

III

Ethical Issues

Niels Bohr's Political Crusade during World War II¹

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Niels Bohr's "Open Letter to the United Nations", published in 1950 and pleading for an "open world" between nations, is well known. It is also well known that Bohr took part in the Manhattan Project during World War II. This article describes in some detail how Bohr's idea of an open world not only matured during his war-time exile, but even constituted the basis for a veritable crusade on Bohr's part in the course of the war to convince statesmen of the necessity to think differently in the post nuclear-bomb era. How and why did Bohr come to these ideas? Why were they so important to him? How did his crusade relate to his simultaneous participation in the Manhattan project? What means did he use during war-time to convince the statesmen? How successful were his efforts? A treatment of these specific questions is intended to serve as background for a discussion of what general lessons, if any, can be drawn on the basis of Bohr's crusade with regard to the political role of the scientist, particularly in a war situation.

Unlike most historians contributing to this volume, my specialization is not in the history of mathematics. Likewise, Niels Bohr, the leading person in the present article, while known for many things, was not a mathematician (although his younger brother, Harald, was). Indeed, one contributor to this summer's newspaper debates in Denmark has even claimed that Bohr's influence inside and outside science has been greatly overrated and that, in particular, he was extremely bad at mathematics.² These claims have led another newspaper jokingly to suggest that the Danish 500-kroner bills, which carry a photo of Niels Bohr, must be withdrawn.³ Although this debate is not to be taken all too seriously, it does underscore that physics and mathematics constitute separate activities and that Bohr was first and foremost a physicist. I am happy to observe that the editors nevertheless find my contribution relevant to the questions addressed in this volume.

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¹ The article is based on Finn Aaserud, "The scientist and the statesmen: Niels Bohr's political crusade during World War II," *Historical Studies in the Physical and Biological Sciences* 30 (1, 1999), 1–47, as well as Aaserud's editorship of Volume 11 of the *Niels Bohr Collected Works*, tentatively titled *Political Activities and Occasional Writings* and scheduled for publication by Elsevier in 2004.

² Ib Ravn, "Opgøret med Bohr," *Politiken* 18 August 2002.

³ *Ekstra Bladet* 21 August 2002.

My article follows upon that of Andrew Hodges, whose book on Alan Turing I consider truly admirable.⁴ Alan Turing (who *was* a mathematician) and Niels Bohr have recently shared the fate of being the main characters in two very well-received plays for the stage – Turing in Hugh Whitmore’s *Breaking the Code* (based directly on Hodges’s Turing biography)⁵ and Bohr in Michael Frayn’s *Copenhagen*.⁶ Indeed, there were lectures by both Whitmore and Frayn at a symposium organized by the Niels Bohr Archive in September 2001 on the relationship between drama and history of science.⁷ This is a topic outside the scope of this volume, but I’m happy to be able to present an article in the company of the person who was the true originator of Whitmore’s excellent drama.

As a result of the great success of Michael Frayn’s play, the focus with regard to Bohr’s war experience has lately been on his meeting with Werner Heisenberg in Copenhagen in German-occupied Denmark in September 1941 (Fig. 1). Partly as a result of the great public interest in the play, my institution, the Niels Bohr Archive, has recently been able to place previously unpublished documentation on this meeting on the web.⁸ Notwithstanding the indubitable qualities of the play, the result has been that the historical significance of the Bohr–Heisenberg meeting has become greatly overrated, whereas Bohr’s other political activities in the later stages of the war, which were substantially more important, have largely been forgotten or at least ignored. It was these activities that led up to Bohr’s most well-known publication on political matters, namely his “Open Letter to the United Nations” from 1950.⁹ This publication and the views it represents, while not leading to concrete results, has been claimed to be prophetic with regard to national relationships in the modern world.¹⁰ Bohr’s article cannot be understood without reference to Bohr’s wartime activities, which is the topic of this article, and which may well be argued to have had greater impact than his subsequent publication.

