it is quite possible that Germany would have realized the large energy release in fission and would have developed a bomb. One can imagine German use of the bomb on large cities, including London—or even just a demonstration—with resulting complete domination of Europe and western USSR. However, the difficulty of separating the two main isotopes of uranium (see below) would have presented a substantial obstacle.

As the Nazi threat to the Jewish population became ever more apparent during the 1930s, many scientists—many of whom had Jewish backgrounds—fled to Britain and the USA. By the end of 1938, when the actual discovery of fission occurred, the number of leading physicists remaining in Germany had been reduced. The most famous was Werner Heisenberg, Nobel Prize winner and one of the pioneers of quantum theory. But there were many other good physicists still there. It was impossible to tell externally what nuclear research was being done. (In the West, it was rather belatedly realized that research into fission should not be reported in the public scientific journals, although the sudden absence of articles about it was itself a clue that important research on it was being done.) The German importation of uranium from the Belgian Congo was enough to alarm Szilard and Wigner, who were both refugees from Hungary and who had a good idea of Hitler's threat.

While Germany was rearming and expanding its control over neighboring nations, a similar scenario was playing out in Japan. The Sino-Japanese war had begun in 1931, and in 1932 Japan attacked Shanghai. By 1934, Japan had withdrawn from the League of Nations and the Washington Naval Treaty. In 1936, Japan and Germany signed a cooperation pact. In 1937, Japan captured Beijing and perpetrated the Nanjing massacre. Japanese forces attacked the United States gunboat *Panay* in the Yangtze River in December of that year. In 1940, Japan occupied French Indochina. By 1941, many Americans expected war between the US and Japan. Indeed, when Pearl Harbor was attacked, there were charges that Roosevelt and others knew of it ahead of time and allowed it to happen in order to pull the US into war, although mainstream historians discount this. At the same time that Japan attacked Pearl Harbor, it also attacked the Philippines, Malaya, Singapore, and Hong Kong, showing its determination to become the dominant Pacific power.

Development of the atomic bomb

Einstein's letter to Roosevelt provoked an immediate response, that uranium research needed action. [13] However, it was two years before the project got moving and another year before it got into high gear [14] In the meantime, more had been learned about fission.

It was clear fairly early that spontaneous fission could take place in one naturally occurring isotope of uranium, U-235 (where 235 indicates the mass), and not in the other, U-238. Isotopes of an element are chemically identical since they have the same number of electrons. The electrons determine chemical behavior. The difference between isotopes arises solely from differing numbers of neutrons in the nucleus, which yield different masses. U-238, for example, has 92 protons and electrons and 146 neutrons in its nucleus (238 equals 92 plus 146); U-235 has the same number of protons and electrons but only 143 neutrons. Both occur naturally, but U-235 makes up only 0.7% of the natural element, a fact of crucial importance. To make a fission chain reaction in uranium possible, a much larger percentage of U-235 must be present. To increase the percentage, U-235 must be separated from U-238. [15] Because of their chemical identity, the two isotopes cannot be separated chemically. Only a process that depends on the mass can be used for separation, and even that is difficult because the mass difference of the isotopes is only 238 minus 235, or 3, only 1.3 percent. To achieve separation of the two isotopes thus requires a large facility capable of repeating such a process over and over, requiring long time. This was one of the major reasons that the bomb development took years.

The director of the entire effort, later named the Manhattan Project, was eventually chosen in late summer 1942 to be General Leslie R. Groves, who had built the Pentagon. [16] He was clearly a man who could lead and develop a large scale project rapidly. In short order he began the Oak Ridge, Tennessee facility to achieve the separation of the two isotopes of uranium. Three different separation methods were proposed initially: electromagnetic isotope separation, gaseous barrier diffusion, and use of centrifuges. The first two were pursued at Oak Ridge. Electromagnetic separation, using devices named "calutrons", was tried first, but it developed severe problems, and Groves switched to the second method, gaseous diffusion, which required use of porous barriers through which a uranium gas compound could be pumped, over and over. Finding the right barrier material involved considerable money and study. Rhodes comments that when Groves chose the final barrier that it showed he was willing to devote considerable time to the development of the bomb, which in turn showed that he viewed the atomic bomb as a permanent addition to the US arsenal of weapons, not just a weapon to win World War II. [17] Centrifuges were apparently not considered at the time, but their use is the main current method for separation, such as is being done in Iran.

Groves chose J. Robert Oppenheimer to be the scientific director and the two of them chose the Los Alamos site in New Mexico for the main laboratory. [18] Meanwhile, plutonium, a man-made element obtainable from U-238, had been shown to be fissionable. It could be made in a "nuclear reactor," in which uranium fission could proceed in a controlled manner. In Chicago Enrico Fermi constructed such a reactor and demonstrated its successful operation in December 1942. (Achieving the controlled reaction, as opposed to an uncontrolled one, was a fairly delicate matter. Fortunately for the participating scientists, and indeed the city of Chicago, Fermi had complete control of its operation—using only a slide rule for calculation—and kept the reaction at a reasonable level!) [19] This first reactor paved the way for the choice of the Richland, Washington area for construction of large reactors for the production of plutonium.

The Los Alamos Scientific Laboratory began operation on 1 January 1943, on a mesa in New Mexico, in primitive conditions and in total secrecy. [20] The ultimate theory and design of the uranium bomb, later called Little Boy, were quite simple. The roadblocks to be overcome included provision of enough U-235 for experimentation and for the bomb itself; measurement of various parameters such as "cross sections" which could determine probabilities of producing a chain reaction; design of a method to cause rapid ignition of the explosion so as not to disperse the uranium before it could explode; and other matters of construction. The plutonium bomb (Fat Man) was trickier; only in 1944 was a method of bomb construction (using "implosion") developed that could yield a workable device. It was this type of bomb that was tested at Alamogordo in July 1945. The uranium bomb was simple enough, and the supply of uranium so small, that it was deemed not necessary to test it.

The German project

Fear of possible German development of a bomb drove researchers in their work. But what did happen in Germany?

The actions of Heisenberg were of course unknown. Was he actually leading an atomic bomb project? Or was he not doing anything on this line? Or was he leading a project but intentionally dragging his feet, because he might have wanted the Allies to win the war or because he knew the immense destructive potential of the bomb?
A recent play, "Copenhagen", by Michael Frayn, presents possible conversations between Heisenberg and Bohr and Bohr's wife (Margarete) when Heisenberg went to the Bohrs' for dinner in 1941. They apparently discussed the possibility of a nuclear bomb; the play attempts to reconstruct the conversation. Frayn did considerable research on later correspondence about the conversations. Opinions differ on what was actually said; the matter is sufficiently complicated that it will not be treated here. Suffice it to say that there is some indication that Heisenberg was aware of possible German efforts to develop a bomb. [21]

After the war, when Heisenberg and other scientists were being held at Farm Hall in Britain, he was asked about a possible German project. His response was ambiguous. (More details are provided by Groves. [22])

Information about the German nuclear effort was eventually provided by the "Alsos Mission." This was an investigation into weapons, including nuclear weapons, that might have been developed in Italy and Germany. A team of intelligence and military officers and scientists followed Allied troops into Italy in 1943 and 1944 and into France and Germany in 1944 and 1945, searching for German and Italian scientists and research work into such weapons. While there was some indication of nuclear research, it became clear by November 1944 that there was no German bomb and that

Germany was nowhere near its development, although rumors of such a bomb continued until the spring. There was a small but likely ineffective nuclear reactor. Thus the original concern, which had served as the initial motivation for the Allied development of the bomb, was removed. [23]

Why was the effort so small? It is clear that there was never a centralized laboratory in Germany like Los Alamos which could have coordinated the research. This is made clear by Groves. [24] It may be that the available amount of U-235 was small in quantity and was shuttled from place to place, so that no one laboratory or university could make much progress in research with it. Frank notes that the estimate of amount of uranium for a bomb was overestimated, leading the Germans to conclude that a bomb was impossible. [25] An unanswered question, as noted above, was how much Heisenberg was involved, and how effective he was in such an effort. There is a remote possibility that had circumstances been different the Germans might have indeed created a bomb. But the remarks made at Farm Hall by German scientists, including Heisenberg, after hearing of Hiroshima, indicate that they never considered making a bomb because they thought it was too difficult, particularly the separation of U-235 and U-238.

