Organizational Dynamics of Atomic Scientists: Finding a Political Voice in the Second World War

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On July 16th, 1945, J. Robert Oppenheimer stood in the cold isolation of the New Mexico desert. He was somewhere halfway between Alamogordo and Secorro, and uncertain if he was more than halfway down an exponential trajectory of growth in the destructive power that humankind had brought to bear on its world. On that day, however, his work would reap many certainties. At 5:30 in the morning, the fireball of the Trinity Test ascended in a column of smoke that would not soon escape the gaze of the scientists who had just rendered it possible.[1] Oppenheimer—awkward, eccentric, stoic—announced that he had "become Death, The Shatterer of worlds," a realization inspired from the Bhagavad-Gita epic that has since come to capture the sense of partial awe, power, urgency, and perhaps inner conflict that the first bomb must have engendered in its creators.[2] The shock at New Mexico would soon shake the world, as Nagasaki and Hiroshima would soon witness and endure the epicenter of the bomb. So on these terms, and not necessarily on the terms of the scientists behind the miracle, the mushroom clouds would come to symbolize the end of the Pacific War and the triumph of American military might.

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[1] S. S. Schweber, In the Shadow of the Bomb: Bethe, Oppenheimer, and the Moral Responsibility of Scientists, (Princeton: Princeton University Press, 2000), p. 155.

[2] Donald A. Strickland, Scientists in Politics: the Atomic Scientists Movement, 1945-1946, (Purdue University Studies, 1968), p. 8.

Introduction: Scientists in Postwar Historiography

The unique finale of the Pacific War has forced academics to produce a vast and diverse literature to grapple with the consequences of the discovery, development, and use of nuclear weapons. Particularly pressing are the historiographical treatment of the moral questions raised by the combatant use of atomic weaponry, the bomb's cost-benefit strategy undertaken by the military, and the diplomatic uncertainties that the bombs made likely in the postwar. In this way, the history of the end of the war often precipitates questions concerning the political, diplomatic, and military elements of the decision to use the atomic bomb. Yet, presenting such pressing issues squarely in the arena of the military and political elite has often left the scientists who were central to the testing and development of the bomb with peripheral political importance. This historical treatment is no coincidence.

Prior to the war, science interfaced minimally with government. This precedent meant that there were few formal channels through which the greater scientific community could organize to exert their political will on Federal affairs. With respect to the historiographical treatment of the decision to use the atomic bomb, this examination identifies the wartime scientists as a politically weak amalgam of interest groups that could not contend with greater political powers for a meaningful voice on a national stage. This analysis is substantiated by two contrasting trends. First, parts of the community wanted to assume a greater social responsibility for their work, yet they were denied that opportunity. In the Chicago branch of the Manhattan Project enterprise, the scientists of the Metallurgical Lab made political demands regarding continued postwar research funding, international control of the atom, and a reconsideration in the use of the bomb against Japan. None of these grievances were immediately realized because none of them could be formally communicated to the upper echelons of the decision-making machinery in Washington. The Met Lab scientists, instead, floundered in their own political frustrations vis-à-vis reactionary committees and internal memoranda, most of which never saw the light of day. A second trend, however, emerged after the bombs had been dropped on Japan. In the postwar era, the scientific community revised their strategy and decidedly consolidated their political power into national organizations like the Federation of Atomic Scientists and the National Science Foundation. Their collective power garnered considerable public appeal and political influence to the point that the scientists became a respectable political lobby. Many of the concerns of the Met Lab scientists, then, came to light in the postwar termination of research restrictions in the May-Johnson Bill, and were rewarded with recognition in the more amicable McMahon Bill.

Overall, the wartime divide between administrators and rank-and-file physicists, and the activities of the Met Lab establish that the scientific community as a whole—disorganized and without any formal channels of external political communication—had no substantial political power. So while the Met Lab did not represent the entire scientific community, their plight nonetheless demonstrates that were no real mechanisms for any scientists to effectively voice their dissent when it arose. Their subsequent postwar revision of strategy and consolidation of interests further demonstrates that their initial suboptimal lobbying power was expressly derived from their initial political disorganization. Ultimately, an examination of the structure of the Manhattan Project, the Met Lab committee schemes, the black-hole of communication through the Interim Committee, and the scientists' postwar consolidation of the political power adds a new dimension to the importance of organizational dynamics in political decision-making.