But in order to understand Bohr’s political activities and viewpoints we need to go yet further back in time. Neither the “Open Letter” nor Bohr’s main wartime activities can be understood without an appreciation of Bohr’s earlier experiences. I will therefore start by summarizing the most relevant aspects of his earlier career.¹¹

⁴ Andrew Hodges, *Alan Turing: The Enigma* (London: Simon and Schuster, 1983; Vintage, 1992).

⁵ Hugh Whitmore, *Breaking the Code* (London: Samuel French Ltd, 1987).

⁶ Michael Frayn, *Copenhagen* (London: Methuen, 1998; Anchor Books/Doubleday 2000).

⁷ The symposium, including most of the talks, is presented at the website of the Niels Bohr Archive, www.nba.nbi.dk.

⁸ *Ibid.*

⁹ Niels Bohr, “Open Letter to the United Nations,” private print in Danish and English 1950. Posthumously published in *Niels Bohr: His life and work as seen by his friends and colleagues*, Stefan Rozental, ed. (Amsterdam: North-Holland, 1967), pp. 340–352.

¹⁰ See, for example, Abraham Pais, *Niels Bohr’s Times, in Physics, Philosophy and Polity* (Oxford: Clarendon, 1991), pp. 473.

¹¹ In the narrative that follows, references are given for direct quotations only. More detailed documentation can be found in Aaserud, “The scientist and the statesmen” (note 1).



Figure 1. Heisenberg (left) and Bohr at Bohr's institute in 1936, five years before their fateful encounter during the German occupation of Denmark. [Courtesy of Niels Bohr Archive]

These are:

1. Bohr's background in Denmark's social and cultural environment.
2. His experience and activities within the international physics community.
3. His establishment and running of Copenhagen University's Institute for Theoretical Physics.
4. Bohr's philosophical outlook.

As for the first point, Bohr was born and raised within a prominent intellectual family. His father was professor of physiology at the University of Copenhagen, and from an early age Bohr and his siblings were bred on general intellectual discussions in the home. Niels got the very best *Gymnasium* education, the majority in his class subsequently receiving entries in *Kraks Blå Bog*, the Danish Who's Who of influential persons. He decided early to study physics at the University of Copenhagen, the Danish newspapers hailing his doctoral dissertation and defence in 1911 as a major scientific achievement. Bohr's continued association with the Danish intellectual elite can be seen from his membership on the committee to rebuild the Danish National Museum as early as the mid-1920s and from his long-time presidency (from 1939) of the Royal Danish Academy of Sciences and Letters.

Bohr's introduction to the international physics community took place immediately after his doctoral defence, when he went to England to do post-doctoral work. His first main – and perhaps his very greatest – contribution as a physicist

stemmed from his work with experimentalist Ernest Rutherford in Manchester. Having returned from Manchester in the middle of World War I to take up a professorship established for him at the University of Copenhagen, Bohr wrote a long letter at the end of the war, congratulating Rutherford with the happy outcome. In his letter he stated, first, the opinion, typical of the time, that the nations must now have learned from the terrible events never to make war again. He thus believed in the establishment of new “principles ... of international politics” and “a new era in history.” Second, he considered Rutherford a role model for having played a comforting role for the younger guard of physicists throughout the war. Third, he expressed his awareness of and respect for Rutherford’s application of science for the war’s outcome.¹² In the years immediately following, however, Bohr did not show much interest in international politics, except by taking up earlier and closer relations than most with the physics community of defeated Germany.

In 1921 Bohr’s new Institute for Theoretical Physics at the University of Copenhagen was inaugurated. Henceforth, it was this institution that would provide the setting for Bohr’s interaction with the international physics community. In his inauguration speech Bohr underlined two main points: first, that experimental activities at the institute were essential in order to test the theoreticians’ predictions, and, second, that the institute would be a meeting place for the younger generation of theoretical physicists from around the world. Both desires were fulfilled to the utmost. As for the latter, the younger physicists came to remember Bohr’s institute as the site of the “Copenhagen spirit,” where Bohr and his disciples discussed physics without regard for anything else. In fact, Bohr was psychologically dependent on having a “helper” – sometimes half in jest called a “slave” – to throw back his ideas on. Thus Bohr was able to play the role of the full-fledged physicist, keeping his younger visitors completely occupied by physics and completely unaware of Bohr’s quite considerable fund-raising activities and direction of his institute.¹³