It is also known that there was a small Japanese effort to develop a nuclear bomb. According to Groves, this was discounted early in the US because of the lack of a large number of good nuclear physicists in Japan and the lack of industrial capacity. [26] Frank says that the Japanese government was interested in producing a bomb, but the project was pursued only half-heartedly, and also Japan was short of uranium. Allied bombing raids eventually destroyed the facilities. [27]

Notwithstanding the removal of the main fear about a German bomb, research on developing the bomb continued, mainly in the US but also in Britain. It was considered by US political and military leaders that it would indeed be available for use in the war and would in fact be used, as discussed further below.

Considerations and concerns about use of the bomb

As early as 1943, Niels Bohr made an effort to spread knowledge of the bomb among the allied nations, including the USSR, to avoid what he could foresee as an arms race. His effort was doomed to failure. He talked to Churchill, but the conversation was diverted and besides Churchill didn't trust him. Bohr did not communicate well, he was hard to understand, and he didn't make his case. He also met with Roosevelt and thought he had an ally, but Roosevelt later signed an agreement with Churchill rejecting the idea of an international agreement. [28] Bohr tried to see Truman after Roosevelt's death but was unable to, partly just because they couldn't make their schedules agree. A contact with the Soviets might well have been fruitless in any case; the Soviets, through the spy Klaus Fuchs, already knew about the US work on the bomb. Some feel that the unannounced United States use of the bomb damaged US-USSR relations. My own feeling (see below) is that relations were already deteriorating.

Targets for use of the bomb on Japan were considered by a target committee, composed of Groves' officers and scientists, which met in April and May 1945. After Kyoto, the ancient Japanese capital, had been removed from the target list by request of Secretary of War Henry Stimson, Hiroshima was at the top. Further discussions were held by the "Interim Committee," a group appointed by Stimson to look at the bomb's use, which met in May 1945. [29] Frank notes that the committee did not have a mandate to decide whether the bomb would be used, but it did look at alternative scenarios, including:

1) Demonstration of the bomb on an uninhabited island, with or without advance notice to the Japanese. This was rejected because of the possibility of failure, which would make the Japanese even more resistant to surrender.

2) Demonstration on a specified city, with advance warning. This was rejected for the same reason, also because the Japanese might move American prisoners into the city before the demonstration. (It should be noted that, in the end, Japanese cities were notified after the bombing of Hiroshima but before the bombing of Nagasaki via air-dropped leaflets that the United States possessed a highly destructive weapon that the Japanese had witnessed used on Hiroshima, and that evacuation should take place.)

Another consideration was the scarcity of bombs. One bomb had been used in the test at Alamogordo; two bombs were used on Japan. On a visit to Los Alamos in 1990, I found myself at lunch with a man who knew the bomb inventory in 1945. Upon being questioned, to the my recollection, he said there were no more bombs immediately available. Of course, materials for more bombs were rapidly being produced at Oak Ridge and Hanford. McCullough says there was one bomb available. [30] Frank says that there would not have been another bomb ready until August 21. [31]

The committee's final report recommended use of the bomb against Japan as soon as possible without warning. [32]

As 1945 progressed, some scientists, e.g., Leo Szilard, began questioning whether it was advisable or moral to use the bomb. Szilard circulated a petition against its use, which did not see the light of day. [33] Some regretted the headlong development of the bomb, in which most scientists never seriously questioned its assumed later use. After the recommendation of the Interim Committee had filtered down, James Franck and others sent a report to Secretary Stimson suggesting serious review of whether the bomb should be used, anticipating the possibility of an arms race. Eventually nothing came of it. [34] (The disappearances of Szilard's petition and Franck's report support Alperowitz' claim that there was suppression of opposition to its use. See below.)

Events of 1945 leading up to the use of the bomb on Japan

Several events happened in rapid fire in 1945. In the first few months Allied forces closed in on Germany from both the west and the east. Roosevelt died suddenly on April 12 and Harry Truman, full of trepidation, became the US president. Hitler killed himself on April 30, and a week later Germany surrendered. Henry L. Stimson told Truman in detail about the bomb on April 25; neither Roosevelt, nor anyone else, had told him about it before. [35] The Potsdam conference, to discuss the end of the war against Japan, was scheduled for July, and was to feature leaders from the US, Britain, and the USSR. Scientists at Los Alamos raced to conduct a bomb test in time for the conference.

Truman inherited existing plans for prosecuting the war and apparently made no effort to change the strategy. Before he became president there already had been considerable bombing of cities, with huge loss of civilian lives. Hamburg and Dresden in Germany had suffered firestorms. Tokyo and other cities in Japan had been bombed with large loss of life due to the crowded conditions and the flammable buildings. The possible use of the atomic bomb seemed to many as just a continuation of the strategy of bombing cities. Efforts were made in the selection of atomic bomb targets to choose cities with large military installations.

There have been moral, if not legal, restrictions, in the past, against killing civilians in warfare,

although that prohibition was often honored only in the breach. The advent of large scale bombing exacerbated the issue. Why was bombing conducted on cities in World War II, especially during the last year? One reason is that it is difficult to bomb military installations without killing civilians. (Frank 1999, pp. 7, 39, makes the point that in Japan residential and industrial areas were often closely intermixed.) A second reason is that it was felt that killing civilians would help destroy the will to fight among the enemy. [36]The issue is actually complex; it is discussed in many places by Frank. [37] (Also see a discussion of the history of international law on this matter in J. Reuben Clark, Jr.'s talk. [38])

Plans were being made for an invasion of the Japanese home islands by the US Army. They contemplated an invasion of the southern island of Kyushu in November 1945 (Operation "Olympic") and of the Tokyo area of Honshu in Spring 1946 (Operation "Coronet"). The US strategy had been to bomb and blockade, and some people hoped that would be sufficient to force Japan to surrender, but plans for the invasion were going ahead anyway. Frank discusses these plans extensively. [39]

Unknown to US planners until intelligence (MAGIC and ULTRA operations) gradually revealed it, the Japanese were expecting an invasion of Kyushu and were mounting a massive buildup of forces there, called the Ketsu operation. Although Japan had suffered greatly from conventional bombing and from the blockade, Japanese military and political leaders hoped that a stout, all-out defense of Kyushu would deter the US forces and cause a reassessment of the war in the United States, especially in view of the "war weariness" felt by many. They believed that the United States had no stomach for a protracted war and that it might have been willing to consider a negotiated peace. (But see comments below in Group B.)

