"The Decision to Drop the Bomb" (1992)[1]

James West Davidson and Mark Hamilton Lytle

Just before dawn on July 6, 1945, only a few clouds hung over the still New Mexico desert. The air possessed that lucid clarity which skews all sense of distance and space. Out on the desert stood several large towers, yet from the perspective of the blockhouse, where the observers anxiously waited, they appeared as little more than a few spikes stuck in the sand.

Suddenly, one of the towers erupted into a brilliant fireball, searing the air and instantly replacing the dawn's pastels with a blazing radiance. With the radiance came heat: an incredible, scorching heat that rolled outward in waves. Where seconds before the sand had stretched cool and level in every direction, now it fused into glass pellets. The concussion from the fireball completely vaporized the tower at its center, created a crater a quarter of a mile wide, and obliterated another forty-ton steel tower one-half mile away. Above the fireball an ominous cloud formed, shooting upward, outward, then back upon itself to form the shape of a mushroom, expanding until it had reached eight miles in the air. The effects of the fireball continued outward from its center: the light, followed by the waves of heat, and then the deadening roar of the concussion, sharp enough to break a window over 125 miles away. Light, heat, concussion—— but first and foremost, the brilliance of the light. At the edge of the desert a blind woman was facing the explosion. She saw the light.

In the blockhouse at Alamogordo, where scientists watched, feelings of joy and relief were mixed with foreboding. The bomb had worked. Theory had been turned into practice. And devastating as the explosion appeared, the resulting fireball had not ignited the earth's atmosphere, as some scientists had predicted. But the foreboding was impossible to shake. Humankind now had in its hands unprecedented power to destroy.

General Leslie R. Groves, director of the atom bomb project, shared none of the scientists' fears. Groves could barely contain his joy when he wired the news to President Harry Truman, who was meeting allied leaders at Potsdam outside the conquered city of Berlin. "The test was successful beyond the most optimistic expectations of anyone," reported Groves. Buoyed by the message, Truman returned to the conference a changed man. British Prime Minister Winston Churchill noticed the president's sudden self-confidence. "He stood up to the Russians in a most decisive and emphatic manner," Churchill remarked. "He told the Russians just where they got on and got off and generally bossed the whole meeting." Since the British were partners on the bomb project, Churchill soon learned what had so lifted Truman's spirits.

Less than three weeks later, on August 6, 1945, a second mushroom cloud rose, this time above Hiroshima in Japan. That explosion destroyed an entire city, left almost 100,000 people dead and thousands more dying from radiation poisoning. Three days later another bomb leveled the city of Nagasaki. Only then did World War II come to an end, the bloodiest and most costly

---

[1] James West Davidson and Mark Hamilton Lytle, "The Decision to Drop the Bomb" Ch. 12 from James West Davison and Mark Hamilton Lytle, *After the Fact: The Art of Historical Detection* (New York: McGraw-Hill, Inc., 1992), 275-302.

war in history. Ever since, the world has lived with the stark prospect that in anger or in error, some person, group, or government might again unleash the horror of atomic war.

The New Mexico test of the first atom bomb marked the successful conclusion of the Manhattan Project, the code name for one of the largest scientific and industrial efforts ever undertaken. Between 1941 and 1945 the United States spent over $2 billion to build three atom bombs. Twenty years earlier that would have equaled the entire federal budget. The project required some thirty-seven factories and laboratories in nineteen states and Canada, employed more than 120,000 people, and monopolized many of the nation's top scientists and engineers during a period when their skills were considered essential to national survival. Leading universities, as well as some of the nation's largest corporations——Du Pont, Eastman Kodak, and General Electric——devoted substantial resources to the undertaking.

Even before the Manhattan Project, physicists and other scientist's had experienced the trend in modern industrial society toward ever more human work, creativity, and important decisions to take place from within large organizations. For much of the nineteenth century, scientists, like artists, worked alone or in small groups, using relatively simple equipment. Thomas Edison, however, led the way toward rationalized, business-oriented research and development, establishing his own "scientific" factory at Menlo Park, New Jersey, in 1876. Like a manufacturer, Edison subdivided research tasks among inventors, engineers, and toolmakers. By the first decades of the twentieth century, Westinghouse, Du Pont, U.S. Rubber, and other major corporations had set up their own industrial labs.

Then too, World War I demonstrated that organized, well-funded science could be vital to national security. During the war scientists joined in large research projects to develop new explosives, poison gases, optical glass for lenses, airplane instruments, and submarine detection devices. In less than two years, physicists and electrical engineers had doubled the advances of radio technology over the previous ten years. The government, for the first time, funded research on a large scale. But scientists were as much committed to the notion of laissez-faire as any conservative robber baron. They were suspicious of any "scheme in which any small group of men, appointed as a branch of the government, attempt to dominate and control the research of the country," is one scientist put it.

The end of the war halted government interference and financial support. Still, like most Americans, scientists shared in the prosperity of the 1920s. Economic boom meant increases in research budgets. Success in the laboratory attracted contributions from private foundations and wealthy individuals. American science began to produce both theoretical and applied results that rivaled the quality of science in Europe.

The Depression of the 1930s forced researchers to tighten their belts and lower their expectations. The government, though seldom an important source of funding, drastically cut the budgets for its scientific bureaus. Even when the New Deal created jobs for scientists, it did so primarily to stimulate employment, not research. But by the late 1930s private foundations had resumed earlier levels of support. One of their most prominent beneficiaries was Ernest Lawrence, a physicist with a flair for showmanship who had established himself as the most famous, most funded, and most bureaucratically organized scientist in the United States. During the 1930s Lawrence built what he called a cyclotron, a machine designed to accelerate atomic particles in a focused beam, in order to penetrate the nucleus's shell and unravel its structure and dynamics. By 1939, his Radiation Lab at the University of California at Berkeley was raising the unprecedented sum of $1.5 million to build an enormous, 100-million-volt cyclotron.

The movement of science toward organization and bureaucracy reflected similar forces at work elsewhere in American society. As Lawrence expanded his laboratory at Berkeley, the New Deal was establishing new regulatory agencies, social welfare programs, and other government organizations that reached into many areas of daily life. Furthermore, much that the New Deal instituted through government and politics in the 1930s, large corporations had accomplished in the preceding era. Centralized slaughterhouses, with their elaborate distribution system involving railroads, refrigerated warehouses, and trucks, replaced the local butcher as the source of meat for many American tables. What Armour and Swift did for meatpacking, Heinz did for the pickle, Henry Ford for the automobile, and other corporations for the multitude of food, clothing, and goods used in American homes and industry. To understand the nature of the modern era, to grasp an undertaking as vast as the making of an atomic bomb or a decision as complex as how to use it, historians must understand how large organizations work.

Models of Decision Making

"Truman dropped the atom bomb in order to win the war as quickly as possible." Historians routinely use such convenient shorthand in their historical narratives. Yet physically, of course, Truman was nowhere near Japan or the bomb when it was dropped. He was halfway around the world, returning from the Potsdam Conference with Stalin and Churchill. The actual sequence of events was rather more complicated. President Truman did give an order. It passed through the Pentagon to an airbase on the island of Tinian in the western Pacific. The base commander ordered a specially trained crew to arm an American airplane with a single atom bomb, designed and built by scientists and technicians, under the authority of the War Department. The pilot of the plane then followed an order, conveyed through the military chain of command, to proceed to a target in Japan, selected by the secretary of war in consultation with his military advisers, in order to destroy a Japanese city and thereby hasten the end of the war.

