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Niels Bohr - A survey of some of his contributions
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**NIELS BOHR AND THE PROBLEM OF PEACEFUL COEXISTENCE
IN THE ATOMIC AGE**

by

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(The views expressed by the author do not necessarily
reflect the standpoint of Unesco.)

Niels Bohr and the Problem of Peaceful Coexistence in the Atomic Age

From 1948 to 1950, as a student and later as a doctorand I was granted the opportunity of working at the Max-Planck-Institute for physics in Göttingen. This institute had been founded by Werner Heisenberg after his return from internment in Great Britain. Other participants in the German "uranium project", among them C. F. v. Weizsäcker and Karl Wirtz, under whose guidance I worked, were also members of this Institute.

The predatory Nazi war and the fascist terror had convinced me and many people of my generation that it would only be possible by a radical transformation of the social order and the relations between the peoples to secure the peace reached ultimately and to safeguard the respect for human rights. As a member of a progressive students' group during my work at the Heisenberg-Institute I committed myself to the emerging world peace movement, with its first President Frédéric Joliot. In March 1950 this movement mounted a great international campaign known under the name "Stockholm Appeal".

This Appeal, with signatures collected from all parts of the world, read as follows:

"We demand the absolute banning of the atomic bomb, weapon of terror and mass extermination of populations.

We demand the establishment of strict international control to ensure the implementation of this ban.

We consider that the first Government to use the atomic weapon against any country whatsoever would be committing a crime against humanity and should be dealt with as a war criminal.

We call on all men of good will throughout the world to sign this Appeal."

These demands which are topical still today were met with great response. All in all, more than 500 million signatures were collected. During the campaign we were informed that also Niels Bohr

had signed the Appeal. With this news I went to Heisenberg in an attempt to move him to sign as well.

But Heisenberg declined. As an explanation he told me that Bohr could not be a principal witness for him since he had been actively involved in the U.S.-British atomic bomb project, contrary to a personal agreement between them that neither, each on his side, would support any relevant works. Thus Heisenberg gave his own version of a private conversation he had with Bohr in Copenhagen in autumn 1941. This might have been the aim of the confidential talk which produced, however, exactly the opposite effect on Bohr, as we know today. As Heisenberg did not dare to speak openly on the current activities in Germany, Bohr gained the impression as if Germany was already working on an atomic bomb project. Aage Bohr describes it as follows /1/: "In a private conversation with my father Heisenberg brought up the question of the military applications of atomic energy. My father was very reticent and expressed his scepticism because of the great technical difficulties that had to be overcome, but he had the impression that Heisenberg thought that the new possibilities could decide the outcome of the war if the war dragged on."

This "misunderstanding" resulted, as is known, in a breach of friendship between the two great physicists that could never be fully healed after the war. It appears to me, however, that it is not quite correct to use here the term "misunderstanding". Would it have been possible at all for Bohr as a Danish patriot and a world citizen who was deeply committed to the values of human civilization to agree to such an offer even if it had been formulated in a clear and unmistakable manner? Was it possible for him to enter into a "gentlemen-agreement" with colleagues standing on the other side of the barricade in a situation where in the struggle with the fascist beasts it was a matter of "to be or not to be"?

Be it as it may, Heisenberg used this argument in order to refuse to sign the Stockholm Appeal. But in reality it was, of course, the political atmosphere of the "cold war" that was already developing and deterred him together with many of his western colleagues to join this Communist-supported initiative. This

became also evident in the further course of talk when Heisenberg finally declared that he considered the atomic bomb an indispensable means for the defence of the western world. However, in signing the well-known Göttingen declaration of 1957 Heisenberg, later on, revised his approach.

But in fact Bohr had not signed the Stockholm Appeal, as it became clear soon. The information which we had received was based on an error. My friends and I myself were, of course, highly disappointed about it, for it was possible to expect from Bohr that he would not pay tribute to the cold war.

As was shown on later occasions (such as the Mainau Declaration of the Nobel-prize laureates, or the Einstein-Russell-Memorandum) such public declarations were not the style of Bohr. He believed that he, by resorting to the specific possibilities he had like scarcely any other of his colleagues could achieve more by exerting his direct and personal influence on the ruling people.

Nevertheless, Bohr faced with the situation of the year 1950, decided in favour of public action. Instead of signing the Stockholm Appeal, he wrote an "Open Letter" to the United Nations /2/. However, the content of this open Letter was totally different from the publicity-effective and convincing demands put forth by the Stockholm Appeal. The "Open Letter" was, in a way, "complementary" to the "Stockholm Appeal".