Reasons for the use of the bomb on Japan

1. It seems to have been assumed for a long time that the atomic bomb would be used against Japan, as indicated, e.g., by Roosevelt and Churchill in late 1944. [40] Groves said that while it is often assumed that we developed the bomb so that Hitler would not get it, the original decision to make the project an all-out effort was based upon using it to end the war. (Groves 1962, p. 255.) (See also remark above that Groves considered it to be a long term addition to the US arsenal.) In a sense, one could characterize this as just "momentum" carrying the project along. [41] Alperowitz, however, argues extensively against momentum arguments and suggests that the final decision was made only in the summer of 1945. He ultimately places much of the blame for the use of the bomb on James F. Byrnes, Truman's secretary of state, who opposed clarification of the statement in the Potsdam declaration about the status of the emperor. [42]

2. One uses the weapons one has. Part of the reason for this is to satisfy the people of the nation. General Groves stated forcefully that if we hadn't used the bomb, and the war had continued anyway (with the implied assumption that the bomb did indeed help end the war quickly) that the president would, rightly or wrongly, be blamed for lives lost after some particular date. [43] It has even been suggested that if the president had the bomb and didn't use it and the war was prolonged, that that would have been grounds for his impeachment. (See remarks by Raymond Swenson in [44].)
Churchill is characterized as saying much the same thing: "Churchill believed, correctly, that if you get into a fight, you have got to let your enemy know that they are losing, and you have got to make the point with whatever tools you have available." [45]

3. A very important reason for using the bomb was a conviction that Japan would not surrender without some sort of dramatic, forceful action such as the bomb provided. This is discussed extensively by Frank. [46] The Ketsu buildup, which left the U. S. Army in a quandary about likely

failure of Operation Olympic, lent considerable force to this conviction. The Japanese style of battle, resistance to the bitter end rather than surrender, was a consequence of the Japanese culture, including the importance of saving face and the warrior tradition. Surrender was regarded by the Japanese as dishonorable. No Japanese units had surrendered during the entire war. [47] The brutal treatment of American prisoners who surrendered at Bataan and Corregidor may have been correlated with their Japanese captors' belief that they had dishonored themselves by surrendering and therefore were not deserving of humane treatment. The bloody campaigns for the Pacific islands, Guam, Saipan, Guadalcanal, Iwo Jima, Okinawa, and others all indicated the extreme Japanese resistance to surrender; the ratio of those killed to those surrendered was much higher among Japanese troops than among Americans, Germans, or other nationalities fighting in WWII. Many Japanese participated in kamikaze suicide flights. These facts strongly suggested that an invasion of the Japanese home islands, necessary if the war continued, would be terribly bloody, leading to deaths of large numbers of Allied and Japanese fighters. There was considerable uncertainty about the estimated number of casualties. The figure usually heard is a million American lives. Frank supports larger figures, Alperovitz, smaller. [48] It is also likely that Japanese casualty figures would be very large. The Japanese, in their efforts to fortify Kyushu, were mobilizing men, women, and children, of all ages, and these would have all been at risk. [49]

A consideration not often mentioned is that a forceful end to the war was greatly needed in order to encourage Japanese forces throughout the Japanese empire—in China, Korea, the Pacific islands, as well as in the home islands—to surrender without prolonging the war. This was of much concern to American leaders right up to the final surrender. It is discussed extensively by Frank. [50]

Another matter was the fear that Allied prisoners of war might be harmed on the occasion of a Japanese surrender; General George Marshall and President Truman were greatly worried about this. [51] There was indeed a Japanese order, called the "kill-all policy," dated 1 August 1944, that prisoners were to be killed in various eventualities. [52]

4. We used the bomb against Japan because of anger and resentment resulting from, and retaliation for, the Japanese attack on Peart Harbor, which followed Japanese military buildup in the Pacific (see above.) This reason presumably underlies other reasons, such as the three listed above. It is somewhat more visceral than other reasons. It may be partly responsible for the insistence on unconditional surrender. The author is indebted to Brianna Higa, who, after reading the paper and doing her own study of the situation, suggested that resentment about Pearl Harbor was the basic reason for use of the bomb. [53]

What evidence is there for this interpretation? Perhaps the strongest evidence that can be given here is my own recollections of the tenor of the times. The daily newspapers were filled with reports of the progress of the war. After the end of the European war, the focus was entirely on the war in the Pacific. Resentment about the attack on Pearl Harbor continued unabated throughout the war (as indeed, it continues even today.) Political cartoons ridiculed the Japanese with racial epithets and expressed joy over each Allied advance. Japanese resistance to surrender surely was clear in accounts of the battles for islands like Guam, Iwo Jima, and Okinawa; but the remarks that stand out more in the author's mind are comments like, "They deserved what they got. They had it coming. After all, they bombed Pearl Harbor." The Pearl Harbor Memorial in Honolulu Bay still arouses great emotion in visitors, as felt by my wife and me on a recent visit.

Two quotes are given here as illustrations supporting the view that Pearl Harbor feelings determined our actions. The first is from Assistant Secretary of State Joseph Grew, July 10, 1945: "We have

received no peace feelers from the Japanese government…Conversations relating to peace have been reported to the Department from various parts of the world…*The nature of the purported 'peace feelers' must be clear to everyone. They are the usual moves in the conduct of psychological warfare by a defeated enemy. No thinking American, recalling Pearl Harbor, Wake, Manila, Japanese ruthless aggression elsewhere, will give them credence…Japanese militarism must and will be crushed…The policy of this Government has been, is, and will be unconditional surrender."*[54; Italics added] (It is noteworthy that Grew was ambassador to Japan at the time of the 1937 *Panay* incident mentioned above.) The second statement is made by Frank: "In 1945, Americans of all ranks remembered very well the image of Japanese diplomats in ostensible parleys for peace in Washington at the moment bombs rained on Pearl Harbor. Thus, Americans were not disposed to accept the words of Japanese diplomats as definitive proof of their nation's intentions." [55] (The official Japanese declaration of war on the US was delayed and did not reach our government until hours after the Pearl Harbor attack. Hence, forever after, the attack was regarded as a "sneak" attack.)

Revenge, suggested here, cannot justify the use of the bombs by themselves. Other reasons provide greater justification. But this reason does make the decision more *understandable.*

5. Considerable money had been spent by 1945 to develop the bomb. Total cost of the project was eventually estimated at two billion dollars. There was undoubted concern about the reaction of the American people when they found out that such a sum had been spent for some untested "pie-in-the sky" weapon, had it not been used. [56]

6. It has been suggested that race prejudice against the Japanese played a role in our decision to use the bomb. It certainly existed but almost certainly played a secondary role. No attempt will be made here to consider this matter in detail.

7. A reason sometimes given for use of the bomb, especially the second one on Nagasaki, is that it was thought necessary to forestall the USSR, which came into the war two days after Hiroshima, from occupying Japanese territory and tipping the balance in the Far East—even though the US had hoped for Soviet entry into the war. [57] Critics of Truman's decision to go ahead with the bomb's use sometimes suggest this, calling it "atomic diplomacy." [58] Frank considers this and states that it was not a serious reason, especially in view of the paucity of knowledge about the Soviet invasion of Japanese-controlled territory. [59]

However, the use of the bomb established the leadership and military superiority of the United States in the post-war world. The urgency of the development of the bomb and its use is stressed by Edward Teller in his 1983 introduction to General Groves' history of the Manhattan Project; "In the struggle against totalitarian military might…the awareness of the overriding importance of defense has rested with men who, like Groves, understand that only strength can counter an adversary determined to enforce his goals by physical force." [60] It is quite possible that the U. S. atomic bomb was the only thing that deterred Soviet expansion into western Europe after the war, as, for example, seemed to be threatened by Soviet moves in Germany. [61]

8. A related reason was that use of the bomb by the USA was better than not using it and then having another nation develop it and perhaps use it in war. Groves and others have made the point that, as noted below, atomic energy would have been developed somewhere in the world in the mid-twentieth century. [62] This is actually a very important consideration. Imagine the world if we had not used it, and then the USSR developed it and then demonstrated or used it…

9. (This reason must be considered as after the fact, and so is more a result.) Col. Terry Hawkins, in a

recent talk, supported by a detailed publication, said that the number of fatalities in war had dropped considerably after the use of the bomb, with a bar graph showing that and attributing at least some of that reduction to the knowledge of the atomic bomb. [63] My own father made a similar comment, that maybe the bomb needed to be used in order for people to see what it could do and thus to be frightened by it. An acquaintance observed to the author that use of the bomb may have prevented World War III.