The Prewar State of Science and Early Developments

The state of prewar science during the depression era was fairly bleak. Funding and general regulatory infrastructure was desperately lacking. Physics, indeed, had reached a crossroads where the frontier of research in quantum physics required incredible fiscal backing to fund the huge facilities required for the next generation of experimentation. Often, even if funding was procured, the development of large instrumentation for modern physics experiments was still impractical because of the changing nature and constant reengineering of the instruments—that is, when a huge piece of equipment is completed, drastic modifications would have already been blueprinted.[3] Thus, progress was limited by funding and the lack of clear-cut, goal-oriented engineering design thinking. One of the first physicists to intimately face these constraints was Compton, who, announced intention to explore nuclear phenomena by way of studying high energy cosmic rays in 1932.[4] This required money public and private funds that were quickly disappearing in the midst of the depression. At the time of Compton's developments, congress cut funding for federal scientific agencies across the board by an average of 12.5%.[5] Funding from the private sector also started to wane during the 1930s, as society began to question more and more the utilities modern science could bring to bear.[6] Science also took a hit in industry: by 1933, the Federal Bureau of Standards had fired almost half its members; General Electric fired 50% of its lab staff; AT&T fired 40% of

[3] Percy Bridgman, "Science and Freedom Reflections of a Physicist," Isis, Vol 37, No 3 (1947), p. 130.
[4] Daniel J. Kelves, The Physicists: The History of a Scientific Community in Modern America, (New York: Alfred A. Knopf, 1978), p. 232.
[5] Ibid.
[6] Larry Owens, "The Counterproductive Management of Science in the Second World War: Vannevar Bush and the Office of Scientific Research and Development," The Business History Review, Vol. 68, No. 4 (1994), p. 518.

their lab staff; National Research Council fellowships awards halved in number almost every year from 1933-1936.[7] On all fronts, there was a vacuum of supportive infrastructure to lend scientists a helping hand in their academic pursuits. This lack of funding, indeed, placed additional pressures on lower level scientists and technicians. At MIT, Compton similarly observed the need to continually put effort into selling his newly minted physic graduates in an already saturated market for science Phds.[8] With industrial jobs scarce, and prospects in the academy even bleaker, the scientific community found itself dire straits.

Some prominent scientists hoped to ameliorate the situation by establishing the necessary government infrastructure necessary for professional development of their stalling field. Karl Compton, again, was instrumental in expressing the grievances of his fellow physicists: he prompted Secretary of the Interior Harold Ickes to revive sciences funding, lest American innovation be bested by that of Europe. He went so far as to suggest that Public Works Administration funds be funneled to pay for independent university research.[9] Compton was not alone in trying to solicit government support. Vannevar Bush, former Vice President of MIT, recognized that there was no real policy for science in the United States: no standing committees in the federal government existed to govern, direct, and better fund science.[10] Bush, an adept mathematician and electrical engineer, quickly moved from MIT, to head the Carnegie Institution, and finally to a chairmanship of the National Advisor Committee for Aeronautics.[11] As a capable science-administrators with a number of contacts with prominent scientific defense efforts, Bush was able to convince President Roosevelt to form the National Defense Research Committee (NDRC) in 1940, with himself as chair, upon learning of sustained Nazi Advances in Poland. The NDRC was charged, quite broadly, with extending the research base and recruitment efforts of the federal government.[12] Ultimately, efforts of the likes of Compton and especially Bush led to some of the first inroads the scientific community made to involve themselves in the policymaking processes at the national level. These efforts, however, were largely temporary solutions to the problems scientists faced nationally: that is, there was no permanent political foothold for scientists in the government. Nonetheless, these first precedents, in the context of the coming war, were

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[7] Ibid., 250.
[8] Kaiser, "Cold War Requisitions, Scientific Manpower, and the Production of American Physicists after World War II," p. 137.
[9] Bruce Smith, American Science Policy Since World War II (Washington D.C.: The Brookings Institution, 1990), p. 32.
[10] Joseph Haberer, Politics and the Community of Science (New York: Van Nostrand Reinhold Company, 1969) 185.
[11] Richard G. Hewlett, Francis Duncan, Jack M. Holl, and Oscar E. Anderson. A History of the United States Atomic Energy Commission (University Park, Penns.: Pennsylvania State, 1962), p. 24.
[12] Ibid., 25.

extremely important in what would become the largest national war mobilization that American has ever known.

Scientific Development during the Manhattan Project

A turning point in modern physics precipitated a turning point in modern history. The 1939 discovery of a nuclear fission reaction by German Chemists, Otto Hahn and Fritz Strassman, sent shockwaves in the international physics community.[13] Communication of the atom-splitting experiments soon caught the attention of Princeton scientist Niels Bohr, who further excited fervor among American physicists at the Fifth Washington Conference on Theoretical Physics.[14] The excitement, however, soon led some to believe that fission—with its immensely fast kinetics and release of energy—could render possible a chain reaction that could potential lead to the creation of an atomic weapon. The scientific establishment asked Albert Einstein, an ambassador of their often esoteric field, to relay the important information to President Roosevelt.[15] At the same time, universities across the nation scrambled to confirm the European findings through their own experimental endeavors. [16] Thereafter, it did not take long for a large-scale mobilization of organized scientific talent take shape.