Having physicists visiting from Germany as well as the Soviet Union, Bohr became intimately familiar with the effects of the political developments in both countries. He wholly disapproved of Hitler’s taking power in Germany, making his institute a haven for the young guard of Jewish refugee physicists. Being more ambivalent to the Soviet system, he eventually accepted that the Russian physicist Peter Kapitza – like Bohr a disciple of Rutherford – was not allowed to return to England and instead given a physics laboratory in Moscow. As for experimental work at the institute, Bohr was able in the 1930s to change from spectrography – the basis for atomic physics – to accelerators, thus redirecting his institute to the field of nuclear physics well in time for the discovery of fission. Indeed, Bohr was

¹² Draft of letter from Bohr to Rutherford 24 Nov 1918, Niels Bohr Scientific Correspondence (BSC), Archive for the History of Quantum Physics, microfilm collection retained in several repositories, microfilm 6, section 3. The original BSC is retained in the Niels Bohr Archive.

¹³ The “Copenhagen Spirit” as well as Bohr’s fund raising activities are described in some detail in Finn Aaserud, *Redirecting Science: Niels Bohr, Philanthropy and the Rise of Nuclear Physics* (Cambridge, etc.: Cambridge University Press, 1990).

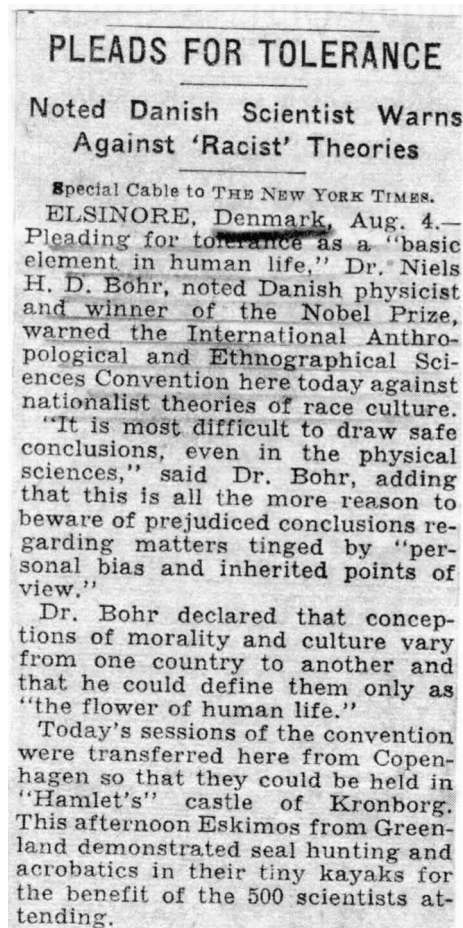


Figure 2. Article in the *New York Times* of 5 August 1938 about Bohr's lecture at the International Congress of Anthropological and Ethnological Sciences. [Courtesy of Niels Bohr Archive]

one of the first to foresee the implications of this discovery, contributing importantly to the understanding of the phenomenon during a visit to the United States in the spring of 1939.

As for Bohr's philosophical outlook, he returned to his early interest in philosophy by formulating the "complementarity argument" in 1927. Arising from Bohr's involvement in the interpretation of quantum mechanics, the argument was subsequently applied by Bohr to other fields, notably psychology and biology. In 1938 Bohr gave the opening lecture at the second meeting of the International Congress of Anthropological and Ethnological Sciences. Speaking at Kronborg Castle, Bohr argued that man is shaped by his culture and not by race.¹⁴ Since cultures are complementary to one another, no culture is superior to any other culture. The talk was even reported by the *New York Times*, which took the talk to be a criticism of Nazi race theories flourishing at the time (Figure 2).