The difference in meaning between "Truman dropped" and what actually happened encapsulates the dilemma of a historian trying to portray the workings of a systematized, bureaucratic modern society. The first explanation is coherent, clear, and human. It accords with Harry Truman's own well-known maxim, "the buck stops here"——implying that the important, truly difficult decisions were his and his alone. The second explanation is cumbersome and confusing, but more comprehensive and descriptive. It reflects the fact that the president stood at the tip of a pyramid of advisers, agencies, bureaus, offices, and committees, all going about their own business. And such organizations create their own characteristic ways of gathering information, planning, working, and acting. To a large extent, what Truman decided or did not decide depended on what he learned from those organizations. To that extent also, the shorthand "Truman dropped the bomb..." conceals as much as it reveals.

To better analyze the workings of organizations, historians have borrowed a technique from the social sciences. They work with interpretive models. For many people the term "model" might bring to mind an object like a small plastic airplane or an electric train. For social scientists a model, not unlike the small plane, reduces the scale of reality and increases the researchers' capacity to describe the characteristics of what they observe. Models can be applied to systems as basic as individual behavior or as grand as the world's climate. If the average daily temperature goes up, will we have more or less rain? If the amount of carbon dioxide in the atmosphere increases, will temperatures rise? A computer model of weather patterns allows meteorologists to test the relationship between such variables in the climate. Even so, the number of variables is so great, meteorologists are forced to speak of probabilities, not certainties. While their model provides insights into several components of a weather system, it inevitably simplifies as well. In that sense, models too have limits.

The phrase "Truman dropped the bomb..." typifies the application of what some social scientists have called a "rational actor" model. This is perhaps the interpretive framework that historians most often adopt without even thinking about models. Rational actor theory treats the actions of governments and large organizations as the acts of individuals. Further, it assumes that the individual actor, like Adam Smith's capitalist, behaves rationally, in that he or she uses the most efficient means to pursue ends that are in his or her self-interest. When forced to choose among a range of possible actions, government leaders will select the option that achieves the best result at the lowest cost. One does not use a bat to swat a fly, nor would a government go to war to collect a small debt, unless war served some larger purpose.

The appeal of this model lies in its predictive powers. Often enough, governments do not make clear why they act. On other occasions, they announce their goals but keep their strategies for achieving them secret. By applying standards of rational behavior, an analyst can make inductive leaps about a government's unclear goals or hidden actions. If we know that a government has suddenly ordered highly mobile assault troops to the borders of its nation, but we lack evidence about goals, we might still conclude that a rational actor would not use mobile assault troops merely to defend borders: an invasion is planned. The process works in reverse as well. If analysts know what goals a nation has at hand, they can guess with some confidence what its leaders might do in a situation, given their resources.

Franklin Roosevelt's decision to launch the Manhattan Project presents historians with an example of how rational actor analysis can help reveal motivations and goals. Roosevelt was not an easy person to read——either for his advisers or for historians. Often enough, his orders to different people seemed contradictory. Or he would encourage competing bureaucracies to implement the same policy. In setting in motion the bomb project, Roosevelt left little evidence about why he made his decision. But the rational actor model suggests that Roosevelt recognized the military potential of nuclear fission; calculated that the United States had the financial, industrial, and scientific resources needed; and concluded that the nation's security demanded full-scale research and development.

The available evidence does support that conclusion. The Manhattan Project owed its beginnings to several physicists, primarily refugees from fascist Germany and Italy, who feared that recent atomic research would allow the Nazis to develop a weapon of unparalleled destructive force. In March 1939 Enrico Fermi, a Nobel prize-winning physicist who had fled from Mussolini's Italy, paid his own way to Washington to warn the military. Fermi himself had been on the verge of discovering fission reactions in 1934, but had not then recognized the meaning of his results. If he had, the fascist powers might have appropriated his results and put the process of fission to military use. Though Fermi had become an American citizen and a faculty member at Columbia University, Navy technical experts ignored his warning. Other refugee physicists, led by Leo Szilard, joined the campaign. Szilard persuaded Albert Einstein, the world's most admired scientist, to lend his name to a letter explaining their concern to President Roosevelt. Alexander Sachs, an economic adviser to the president, acted as their emissary. After Roosevelt read the letter and heard Sachs out, he remarked, "Alex, what you are after is to see they don't blow us up."

The president took immediate action, but he did not yet set in motion a massive research project. That would have been irrational, for as Sachs had made clear, the scientists had not yet found a way to harness the power of fission for war. Instead, he merely created a Uranium Committee to promote American research on a fission bomb. The research got under way slowly, for the committee requested only $6,000 for its first year of operations. Other more promising experimental efforts competed for research funds that were particularly scarce since the United States was not yet at war.

In England, however, two German emigrés were making progress in understanding how a "superbomb" might work. When war had broken out in September 1939, British security restrictions barred former German scientists like Otto Frisch and Rudolph Peierls from being involved in sensitive projects. Thus they were free to do their own research. In June 1941 they determined that the fast neutrons needed to set off an explosive chain reaction could be produced using either plutonium or uranium 235, a fissionable isotope that could be separated from uranium 238. They also suggested ways to separate uranium 235 from uranium 238. The amount of fissionable material needed would be small enough to fit into a bomb that existing aircraft could carry. Such a bomb, Frisch and Peierls calculated, could probably be built within two years. What was more frightening, German physicists were known to have made similar discoveries. Their high-quality physics programs might have put them as much as two years ahead of Allied efforts.

The British passed this information along to the American administrators supervising war research, the National Defense Research Committee (NDRC). Its head, Vannevar Bush, wasted no time in bringing the news to Roosevelt in June 1941. "If such an explosive were made," he told the president, "it would be thousands of times more powerful than existing explosives, and its use might be determining." The British research had given the rational actor——in this case President Roosevelt——cause to commit the United States to a larger project. To accelerate the research effort, Roosevelt replaced the ineffective Uranium Committee with a group called S-1. The membership of the committee reflected the new priority of the bomb project. It included Bush, now head of the Office of Scientific Research and Development; his successor at NDRC, James Conant (the president of Harvard University); Vice President Henry Wallace; Secretary of War Henry Stimson; and Chief of Staff General George Marshall. Bush and Conant assumed primary responsibility for overseeing the project and keeping the president informed. In September 1942, they were joined by General Leslie Groves, who had been appointed to command construction and operation of the rapidly expanding facilities that were named the Manhattan Project.

For three years, American, British, and emigré scientists raced against time and what they feared was an insurmountable German lead. At first, research focused on the work of scientists at the Chicago Metallurgical Lab (another code name). There, on a squash court under the old University of Chicago football stadium, Fermi and his associates achieved the first self-sustaining chain reaction. The next goal was the separation of enough pure uranium 235 or sufficient plutonium to build a bomb. That required the construction of huge plants——an expense that now seemed rational, in light of the work at Chicago. Conant authorized Groves to begin building facilities at Oak Ridge, Tennessee, and Hanford, Washington.