The institutional infrastructure of the scientific community had to change to accommodate America's first explorations into the realm of atomic weaponry. Bush, already the head of the National Defense Research Committee, observed that there were still structural inefficiencies in its operations. First, it was primarily a research organization that had little leverage over engineering development for practical military use of the research it conducted. Second, there were apparent redundancies with the roles of the National Advisory Committee for Aeronautics and other military service labs.[17] Ultimately, Bush's discontents with the proceedings of the NDRC compelled him to ask Roosevelt to further centralize and crystalize the views of scientists through an Office of Scientific Research and Development. On June 28th, 1941, the OSRD was established by Executive Order with Bush at the helm—James Conant, president of Harvard and leading member of the NDRC, took Bush's vacant seat as NDRC president. The OSRD made research and subsequent development recommendations, and was charged with applying funded research for the national

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[13] Kelves, The Physicists, p. 324.
[14] Hewlett, A History of the US AEC, p. 11.
[15] Kelves, The Physicists, p. 324.
[16] Hewlett, A History of the US AEC, p. 29.
[17] Ibid., 41.

defense in the tense times of its creation.[18] These applications, in its early stages, typically involved exploratory studies into the isotopic separation of Uranium to procure fissionable material, activities that would long outlast the present war. Overall, the OSRD revolutionized the scientific community's relationship with the state.[19] It allowed for a more direct mobilization of the scientists in the national interest.

Bush, with the tools of the OSRD at his disposal, envisioned the scaling of the preliminary, collective work that was churning through the nation's labs by November 1941.[20] The Pearl Harbor attacks only accelerated their sense of urgency. By June 1942, that same urgency compelled Roosevelt to give Bush the green light to pursue the production of the bomb in earnest. That following September, Brigadier General Leslie Groves was given the reins, and three separate research focuses were targeted by the project under three different civilian leads: Ernest Lawrence of Berkeley oversaw the production of the recently created element of plutonium, Harold Urey over saw isotopic separation by gaseous metal diffusion at Columbia University, and Arthur Compton developed weapon theory and sustainable chain reactions at the University of Chicago's Metallurgical Laboratory.[21] The compressed timeline of the war gave research little room for confirmatory experimentation, and projects to scale up all of the academic developments were simultaneously undertaken: Roosevelt allotted $400,000,000 for large-scale uranium enrichment plant development, leading to the development of the Oak Ridge facility for the gaseous diffusion and the Hanford plutonium works.[22] Each plant spawned temporary towns with unique local economies and a high degree of government surveillance to ensure the project's secrecy. In all, talent from across the nation made possible a project of the scale necessary for the goal-oriented scientific enterprise, whose results often remained elusive and whose pursuits promised no guarantees.

The Manhattan Project proceeded, in many ways, like any other experimental endeavor. Upon having completed the scaled facilities for the all-out assault on fissionable material development, some methods for isotope isolation proved more fruitful than others. Pile experiments—the name for small scale reactors—in Chicago's Met Lab proved promising when Glenn Seaborg of University of Chicago was able to isolate plutonium in appreciable amounts in

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[18] Ibid.
[19] Owens, "The Counterproductive Management of Science in the Second World War," p. 517.
[20] Hewlett, A History of the US AEC, p. 49.
[21] Kelves, The Physicists, p. 326.
[22] Ibid.

August 1942.[23] Projects at the University of Virginia focused on centrifugation to isolate uranium in its gaseous form, but proved complicated and low-yielding to chemist's dismay.[24] The unremitting progress made by various research facilities across the nation culminated in the development of the Los Alamos labs, whose primary objective laid in the final stages of uranium research and, ultimately, weapons research. From its inception in 1943, it was able to attract some of the leading scientific talent in the nation. Under the leadership of Robert Oppenhiemer and Leslie Groves, the isolated camp in the New Mexico desert developed gun type and implosion based nuclear weapons with the raw material that they acquired from the university labs and the larger plants at Oak Ridge and Hanford.[25] Feverish work at Los Alamos brought the bombs to the final stages of the production line.

Initial Dissent at the Met Lab

Los Alamos was the new face of the project, with the Hanford and Oak Ridge sites working overtime to produce the raw material required to build the bombs that the end of the war ostensibly required. This shift in the project phase, however, sent shockwaves through the scientific community, especially that of the Met Lab of Chicago, who soon realized that their services might no longer be needed, even before the war's end. By 1944 especially, the Met Lab's role in the assembly line was less intense and less important than that in Los Alamos.[26] This led to rumors of impending layoffs that could affect up to 90% of Chicago's laboratory staff.[27]

Arthur Compton of the University of Chicago group hoped to quell the fears of his staff by exploring "post-Hanford" plans for the research facilities on campus. He drafted an April 10th report to Groves hoping to procure more funding after the inception of Los Alamos with three goals in mind. Compton first argued for the continued funding of the Met Lab; second, he wanted more communication and collaboration with Los Alamos; finally, he hoped to get further support for future research. Of particular interest to the lab were the exploration of thorium metals, more efficient pile production, and broader military, industrial, and biological applications of radiation.[28] The combination of the demands were quite telling of the motives behind the famous reports the Met Lab produced. Particularly peculiar is that the economic anxiety under which they were

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[23] Hewlett, A History of the US AEC, p. 90.
[24] Ibid., 96.
[25] Ibid., 249.
[26] Matt Price, "Roots of Dissent: The Chicago Met Lab and the Origins of the Franck Report," Isis, Vol. 86, No. 2 (1995), p. 223.
[27] Hewlett, A History of the US AEC, p. 322.
[28] Ibid., 323.

operating seemed to lead to redundancies in their requests to Groves. The original economic impetus for the Met Lab activism, which largely started with the prospect of layoffs, opened the floodgates for more grievances to ultimately surface.