Bohr's close involvement in the theoretical work on fission had convinced him that although an atomic bomb was theoretically feasible, it would be technically impossible to develop one before the end of the war. Indeed, he made this point publicly in more than one talk shortly before the occupation of Denmark. Heisenberg's mention of

bomb work during his 1941 visit to Copenhagen did not change Bohr's mind, and when James Chadwick secretly invited Bohr to England in early 1943 to help develop the bomb, Bohr refused on the grounds that he considered the task impossible (Figure 3). He escaped across the Sound to Sweden only when compelled to as a Jew at the end of September that year, whereupon he did accept the repeated British invitation. While in Stockholm he prepared a talk to a British audience

¹⁴ Niels Bohr, "Natural philosophy and human cultures," reprinted in *Niels Bohr Collected Works*, Finn Aaserud, general editor, Volume 10: *Complementarity Beyond Physics*, David Favrholt, ed. (Amsterdam: Elsevier, 1999), pp. 240–249.

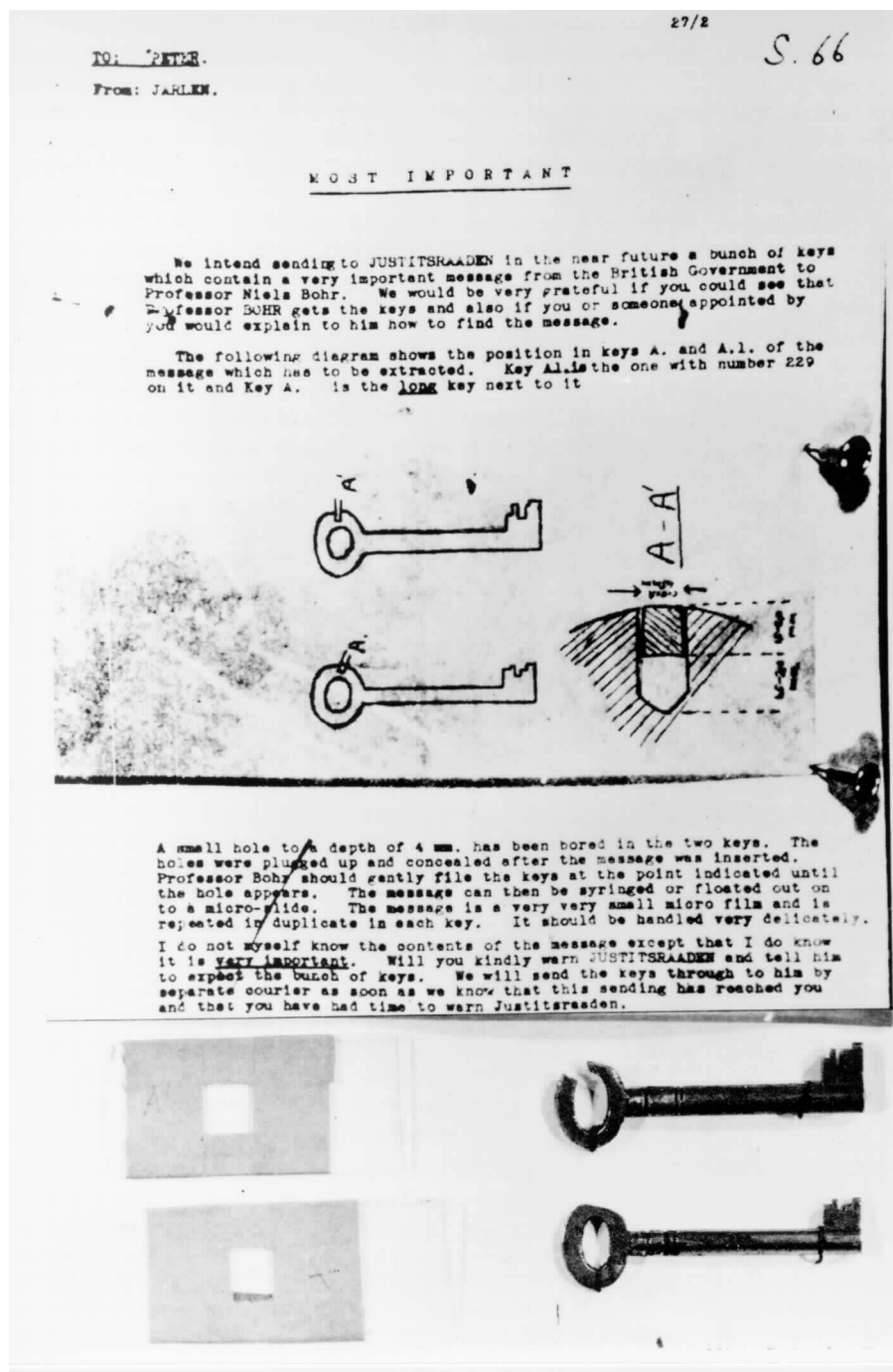


Figure 3. Chadwick's message to Bohr in early 1943 was sent on minute microfilm hidden in keys. The text of the letter (above) describes in detail how the films could be found. Below are photos of the keys themselves, together with the films, which can be seen as dark points in the squares to the left. [Courtesy of Niels Bohr Archive]

in which he expressed himself in uncharacteristically bitter terms about the Nazi occupation of Denmark, yet expressed “the hope” – as opposed to the certainty in the letter to Rutherford after World War I – “that the present crisis through which mankind is passing will, how[ever] great the sacrifices have been and will still be, have to enforce the understanding of the unity of mankind.”¹⁵

Bohr was taken to England after a week's time, being joined by his son Aage a few days later. He was briefed immediately about the development of the atomic bomb and seems to have been convinced immediately of the project's feasibility. He agreed to help in the project while at the same time developing his own thoughts about the post-war implications of the bomb and what could and should be done about it. He found sympathy for his thoughts in particular with John Anderson, the political leader of “Tube Alloys” (the British part of the bomb project) and Winston Churchill's Chancellor of the Exchequer. The first contemporary documentation of Bohr's views and Anderson's involvement in