The following is a list of individual reactions, after the fact, to the bomb's use.

1. An observation by a military man, who later lived in Japan during his military service, is supportive of the use of the bomb. He said that while he lived in Japan, he asked citizens there about their opinions on the use of the bomb against them at the end of the war. They said that while they initially were horrified that the US would use such a dreadful weapon on their cities, later they recognized that it essentially saved their nation; had the invasion of their home islands proceeded—with presumed continued conventional bombing and the use of other weapons—it might well have devastated Japan to an unbelievable extent. Thus they were finally grateful that the war could be brought to such a quick end. [64] (A contrary opinion was given by Bramwell, who indicated that he had found considerable bitterness in Japan about the use of the bomb, many years later. [65] If, as some have remarked to me, the Pearl Harbor attack is not taught in Japanese schools, then such bitterness would be expected. [66])

2. I had a personal experience that dramatically illustrated the strong feelings some had about the end of the war. About 1972, I was teaching an honors course with other facult, about various science topics, and chose for the physics topic, the decision to use the bomb. In preliminary discussions, all the faculty saw a film originally produced in 1965 for TV by NBC on that decision [43], and then they discussed the pros and cons afterward. Suddenly one faculty member broke down in racking sobs, and amid the sobs said, "I was on a ship headed for Japan for that home island invasion. *You cannot imagine the relief we felt to know the war was over and we did not have to invade Japan.*" The rest of us were silent. There seemed nothing more to be said.

3. A similar remark was made to me by an individual who told him that his father served on Iwo Jima, was almost killed there several times, and who was convinced that if an invasion of Japan had been necessary, his father would not have lived. [67]

4. In the talk by Col. Terry Hawkins mentioned above, he says he ate lunch once with Tennessee Senator Albert Gore, Sr., who told him of flying into the island of Tinian in early August 1945 and seeing the runway lined with stacks of coffins, anticipating the invasion of Japan. But then, in a meeting on the island, General MacArthur entered with a smile on his face and said, by the time they saw a newspaper the war would be over. When they saw the newspaper, they saw the announcement of the dropping of the atomic bomb.

One can also give reasons against the use of the bomb. These are concerned mainly with developments after the war. As Frank notes, a substantial percentage of Americans, much higher than at the end of the war, currently feel that the United States was wrong to use the bomb. [68] But such reasons are essentially "Monday morning quarterbacking." One had to be on the scene at the time, having the information that our government and military leaders had, to properly judge whether the bomb's use could be considered justified.

1. Its use, especially without prior notice to the USSR, perhaps contributed to the eventual cold war. This is somewhat questionable, since the USSR had already embarked on its own research, aided by the information provided by the spy Klaus Fuchs. Secretary Stimson commented in September 1945 that Soviet research would be stimulated by the bomb's use unless the USA and the UK brought it into the fold voluntarily.69 Whether the bomb's use provoked later Soviet intransigence is open to question. In the author's opinion, and that of many others, the cold war would likely have happened anyway. Contributing to that development were Stalin's personality, paranoia, and fear of western pressure against the USSR.

2. The use of the bomb by the USA compromised, in many persons' eyes, the moral position of the USA.

3. It is possible that the bomb's use may have encouraged possible further use of the bomb by the USA in later conflicts. Eisenhower's forbearance may have forestalled that possibility (see section below).

4. The bomb's use certainly encouraged other nations to develop nuclear weapons for themselves. At the same time, knowledge of its tremendous power may have deterred other nations from using it in war, despite the many regional wars that have occurred since 1945.

The final decision to use the bomb against Japan in the summer of 1945 and the Japanese surrender

Truman envisioned using the bomb on Japan from his first knowledge of it. This is suggested in the "momentum" argument above. He anticipated news of the New Mexico test while at the Potsdam conference in July 1945. Proceeding out of that conference came the Potsdam Declaration on July 26, stating the terms expected in a Japanese surrender. [70] It did not state the final status of the Japanese emperor. After considerable debate the Japanese government decided to *mokusatsu* the Declaration, which could mean ignore it, treat it with silent contempt, or withhold comment. The meaning of the word has been debated over the years. But it was interpreted at the time as indicating that the Japanese intended to fight on. With that decision, Truman's order to use the bomb, without further warning, went ahead. [71]

It was suggested that the Japanese be given some warning before its use. Roosevelt and Churchill did suggest this long before, as we have noted. The leaflets dropped said nothing about what would happen to the Japanese emperor.

The bomb was used against Hiroshima on August 6 and against Nagasaki on August 9. No further bombs were used. One reason was the scarcity of bombs, as noted above. Another reason was that Truman didn't want to use any more bombs; he hated the thought of "killing all those kids." The Japanese surrendered on August 14.

These are the bare, public facts. The details of what went on behind the scenes, however, are fascinating and complicated. They are discussed by both Frank and Alperovitz. [72] Much information was obtained by the intelligence operations MAGIC and ULTRA. As noted above, the Japanese were planning a stout defense of Kyushu in Operation Ketsu. Defense of Shikoku, a neighboring island, was also planned. The Japanese were expecting to continue the war in land

battles on their home islands. The Emperor, his cabinet, and the armed forces seemed all to be in agreement on this policy. Despite the horrific destruction inflicted by bombing raids, they planned to fight on. A significant insight is that the Emperor wished to preserve the "sacred regalia"-- a mirror, a curved jewel, and a sword--that had been passed down for thousands of years. Frank points out that this indicated that his primary concern was the preservation of the Imperial Institution, not the welfare of his subjects. [73] 73 However, a reviewer of this paper notes that the two considerations are not mutually exclusive in view of the importance to the people of that institution.

There was an attempt made to seek a negotiated peace using the USSR as an intermediary. [74] This did not go anywhere; the Soviets seemed unresponsive. This suggests the possibility, in retrospect, that the USSR did not want peace right away because it was planning on entering the war and taking over Japanese-occupied territory. Indeed, the USSR had begun planning for its Manchurian invasion as early as March 1945. [75] Alperowitz believes that the possibility of negotiation might have borne fruit given enough time, as discussed extensively in Alperowitz (1995).

The use of the atomic bomb on Hiroshima did not immediately move the Japanese to consider surrender, even in view of President Truman's announcement about the imminent threat of destruction of Japan's power to make war. Alperovitz challenges this conventional assumption. [76] Many Japanese leaders, military and civil, minimized the damage to property and life and even correctly assumed that the USA could not possess more than a few such bombs, also suggesting that world opinion would force the USA from perpetrating another such "inhuman atrocity". The bomb indeed did "unsettle" the Emperor. But by midnight on August 8, the Japanese government had still not met to consider the implications of the new weapon. [77] A reviewer of this paper observes, however, that it may have been that the Japanese leaders simply had not been able to process the implications of the situation.