With the "Appeal" denouncing directly the political misuse of the atomic bomb as an instrument of power politics in demanding the immediate ban on atomic weapons and the criminalization of their use, no demands of this kind were made in the "Letter". But Bohr explained in great detail on the basis of citations from his confidential memoranda of the years 1944, 1945, and 1948, how in 1950 this dangerous situation of cold war could arise.

While the "Appeal" demanded the establishment of a strict international control only for ensuring the compliance with the atomic weapons ban, Bohr's central concern was in his "Letter" the opening of States to an unimpeded exchange of information

to be made the foremost requirement for the restoration of confidence between them.

With the "Appeal" making the ban on atomic weapons to the most pressing task of the day and bypassing other aspects of a peaceful order of the world without atomic weapons, Bohr in his 'Letter' dwelled at length on the challenge to create peaceful relations between States of very different socioeconomic systems.

Bohr himself had at that time given the following explanation for his refusal to sign the Stockholm Appeal:

"From the content of the open letter it will be understood that I cannot join any appeal, however well-meant it might be, which does not include the clearly expressed demand of access to information about conditions in all countries and of fully free exchange of ideas within every country and across the boundaries. As repeatedly expressed in the open letter this demand is to my conviction a necessary basis for that mutual respect and confidence which is indispensable for fruitful international cooperation on the development of civilization. If an open world can be realized the main obstacle to agreement about measures to guarantee that the progress of science is used only to the benefit of humanity would be removed, while without openness no measures can be expected to lead to the desired result."

(Quoted according to Röseberg /3/)

Bohr's letter to the United Nations, at that time, produced little effect. The world was already divided too deeply into the two camps to be capable of understanding his message correctly. But also the Stockholm Appeal did not achieve its final goal, although, undoubtedly, it had essentially contributed to the fact that no atomic weapons were used in the Korean War that broke out soon, and in later conflicts as well. This is reaffirmed, for instance, by Henry Kissinger /4/.

It was also possible to misinterpret the somewhat one-sided statements of both Appeals in the wake of the struggle of ideologies. However, the concern underlying both appeals in those critical years some 35 years ago was the same, i.e. to create

conditions for the peaceful co-existence of nations with different social systems in the atomic age.

From today's point of view it is impressive to realize the clarity in Bohr's words of 1944/45, as he had foreseen the effects on the world, if the atomic bomb should be used as an instrument of conventional power politics after the victory over the aggressors and thus would again disrupt the good relations between the allies established in the war against the common enemy. His proposal to take the Soviet Union into confidence in due time and to come to agreements on the control of nuclear energy well in advance of the completion of the first atomic bomb showed a way out of the situation. Bohr in his self-cited secret memorandum of 23/3/1945 wrote the following:

"Indeed, it need hardly be stressed how fortunate in every respect it would be if, at the same time as the world will know of the formidable destructive power which has come into human hands, it could be told that the great scientific and technical advance has been helpful in creating a solid foundation for a future peaceful cooperation between nations."

Bohr rejected the naive belief that the monopoly over atomic weapons could for long be maintained by carefully protecting the "atomic secret".

"Above all, it should be appreciated that we are faced only with the beginning of a development and that, probably within the near future, means will be found to simplify the methods of production of the active substances and intensify their effects to an extent which may permit any nation possessing great industrial resources to command powers of destruction surpassing all previous imagination.

Humanity will, therefore, be confronted with dangers of unprecedented character unless, in due time, measures can be taken to forestall a disastrous competition in such formidable armaments and to establish an international control of the manufacture and use of the powerful materials."

Therefore, the demand for openness and a free international exchange of information as a decisive means for safeguarding an effective international control and for the preservation of confidence between

nations was first and foremost addressed to the then guardians of the "atomic secret".

But Bohr's efforts which even made him suspect to being a "security risk" were doomed to fail, because the decision had long been taken in the U.S. Armament Establishment. This becomes more than obvious from the report by the head of the Manhattan project, General Leslie R. Groves /5/ as well as from many other sources.

All the endeavours together with the specific security measures were aimed at securing the United States a long-term monopoly over atomic weapons and atomic energy in the post-war period. Even the cooperation agreed upon between Roosevelt and Churchill for the British group (to which Bohr belonged) in the Manhattan project ran into heavy opposition and the efforts by Joliot to resume research on nuclear energy after the expulsion of the occupying forces from France were really shocking for Groves.

In 1950 the American atomic-weapons monopoly was already broken by the Soviet Union and the arms race, as predicted by Bohr, began with full intensity. Bohr gave the following description of the situation: "Within the last years, world-wide political developments have increased the tension between nations and at the same time the perspective that great countries may compete about the possession of means of annihilating populations of large areas and even making parts of the earth temporarily uninhabitable have caused widespread confusion and alarm."