them is a long letter from Bohr to Anderson written from the United States in mid-February 1944. Here Bohr laid out in some detail the need for sharing the atomic secret with the Soviet Union before making use of it, arguing in his typically complementary fashion that “the impending realization of the [atomic bomb] project would not only seem to necessitate, but should also, due to the urgency of confidence, facilitate, a new approach to the problem of international relationship.”¹⁶ This was the core of Bohr's viewpoint, which he would repeat in his innumerable subsequent communications and memoranda.¹⁷ Thus Bohr seems to have considered the existence of the atomic bomb a welcome instrument by which “to enforce the understanding of the unity of mankind,” as he had expressed it when writing his speech in Stockholm before learning about the advanced state of the bomb project.

Anderson encouraged Bohr to contact the British Ambassador, Lord Halifax, about his political views. Halifax's reaction to his meeting with Bohr is telling: “These scientists find it very difficult to make their thoughts precise on political problems, and ... I have had to do a lot of work with B[ohr] to get any clear idea of how his thoughts worked. But I think we succeeded in doing it fairly well in the end.” Indeed, he was appreciative of Bohr's idea: “His thought is, I think, that, as long as no competition has begun (and the situation in this respect may change very rapidly after the surrender of Germany), Great Britain and the United States would seem to have in their hands a card which they could use in their negotiations with others of the United Nations for the improvement of the world situation with a view to the assurance of future peace. This idea of his about the political treatment of the project seems sensible, if it can be translated into a practical course of action.”¹⁸ This was a translation of Bohr's ideas into the language of the politician; yet Bohr approved of it.

¹⁵ “1.4 Regarding the persecution of Jews,” Niels Bohr Political Papers (BPP), Niels Bohr Archive.

¹⁶ Letter from Bohr to Anderson 16 Feb 1944. Original in Records of the [British] Cabinet Office, series 126, folder 39 (henceforth CAB 126/39), Public Records Office (PRO), London. A carbon copy can be found in “2.2 Correspondence with John Anderson,” BPP.

¹⁷ Much of this material will be published in the *Niels Bohr Collected Works*, Vol. 11 (note 1).

¹⁸ Letter from Halifax to Anderson 18 Feb 1944 (CAB 126/39).



