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BOOK REVIEW

THE RACE THAT WASN'T

Churchill's Bomb: How the United States Overtook Britain in the First Nuclear Arms Race, Graham Farmelo. Basic Books, 2013, 554 pages, $29.99.

ABSTRACT
Graham Farmelo's new book on the early British nuclear weapon program assembles a fascinating cast of characters in a gripping narrative. It particularly succeeds at illustrating the importance of "atomic energy" imagery in the United Kingdom well before the discovery of fission, and provides nuanced insights into Churchill's handling of issues relating to the atomic bomb and scientific expertise. However, in arguing that the British had a "lead" on the manufacture of atomic bombs that was "lost" to the United States during the early Manhattan Project, the book overstates its case, and in the process misunderstands what it took to make the bomb.

KEYWORDS
Manhattan Project; United States; United Kingdom; history; World War II

The history of the development of the first nuclear weapons during World War II has been told many times since it was first made public in the days after the bombing of Hiroshima. That it was a joint effort between the United States, the United Kingdom, and Canada was made clear from the very beginning, though the United States has received the lion's share of the credit. This is arguably appropriate. The United States housed the great factories that produced the fissile material for the bombs. It spent the most money by far on building the bomb, and employed the mind-boggling number of people necessary to produce it (almost 1 percent of the entire US civilian labor force during World War II participated in some way in building of the bomb, most of them ignorant of the project's ultimate purpose at the time). Americans held the ultimate authority on the project, and they were the ones to drop the bombs on Japan. The project became the template for the quintessentially American approach to the Cold War that followed, marrying scientific genius (including foreign genius that was willing to declare loyalty to a new country) with military momentum, near-endless financial expenditure, and industrial know-how.

And yet, as Graham Farmelo's new book emphasizes, the United Kingdom was for a short time on the vanguard of scientific work on nuclear weaponry. Why it fell behind, and its eventual nuclear legacy after it slid into the shadow of the two postwar superpowers, is the overriding narrative of *Churchill's Bomb*.

Farmelo's book could be roughly characterized as a "nuclear biography" of Winston Churchill, though it includes many side narratives as well. It begins with a long but useful discussion of the context of speculation on the possibility of "atomic bombs" in the United Kingdom well before scientists considered their creation a likely endeavor. This includes not only the well known account of "atomic bombs" by H.G. Wells in his

1914 novel, *The World Set Free*, but plenty of other, more minor works. Churchill devoured such imagery, and Farmelo gives an immensely compelling account of how the later prime minister was influenced by imaginative speculations about the future of science and technology through his acquaintances with both Wells and the divisive physicist Frederick Lindemann, the latter of whom would be Churchill's most trusted scientific advisor over the long course of his life. Sober experimentalists like Ernest Rutherford scoffed at such predictions, and rightly so: while the new sciences of radioactivity and nuclear physics depicted a world swimming with hypothetical energy, until the discovery of nuclear fission in late 1938, there existed no plausible mechanism for its release.

In his approach to this early period, and to a lesser extent later parts of his story, Farmelo falls into a familiar narrative trap. We, the contemporary audience, know that nuclear weapons can be made. It is therefore easy to label the few people (whether authors, statesmen, or scientists) who talked about atomic weapons prior to the discovery of fission as visionaries, and to portray the suspicious and doubtful as overly conservative in their thinking. In their own context, though, as historians of science rightly acknowledge, the "visionary" can be indistinguishable from the "crank."

There are at least two problems with this false—or at least exaggerated—dichotomy. The first is that focusing on correct predictions about the future overstates their correctness. Futurism has a bad track record, looked at objectively, and it is easy to overstate the correctness in vague ideas (and to ignore the incorrectness). The second is that it causes us to misunderstand the historical context in its own right. When we focus on the "winners" of history, we can lose the insight into why their logic was not compelling to their contemporaries at the time (and it is usually not because their contemporaries were any less brilliant or forward-thinking).

This "presentist" stance leads Farmelo to harshly judge some of his historical actors, including Churchill himself, when they do not always appear to recognize the vast implications of the atomic bomb. Their confusion, though, stems from the fact that they did not know how things would play out—not only at a world-historical level, but even with regard to relatively more limited technical questions, like how big of an explosion an atomic bomb would render. The "Trinity" test, for example, was five times more explosive than predicted, illustrating that even at such a late stage in the work, there were still massive uncertainties. Reconstructing the world of the past as it was understood at the time is generally the job of the historian, even if it is done with an eye to questions that the present-day reader will find most important.