On August 8, the USSR declared war on Japan and invaded Manchuria. A few hours later, the bomb was dropped on Nagasaki. Due to various difficulties (such as with weather and target selection), the damage was less than in Hiroshima and so the effect on the Japanese leaders was smaller than it could be, but it still made it clear that the USA had more than one bomb. There was now considerable confusion and disagreement among the Japanese leaders and people over which course to take. Some people have suggested that the Soviet declaration was decisive in bringing about surrender; Frank discounts this, noting that information about the Soviet invasion was erroneous or missing, and Alperowitz challenges the conventional assumption that the second bomb was necessary. [78]

The actions of the Japanese government during the final months of the war were extremely convoluted. It is sufficient here to note that there were only eight men at the time who determined the war's course of action: Emperor Hirohito, Lord Privy Seal Marquis Kido, and the Supreme Council for the Direction of the War, the so-called "Big Six," which was composed of two political leaders and four military leaders. The Big Six made decisions by unanimity, and decisions were then subject to approval by the full cabinet. [79]

After the Nagasaki bomb, the Big Six were divided as to a course of action. Three favored accepting the Potsdam declaration with only a single proviso, a "guarantee of the Emperor's position," the "one-condition offer." The other three insisted on the "four-condition offer," which included the additional requirements: self-disarmament, Japanese control of any war-crimes trials, and no Allied occupation of Japan. In a rather confused action, Prime Minister Kentaro Suzuki eventually announced acceptance of the Potsdam declaration but with the four conditions. But there was still division, and finally Suzuki submitted the matter to the Emperor for a final decision. Although the Emperor had

earlier supported continuation of the war, at this time (August 10) he spoke in favor of accepting the Allied proposal (the Potsdam declaration.) This decision was approved by the cabinet and was sent to Allied headquarters, with the condition that this "does not comprise any demand which prejudices the prerogatives of His Majesty as a Sovereign Ruler." [80]

Confusion still reigned, on the Allied side and the Japanese side. The Japanese Army was not ready to concede. There was concern about the additional condition, spoken of in the preceding paragraph, which the Japanese felt was necessary, but which the Allies felt fell short of unconditional surrender. The Americans continued conventional bombing and even started to consider a third atomic bomb, perhaps on Tokyo itself. Secretary of State James Byrnes sent a reply to Japan, stating that the Emperor would be subject to the Supreme [Allied] Commander but also stating that the ultimate form of government would be established by the "freely expressed will of the Japanese people." [81]

On August 14, the Emperor announced to his cabinet and other officials, with everyone in tears, that he deemed the Allied reply to be acceptable. The next day, August 15, at noon on the radio, he announced Japan's capitulation to his people, provoking much outrage and consternation. In the USA (August 14, USA time), Truman was on the verge of ordering an atomic bomb to be dropped on Tokyo when he received official word at 4:05 p.m. of Japan's decision to surrender. [82] (The truth of this statement relates to the number of bombs available at the time.)

It was clearly the Emperor's intervention that brought about the Japanese surrender. However, despite his considerable authority, a number of high-ranking military officials attempted a coup d'etat. Lacking support from critical leaders, however, it eventually failed, although one man was murdered. Two coup leaders, plus Army Minister Korechika Anami, committed suicide. [83] Thus the end of the war was problematic even at this late date. Fortunately, there were no major incidents among Japanese outposts throughout Asia and the Pacific.

Brianna Higa raises a very provocative question: what would have happened had we simply stopped fighting? She notes that this would have been highly unlikely in view of our continuing anger about the attack on Pearl Harbor. But the question is worth asking. After all, the Japanese economy, military, and cities had been devastated. What threat could they have mounted had we just quit, or even if we had tried to negotiate a peace? (One can hear Alperowitz in the background saying, "Exactly!")

Probably the answer to this question is multifaceted. Had we just stopped fighting, the belligerent side in Japan would have continued to exist. The Japanese economy would have been rebuilt, and the balance of power in the Pacific might have reverted to the pre-war state. There were still Japanese forces in the Pacific islands and in China that would have continued to exist. There would have been a vacuum in Japan and the Far East that the Soviet Union would have been happy to fill.

The result of the situation as it developed was that the USA was firmly established as a world power. Many people in the world deplore that situation; but from the author's point of view, that is a good thing.

Reaction to the bombing and the end of the war

There was tremendous joy among the American people, as this author remembers, that the war was over. It was widely believed that the use of the bomb had indeed brought a quick end to the war. There was great curiosity about what it was and how it worked. This author remembers attending a

fireside in which a BYU physics faculty member explained the bomb's operation to curious attendees.

More sober assessment, with regrets, came only later, especially as the extent of the damage to the two target cities was realized, together with the understanding of the destruction, the maiming, and the injuries that resulted. Many injuries were similar to those from previous conventional bombing, which was terrible enough, but the new developments were the fact that only one bomb was needed to obliterate a city and the horrific advent of death from radiation poisoning. Thus gradually there arose public discussion about the morality and the need for the bomb's use and questions about whether there were alternatives. Scientists themselves had conflicted feelings. Oppenheimer himself went to see Truman and said, "Mr. President, I feel that I have blood on my hands." Truman was coldly unsympathetic, noting that it was he himself who gave the order to use the bomb and that he had no regrets. Afterwards he instructed his staff not to allow Oppenheimer to see him again. [84] Szilard expressed reservations. Einstein's reaction, when he heard the news, was to utter a German cry of deep despair: "Oh weh!"[85]

The mixed feelings about nuclear bombs affected the later debate about the development of the hydrogen (thermonuclear) bomb. That, however, is another story (Rhodes 1995.)

It is noteworthy that Truman later expressed real concern about the use of the bomb. [86] He refused requests to turn control of nuclear weapons over to the military, said that it was the commander-in-chief's responsibility, and that—in view of its potential for killing women and children—it was *not* a military weapon.

One can ask, had we known ahead of time about the terrible deaths and injuries that would result from the use of the bomb, would it have affected our decision? Actually, we did know. The experimental test in New Mexico in July certainly showed the bomb's power, and the scientists were well aware of the intense radiation that would result from an atomic explosion. Leaders in the military and the government also knew.

Was Japan on verge of surrendering?

One of the claims made in the decades after the war is that the bombs were not necessary to force Japan to surrender. [87] This is the main question raised by Alperovitz 1995, in a very extensive and well documented treatment. His claims are basically two: that the possible intervention of the USSR in peace negotiations may have brought about surrender and that the Allied insistence on unconditional surrender prevented an earlier surrender. [88] He not only claims that the bomb use was unnecessary but also suggests that there was and continues to be government deceit in claiming the use was necessary. He cites many US leaders, both political and military, who had doubts about the use of the bombs.

Frank 1999 (see, e.g., Chaps. 18-20) provides a detailed refutation of those claims. He considers extensively the confusion among the Japanese leaders, the resistance of many of them to surrender, the cultural resistance to surrender, the abortive palace coup—something not done in so much detail by Alperowitz. Frank quotes at great length from Japanese documents and transmissions, including a 1946 statement by Emperor Hirohito, called the *Showa Tenno Dokuhakuroku (Showa Emperor's Monologue).* This author considers the Japanese situation, knowledge of much of which was available to US leaders by means of the MAGIC and ULTRA intelligence, critical to the entire matter. The matter is also discussed by McCullough, who also concludes that surrender would not have happened without the use of the bomb. [89]

Moral and legal questions

What is the reaction of a religious person, a Christian, a Latter-day Saint, such as the author, to the use of the bomb?