Figure 4. The only photo of Niels Bohr from Los Alamos during the war. [Courtesy of Niels Bohr Archive]

Because of the strained relationship with the Manhattan Project – the U.S. side of the effort to develop the atomic bomb in Los Alamos, New Mexico – Bohr was expected not to tell the American side of his receiving advice in these matters from the British; the crusade should be perceived entirely as that of a concerned private citizen. In the same vein, Bohr took care only to discuss purely scientific issues with the physicists working on the bomb and not inform them about his political activities. This was a difficult task for Bohr, although, as we have seen, he had made a similar fruitful separation between scientific and administrative work when working with fellow physicists at his institute between the wars (Figure 4).

Halifax agreed that the best approach might be to seek contact as high in the political system as possible, that is, to arrange an interview with President Roosevelt. In the circumstances, such an arrangement could not be made through the British. Nevertheless, an opportunity arose when Bohr met Felix Frankfurter, a former acquaintance, who was both a member of the U.S. Supreme Court and a close friend and adviser of the President. When in mid-February Bohr found that Frankfurter knew about the bomb project in outline, he explained his political objective. Frankfurter was enthusiastic, and at the end of March told Bohr that the President had reacted approvingly to Bohr's views and even wanted him to bring his concern about the post-war implications of the bomb directly to Churchill. Frankfurter drew up a "message" to this effect, whereupon Bohr went back to the British asking for passage back to England.

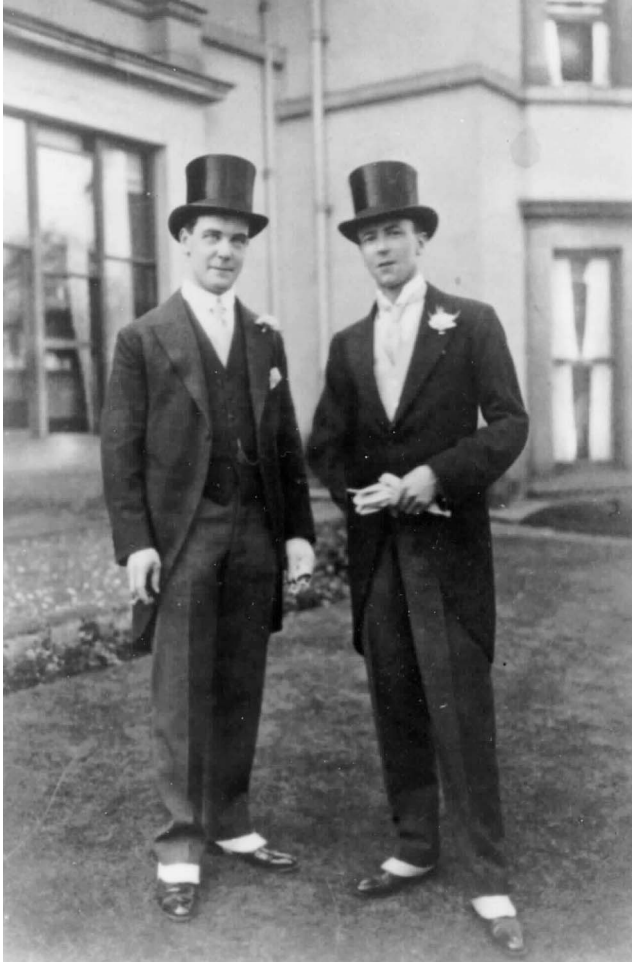


Figure 5.
Peter Kapitza (left) and
James Chadwick during
happier times. Cambridge
1923.
[Courtesy of Niels Bohr
Archive]

Anderson had already advised Churchill to tell the Soviets about the bomb project, getting a very negative reaction. He now agreed to let Bohr carry the message to England, whereupon Bohr and son arrived in London on 17 April. In London, a letter was waiting for Bohr at the Soviet embassy. It had been written several months before by Bohr's Russian colleague Peter Kapitza, and was in effect an invitation to Bohr to work on physics in the Soviet Union. Both Bohr and British intelligence suspected that the letter meant that the Russians were working on an atomic bomb and wanted Bohr to join in the effort. Bohr wrote a guarded response to Kapitza, which was cleared by British intelligence before it went off (Figure 5).