All that being said, the early portion of the book, with its rich, vivid descriptions of the early trope of "atomic bombs," is highly stimulating. It indicates much about the milieu in which that early work on fission took place, and the hyperbolic nature of the early history of the atom gives a context for the inherent skepticism that some major scientists (e.g. Enrico Fermi) had for claims about the possibility of fission bombs. It is also revealing as an intellectual biography of Churchill and his receptiveness to the idea that science and technology would become major determinants in the future of the world.

What is so odd, then, is that much of the rest of the book shows how inept Churchill was at actually making that vision a reality. This extends well outside the nuclear realm. In Farmelo's account, Churchill's reliance on his own côterie of advisors (Frederick Lindemann in particular) and his insistence on centralization resulted in a wartime approach to science and technology that was, at best, haphazard. Unlike in the United States,

where Vannevar Bush worked to centralize the delegation of scientific responsibilities and coordinate their uptake by industry and the military, the British scientific effort appears relatively uncoordinated and rife with bitterness. This, it seems to be implied, is why, as the book's subtitle indicates, the United States "overtook" the United Kingdom in the work for the first atomic bomb—bad, indecisive management from the top. This narrative arc is one of tragedy: the British initially have a strong showing, but are then eclipsed by their "cousins" across the Atlantic.

The general gist of this narrative is one that will be well known to those who have read the works of Richard Hewlett, Margaret Gowing, or Richard Rhodes. After the announcement of fission in early 1939, physicists around the world contemplated the possibility of nuclear weapons. Émigré physicists who had fled fascism, both in the United Kingdom and United States, were generally the ones pushing for both secrecy and research into atomic weaponry, fearing that the Germans might develop one first. In the United States, this resulted in the famous Einstein-Szilard letter in August 1939, which resulted in the creation of the Uranium Committee. In the historiography of the bomb, the Uranium Committee is simultaneously celebrated as the beginning of the American bomb effort, but also criticized as sluggish, obsessed with secrecy, and ultimately ineffective. Through 1941, it produced little output of merit, and failed to attract serious interest in building an atomic bomb.

In the United Kingdom, work by German refugees Otto Frisch and Rudolf Peierls started off a new enthusiasm for the bomb. Frisch and Peierls calculated that a bomb made of pure uranium-235 could have a relatively low critical mass, which thus seemed to be something feasible. This, and other British work, eventually led to considerable enthusiasm about the possibility of developing fission weapons in time to be consequential in the war currently underway, and thus also to a renewed fear of German dominance.

This did not, however, lead to consensus about the ability of the United Kingdom to develop its own bomb. Many of the scientists involved doubted the ability of the United Kingdom to shoulder the full burden of the job while under aerial bombardment and threat of German invasion. A copy of the British work was sent to the United States and quietly filed away by the head of the Uranium Committee. Eventually, an emissary, Marc Oliphant, was dispatched to follow up on American interest in mid-1941. Oliphant soon realized the ineffectual nature of the Uranium Committee and instead went to Vannevar Bush. Bush became a true believer in the feasibility of an atomic bomb, and led the charge (along with Ernest Lawrence, Arthur Compton, and others) to wrest control of the fission work from the hands of the slowpokes. By late 1941, the Uranium Committee became the S-1 Committee (the cloaking of its purpose one indication of the new respect given for the work), and over the course of 1942, it steadily evolved into an all-out effort to produce an atomic bomb. The Manhattan Project constituted the final stage of this, when the US Army Corps of Engineers assumed the responsibility of building actual atomic bombs—including the three detonated during the war—and, eventually, a sprawling nuclear empire that continued into the postwar period.

Farmelo's version of the story, understandably, focuses on the British position in this process. The British "lead" is summed up primarily by the work done by Frisch and Peierls: a theory of nuclear weapons design that implied a weapon could be built. Even from a US-centric perspective, this work was important, as it was the crucial impetus that led to the actual path to the bomb, as opposed to the Einstein-Szilard letter, which only led to the ineffectual Uranium Committee.

But it is perhaps an overstatement to really call this a "lead" in a nuclear arms "race." No one was really racing to build a bomb during World War II except the Americans, and even this was only true after the S-1 Committee had produced favorable results. The British were certainly not "racing." When the output of a nuclear research effort is primarily in the form of papers, rather than fissile material or actual atomic bombs, then it is merely an exploratory effort, not a serious bomb development program. In focusing on the role of the British, Farmelo seems to also miss out on the deepest irony here: the entire premise of anyone being in a "race" with Germany proved to be a false one, and constructing atomic bombs proved to be considerably more difficult than Frisch and Peierls estimated. The British work convinced the American scientists of several incorrect things: namely, that there was a strong possibility of Germany developing atomic bombs, and that atomic bombs would be relatively straightforward to develop. The initial American skepticism that atomic bombs were something that would probably not have emerged until several years after the end of the war was not wrong, in the sense that nobody else really would have produced atomic bombs had the Americans not gone down that path. Bush's 1942 estimate of the price of the job was off by a factor of five. But by the time the true difficulty of building an atomic bomb had become apparent, the US effort was so far along in the work that abandoning it was never considered.