Actual design of the bomb took place at a remote mountain site near Los Alamos, New Mexico. Los Alamos was the choice of physicist Robert Oppenheimer. As director of the design laboratory, Oppenheimer sought a place to isolate the most outstanding collection of experimental and theoretical physicists, mathematicians, chemists, and engineers ever assembled. Free from the intrusions of the press and inquisitive colleagues, world-renowned scientists rubbed elbows with brilliant, eager young graduate students, all bringing to bear the abstract theories of physics to the question of how to produce an atomic weapon.

By the summer of 1944, the race with the Nazis had ended. Spies discovered that German physicists had long since given up hope of building a bomb. As Allied forces marched into Berlin in April, 1945, scientists knew that peace would come to Europe before the bomb was ready to be used. Still, the war against Japan seemed far from over. As Allied troops approached the home islands, Japanese resistance grew more intense. Fearing heavy American casualties during an invasion, President Roosevelt had asked Stalin to enter the war against Japan. Yet as the tide of battle began to favor the Allies, the president became more reluctant to draw the Soviets into Japan. If the bomb could win the war for the United States, all the sacrifices of time, personnel, and materials would not have been in vain. Oppenheimer, Groves, and the Manhattan Project scientists redoubled their efforts to produce a working bomb.

Thus the rational actor model explains adequately the progression of events that brought about the bomb's development: (1) physicists saw the potential of nuclear fission and warned the president; (2) Roosevelt ordered a speed-up in research; (3) scientific breakthroughs led to greater certainty of eventual success, causing the president to give bomb research top priority; (4) the race with Germany, and then Japanese resistance in the Far East, encouraged scientists to push toward success.

Although this outline of key decisions proceeds logically enough, there are troubling features to it, suggesting limits to the rational actor model. Certainly Roosevelt could be viewed as the rational actor. But we have already seen that a host of committees and subgroups were involved in the process. And the model becomes murkier when we seek answers to a number of controversial questions surrounding the decision actually to *use* the bomb. Did the military situation in the summer of 1945 justify launching the attacks without warning Japan? Could a nonmilitary demonstration of the bomb's power have persuaded the Japanese to surrender without immense loss of life? Why drop a second bomb on Japan so soon after the first? And finally, who did the United States really want to shock with its atomic might——Japan or the Soviet Union?

To be sure, rational actor analysis provides answers to these questions. The problem is, it provides too many. Historians have offered contradictory answers to the way a rational actor might have been expected to behave under the circumstances.

To begin with, what was the most crucial problem to be solved by a rational actor in that summer of 1945? On the one hand, convincing Japan to surrender was the primary goal of the war——something the use of atomic bombs would be expected to hasten. On the other hand, military and diplomatic planners had already begun to focus on the transition from war to peace. Increasingly, they worried about the postwar conduct of the Soviet Union. Following the surrenders of Italy and Germany, the Russians had begun consolidating control over Eastern Europe. Many British and American officials feared that Stalin saw victory as a way to extend the global reach of communism. The larger the role assumed by the Soviets in the Pacific, the greater their opportunity for expansion there too.

But what if the bomb were used to end the war before Stalin's troops could make any headway in the Far East? Wasn't it likely Stalin would become more cooperative once he saw the awesome power of such a weapon? That "rational" line of reasoning raises an unsettling possibility. Did the United States drop the bomb primarily to send a warning to the Soviet Union? So concluded historian Gar Alperovitz. Alperovitz argued that after Franklin Roosevelt's untimely death in April 1945, President Truman was more concerned with containing the Soviet Union than with defeating Japan.

Alperovitz came to that conclusion by examining the information available to Truman and his advisers in the summer of 1945. That data, he argued, should have convinced Truman (or any rational actor) that the United States had no compelling military reason to drop atomic bombs on Japan. The American navy had already established a tight blockade around Japan, cutting off delivery of raw materials and isolating Japan's army in Manchuria from the home islands. Allied land-based bombers had leveled whole sections of Tokyo without opposition from Japanese fighters. By July 1945, Japan was ready to consider capitulation, except that in 1943, Roosevelt had laid down uncompromising terms of "unconditional surrender." The Japanese feared that the United States would insist that their emperor leave his throne, a humiliation they wished at all costs to avoid. Their only hope was to negotiate terms of surrender, using the Russians as intermediaries, to obtain a guarantee that the institution of the emperor would be preserved.

Truman knew that the Japanese had made overtures to the Soviet Union. "Unconditional surrender is the only obstacle to peace," the Japanese Foreign Minister had cabled his emissary in Moscow, in a coded message intercepted by American intelligence. Still, Truman refused to deviate from Roosevelt's policy of unconditional surrender. At the Potsdam conference, Allied leaders issued a vaguely worded proclamation warning the Japanese that they faced "prompt and utter destruction" if they fought on. Nowhere did the proclamation mention the existence of a new superbomb. Nor did it offer hope that the Allies might permit the Japanese to keep their emperor. When the Japanese ignored the warning, the Americans concluded that Japan had resolved to continue fanatic resistance.

In fact, the emperor himself had taken unprecedented though cautious steps to undermine the war party. He had decided that the military extremists must accept surrender on Allied terms. But the bombing of Hiroshima, on August 6, followed two days later by a Russian declaration of war, threw the Japanese government into confusion. Before it could digest this double shock, Nagasaki was leveled on August 9. Even then, the Japanese surrendered only when the United

States made an implicit commitment to retain the emperor. Despite Truman's insistence on an "unconditional" surrender, in the end it had been conditional.

Alperovitz's conclusion is sobering. If ending the war had been Truman's *only* goal, the rational response would have been to give Japan the extra few days or weeks to negotiate a surrender. There would have been no need to drop the bomb. But of course it *was* dropped. Therefore (so the logic goes) the president's primary goal must have been to intimidate the Soviets. This was a possibility that Alperovitz understandably condemned, for it would have meant that Truman had wantonly incinerated hundreds of thousands of Japanese for reasons that had nothing to do with the war itself. Furthermore, if Truman had hoped to intimidate the Russians into cooperating, he seriously erred——for the Soviet Union became, if anything, more intractable after Japan's surrender. Failure to achieve a nuclear arms control agreement with Stalin, while the United States and Britain had a monopoly on atomic weapons, led to a postwar arms race. Possession of the atom bomb resulted finally in a decrease in American security and a loss of moral stature. Those are not the desired results of rational decision making.

Alperovitz's reconstruction of Truman's choices placed most emphasis on the diplomatic effects of dropping the bomb. But were these the factors that weighed most heavily in the minds of Truman and his advisers? Other historians have placed more emphasis on the military factors behind the development of the bomb——not only in 1945 but in the years preceding it. In doing so, they have constructed an alternate set of motivations that might have influenced a rational actor.

Franklin Roosevelt was the first president who had to consider whether the bomb would actually be used. And merely by approving the massive effort to build a weapon, there was an implicit assumption on the president's part that it would be used. "At no time," recalled former Secretary of War Stimson, "did I ever hear it suggested by the President, or by any other responsible member of the government, that atomic energy should not be used in the war." Robert Oppenheimer, whose leadership at Los Alamos played a critical role in the success of the project, confirmed Stimson's point about the bombs: "...we always assumed if they were needed, they would be used."