Bohr was finally successful in arranging a meeting with the Prime Minister, to a great extent through influential friends. The meeting took place on 16 May and was a dismal failure. Bohr hardly got in a word while Churchill and Lord Cherwell – the Prime Minister's personal science adviser – argued over the relationship with the Americans. Most likely, Churchill's mind was elsewhere, as he was in the

midst of preparing D-Day at the time. When at the end of the meeting Bohr asked Churchill whether he could write him a letter setting out his views, Churchill responded that he would be grateful to receive a letter from Bohr, only not about politics. Having written a couple of more memoranda for Anderson, Bohr and son left Britain quite disillusioned on 9 June, some time after Leslie Groves, the military leader of the Manhattan Project, had expected Bohr to return to his duties at Los Alamos.

Back in the United States Frankfurter encouraged Bohr to write a “Memorandum” for Roosevelt, laying out his views. Bohr put in a great effort writing the document, but after giving it to Frankfurter expressed uncertainty as to whether it was formulated in a way that would be meaningful for the President. By that time, Frankfurter had already delivered the document to his boss, and he reassured Bohr that it was just right. This document was later regarded by Bohr as the most important of his writings during the war, and he reprinted a substantial part of it in the “Open Letter” of 1950.

Bohr was now waiting eagerly for the President’s reaction, and a meeting was indeed arranged, quite unofficially and at short notice, on 26 August. In contrast to Churchill, Roosevelt was quite forthcoming, describing his role as a “mediator” between Churchill and Stalin, expressing great sympathy for Bohr’s views, and promising to take up the matter with Churchill on their meeting in Quebec scheduled only two weeks later. Understandably, Bohr was in high spirits after the meeting with the American president.

However, the promise of success was again turned into failure. After the formal meeting in Quebec, Churchill and Roosevelt worked out an aide-mémoire at Roosevelt’s summer residence in Hyde Park, New York, on 19 September (Figure 6). The document consisted of three numbered paragraphs, the last of which read: “Enquiries should be made regarding the activities of Professor Bohr and steps taken to ensure that he is responsible for no leakage of information particularly to the Russians.”¹⁹ In a letter to Cherwell written from his London residence soon after, Churchill thundered: “Bohr ought to be confined or at any rate made to see that he is very near the edge of mortal crimes.” He went on to confide that, “I did not like the man when you showed him to me, with his hair all over his head, at Downing Street.”²⁰ Until learning about these developments about a month later, Bohr continued to await a second call from the President in Washington. The explanation Bohr received was, first and most importantly, that the letter from Kapitza had made him appear like a Soviet spy and, second, that sharing the secret of the atomic bomb with Frankfurter, who was not formally cleared for this information, was considered a treacherous act. In Bohr annals, the incident is referred to with characteristic understatement as the “misunderstanding.”

Had Roosevelt changed his mind, was he under the influence of Churchill, or had he been less than honest when speaking to Bohr? Only three days after the

¹⁹ The aide-mémoire is reproduced in full in Margaret Gowing, *Britain and Atomic Energy 1939–1945* (London: Macmillan, 1964), p. 447. A copy of the original document is in CAB 127/201.

²⁰ Quoted in *ibid.*, p. 358. The original is in CAB 126/39.



Figure 6. Franklin D. Roosevelt and Winston Churchill. [Courtesy of Niels Bohr Archive]

Hyde Park meeting Vannevar Bush and James Conant – two of the main civil administrators of the American scientific war effort – were distressed by an utterance by Roosevelt consistent with his and Churchill's joint Hyde Park statement. Roosevelt thus stated that he and Churchill saw the atom bomb as a means for "policing" the world when the war was over. Bush and Conant were provoked to produce memoranda containing viewpoints similar to Bohr's. They too now wanted to see the President, but their papers never reached beyond Secretary of State Henry Stimson. Thus, unlike Bohr, they were never able to speak to President Roosevelt.

Eventually Bohr too was told that the President did not have time to see him and that he should rather see Bush about the matter. Cherwell, however, objected to such an approach, which meant that Bohr had lost contact not only with the American President but also, at least momentarily, with the American leadership of the bomb project.