For Farmelo, the crucial turning point for the wartime British nuclear effort came in October 1941, when Roosevelt reached out to Churchill to propose a collaboration on nuclear matters, which Churchill ignored for several months. This was the last moment, in his telling, when the UK "advantage" still had any leverage with the Americans, and Churchill's inattentiveness and wariness of sharing secrets with the Americans led the United States to develop a lead to the point that it no longer felt the British had much to offer. One wonders, though, whether the Anglophobia sentiments among some of the Americans (General Leslie Groves in particular) would have eventually led to their marginalization. The account on the whole overemphasizes the importance of basic physical theory in the making of the bomb, when the bulk of the effort was concerned with the far more tricky engineering work of fissile material production and the acquisition of over 6,000 tons of raw uranium ore with which to feed the gargantuan facilities at Oak Ridge and Hanford. (A little under one-sixth of that ore came from Canada, and access to uranium constituted one of the few postwar bargaining chips held by the United Kingdom, along with access to bases that were within striking distance of the Soviet Union.)

In any case, the British did not pursue the October 1941 offer. Over the course of 1942, the American project grew until, in the summer of 1942, it was at a point where Bush could request of Roosevelt the approval for the construction, under Army auspices, of three different enrichment plants (centrifuge, gaseous diffusion, and electromagnetic) as well as the construction of industrial-sized nuclear reactors. By that point, any British theoretical work would have been a minor contribution—useful, to be sure, but not a show-stopper.

The British did, as is well known, continue to contribute to the project. Against the advice of the American scientists and military, Roosevelt agreed with Churchill to have "full collaboration" on nuclear matters between the two countries in late 1944 (though General Groves did not make things quite as full as the term would imply). This resulted in a dozen scientists coming to the United States from the United Kingdom, some of

whom proved consequential to engineering the final atomic bombs at Los Alamos and the planning for their use against Japan. One of whom, of course, was Klaus Fuchs, the spy. In the postwar period, the McMahon Act in 1946 abruptly ended this collaboration, and the discovery of Fuchs as a spy in 1950 did not encourage American trust in the British security system. All of these actions encouraged the British to develop their own nuclear weapons, in part motivated by a feeling that to be non-nuclear in a nuclear age was to admit that the sun had finally set on the British Empire.

Farmelo's book is an excellent portrait of the British figures involved in their nuclear work, both before, during, and after World War II. As an atomic biography of Churchill, it is useful and welcome. Farmelo has striking insight into the personalities, motivations, and tactics of all of the characters involved. And it is not hagiography: though Farmelo sometimes wants these characters to be more prophetic than they seem to have regarded themselves (at times he wonders why they seem to have forgotten predictions they had made decades earlier), he paints their thorny aspects as well as the laudable ones. The aged Churchill comes off as something of a pathetic figure in his second term as prime minister, half-attentive and no longer able to meet the demands of the job. His wartime persona seems strikingly out-of-date with the thermonuclear *realpolitik* of the Dwight D. Eisenhower years, and Churchill himself seemed to recognize that at times. Almost every character gets a small, pocket biography, and many of these are quite good, though the narrative conceit can get repetitive. Most frustrating, as a reader, is the frequent speculation as to what people "probably" did. While it is no sin to speculate on that which left no record (and it is good practice to indicate this speculation to the reader), to do it too often (e.g. multiple times in almost every chapter) starts to look like a narrative crutch.

I am not sure this book breaks much new ground in terms of research. Still, as a tale of the run-up to the first atomic bomb from a British point of view, it is a good read, though I have the aforementioned reservations about its historical approach. I worry, as a reviewer, about sounding like a chauvinistic American (or, worse, General Groves) when I dismiss the early British "lead," see the British role in the Manhattan Project as mostly catalytic, and instead emphasize the role of "big engineering" in developing the actual bomb. But this is an important point, for any nuclear program: equations on paper do not an atomic bomb produce. At best, they can give guidance for the future work of making the bomb, or can convince a politician that making an atomic bomb is a worthwhile investment. But without the further investment, no bomb will ever result. The only figure that Farmelo gives for the wartime British project is that, by 1943, the United Kingdom was spending "a quarter of a million pounds a year," a little over a million US dollars at the time. Though this sounds like a lot of money, during that same time, the Manhattan Project spent considerably more than that sum *every single day*. Cleverness, and a good start, were perhaps necessary conditions for making the atomic bomb, but they were not sufficient, and never would have been.

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