In fact, Roosevelt was proceeding a bit more cautiously. He discussed the delicate subject with British Prime Minister Winston Churchill when the two men met at Roosevelt's home in Hyde Park, in September 1944. At the end of their private interview, with only the two of them present, they signed a memorandum summarizing their attitudes. Both men agreed that the bomb would be kept a secret from the Russians, an action that made it clear (as Alperovitz contended) that they recognized how valuable a lever the weapon might be in postwar negotiations. As for the war itself, Roosevelt and Churchill agreed that the bomb might be used against Japan after "mature consideration," while warning the Japanese "that this bombardment will be repeated until they surrender.

If Roosevelt had lived, conceivably he might have proved more cautious than Truman. But if he had any serious doubts about using the bomb, they died with him. None of his military and diplomatic advisers were aware of the Hyde Park memorandum. After Roosevelt's death, responsibility for atomic policy shifted largely to Secretary of War Stimson, the cabinet officer in charge of the Manhattan Project. The new president, Truman, knew nothing about the bomb or, for that matter, most other critical diplomatic and military matters. Roosevelt had seldom consulted the vice president or even met with him. Once, while acting as chair of a Senate Committee, Truman had stumbled onto information about the vast sums being spent on some unknown project, only to be persuaded by Stimson that secrecy should prevail. As the war approached its end and the new president faced a host of critical decisions, Stimson cautiously introduced him to the bomb. "I mentioned it to you shortly after you took office," the secretary prompted him on April 23, 1945, "but have not urged it since on account of the pressure you have been under. It, however, has such bearing on our present foreign relations...I think you ought to know about it without further delay."

To present his case, Stimson prepared a memorandum setting out his two most pressing concerns. He wanted Truman to recognize the monumental importance of the bomb for postwar relations, particularly with the Soviet Union. And he wanted to emphasize the bomb's capacity to shorten the war. Stimson displayed no qualms about using it against Japan and considered no steps to avert a postwar nuclear arms race. But the two men did agree that Stimson should form a committee to formulate further policy options. This, it would seem, was the rational actor at work: If Truman wanted to weigh all his options, the committee would provide him with a full range from which to choose.

The Interim Committee, as the group was known, met three times. It also created a scientific panel including Oppenheimer, Fermi, Lawrence, and Arthur Compton (head of the Chicago lab) to advise the committee. During its meetings, it scarcely touched the question of whether to drop the bomb on Japan. "It seemed to be a foregone conclusion that the bomb would be used," Arthur Compton recalled. "It was regarding only the details of strategy and tactics that differing views were expressed." When those issues were debated, some members briefly considered a nonmilitary demonstration in place of a surprise military attack. They asked Oppenheimer how such a demonstration might be prepared. Since the bomb had yet to be tested, Oppenheimer could only estimate its power. He replied that he could not conceive any demonstration that would have the impact of an attack on a real target of factories and buildings. Furthermore, the committee had to consider what might happen if Japanese representatives were taken to a test site and the mighty atomic "demonstration" fizzled. And if the Japanese were given advance warning about a superbomb, wouldn't that allow them to prepare their defenses or move American prisoners of war to likely bombing targets?

For all those reasons the Interim Committee decided against giving any advance warning. In addition, it made several assumptions about Japan that predetermined its recommendations to the president. First, committee members considered the military leadership of Japan so fanatic that only a profound shock such as an atomic attack would persuade them to surrender. Kamikaze attacks by Japanese pilots as well as other resistance continued to claim a heavy toll in American lives. General Douglas MacArthur, who had led the Western Pacific campaign against Japan, discounted the effectiveness of either a naval blockade of the home islands or continued air raids with conventional bombs. Only a full-scale invasion, MacArthur argued, would compel surrender. The army continued to organize an invasion for November 1, anticipating as many as a half million American casualties.[2]

[2] This casualty figure has become quite controversial. Martin Sherwin has discovered that a number of prominent military figures offered a much lower estimate. That would have made an invasion a more reasonable option.

In any case, by 1945 committee members had become somewhat hardened to the idea of killing enemy soldiers or civilians. Conventional firebombing had already proved as horrifying as the atom bomb promised to be. In one incendiary raid, American bombers leveled one-quarter of Tokyo, left 83,000 people dead, and wounded another 40,000. Having lived with the fear that the Germans might use an atom bomb against the United States, committee members had ample reason to see it as a potential weapon against the Japanese. Since it promised to save American lives, the committee sensed that the public would want, even demand, combat use. And finally, though the members were far from agreed, the committee decided that a combat demonstration would facilitate negotiations with the Russians. From those assumptions they reached three conclusions: (1) the bomb should be used as quickly as possible against Japan; (2) to maximize the shock value, the target should be a war plant surrounded by workers' homes; (3) no warning should be given. When Stimson communicated those views to Truman, he included a recommendation that both bombs scheduled for completion by August should be dropped in separate raids, in order to maximize the shock and convince Japanese leaders that further resistance meant certain destruction.

In only one small but vital way did Truman deviate from the committee's determination of how and why to use the bomb. A group of scientists at the Chicago laboratory, led by Leo Szilard, had become persuaded that combat use of the bomb without warning would lead to a postwar arms race between the Soviets and the Americans. They urged Truman and his advisers to tell the Russians about the bomb and to plan a demonstration before using it in combat. In a concession to Szilard and his colleagues, the Interim Committee recommended that Truman disclose the bomb to Stalin in order to help gain his cooperation after the war. At Potsdam, Truman chose not to discuss the bomb or atomic energy. But he did make an oblique reference to Stalin "that we had a weapon of unusual destructive force." Stalin was equally cryptic in his reply. "He was glad to hear it and hoped we would make 'good use of it' against the Japanese," the president recalled. And so Truman acted.

By retracing the series of decisions made over the entire year preceding the attack on Hiroshima, it becomes clearer that, for Truman, military considerations about how to end the war with a minimum number of casualties remained paramount. Resolution of Soviet-American differences was a secondary goal, though rapidly becoming the administration's chief concern. Using the bomb would also forestall any criticism in Congress for having spent $2 billion on the secret Manhattan Project. Thus the bombing of Hiroshima and Nagasaki appeared to be the optimum way to reach the administration's primary objective, with the additional virtue of promoting secondary goals as well. When applied at the level of presidential decision making, rational actor analysis suggests that the decision to drop the bomb was consistent with perceived American goals.

A Model of Organizational Process

Despite those results, the rational actor model exhibits definite limitations. It leads us to focus attention on the policy-making debates of key actors like Roosevelt and Truman, or even on scientists like Szilard and Oppenheimer. But in truth, our narrative of events has involved numerous committees far from the top of the organizational pyramid: the Uranium Committee, S-1, the National Defense Research Council, the Interim Committee. Roosevelt and Truman relied on the recommendations of those groups in making decisions. Should that make any difference to our explanations?

Imagine, for a moment, the government as a kind of giant clock. Rational actor analysis would define the telling of time as the visible movements of the hands controlled by a closed box. Inside are the gears, springs, and levers that move the clock's hands: the bureaucracy supporting decision makers at the top. In the rational actor model, these gears are seen as neutral cogs in the machine, passing along the energy (or in government, the information) that allows the hands to do their highly visible work. But suppose we look at the decision-making process using a model that focuses on the organizational processes themselves. Is there something about their structure or behavior that influences the outcome of decisions made by supposedly rational actors?