By this time not only representatives of the bomb project such as Bush and Conant, but also scientists outside the project, expressed concern for an arms race after the end of the war. In this regard, Bohr reported to Anderson that he was striving "to discourage steps which might complicate matters for responsible

statesmen ... without disclosing information and by expressing general hope.”²¹ Bohr seems to have taken the comforting role that he had thanked Rutherford for in the letter celebrating the outcome of World War I. A particularly interesting case in point was Albert Einstein who on 12 December sent a letter to Bohr. The only solution to the arms race problem Einstein could envisage was that scientists in the U.S., England and Russia advise their respective governments to work for “an internationalization of military power.” He suggested that with his international connections, Bohr would be instrumental in implementing this.²² Bohr, who considered Einstein’s suggestion to imply a severe breach of security, appeared personally in Princeton ten days later explaining his strong reservations and assuring Einstein “confidentially ... that the responsible statesmen in America and England were fully aware of the scope of the technical development, and that their attention had been called to the dangers to world security as well as to the unique opportunity for furthering a harmonious relationship between nations.”²³ Einstein proceeded to drop his proposal without a quibble.

On 5 March 1945 Bohr was back in England, after Groves had accepted that he made the trip for personal reasons. While there, he wrote another memorandum – in Bohr parlance known as the “Addendum” to the “Memorandum” previously written for Roosevelt – expressing his concerns. This is the second of Bohr’s war writings that he subsequently regarded as important enough to include parts of it in the “Open Letter” of 1950. Again, however, the question came up of whom Bohr could show it to. Now it was Anderson who was sceptical of Bush, whereas Cherwell resisted showing the document to Frankfurter. After Halifax had recommended to Anderson that Bohr meet with Bush, there were three meetings between the two upon Bohr’s return to the United States, the first taking place on 23 April. At this point, however, the so-called “Interim Committee,” of which Bush was a member, had been formed to advise on political matters in relation to the atomic bomb. Even from Bohr’s rather positive account of the meeting, it appears that Bush sought to keep him at arm’s length. Bohr seems to have wanted to stay in the U.S. for a longer period, and after the capitulation of Germany, preparations were made to bring his wife Margrethe from Stockholm.

The unrelenting Frankfurter now sought to achieve a meeting between Bohr and Stimson. After Bohr had informed him on 23 June of Frankfurter’s efforts, Roger Makins, the new Minister at the British embassy, reported back to England that the Americans were suspicious of Bohr’s “always popping around” as well as, indeed, Bohr’s continued relations with Frankfurter, who was considered suspect by many. Indeed, Makins considered that after the appointment of “the advisory group on the American side” there was no longer any need for Bohr’s viewpoints.²⁴

²¹ “2.6 Notes regarding conversations with Sir John Anderson,” BPP.

²² Letter from Einstein to Bohr 12 Dec 1944, “10.1 Albert Einstein, 12 Dec 1944,” BPP.

²³ “10.2 Note regarding letter from Einstein, 12 Dec 1944,” BPP.

²⁴ Reports from Makins to Denis Rickett (War Cabinet Office, London) 25 May 1945, CAB 126/40 and 23 June 1945, folder 65, box 12, Chad4, James Chadwick Papers, Churchill Archives Centre, Cambridge, England.

Four days after the meeting with Makins, Bohr suddenly found himself back in England, to where his wife had now been diverted.

Indeed, although trying hard, evidently with Anderson's support, Bohr was not able to obtain passage back to the United States. He was duly informed, but only at a distance, of the bomb test in Alamogordo on 16 July as well as of the bombing of Hiroshima on 6 August. When he realized that a return to the U.S. could not be achieved, he called back his son, Aage, who had been waiting for him there. Bohr's only option now was to make his concerns public, and upon Anderson's advice, the article "Science and Civilization," written in collaboration with his son, appeared in *The Times* 11 August. Two weeks later Niels, Margrethe and Aage Bohr returned to Copenhagen.

Mathematics and War

Booß-Bavnbek, B.; Høyrup, J. (Eds.)

2003, VIII, 420 p. 79 illus., Softcover

ISBN: 978-3-7643-1634-1

A product of Birkhäuser Basel