One well known Latter-day Saint, certainly, was horrified by its use. This was J. Reuben Clark, Jr., at the time a member of the First Presidency of the Church. He was already known to be a strong isolationist, opposed to American intervention in foreign wars. He condemned the use of the bomb in a public speech (Conference Report, October 1946.) His isolationism is explored in a Dialogue article by Hickman and Hillam but will not be discussed here. [38]

The question can be considered in the context of general LDS views about war and participation in it. While deploring war, LDS leaders have counseled against conscientious objection and have allowed, even encouraged, young LDS men to serve in the military. Brigham Young encouraged the enlistment of men to serve in the Mexican War in the Mormon Battalion, though partly for the financial benefit that would bring.

The Book of Mormon certainly encourages participation in war when necessary, under certain circumstances. Captain Moroni is the leading example. It is important to note that he was a righteous man; his actions were taken under the guidance of the Holy Spirit. He counseled his people to fight for their families, their religion, their country, their freedom (Alma 43:9, 45, 47-48; 46:12, 20, 28; 48:11; 53:17; 58:12). He and other Nephite leaders led their forces valiantly. It is clear from scriptures throughout the Book of Mormon, though not in as much detail, that the Nephites defended themselves regularly against the Lamanites. In the long conflict treated in Alma, It is clear that they did not seek blood (Alma 43:54; 48:14, 16, 23; 55:19; 56:46); many battles were conducted bloodlessly and many prisoners were freed and not executed. But it is also clear that when the Lamanites refused to surrender that the Nephites did not hesitate to kill them (Alma 44:10,17; 52:32; 53:17; 56:54; 57:33), similar to continuing to fight against the Japanese when they did not surrender.

There were guidelines. One doesn't make the first move (Alma 43:46, 3 Nephi 3:20-21.) One defends one's country, family, religion, when necessary, as noted above. One does not kill more people than necessary (Moroni's interaction with Zerahemnah in Alma 43:54; the people of Lamoni not killing their enemies, although that was largely brought about through their repentance, Alma 24 and following; Moroni and Helaman's stratagems of regaining cities without bloodshed, Alma 49, 52, 53, 55, 58, 62).

An LDS apostle, Elder David O. McKay, made a number of comments on war. The entire Chapter 20 of his book, *Gospel Ideals,* is devoted to the subject. An often quoted paragraph, from his remarks in April 1942 Conference, is: "There are, however, two conditions which may justify a truly Christian man to enter—mind you—I say *enter, not begin*—a war: (1) an attempt to dominate and to deprive another of his free agency, and (2) loyalty to his country. Possibly there is a third, viz., defense of a weak nation that is being unjustly crushed by a strong ruthless one." [90] These comments were made shortly after Pearl Harbor and their application to the later use of the bomb is tenuous. Other remarks in that chapter do not mention the bomb.

None of this anticipates the specific question about the use of the bomb, which of course was unprecedented, but it does provide a useful guide to LDS general principles on war.

There are actually legal questions, as well—did the use of the bomb violate certain international

conventions or laws or guidelines? The matter is unprecedented, as noted above. What is legal in war anyway? When nations engage in mortal combat, are all strategies legal? The prohibition of the use of gas, chemical weapons, or more recently, land mines, suggests that nations can indeed agree on such matters, but typically after the fact of their use. In 1945, were there any legal strictures against the use of atomic bombs, a completely new weapon, totally unexpected, inconceivable before its actual use? A summer 2014 online discussion of the legality may be found at reference 44, which considers the matter in terms of "customary international law", references J. Reuben Clark's writings, and features comments by, e.g., Marshall Thompson, Valerie Hudson, and Raymond Takashi Swenson. (See also Clark's conference talk at reference 38.) Some at the time counseled use of the bomb on *moral* grounds, on the basis that fewer lives would be lost in the long run if it could end the war. [91]

A recent troubling development, which in some ways relates to the morality of the use of the bomb, is the December 2014 controversy over the CIA use of torture in the Iraqi and Afghanistan wars, as depicted in the US Senate Intelligence Subcommittee report about the matter. There were LDS soldiers involved in the administration of torture; two presumably figured that it would provide useful information and thus would shorten the war(s) and would save lives (sounds like the atomic bomb argument, doesn't it?), but another was so troubled by the torture and her part in it, as a Latter-day Saint, that she committed suicide, as noted in an online article by Josh Madson. [92] The comparison has been made in print, in a remark made by Max Boot: "In truth, America did far worse in the Second World War, deliberately incinerating hundreds of thousands of civilians in Hiroshima, Nagasaki, and Dresden." [93] But one needs to read the full article by Boot, in which he discusses the complex decisions a leader must make in times of conflict, and in which he says, "Try to place yourselves in the shoes of a Truman or a Bush and ask what you would do when you felt that the only way to effectively protect the United States was to use methods that one's critics could denounce as barbaric." Of course, the two situations are very different and comparisons are thus limited.

The question may also relate to a remark made by Terryl and Fiona Givens in their recent book "The Crucible of Doubt." In a chapter on the horrendous amount of evil in the world, they quote Dostoevsky in a passage from "The Brothers Karamazov", in which the nihilist brother Ivan challenges his gentle Christian younger brother Alyosha whether he could accept a world in which happiness and peace and contentment are available to all men, provided that one tiny creature must be tortured to death. Alyosha whispers that he could not. [94] But war does not use this kind of ethic; it appears to me (and I hasten to add that I am not an expert on either war or utilitarianism) that in war nations seek to maximize their gains while killing as few of the enemy as necessary but not shrinking to do so, a sort of utilitarian approach.

The author's conclusions

In view of these many considerations, I have thought over the question of the 1945 use of the bomb for more than fifty years. I have swung back and forth between the two points of view, that the decision was justified or not justified. In that indecision, I find myself in good company. Historian Barton J. Bernstein stated in 1975 that several key questions "cannot be definitively answered on the basis of presently available evidence." [95] In 1990 he said, "The task I have to try as a historian, as an individual, is to make some sense on a problem that I've labored on for many years. I've had various formulations…I'm sure that each would change and will change over time…Evidence almost never on interesting matters entails answers. It only provides leverage for answers…" [96] Well known author Stephen Ambrose said in 1993, "For my part I've gone back and forth on the A-bomb decision so many times I can't have much confidence in hard conclusions." [97]

However, I feel, and have felt for many years—based on my remembrances of the time (at age eleven, of course) and on considerable observation, study, and reflection over the intervening 70 years—that under the circumstances of August 1945, the preponderance of knowledge and feeling at the time strongly favored the use of the bomb in hopes that it would indeed end the war and produce a net saving of large numbers of lives. I feel that the decision was *understandable*, especially in view of the feelings of Americans about the attack on Pearl Harbor, as discussed above. (Alperowitz disagrees. [98]) I also feel that the decision was practically *inevitable.* This is the momentum argument discussed in an earlier section. (Alperowitz disagrees.[99]) Finally, I believe that use of the bomb was the *right* decision. I feel it did indeed bring about the end of the war. Further justification for that belief comes from reasons 7, 8, and 9 given above, especially with regards to the USSR had we not used the bomb.

But the matter must be considered more deeply. This consideration will be made below.