Of course, the actions of bureaucracies and agencies are usually less regimented than the movements of a clock. Often enough, the subgroups that make up a government end up working at cross purposes or pursuing conflicting objectives. While the Surgeon General's office warns that cigarette smoking is "hazardous to your health," the Department of Agriculture produces films on the virtues of American tobacco. Perhaps, then, it would be better to envision not a clock but a football team. If we observe a game from the stands, the players can be seen moving in coordinated patterns, in an effort to control the movement of the ball. Rational actor analysis suggests that the coach, or another centralized decision maker like the quarterback, has selected the strategies best suited to winning the game. That larger strategy, in turn, determines the plays that the offense and defense use.

After closer observation, we begin to sense that the play is not as centrally coordinated as we anticipated. Different groups of players move in patterns determined by their positions as well as the team strategy. We come to understand that the team is made up of subgroups that execute regularly assigned tasks. Linemen block, ends run pass patterns. On each down, the players do not try to think anew of the best imaginable play. Rather, they repeat actions they have been trained to perform. A halfback will generally advance the ball by running and leave the passing to the quarterback. On some plays, we observe that a few players' actions seem inappropriate. A halfback runs when he should be blocking. Where the rational actor model might interpret such a move as a purposeful attempt to deceive the opposing team, a model focusing on organizational processes might recognize it as a breakdown of coordination among subgroups. What one model treats as planned, the other treats as a mistake.

Thus the organizational process model leads the historian to treat government behavior not as centralized acts and choices, but as the actions of bureaucracies functioning in relatively predictable patterns. Organizations begin by breaking problems into parts, which are assigned to the appropriate subgroup to solve. The subgroups do not have to understand the larger problem, only the piece assigned to them. They follow what the military refers to as SOP——standard operating procedure. If the quarterback decides on a sweep to the right, the lineman's SOP is to block left. On a sweep to the left, he blocks right; for a pass, straight ahead. SOPs allow organizations to coordinate the independent activities of many groups and individuals.

While SOPs make coordination possible, they also limit the actions of organizations. The more specialized a subgroup, the fewer tasks it is able to perform. Its training is more narrowly focused, its equipment is more specialized, the information available to it is more limited. All those factors make it more difficult for the group to deviate from regular routines. The weather bureau, for example, would find it impossible to apply its computer programs and specialized knowledge to predicting changes in the economy rather than the weather. Furthermore, where the rational actor is presumed to weigh all available choices to select the best one, in the real lives of organizations, SOPs determine the range and pattern of choices that are considered. Specialized groups are generally content to choose standardized and previously determined policies rather than searching for the optimum one.

Since organizations are generally more concerned with avoiding failure than with gambling on success, they also tend to be more conservative. Where the rational actor might weigh the potential benefits against possible consequences, and then make a bold new departure, organizations tend to change in small, incremental steps. Corporations, for example, like to test-market a product before investing in expensive new plants, distribution networks, and advertising. And we have already seen that the American government moved relatively slowly in producing an atomic bomb. In authorizing the quest for a bomb, Roosevelt was ordering the government to do something it had never done before: conduct nuclear research. He soon discovered that the military and scientific bureaus could not readily execute such an unprecedented decision. They lacked the scientific personnel, equipment, and research routines that made the Manhattan Project possible. In the end, Roosevelt and project managers like Groves, Conant, Bush, and Oppenheimer had to create new organizations and routines.

Reward structures in organizations reinforce their conservatism. Those who do their jobs properly day after day continue to work. Those who make errors lose their jobs or fail to win promotions. Critical decisions are generally made in committees, so that no individual assumes sole responsibility if a venture fails. But committees take much longer to act and often adopt unwieldy compromises. (An old adage defines a camel as a horse designed by a committee.) As a further hedge against failure, goals and responsibilities are set well within the individual or group performance capabilities. Such practices stifle individual initiative and encourage inefficiency. Mountains of paperwork and miles of red tape are the ultimate symbol of organizational caution and conservatism.

By treating the decision to drop the bomb not as a single act but as the outcome of many organizational routines, historians can see more clearly why progress on the bomb came slowly. In fact, the project could not have gotten under way in the first place if emigré scientists had not broken through the bureaucratic chain of command. When Fermi first approached Navy officials, none of them could even comprehend the concept of nuclear power. Only by writing the president directly did scientists attract the support they needed. To get the project under way, Roosevelt was forced to create an ad hoc committee to investigate the military potential of nuclear fission. His decision to appoint Lyman Briggs, a government physicist, as head of the Uranium Committee may have delayed the project by at least a year. As the director of the Bureau of Standards, Briggs knew little about nuclear physics. He was by temperament “slow, conservative, methodical”——ideal bureaucratic qualities totally unsuited to the bold departure

Roosevelt sought. Not until the president created the National Defense Research Committee did nuclear physics gain adequate support.

As chairman of NDRC, Vannevar Bush made the farsighted decision to keep his organization independent of the military bureaucracies. He knew generals and admirals would fight against civilian interference and that scientists would balk at military regulation of their research. Under Bush, scientists remained free to pursue the research that they and not the military thought was important. Traditional definitions of missions and military needs would not cut off funds for new research projects. Furthermore, Bush wisely chose to operate under the jurisdiction of the War Department rather than the Navy.[3] The Navy had repeatedly shown either indifference or hostility to advice from civilian scientists. The Army and particularly its Air Corps branch proved far more receptive to new research. Consequently, the atom bomb was developed with the Army's mission and routines in mind. Bush's skillful negotiation of organizational bottlenecks was a crucial factor in shifting the Manhattan Project into high gear.

In other areas, organizational conflicts resulted in delays. President Roosevelt had established two incompatible priorities for Bush: speed and security. The scientists felt speed should come before security; military administrators like Groves opted for security over speed. Military SOP had well-established ways to safeguard classified material. Officers were required to operate strictly within the chain of command and were provided information only on a "need-to-know" basis. Thus, each soldier performed only a portion of a task without knowledge of the larger mission and without talking with anyone beyond his or her immediate circle. In that way, information was "compartmentalized"——securely protected so that only a few people at the top of the chain of command saw the entire picture.

To maximize security, Groves proposed placing the laboratory at Los Alamos under military control. All scientists would don uniforms and receive ranks based on their importance. As a group, however, scientist's were among the least likely candidates for military regimentation. Their dress was more informal than most working professionals (*sloppy* might have been the adjective that jumped to the military mind). In their laboratories, they operated with a great deal of autonomy to pursue research as they saw fit. Oppenheimer could not recruit many scientists to come to Los Alamos until he assured them the project would not be militarized.

Compartmentalization, also promoted by Groves, seriously inhibited research. Physicists insisted that their work required access to all relevant information. They thought best when they understood the wider implications of their work. Groves disdained their habit of engaging in creative, freewheeling discussions that regularly drifted far afield of the topic at hand. Scientists should stick to their jobs and receive information only on a need-to-know basis. "Just as outfielders should not think about the manager's job of changing pitchers," Groves said to justify his system, "...each scientist had to be made to do his own work." While compartmentalization promoted security, it denied researchers vital information from other areas of the project. Some scientists, like Szilard, simply violated security procedures whenever they chose to. Oppenheimer

---

[3] At that time the Army and Navy had separate organizations. The head of each held a cabinet post. The Marines were a branch of the Navy, the Air Corps a branch of the Army. Congress created a unified defense structure under a single secretary in 1847.

eased the problem at Los Alamos by conducting seminars where his staff could exchange ideas and information. But information never flowed freely among the many research and production sites.