New trends emerged in the thinking of the Chicago scientists. First, the moral question of the bomb emerged, as word broke that the Germans would not be able to produce the bomb as the scientists initially feared.[29] The prospect of bombing Japan, in the eyes of the scientists, was not fully justified considering the Manhattan Project's foundational motives.[30] Second, a growing fear of a nuclear arms race developed amongst scientists, who knew all too well that the available scientific literature would be more than enough to aid an eager nation in the pursuit of a weapon of their own.[31] In the minds of Chicago scientists, the loss of the American nuclear monopoly and the prospect of an active arms race mandated some form of international control of nuclear weapons after the war.[32] Combatant use of the bomb would invariably preclude an international trust in the American government should there be an earnest call for international control. All of these concerns, all slow to develop, led most Met Lab scientists to believe that policymakers needed to rethink the blind military use of the bomb. Myriad opinions, all compelling in their own way, bubbled into growing frustration, as the Met Lab saw the momentum of the Manhattan Project proceeded full speed without a full consideration of its postwar consequences. The scientists, entering the fray of the political arena, needed to develop a strategy to make their concerns known.

Prospectus on Nucleonics and the Franck Report, Reactions to Interim Committee Inaction

The Chicagoans' solutions to their political inquiries manifested in the form of strategic committee meetings. Committees in many ways crystalized individual scientists' desires, and it was generally hoped that they could produce articulate documents to bring the Met Lab's concerns to the government. Burgeoning activism and this committee-minded framework thusly prompted Zay Jeffries, a General Electric consultant for the University of Chicago, to ask Compton to form a new group to explore ways in which the Lab's leaders could better communicate with the government. Jeffries saw that a healthy science-government relationship would facilitate important

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[29] Joan W. Moor and Burton M. Moore, "The Role of the Scientific Elite in the Decision to Use the Atomic Bomb," Social Problems, Vol 6, No.1 (1958), p. 83.

[30] Arthur Steiner, "Scientists, Statesmen, and Politicians: The Competing Influences on American Atomic Energy Policy 1945-46." Minerva, Vol. 12, No. 4 (1974), p. 476.

[31] Smith, "Scientists and the public," p. 24.

[32] Jessica Wang, American Science in an Age of Anxiety: Scientists, Anti-Communism, and the Cold War (Chapel Hill: University of North Carolina Press, 1999), p. 13.

defense research well into the future.[33] And so the Jeffries Committee—comprised of Jeffries himself, Enrico Fermi, James Franck, and others—was the initial call to political arms that the Met Lab hoped to use to mobilize their scientists and opinions.

The Jeffries Committee's drafted the *Prospectus on Nucleonics*, which they submitted to Compton for review in November 1944. In its ominously titled fourth section—*The Impact of Nucleonics on International Relations and the Social Order*—the committee argued that the advent of atomic weapons mandated international control of their use. It also suggested that increased public awareness and scientific understanding of the bomb was needed to move forward in their brave new world.[34] The report further acted to relieve the political pressure building in Chicago, as questions about the German bomb effort, the use of the bomb against Japan, and the structure of the postwar control further arose.[35] The document was expressly written with the intention of holding the attention of the scientific administrators in Washington.[36] In this way, *Prospectus* came to be the first real effort to forgo Chicago's traditional late-night meetings and handwritten memoranda and communicate with the outside world.[37] But while the Chicagoan scientists first started to stretch their legs in the political arena, Washington was already contemplating the use of the first available bomb, and they were nearly at the finish line.