Afterword

If we had not used the bomb it almost certainly would have been developed by someone else. After all, the USSR knew of our research for years. There would have been no hiding it. After the discovery of fission, then the discovery that a fission produced excess neutrons so that a chain reaction was possible (cf. Szilard's patent), and the outline of the theory (Bohr and Wheeler), it was clear that bombs could be made. The main obstacle was technical—the separation of U235 from U238—as it is in Iran today. The author John McPhee, echoing physicist Theodore B. Taylor, notes that it was easy to make a bomb, just using existing information in the open literature, provided one could get the fissionable material. [100]

It is hard to say, but highly dubious in the author's view, whether overtures to the USSR before we used the bomb would have mitigated the competition and the ensuing cold war. It is likely that such overtures, besides having only problematic success, would have been condemned by the American people. Well before the end of WWII, there was hostility in the US toward the USSR and Stalin in particular. After the war, Soviet belligerence intensified American hostility to the USSR. [101] Churchill characterized the Soviet bloc boundary in Europe as an iron curtain. [102]

Many people high in government and military circles felt during the 1950s that necessity would require, sooner or later, the use of nuclear weapons in warfare. Their speeches (e.g., John Foster Dulles [103] and Curtis LeMay [104]) often reflected this judgment. This philosophy may be related to the general view of many like LeMay who had great faith in the efficacy of bombing. However, as a recent author discusses, President Dwight D. Eisenhower apparently realized the danger of such use and such statements and cannily refused to say whether he would authorize the use of nuclear weapons in war—feeling that safety lay in projecting an image of uncertainty. [105] He was often pictured as a bit of a bumbler, a rather weak president. But this author portrays Eisenhower's actions as a wise and intentionally ambiguous strategy from a man who was all too familiar with the devastation and carnage of war and who carefully sought to avoid it. He was familiar with Clausewitz, who noted that little wars inevitably tended to become big wars. (This author remembers a tee shirt, much later than Eisenhower, reading, "Oxymorons for limited nuclear war." Limited nuclear war, however, is actually a real possibility. [106])

Post-war events

The explosion of the Russian atomic bomb in 1949 shocked the US public—which had been told that there would probably not be a Russian bomb for 20 years. The discovery of espionage that fed nuclear information to the USSR only fueled the flames. This fear/hatred/mistrust of Russia made for fertile ground for the approval of the development of the hydrogen (thermonuclear) bomb, the removal of Oppenheimer's security clearance on the grounds that he was a security risk, and the fear of communism, especially highlighted by the House Un-American Activities Committee, and in the Senate, by Joseph McCarthy. President Eisenhower was slow to condemn McCarthy, probably because of the anti-Russian feeling among the American populace. American development of bombs was mirrored by the USSR. The launching of Sputnik in 1957 further fueled fears of nuclear competition, as I observed and felt at the time.

Testing of nuclear weapons, in atmospheric tests, was conducted by both the US and the USSR, in the 1950s and 1960s. People who raised concerns about nuclear pollution in the atmosphere, such as Ernest Sternglass, were viewed with suspicion as being "pink"—sympathetic to the Soviet Union. Charges that the US was behind the Soviet Union in the "bomber gap" and later the "missile gap" played a role in elections like the 1960 election.

Only later came the realization that atmospheric pollution of radioactive materials could be dangerous. People who were downwind (east) of the tests at the Nevada Proving Grounds in the late 1940s and early 1950s belatedly received monetary compensation for damages. My wife's younger sisters, who worked at Grand Canyon during that time, died of cancer; we have often wondered whether they were contaminated by fallout. The case for such a conclusion is weak, as cancer runs in the family anyway, but we wonder.

John F. Kennedy, who became president in 1961, did not have as much experience with war as Eisenhower, and he showed his inexperience with military matters when he authorized and mismanaged the abortive Bay of Pigs invasion of Cuba. His inexperience may have led the adventurous Nikita Khrushchev to encourage the placement of missiles in Cuba, leading to the terrifying Cuban Missile Crisis in October 1962, in which this planet was closer, before or since, to a worldwide nuclear war. (My family and I were living in Los Alamos at the time and were very aware, along with the entire community, that Los Alamos was a prime target in a nuclear war.) Fortunately, President Kennedy and his cabinet, together with Khrushchev's second thoughts, forestalled the war and the crisis passed. That confrontation contributed to the joint agreement the next year, 1963, of the treaty banning atmospheric testing (opposed by one of the fathers of the hydrogen bomb, Edward Teller, and favored by the other, Stanislaw Ulam, as depicted in a cartoon in the Santa Fe New Mexican, Fall 1963, labeled "It's a wise father that knows his own bomb." [107]) (Ulam and Teller are considered to be fathers of the hydrogen bomb; discussions of their contributions can be found in many places. [108])

Since then, although there have been fearful escalations of the arms race—such as in the development of MIRV—multiple independent reentry vehicles, rockets with multiple nuclear warheads—there have also been steps away from the brink of nuclear war, such as by various international treaties. [109] Nuclear accidents, notably the Chernobyl plant failure in 1986 (and to a lesser extent, Three Mile Island in the US), alarmed people enough that they may have helped avoid nuclear warfare. The fall of the Soviet Union in 1991 relieved much of the tension.

There continue to be dangers. Nations like India, Pakistan, and possibly Israel have nuclear weapons and a regional war could spiral out of control. There are fears of Iranian nuclear weapons, which could render the Middle East extremely dangerous, also North Korean nuclear weapons and the

possibility of terrorists acquiring nuclear weapons and threatening to use them. Once the nuclear genie was released from the bottle, it was impossible to put it back. We must admit that we got through the cold war by restraint among people like Eisenhower and many others, or by incredible luck, or by divine guidance, or all of the above.

Various movies have been made throughout the years about the possibility of worldwide nuclear war. A notable one is the black comedy "Dr. Strangelove: or, How I Learned to Stop Worrying and Love the Bomb." (This came out while I was living in Los Alamos. As I recall, community members found it grimly amusing.) There are others, like "Fail Safe", "Seven Days in May", and "On the Beach," with which the author is less familiar. The most terrifying of all, without question, is the 1985 British movie "Threads", which depicts a nuclear war in England and the aftermath. (This movie was brought to the author's attention by Valerie Hudson.) One hopes that those in the world in power will have the restraint and the humanity to forego any such eventuality. Unfortunately, this is not a sure thing. We are not out of the woods. We will need further divine help if the world is to be spared future nuclear war.

Final judgment

The alert reader will have noticed that the predominant number of references cited here, such as Frank 1999, that favor the use of the bomb. Why is that? There are several reasons. One is, as noted, that Frank provides extensive detail of the Japanese government considerations during the critical days, more than the author has found elsewhere. Another is that most authors seem to favor the bomb use. There could be, in turn, three reasons for this. One of those is that this author may have selectively, consciously or unconsciously, chosen such authors. Another is that most authors, historians, really do favor the bomb use, with good reason. But Alperowitz would likely disagree (see the first paragraph in Section XIV, which mentions Bernstein and Ambrose). He gives a third reason. His entire Book II in Alperowitz 1995 is devoted to the thesis that there was intentional or unintentional deceit, then and now, among government and military leaders, that has misled almost everyone.

To believe that thesis is somewhat to accept something like a theory of a conspiracy, among many or among few. But one must consider the primary actors on the scene, who often acted individually: Truman, Byrnes, Stimson, MacArthur, Groves, many military leaders, many government leaders, the decoders in MAGIC and ULTRA, others not present at the final decision, like Roosevelt and Churchill. They all made their own choices, rightly or wrongly, based on inadequate information, believing in their own judgments, and all being fallible to some extent.

This brings me to a consideration of my own choices. I have read a substantial amount of literature on the subject of the use of the bomb. As stated at the beginning, I am not a professional historian, but am at least a well read and critical reader. I read Rhodes 1986 when it came out and read it as a well-researched history of the whole atomic bomb project. On rereading parts of it recently, I have found uncritical comments which should actually be reconsidered. I read Alperowitz 1967 and Sherwin 1975 when they came out, also Alperowitz 1995 not long after it came out. Frank 1999 was a recent discovery, found as I was researching the attempted coup against Emperor Hirohito. There is also the matter that eventually one must decide to stop reading and finish writing. As noted at the beginning, the Manhattan Project literature is vast. One cannot possibly read it all, much less critically, in a lifetime.