Security procedures indicate, too, that long before the war ended many policymakers saw the Soviet Union as their chief enemy. Few precautions were designed against Japanese or even German agents. Military intelligence concentrated its counterespionage against Soviet and communist spies. Known communists or scientists with communist associations were kept under constant surveillance. Had intelligence officers prevailed, they would have barred Oppenheimer from the project because of his previous involvement with communist-front organizations. To his credit, Groves overruled the nearsighted sleuths in Army intelligence and saved the project's most valuable member. In the meantime, security precautions against a wartime ally continued to work to the advantage of the Nazis by delaying the project.

The military was not solely responsible for project bottlenecks. The procedures of organized science caused delays as well. Scientists recruited from private industry did not share their academic colleagues' preoccupation with speed. Work in industry had conditioned them to move cautiously, with an eye toward efficiency, permanence, and low risk. Academic scientists felt such industrial values "led to a considerable retardation of the program." But the traditions of academic science also created problems. The bulk of research money had most often been directed to the celebrities in each field. Ernest Lawrence's reputation made him a magnet for grants and contributions. Manhattan Project administrators automatically turned to him as they sought methods to refine the pure uranium 235 needed for the bomb. Much of the money spent at Oak Ridge, Tennessee, went into Lawrence's electromagnetic process based on the Berkeley cyclotron.

In the end, Lawrence's program proved to be a conspicuous failure. By 1944, Oppenheimer had the design for a uranium bomb, but scarcely any uranium 235. In desperation he looked toward a process of gas diffusion developed four years earlier by Harold Urey and a young, relatively unknown physicist named John Dunning. Lawrence had been so persuaded of the superiority of his own method that Groves gave it priority over the process developed by Urey and Dunning. And compartmentalization prevented other physicists from learning more about gas diffusion. As Dunning recalled, "compartmentalization and security kept news of our program from filtering in to Ernest and his Laboratory [the Radiation Lab at Berkeley]." Physicists soon acknowledged that electromagnetic separation was obsolete, but in the meantime, the completion of the uranium bomb, "Little Boy," was delayed until July 1945.

A Model of Bureaucratic Politics

Clearly, bureaucratic structures and SOPs played major roles in determining how the bomb was developed. Yet the example of an energetic and forceful Vannevar Bush makes clear that within that organizational framework, not all bureaucrats were created equal. Powerful individuals or groups can often override the standard procedures of organizations as well as the carefully thought-out choices of rational actors. It makes sense, then, for historians to be alert to decisions shaped by the politics within government institutions.

It we return to our vantage point in the football stadium, we see linebackers blocking and receivers going short or long——all SOPs being executed as parts of a complex organization. The team's coach——the rational actor——remains prominent, pacing the sidelines, deploying forces. But we notice now that often an assistant sends in a play or the quarterback makes a decision at the line of scrimmage. There is not just one decision maker, but many. And the play finally chosen may not reflect rational choice, but bargaining and compromise among the players and coaches. Although final authority may rest with a coach or the quarterback, other players, such as a star halfback, gain influence and prestige from the skill with which they play their position.

A historian applying those insights, in what might be called a model of bureaucratic politics, recognizes that a person's official position as defined by the organization does not alone determine his or her bargaining power. According to an organizational flowchart, the most influential members of the executive branch, after the president, would be the secretaries of state, defense (war and Navy), and treasury. Yet American history abounds with examples where power has moved outside normal bureaucratic channels. Sometimes a political actor, through astute jockeying, may convert a relatively less influential office into an important command post, as Henry Kissinger did when he was Richard Nixon's national security adviser. Kissinger, through forceful advocacy, shaped foreign policy far more than Secretary of State William Rogers. Colonel Edward M. House, the most influential adviser to Woodrow Wilson, held no formal position at all. House achieved his power by maintaining a low profile and offering the president seemingly objective counsel. For Attorney General Robert Kennedy, it was family ties and political savvy, not the office, that made him a powerful figure in his brother's administration.

In the case of the atom bomb, the lines of political influence were shifted by President Roosevelt's untimely death. When Harry Truman assumed the presidency, all the old institutional and informal arrangements of decision making had to be readjusted. This was especially true in Truman's case, since few members of Roosevelt's administration had less access to information and decision-making channels. Ignorance of Roosevelt's policies forced Truman to rely far more heavily on a wider circle of advisers. Stimson, for one, suddenly found that for several months the need to initiate the president into the secrets of S-1 or the Manhattan Project greatly enhanced his influence.

Thus, during the same months that Truman was trying to set up his own routines for decision making, individuals within various bureaucracies were jockeying for influence within the new order. And amid all this organizational turmoil, key decisions about the bomb had to be made——decisions that were neither clearcut nor easy. Would a Soviet entry into the war force Japan to surrender? Would conventional bombing raids and a blockade prove sufficient to end the war? Did Japan's peace initiatives indicate victory was at hand? Would a compromise on unconditional surrender, specifically a guarantee for the emperor, end the war? Would a demonstration of the bomb shock the Japanese into suing for peace?

As critics of Truman's decision have pointed out, each of those options had significant advocates within government circles. And each presented policymakers with reasons to avoid dropping the bomb——something which, as historian Barton Bernstein pointed out, was "precisely what they were not trying to do." But why not? Why did the decision makers who counseled use of the bomb outweigh those who championed these various alternatives? By applying the bureaucratic politics model, historians can better explain why the alternatives were never seriously considered.

The chief advocates for continued conventional warfare came from the Navy. From the beginning, Navy leaders had been skeptical of nuclear fission's military potential. Admiral William Leahy, the senior Navy representative on the Joint Chiefs of Staff and also an expert on explosives, always doubted the bomb would have anywhere near the force scientists predicted. The Alamogordo test laid his argument to rest. Chief of Naval Operations, Admiral Ernest King, believed a naval blockade would successfully end the war. King had no qualms about developing the bomb, but as a loyal Navy officer, he hated to see the Air Force end a war that his service had dominated for four years. He knew, too, that the bomb might undermine the Navy's defense role after the war. Among military brass, Admirals Leahy and King had somewhat less influence than General George Marshall, Army Chief of Staff. Marshall, along with General Douglas MacArthur, felt that further delay would necessitate an invasion and an unacceptable loss of American lives. Since they favored using the bomb instead, the Navy lost that round.

Some members of the State Department, led by Acting Secretary of State Joseph Grew, believed that diplomacy should end the war. As early as April 1945, Grew had urged administration officials to extend some guarantee that the imperial throne would not be abolished. Without that assurance, he felt, the peace party could never overcome the military's determination to fight on. As former ambassador to Japan, Grew knew more about Japanese politics and culture than any major figure in the Truman administration. On the other hand, he had spent much of his career as a foreign service officer far from Washington. Thus he could exert little personal influence over Truman or key advisers. Even within the State Department, Assistant Secretaries Dean Acheson and Archibald MacLeish, both more influential than Grew, opposed his position. They considered the emperor as the symbol of the feudal military tradition they hoped to see destroyed. By the time of the Potsdam conference, Grew had made just one convert for negotiations——Secretary Stimson——and a partial convert——Harry Truman. "There was [sic] pretty strong feelings," Stimson recalled, "that it would be deplorable if we have to go through the military program with all its stubborn fighting to the finish." Truman showed sufficient interest to arrange talks between Grew and the military chiefs, but he did not feel he could bring congressional and public opinion in line with Grew's position on the emperor.