Advisors close to the President independently recognized a need for a nuanced position on the use of the atomic bomb. For this reason, Secretary of War Stimson formed the Interim Committee—comprised of high brass military, diplomatic, and scientific elite—on May 4th, 1945, to act as a collective advisor on postwar nuclear directions.[38] Among the members of the panel was Vannevar Bush, whose prewar predilection for the defense of scientific interest prompted him to suggest the appointment of a Scientific Panel for the committee. The Panel—comprised of Oppenheimer of Los Alamos, Compton and Fermi of Chicago, and Lawrence of Berkeley—were to meet with the Interim Committee on May 31st to discuss the bomb and its military use. At this juncture, knowing that there were administrative scientists at the policymaking table, it would seem as though communicative channels for political dissent were open. Ideally, Chicago could find a vehicle for their loud political voice on the backs of Oppenheimer, Compton, Fermi, and Lawrence. However, it is instructive to note that the informal nature of the Scientific Panel, and the advisory

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[33] Price, "Roots of Dissent," p. 237.
[34] Smith, A Hope and a Peril, p. 22.
[35] Ibid., p. 24.
[36] Joseph Manzione, "Amusing and Amazing and Practical and Military": The Legacy of Scientific Internationalism in American Foreign Policy, 1945-1963." Diplomatic History, Vol. 24, No. 1 (2000), p. 29.
[37] Smith, A Hope and a Peril, p. 43.
[38] Ibid., 34.

role of the Interim Committee, meant that Chicago's dissent merely moved from one local committee environment to another, albeit more distant. With too many orders of separation from actual political decision-making channels, too many filters for too many disorganized arguments could not make their way out of the committee planning stage. The historiographical treatments by the likes of Leon V. Sigal of the Northeast Asia Cooperative Security Project conclude that the Interim Committee had no real power, and was only a political buffer to mitigate growing unrest in the scientific community:

> The committee was not an action channel for that decision. Its consideration of how to use the bomb in the war was instead a maneuver to influence a decision made elsewhere in the policy process. It became part of the bureaucratic strategy of a handful of senior American officials with a stake in dropping the bomb on Japan to head off opposition in the scientific community, lest that opposition succeeded in widening the range of options before the president on wartime.[39]

Such a high degree of specificity to the role of the Committee is questionable. Yet it is not particularly difficult to see how the communication of a whole community's demands via individual actors in mere advisory committees could not engender meaningful political change. Sigal notes, additionally, that the scientists could not contend with the expressed interests of the established political elite, who had a stake in the use of the bomb on Japan. There was thus no actionable way for the scientists to have a fair say at the bargaining table. In theory, the Interim Committee could give a voice to the Met Lab scientists. In practice, however, the Interim Committee represented something closer to political formality.

Prospectus actually made its way into the hands of the Interim Committee by the May 31st meeting.[40] The contents of the forty two page document, however, were not fully considered. This particular meeting brought the group together with its subsidiary Scientific Panel to review scientific community suggestions about weapons development, research, international competition, non-military use, and political implications. The administrative scientists listed developments of the hydrogen bomb, the armaments race, and the importance of continued basic research as key factors that guided communal thinking.[41] Thus, the year-long political developments of the Met Lab were evaluated in a matter of hours in an informal advisory setting. Moreover, the scientists on the Panel had observed in the meeting that the use of the bomb was all but a foregone conclusion by the military elite.[42] In this way, *Prospectus* remained in committee-level limbo, and its importance was

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[39] Leon V. Sigal. "Bureaucratic Politics & Tactical Use of Committees: the Interim Committee & the Decision to Drop the Atomic Bomb," Polity, Vol. 10, No. 3 (1978), p. 330.
[40] Hewlett, A History of the US AEC, p. 353.
[41] Smith, A Hope and a Peril, p. 36.
[42] Steiner, Scientists, Statesmen, and Politicians, p. 478.

ultimately washed away in the proceedings of the informal meeting. The late-May developments demanded a new Met Lab strategy to enact their political agenda. Instead, they resorted to familiar tactics.

On June 2nd, Arthur Compton returned to Chicago from Washington, hoping to assuage his staff's fears. Instead, mentioning a second Interim Committee meeting scheduled for two-week's time, he did the exact opposite.[43] On June 4th, there was a vast reshuffling and formation of Met Lab committees in response to the inertial inaction of the Interim Committee. Groups on the postwar "Research Program," "Education," "Production," "Controls," "Organization," and "Social and Political Implications," all emerged.[44] The last committee on Social and Political Implications was headed by émigré physicist James Franck, and produced a document modeled on the *Prospectus*. What would later come to be known as the Franck Report suggested in pressing terms that international control was needed to hedge against the possibility of the loss of American's nuclear monopoly. International control, it explained, would best prevent a global arms race that, in very specific terms, could lead power nations to build a stock of weapons that could destroy all densely populated regions in the United States.[45] The cause for international control would, then, best be served by reconsidering the combatant use of the bomb. It was thusly suggested that a demonstration would suit military interests in bringing about the War's end, while simultaneously giving the nation a better footing to argue for further international control.[46] Ultimately, however, the importance of the Franck Report comes from the Scientists' frustrations for their peripheral political position in the decision making process:

> Although important tactical results undoubtedly can be achieved by a sudden introduction of nuclear weapons, we nevertheless think that the question of the use of the very first available atomic bombs in the Japanese war should be weighed very carefully, not only by military by military authorities, but by the highest political leadership of this country.[47]