But there are still deeper considerations. While I found Alperowitz 1967 and 1995 and Sherwin 1975 interesting and sobering, I found them ultimately somewhat unconvincing. Again, why is that?

Probably because I had a basic belief in my leaders. Call it naivete, as opposed to skepticism. Call it a belief in the basic goodness of man. Call it the faith of an eleven year old boy. As one grows up and achieves adulthood, one overcomes boyish things and develops a mature outlook, including a mature skepticism. One does that by broadening one's study, experiences, observations, and reflections. I have considered both points of view on the bomb over the years. I well know that trust in our government leaders must be limited. Yet I have still felt most comfortable with the decision as it was made, to use the bombs against Japan in August 1945.

The author hopes that readers who read this essay may benefit from his remarks and may take another look at their own opinions. Ultimately, of course, the question cannot be decided in this life. The decision was made long ago and cannot be changed. One cannot go back and probe the minds of those involved in the decision. In the last analysis, the final judgment is available only in the hereafter, as noted by Valerie Hudson in the discussion found at reference 44. Individual judgments, made by Divine Authority, will depend on the characters of the men and women who were involved in the actions of the years of World War II.

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[3] Jungk 1958, p. 201; Rhodes 1986, p. 676. [Back to manuscript].

[4] Rhodes 1986, p. 28. [Back to manuscript].

[5] Rhodes 1986, pp. 209-213, 217-221. [Back to manuscript].

[6] Rhodes 1986, pp. 230-232. [Back to manuscript].

[7] Rhodes 1986, pp. 227-228. [Back to manuscript].

[8] Extensively treated in Rhodes 1986, Chapter 9. [Back to manuscript].

[9] Rhodes 1986, pp. 264-266. [Back to manuscript].

[10] Rhodes 1986, pp. 291-292. [Back to manuscript].

[11] Rhodes 1986, p. 319. [Back to manuscript].

[12] Rhodes 1986, pp. 303-308; Kelly 2007, pp. 38-44. [Back to manuscript].

[13] Rhodes 1986, p. 314. [Back to manuscript].

[14] Kelly 2007, pp. 51-55. [Back to manuscript].

[15] A rather technical discussion of some of these matters can be found in Serber 1991, Chapters 9 and 10. [Back to manuscript].

[16] Rhodes 1986, p. 424. [Back to manuscript].

[17] Rhodes 1986, pp. 405-406, 487-496. [Back to manuscript].

[18] Rhodes 1986, pp. 447-451. [Back to manuscript].

[19] Rhodes 1986, pp. 429-442. [Back to manuscript].

[20] "The First 20 Years at Los Alamos: January 1943; January 1963", January 1, 1963 issue of LASL NEWS, copy in the author's possession. [Back to manuscript].

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[22] Groves 1962, Chap. 24. [Back to manuscript].

[23] See extensive discussion of the Alsos project and findings in Groves 1962, Chaps. 13, 15, and 17. [Back to manuscript].

[24] Groves 1962, Chap. 17. [Back to manuscript].

[25] Frank 1999, pp. 252-253. [Back to manuscript].

[26] Groves 1962, p. 187. [Back to manuscript].

[27] Frank 1999, p. 253. [Back to manuscript].

[28] Frank 1999, pp. 258-259; Rhodes 1986, pp. 525-528, 644-645, 651. On May 18, 1964, Robert Oppenheimer came to Los Alamos and gave a talk about Bohr's efforts to achieve some sort of international control of atomic weapons before their actual use. My wife and I attended. It was our understanding that this was the first time that Oppenheimer had been back to Los Alamos since 1947. In 1964 it had been ten years since his security clearance had been revoked. The talk was held in the high school auditorium with a packed house. He passed close to us and my wife commented on his intense blue eyes. As Oppenheimer appeared on stage the audience quietly rose, as one, and gave him a long, sustained ovation. That was repeated at the end of the talk. It was one of the most moving, memorable experiences this author has ever had. [Back to manuscript].

[29] McCullough 1992, pp. 390-391, 394-395; Frank 1999, pp. 255-257. Alperovitz 1995 devotes his entire chapter 12 to a discussion of the Interim Committee. [Back to manuscript].

[30] McCullough 1992, p. 460. [Back to manuscript].

[31] Frank 1999, pp. 302-303. [Back to manuscript].

[32] Jungk 1958, pp. 180-183. [Back to manuscript].

[33] McCullough 1992, pp. 391, 395-396; Alperovitz 1995, pp. 603-605. [Back to manuscript].

[34] Jungk 1958, pp. 183-186. Frank 1999, pp. 259-260, provides details about the views of both Szilard and the Franck Report. [Back to manuscript].

[35] McCullough 1992, pp. 376-378; Rhodes 1986, pp. 623-626. [Back to manuscript].

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[40] McCullough 1992, p. 379. [Back to manuscript].

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[46] Frank 1999, Chapters 14-19, but this is discussed intermittently through the entire book. [Back to manuscript].

[47] McCullough 1992, p. 438, Hillenbrand 2010, p. 195. [Back to manuscript].

[48] Alperovitz 1995, pp 496, 633, discussing extensive research on the matter; Frank, giving details in his text, pp. 132-148, 243-245, 338-343, 356-359. See their index entries on casualty estimates. [Back to manuscript].

[49] See, e.g., Frank 1999, pp. 188-190 and elsewhere, also Hillenbrand 2009, pp. 291-292. [Back to manuscript].

[50] Frank 1999, pp. 322, 326 ff. [Back to manuscript].

[51]Frank 1999, pp. 300-301. [Back to manuscript].

[52] The order is referenced in the notes to page 198 in Hillenbrand 2010 and can be found at http://www.pbs.org/wgbh/amex/bataan/filmmore/ps_order.html, also at http://mansell.com/pow_resources/formosa/taiwandocs.html. See also e.g., Hillenbrand 2010, pp. 221-222, 291, and Young 2009, p. 234. [Back to manuscript].

[53] Personal conversation between the author and Brianna Higa, May 14, 2015. [Back to manuscript].

[54] Frank 1999, p. 115. [Back to manuscript].

[55] Frank 1999, p. 239. [Back to manuscript].

[56] A callous remark about this may be found in Rhodes 1986 at the bottom of p. 697. [Back to manuscript].

[57] McCullough 1992, p. 419, 427. An uncritical remark about this is found in Rhodes 1986, p. 697. [Back to manuscript].

[58] Alperovitz 1967; Alperovitz 1995, Section III. [Back to manuscript].

[59] Frank 1999, Chapters 17-18. [Back to manuscript].

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[73] Frank 1999, p. 235. [Back to manuscript].

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[76] Alperovitz 1995, pp. 532-535. [Back to manuscript].

[77] Frank 1999, pp. 268-272. [Back to manuscript].

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[79] Frank 1999, pp. 87, 90. [Back to manuscript].

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[98] Alperovitz 1995, p. 648. [Back to manuscript].

[99] Alperovitz 1995, p. 657. [Back to manuscript].

[100] McPhee 1974, Kindle edition, locations 9-59. [Back to manuscript].

[101] See for example McCullough 1992, pp. 486, 537 ff, and extensive discussion in the latter part of the book. [Back to manuscript].

[102] McCullough 1992, p. 383. [Back to manuscript].

[103] Thomas 2012, pp. 71-73. [Back to manuscript].

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[105] Extensively discussed in Thomas 2012; see e.g., pp. 14-15, 72-74, 98-108, 130, 157-161, 299-300. [Back to manuscript].

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