The ghost of Franklin Roosevelt proved to be Grew's major opponent. Lacking Roosevelt's prestige, popularity, and mastery of government, Truman felt bound to pursue many of FDR's policies. Any move away from "unconditional surrender" posed political risks at home and military risks abroad that Truman did not feel strong enough to take. Acheson and MacLeish reminded their colleagues that Americans despised Emperor Hirohito as much as they did Hitler. The Joint Chiefs of Staff argued that premature compromise might reduce the emperor's incentive to subdue military extremists after the armistice.

James Byrnes emerged as the leading defender of unconditional surrender. In contrast to Grew, Byrnes had little training in foreign affairs. His importance in the government reflected his consummate skill at domestic politics. During the war, many people considered him second in power only to Roosevelt. In fact, Truman himself had risen to prominence as Byrnes's protegé and had repaid his debt by making Byrnes secretary of state. Deep down, Byrnes could not help feeling that he, not Truman, was the man best qualified to be president. He never got over thinking of himself as Truman's mentor.

Byrnes was exceptionally sensitive to the political risks of modifying unconditional surrender. More important, among Truman's advisers he was the most preoccupied with the growing Soviet threat. Using the bomb quickly would minimize Russian demands for territorial and political concessions in Asia, he believed, as well as strengthen the United States in any postwar negotiations. Since Byrnes's chief opponents, Grew and Stimson, were old and near retirement, and since he had strong support in both the military and State Department, his position carried the day. If the Japanese "peace feelers" to Moscow had been followed by more substantive proposals, either to the Russians or the Americans directly, perhaps some compromise might have been reached. But no other proposals were forthcoming. Thus at Potsdam, Byrnes and Truman remained convinced that the peace party in Japan would never marshal enough support against the military unless American attacks made further resistance seem futile. And it was again Byrnes who persuaded Truman to delete a provision in the Allied declaration that would have guaranteed the institution of the emperor.

By now it must be obvious why none of Truman's advisers wanted to rely on Soviet entry into the war as an alternative to dropping the bomb. By the time of the Potsdam conference, Japan's military position had become hopeless. Why encourage Stalin's imperial ambitions, especially when the bomb was available for use?

Some Americans proposed that the bomb be demonstrated before a group of international observers instead of being dropped on Japan without warning. But advocates of this alternative were found largely among scientists working at the Chicago Metallurgical Laboratory. This group had been the first to finish its work on the bomb. While the Los Alamos lab rushed to complete the designs for "Little Boy" and "Fat Man," the Chicago lab began discussing the postwar implications of nuclear weapons and the threat of an international arms race. The eminent scientist Niels Bohr had already raised those issues with Roosevelt and Churchill. Yet, as we have seen, Churchill and Roosevelt agreed at their 1944 Hyde Park meeting to keep the bomb secret from Stalin, hoping to use it to advantage in any postwar rivalry with the Russians.

Unaware of the Hyde Park agreement, scientists continued to press their case. Ironically it was Leo Szilard, the physicist who marshaled support for creating the bomb, who six years later led the opposition to its use against Japan. The chain of command required Szilard to make any appeal outside the Chicago lab through its director Arthur Compton. Instead, Szilard violated security rules and tried to reach Truman through his newly appointed secretary of state. After all, it had been an earlier unorthodox appeal that first persuaded Roosevelt of the bomb's importance. But this time, James Byrnes acted as the gatekeeper. A man of shallow mind and deep prejudices, he had little patience with an intellectual like Szilard and almost no understanding of the scientists' concerns about a nuclear arms race. To Byrnes, the bomb was a weapon that would cripple Japan and shock the Russians. He refused to take up Szilard's concerns with Truman. The internal politics of the situation proved determinative.

Nonetheless, scientists at the Chicago lab continued to speak out on bomb policy. Arthur Compton had organized a series of committees to make further recommendations, the most important of which was headed by emigré James Franck. The Franck Committee concluded that a surprise attack against Japan would destroy the trust and good will of other nations for the

United States, as well as "precipitate the race for armaments, and prejudice the possibility of reaching an international agreement on the future control of such weapons." When Franck went to present the report to Stimson, the secretary avoided a meeting. The Interim Committee then steered the report to their scientific panel, whose members were Karl Compton, Fermi, Lawrence, and Oppenheimer. Those scientists, all of whom had greater prestige and influence, concluded that they could "propose no technical demonstration likely to bring an end to the war...and no acceptable alternative to direct military use."

That conclusion came before the first test of the bomb, and Oppenheimer later regretted the panel's shortsightedness. The explosion over the New Mexico desert so profoundly moved him that its eerie glow recalled an image from the *Bhagavad-Gita*: "I am become death, the shatterer of worlds." Perhaps after Alamogordo, the scientific panel might have concluded that a demonstration would be worthwhile, but by then the time for deciding had passed. The momentum of the bureaucracy proceeded inexorably toward launching the missions over Japan. Scientists lacked the political influence to alter the assumptions of leading policymakers.

It remained, then, only to decide where specifically to drop the bombs and when to use them. Here, too, our models reveal both organizational processes and bureaucratic politics at work. To select the targets, Groves appointed a target committee composed of scientists and ordnance specialists. Their priorities reflected both the military's desire to end the war quickly and the scientists' hope to transmit a dramatic warning to the world. They sought cities that included military installations, but they also wanted a site with a large concentration of structures subject to the blast, in case the bomb missed its primary target. Kyoto, the ancient cultural and political center of Japan, topped their list.

Secretary of War Stimson vetoed that choice. As a former secretary of state and a person of broad cultural and political experience, he believed that the destruction of Kyoto would engender in the Japanese an undying bitterness toward the United States. Any hopes of integrating a revitalized and reformed Japan into a healthy postwar Asia might die with Kyoto. Stimson's position near the top of the organizational hierarchy gave him a different perspective from lower-level planners who weighed other issues. On the final target list Hiroshima ranked first, Nagasaki ranked fourth, and Kyoto not at all.

It was the weather and the routines of organization, not diplomatic or military strategy, that sealed Nagasaki's fate. After the bombing of Hiroshima and the Russian declaration of war, Japanese leaders decided to sue for peace. Advocates of surrender needed only enough time to work out acceptable terms and to reconcile military officers to the inevitable. As the Japanese discussed policy, the Americans followed standard military procedure. Control shifted from the commander in Washington, President Truman, to the commander of the bomber squadron on the island of Tinian in the Pacific. Plans called for Fat Man, a plutonium bomb, to be ready by August 11. Since work went faster than expected, the bomb crew advanced the date to the ninth. The forecast called for clear skies on the ninth, followed by five days of bad weather. Urged on by the squadron commander, the crew had Fat Man armed and loaded on the morning of the ninth. And again following military SOP, the pilot shifted his attack to Nagasaki when clouds obscured his primary target.

Had the original plan been followed, Japan might well have surrendered before the weather cleared. Nagasaki would have been spared. But the officer who ordered the attack had little appreciation of the larger military picture that made Nagasaki a target or that made the Soviet Union a diplomatic problem connected with the atom bomb. He weighed factors important to a bomb squadron commander, not to diplomats or political leaders. The bombing of Nagasaki slipped from the hands of policymakers not because of some rogue computer or any power-mad, maniacal general, but simply because of military SOPs.