Claiming that their document merited consideration by the highest of political authorities in the nation, the Franck Report acknowledged that a prerequisite to their political agenda was the political power that that had lacked. The high hopes and responsibilities of political communication with which the Committee on Political and Social Problems charged itself did not, however, come to fruition. The Franck Report, using the same committee-level memorandum tactics used by the Jeffries Committee, fell victim to a similar fate. Upon completion on June 11th,

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[43] Price, "Roots of Dissent," p. 240.
[44] Smith, A Hope and a Peril, p. 42.
[45] Ibid, p. 562. *From Appendix B. The Franck Report.*
[46] Ibid, p. 566.
[47] Ibid.

the report was forwarded to the Interim Committee's Scientific Panel, again, for further evaluation. The panel of administrative scientists, however, responded that "no technical demonstrate" would bring about the end of the fatiguing war, arguing that no alternative to "direct military use" would suffice.[48]

Ultimately, this final analysis comes down to an examination of political methodology employed by the scientists. The meaningful deliberation and discourse from the Jeffries Committee and the Franck Report, along with the myriad committees the Met Lab hoped could affect a political change, prove that the Scientists had a general nontechnical position on the use of the atomic bomb, and in no way lacked the political will to try to do something about it. What they also show, however, is that the existing interface between government and science did not allow for that political will to translate into an effective policy-making directive that could have changed the course of the decision to drop the bombs later that summer. The Interim Committee and Scientific Panel were, arguably, means by which the scientists could voice their opinion. There is, however, a significant difference between being able to express a political opinion—albeit limited in a time of heightened military secrecy over the Manhattan Project—and being able to act on political opinion. The Interim Committee and Scientific Panel proved only to be government buffers that molded the voices of the Met Lab scientists to the views of politically superior interests in Washington. In this way, there was no infrastructure within which the scientists could deliver their dissent in a way that could actually engender a meaningful political change. Many of the committees they formed and the memorandum they shared were nuanced frustrations that formal decision making bodies, like the Military Policy Committee and the President, would not hear in full.

Ultimately, the Chicago faction was the only organized lab to voice their opposition to the proceedings of the Manhattan Project. Labs at Columbia and Berkeley, despite their similar research roles, reported little political activism in their ranks, and many of the coastal scientists were not aware of the Met Lab's anxieties.[49] In many ways, it is conceivable that this anomaly existed in part because no precedent had been set wherein scientists actually tried to engage with political questions: this left little federal infrastructure or institutional infrastructure from which the scientists could mount a political offensive or campaign. Indeed, this divide, in and of itself, undermined the Met Lab's agenda insofar as the message that they hoped to deliver to Washington

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[48] Moore, "The Role of the Scientific Elite in the Decision to Use the Atomic Bomb," p. 83.

[49] Alice K. Smith, "Scientists and the Public Interest – 1945-1946," Newsletter on Science, Technology and Human Values, No. 24 (1978), p. 24.

was neither nationally supported nor even known by the entire scientific community. The lab's interest also competed with those of the science-administrators—like Oppenheimer, Fermi, Bush, and Conant—many of whom were content with appeasing the military elite and were willing to consult only each other.[50] Then, the Met Lab's initial instinct to appeal to with these elite administrative members of their community, most of whom they trusted and respected, inevitably led to the loss of the thrust of their arguments to the noisy backchannels of bureaucratic red tape and communicative in efficiency. In the end, no one could hear the uproar of the Met Lab scientists, despite their best efforts: committee after committee produced memorandum after memorandum to reach a policymaker that might listen to them. Ultimately, a combined analysis of the Prospectus on Nucleonics, the Franck Report, and the Interim Committee response to their pleas again demonstrates that the abundant political will of the Met Lab scientists had no effective, formal mechanism to effectuate real political change.

Organizing After the Bomb

Despite the Met Lab's best efforts, two Japanese cities saw the full force of the bomb in two August raids that would forever change the course of world history. The gravity of the bombs weighed heavily on the minds of scientists after the fact, and indeed, scientists like Oppenheimer were left to privately ruminate about the new world they had created and the blood that they had on their hands. In the end, it was only with the actual news of the detonation that the whole scientific community began to ask the same questions that the Met Lab had asked itself during the war.[51]

Combatant use of the bombs demonstrated America's scientific prowess in the hands of America's mighty military. The subsequent race for atomic weaponry on the international, however, produced a similarly changing political landscape domestically. These domestic changes revolutionized American science culture. The prewar era tradition, characterized by individual enterprise in isolated academic settings, experienced a transformation during the mandated national collaboration demanded by the Manhattan Project's scale. In practical terms, scientific expertise became married to government orchestration and funding like never before. The Federal government, recognizing this new interdependence, quickly moved to consolidate its regulatory power of the atomic research that made it nuclear super power after the Pacific War.

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[50] Strickland, Scientists in Politics, p. 140.
[51] Wang, American Science in the Age of Anxiety, p. 9.