And so two bombs were dropped and the world entered the atomic age.

If historians based their interpretations on a single model, they would never satisfy their desire to understand the sequence of events leading to Nagasaki. Each model provides its own particular perspective, both clarifying and at the same time limiting. The use of several models allows the historian the same advantage enjoyed by writers of fiction who employ more than one narrator. Each narrator, like each model, affords the writer a new vantage point from which to tell the story. The facts may not change, but the reader sees them in another light. As organizations grow more complex, models afford historians multiple perspectives from which to interpret the same reality.

And yet, we must remind ourselves that models do not work miracles, for their potential to reveal new insights depends on the skills of the people who build and apply them. If poorly applied, their seeming precision, like reams of computer printout, conveys a false sense of empirical legitimacy. Data specialists have coined the acronym GIGO to suggest the limits of such mechanical devices——“garbage in, garbage out.” In the end historians must remember that organizations are open systems existing within a broader historical and cultural context. Even when our models have accounted for goals, strategies, SOPs, and political influence, there remain those pieces of the picture which are still irreducible: from Robert Oppenheimer’s uneasy, almost mystical vision out of the *Bhagavad-Gita* to the inanimate, complex meteorological forces that combined to dissipate the clouds over Nagasaki in August 1945.

Some elements of history will always remain stubbornly intractable, beyond the reach of the model builders. The mushroom clouds over Japan did not merely serve as a dramatic close to World War II. The afterglow of their blasts destroyed a sense of security that Americans had enjoyed for almost 150 years. After the war, the nuclear arms race turned the United States into an armed camp. Given the limits of human understanding, who in 1945 could have appreciated all the consequences that would result from the decision to drop the atom bomb?

ADDITIONAL READING

The recent easing of cold war tensions his only emphasized the terror much of the world has felt during the previous half century. That profound unease has informed the debate over the decision to drop the first atomic bombs on Japan. Indeed, the creation and uses of nuclear energy must rank with slavery, democratic reform, civil liberties, and economic justice as issues critical to the study of the American past, a point made in Jack Holl and Sheila Convis, eds., “Teaching Nuclear History,” available from the Department of Energy (Washington, D.C., 1990). Holl and Convis provide comprehensive bibliographies from courses taught on the scientific, military, diplomatic, and political aspects of nuclear energy and weapons.

Many who first lived with the bomb, however, did not initially see it as quite so threatening, as Paul Boyer reveals in *By the Bombs Early Light: American Thought and Culture at the Dawn of the Atomic Age* (New York, 1985). The same point is made with wry irreverence in the film documentary, *The Atomic Cafe* (1982). During the early cold war, most Americans willingly accepted the rationale for dropping the bombs offered in official accounts such as Harry S Truman, *Memoirs, 1945: Year of Decisions* (New York, 1955), Henry Stimson (with McGeorge Bundy), *On Active Service in Peace and War* (New York, 1947), Leslie Groves, *Now It Can Be Told* (New York, 1962), and Richard Hewlett and Oscar Anderson, *The New World: 1939-1946: Volume I of a History of the United States Atomic Energy Commission* (University Park, Pa., 1962).

Then in 1965 came Gar Alperovitz's bombshell, *Atomic Diplomacy* (New York, 1965, rev. ed., 1985). Suddenly the rationale for building and using the bomb seemed much less obvious. Alperovitz raised difficult questions about the decision to drop the bomb at a time when the Vietnam War led many Americans to doubt the explanations of their government. Herbert Feis defended the official view in *The Atomic Bomb and the End of World War II* (Princeton, NJ., 1966). The debate has continued with critical studies by Martin Sherwin, *A World Destroyed* (New York, rev. ed., 1985), and Barton Bernstein, "Roosevelt, Truman, and the Atomic Bomb: A Reinterpretation," *Political Science Quarterly,* 90 (Spring, 1975), 23-69. McGeorge Bundy reviews the moral and political debates about the bomb in *Danger and Survival* (New York, 1988). George Kennan, the father of the cold war policy of containment, became more cautionary of nuclear diplomacy in later years, as reflected in *The Nuclear Delusion* (New York, 1982).

The military context of the bomb's development is important for understanding the implications of atomic weaponry. The evolution of military weapons and strategy is traced broadly in William H. McNeill, *The Pursuit of Power* (Chicago, Ill., 1982) and Robert O'Connell, *Of Arms and Men: A History of War, Weapons, and Aggression* (New York, 1989). Russell Weigley discusses *American Way of War* (Bloomington, Ind., 1977), while Ronald Spector, in *The Eagle Against the Sun* (New York, 1985), examines the Pacific campaigns of World War II. Some critics have suggested that racism made it easier for American leaders to use the bomb against Japan than against Germany. John Dower, *War without Mercy: Race and Power in the Pacific War* (New York, 1986), demonstrates that both Japan and the United States allowed racist misperceptions to inform key decisions. The bombing of Hiroshima and Nagasaki was an outgrowth of the rise of air power and doctrines of strategic bombing, discussed in Michael Sherry, *The Rise of American Air Power* (New Haven, Conn., 1987), and Ronald Schaffer, *Wings of Judgment: American Bombing in World War II* (New York, 1985). The impact of the bombing on the Japanese is movingly explored in John Hersey, *Hiroshima* (1946), and the French film *Hiroshima Mon Amour* (1960).

Issues of nuclear policy have attracted a rich variety of films, videos, and documentaries. The most comprehensive, taking the Soviet as well as the American side, is *War and Peace in the Nuclear Age* (PBS, 1988). *The Day After Trinity* (1980) focuses on Robert Oppenheimer, the Manhattan Project, and the scientists' views on the bomb. Four documentaries that took at the bombing of Hiroshima and Nagasaki are *Decision to Drop the Bomb* (NBC, 1965); *Hiroshima* (Thames TV, 1975), from The World at War series; *Ten Seconds that Shook the World* (Wolper, 1963); and *Hiroshima and Nagasaki: The Harvest of Nuclear War* (1975). The growing disenchantment with nuclear weapons during the 1960s is reflected in Stanley Kubrick's masterpiece, *Dr. Strangelove, or How I Learned to Stop Worrying and Love the Bomb* (1964).

An excellent collection of primary documents on the bomb's development can be found in Michael Stoff, Jonathan Fanton, and R. Hal Williams, eds., *The Manhattan Project: A Documentary Introduction to the Atomic Age* (New York, 1990). Many of the diaries, letters, and top-secret memoranda are reproduced in facsimile form. A brief history of the bomb project is offered by the Department of Energy, F. G. Gosling, *The Manhattan Project: Science in the Second World War* (Washington, D.C., 1990). The decision-making models we discuss are more fully developed in another context in Graham Allison, *The Essence of Decision: Explaining the Cuban Missile Crisis* (Boston, Mass., 1971). Richard Rhodes, *The Making of the Atomic Bomb* (New York, 1986), has written the most comprehensive and readable account of the bomb project. Daniel Kevles, *The Physicists* (New York, 1977), and Nuel Pharr Davis, *Lawrence and Oppenheimer* (New York, 1986 reprint), provide background on members of the science community who helped create the bomb. Many went on to raise profound questions about what they had done and how their work was put to use.