On October 4th, 1945, the military elite hoped to formalize their control over atomic research with May-Johnson bill to the floor of the senate.[52] The bill broadly placed regulatory power over atomic developments in the hands of the military.[53] The wartime science-administrators like Oppenheimer and Bush actually supported the legislation, and saw no reason to fear the growing partnership they had established with the military.[54] There was, however, considerable unrest amongst the greater community of scientists, who were even more incensed than ever over the peacetime control of their work.

Opposition to the May-Johnson bill, however, looked different from the Jeffries and Franck efforts. Unlike the internal committees and memorandum drafting that characterized wartime expressions of dissent, the scientists descended upon Washington to make direct appeals to congress. This required a concerted front from the many geographically and academically separated atomic scientists.[55] Accordingly, the desperate groups of science collectives—the Atomic Scientists of Chicago, the Association of Oak Ridge Scientists, the Association of Los Alamos Scientists, and others— soon assembled themselves as the Federation of Atomic Scientists, which soon became the more inclusive "Federation of American Scientists" (FAS). The FAS soon launched the American Scientists' Movement to further consolidate scientific communities across the nation to fight for the preservation of scientific freedoms.[56] There was soon a full-time staff that acted as a liaison to important Washington officials. Young scientists worked feverishly with longtime dissident physicist Leo Szilard to appeal to sympathetic senators who might oppose the May-Johnson bill.[57] In their own way, the scientist were now in the business of building the necessary political support to build a political infrastructure that could accommodate their needs. In the course of their stay in Washington, they further established themselves as an effective political force through media outings, essays, and radio addresses. Moreover, they became a popular force amongst the people, and a sympathetic press amplified their voice.[58] In the end, the Scientists' Movement caused a storm that afforded them the political clout that they needed to affect the policy changes that they desired. This unified dissent gained final support in the form of congressional alliances.

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[52] Smith, A Hope and a Peril, p. 128.
[53] Steven Del Sesto, Science, Politics and Controversy, (Boulder: Westview, 1979), p. 14.
[54] Wang, American Science in the Age of Anxiety, p. 14.
[55] Smith, "Scientists and Public Interest," p. 25.
[56] Paul Boyer, By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age. (North Carolina: University of North Carolina Press, 1994), p. 51.
[57] Smith, "Scientists and Public Interest," p. 25.
[58] Boyer, By the Bomb's Early Light, p. 60.

The Scientists' Movement found a cooperative partner in democratic Senator Brien McMahon, who introduced S.R. 1717, a bill which would come bear his name. The McMahon bill represented the political voice and the political win that the scientists had long sought. The Legislation formed an Atomic Energy Commission (AEC) to oversee atomic energy research and development under the supervision of a civilian board; it made provisions made for the study of the political, social and economic implications of atomic research; finally, it promoted the free exchange of research without the stringent security requirements outlined in the May-Johnson bill.[59] With pressure coming from liberal legislators and active scientists, President Truman shied away from May-Johnson in February, and established the Atomic Energy Commission through the passage of S.R. 1717 that following August. Thus, the Scientists' Movement was able to build the political infrastructure needed to contend with other, more established government organizations. The founding of the AEC in 1946 served the dual purpose of preserving scientific freedom in the coming atomic age and, taken liberally, gave the scientists legitimacy in national, political affairs.

In the postwar era, the scientific community would continue to crystalize their political goals and consolidated their distributed power to given themselves an even greater voice in Washington. The advent of an independent body to oversee the long term financial health of the sciences, the establishment of the National Science Foundation (NSF) in 1950, further spoke to the growing interface between government and science.[60] The operational structure of the NSF would further tie the public's interest to the interests of academic research scientists, and afforded the scientific community and even stronger political foothold in government.[61] With these newly founded bureaus, scientists had established the political organizations needed to generate meaningful political capital. Ultimately, comparing the scientific community's nontechnical wartime and postwar operations demonstrates that broader organization was needed to exact effective political change. To contend on the same political plane as established decision-makers in Washington, the scientists organically constructed a political infrastructure from which they could formally voice their grievances. Organizations like the FAS, the AEC, and the NSF thus linked government and science more formally than did the haphazard communicative efforts of the *Prospectus* and the Franck Report. In many ways, political organization—not merely political or economic necessity—allowed the scientific community to express meaningful political power.

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[59] Wang, American Science in the Age of Anxiety, p. 18.
[60] Strickland, Scientists in Politics, p. 140.
[61] Wang, American Science in the Age of Anxiety, p. 11.

Conclusion

The Pacific War largely remains in the shadow of the two nuclear bombs that contributed to its end. Special attention, then, must be given to the political circumstances that culminated in the decision to use them. Before the war, the physicists behind the bomb had few organized, well-articulated interests that could unite them politically in the ranks of the government. This prewar precedent meant that there was no established political infrastructure that accommodated scientists and their opinion in the political and diplomatic decision-making process to which they wanted access during the war. This presented a number of frustrations, many of which boiled over in the course of the proceedings of the Manhattan project: committee after committee shared memo after memo in a frenzied effort to bring the physicists' disorganized political interests to the bargaining table in Washington. The scientists wanted, among other things, the international control of the atom, the freedom to continue to perform unrestricted physics research, greater consideration before the deployment of the bomb and, importantly, continued federal funding for basic and applied research. They did not, however, have the political literacy to jockey amongst established political elites to defend their disorganized interests.

Ultimately, the bomb was dropped despite a vocal dissent from the scientific community, especially at the Chicago Met Lab, and a full consideration of the full view of the physicists was never assessed at the highest levels of government that had expressed decision-making responsibilities. Accordingly, a full examination of the political power scientists had in the prewar, wartime, and postwar eras corroborate that the Manhattan Project physicists did not have any real political power. They lacked the organization to voice their political opinion their strategy of forming internal committees amounted to no true political influence. Only in the postwar remobilization of science against government regulation during the May-Johnson debate were the scientists able find their political voice by organically establishing nationwide bureaus and organizations like the National Science Foundation and the Federation of American Scientists to defend their interests. This new strategy culminated in an actual political win: the passage of the McMahon bill which would form an Atomic Energy Commission that could formally communicate the community's grievances to a broader political audience. Ultimately, in the scope of the war itself, the chronology makes clear that the scientific community had little real decision-making power with respect to the decision to use the atomic bomb. In the end, it was this lack of power that inspired an institutional revolution in the community to demand a say in the political arena in the postwar era.

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Brief Bibliographic Essay and Noteworthy Sources

No sources argue that the bomb married scientific inquiry to government need and funding. The operational procedures of science today, from the funding of basic research through the NSF to the culture of collaboration, represent the lasting legacy that the bomb engendered in the scientific community. The bomb, in its goal-oriented nature, transformed the culture of science, which was once dominated by the pursuit and acquisition of basic knowledge. With a new partnership with government, science was able to move forward in some ways: it could use funding to explore new paths that private funding would not have allowed. But this interface would also lead to some problems: there was a compelling military-minded desire to monopolize scientific knowledge and cloak American scientific development in secrecy. These were the considerations that initially brought the topic to my attention. By the end of the course of the research, it was clear that the political role of the scientist was interesting; so too was the postwar picture of American scientific prosperity that the history painted. However, a deeper reading of the vast literature duly reveals that the experience of the scientists—their lack of organization and their acquisition of organization—was a good, general paradigm for understanding organizational dynamics in political decision making.

Two papers were instrumental in the development of these theses. First, Matt Price's "Roots of Dissent" describes the outbreak of political and social concern that stemmed from the Met Lab scientists. This instructive article shows the economic dynamics that inspired initial concerns, and outlines the evolution of those economic concerns to more pressing, grander opinions on the political consequences of the bomb. Price argues that the Met Lab actually had a tradition of dissenting behavior, and that the culmination of their anxieties in the Franck Report was a long time coming. Most importantly, however, his examination of the reactionary nature of the Met Lab dissent concludes that a strong, tight political message is needed to confront tough political challenges: thus, the Met Lab failed because it only had haphazard, disorganized political tools at its disposal. Second, Leon V. Sigal's "Bureaucratic Politics" was phenomenally important to some of the theses of this paper. He crystalized the structural importance of committees, and applied this framework to the function of the Interim Committee late in the war. His comments on the way in which political change does not radiate from advisory committee-like political bodies was wholly instructive in proving that the scientists really didn't have any meaningful channels to express and act on their political opinions.

Two general histories proved enjoyable and useful in the process of painting the broader history of the scientific community's role in the Manhattan Project. Alice Kimball Smith's *A Peril and a Hope* intimately and efficiently painted the wartime plight of the Chicago Scientists, especially with respect to their efforts to use the *Propsectus* and the Franck Report as vehicles to communicate their political agenda. Smith, whose husband worked in the Los Alamos facility, had an access to the scientists that most of the contemporary literature lacks. Especially helpful were her appendices, where she published—for the first time—the full *Prosepctus* and Franck Report. A second historical account of the Manhattan project that proved useful was the first volume of Richard Hewlett's *History of the United States Atomic Energy Commission*, which effectively communicated the grandeur and scale of the project. Though the volume was short of much analysis, it was invaluable for the fast paced narrative, which really introduced the reader to the gravity of the times.

The history richly described a full prewar, wartime, and postwar evolution in scientific political culture whose legacy lasts to this day, from the perspective of academic funding to government's new hand in scientific operation. The breadth of the coverage necessary for this project, in some ways, made for a product that was more dilute than I had originally anticipated. The full scope of the literature, however, really requires that many dots be drawn between dozens of scientists, a dozen research and engineering facilities, and dozens of turning points in the decision making process to produce the Hiroshima and Nagasaki bombs. In the end, a holistic analysis of the sources presented show that the atomic bomb catalyzed and accelerated a positive evolution in the political maturity of American science.