What scope the arms race would assume, could probably not have been imagined even by Bohr at that time, along with the fact that today there is the danger of making the whole Earth forever uninhabitable for man if the stockpiles of nuclear weapons that have meanwhile been accumulated, were ever be used.

The spiral of the arms race can today only be halted if all those involved share the political determination for peaceful coexistence and trustworthy cooperation of States according to the principle of equal security for all and if they put it into

practice by concrete measures. This would also include to desist from any attempts to create persistently new directions for the arms race, whenever there is an opportunity offered by scientific-technical progress, in the insane hope of achieving in this way still a politically utilizable military-strategic superiority over the other side. The history of the atomic bomb has taught that this aim is unattainable, yet that a once-begun development can hardly be reversed.

First measures expressing the political determination to stop the arms race could be the ultimate ban on all nuclear weapons tests, the solemn commitment by all nuclear powers not as the first to use nuclear weapons and the freeze on nuclear weapon potentials available. Proceeding from it, it would be more easily possible to reach, by contractual regulations, the original objective, the gradual abolition of the humanity-threatening weapons, and the installation of the necessary verification measures, as was already demanded by the Stockholm Appeal.

Bohr was hoping to be able to ban the danger of the arms race by a timely opening of the world to a free flow of information and he had been trying to suggest this idea repeatedly and with great personal engagement to the politically responsible people. This intention failed in face of the resolution of those addressed who were prepared to use consistently the new means laid into their hands by science in the spirit of the hitherto practised power politics in the interest of "an attempt at coercion in which no great nation can be expected to acquiesce."

When Bohr addressed himself to the United Nations it was already too late. Disillusionment came only when, as a result of the arms race, an approximate military-strategic equilibrium had been reached between the blocs, the upsetting of which might, however, blow up the entire globe.

History does not repeat itself. Nevertheless, it is a fascinating idea to imagine what the world would look like today if Bohr's initiative had been successful. I am convinced that the world would much more correspond to the ideal that my generation had in mind when and if at all it returned home from the war. Bohr described this ideal in his letter to the United Nations as follows:

"An open world where each nation can assert itself solely by the extent to which it can contribute to the common culture and is able to help others with experience and resources must be the goal to be put above anything else...

Likewise, real cooperation between nations on problems of common concern presupposes free access to all information of importance for their relations."

The greatest obstacle to implementing this ideal is, as before, the arms race and the resulting distrust. If we succeed to ultimately reverse this pernicious tendency and to come to genuine agreements on disarmament, notably in the field of atomic weapons, we will be in a position to come much more closely to this ideal. Only a disarmed world can be an open world, openness and disarmament complement each other. This appears to me the most important conclusion to be drawn by us today from Bohr's commitments to creating a peaceful open world.

It has already been possible in certain fields to demonstrate the necessary correlation between disarmament and openness and to successfully test it within a broad international framework, for instance in the commitments by the participants in the Non-Proliferation Treaty for nuclear weapons with regard to the measures of verification laid down in it. But the world has so far been waiting in vain for the compliance with the commitments, as contained in this Treaty and signed by the nuclear-weapons possessing countries, to take steps in the direction of nuclear disarmament.

In this context we should avoid any possible misunderstanding with regard to Bohr's term of "openness".

Certainly it cannot mean that principally all possible informations should be made freely accessible to everybody. This would be a totally unrealistic ideal doomed to failure already by the simple problem of the commercially utilizable proprietary rights and the related know-how.

Bohr, in his confidential memos, did not at all suggest to "betray" to the Soviet allies any technical details of the atomic bomb, but rather to achieve in due time political agreements on the vital questions of a potential military and civilian use of nuclear energy

after the war, a fact which of course would have required information on the existence of the Manhattan project.

Bohr, who was known to formulate his texts with unusual accuracy, in above quotation of his letter spoke deliberately of "free access to all information of importance for their relations". Furthermore Bohr in his letter stated unequivocally the objectives to be reached by means of a free access to information, i.e. the building of confidence between nations, the creation of relations of peaceful coexistence between states of different social order and, on this foundation, the development of a broad international cooperation "on problems of common concern".

As peaceful coexistence for states with different socioeconomic social order does not only mean to refrain from any use or threat of force against each other but also to maintain comprehensive economic, cultural, scientific and human relations with each other, Bohr's concern was thus not solely confined to achieving an open exchange of information on objects of possible military relevance, as set forth, for instance, in the Non-Proliferation Treaty. He made it clear as follows: "The ideal of an open world, with common knowledge about social conditions and technical enterprises, including military preparations ..."

In this respect Helsinki brought us somewhat forward, but without real steps towards nuclear disarmament the larger part of the road lies still ahead of us.

Niels Bohr was honoured by becoming a member of many academies. In 1922 he became member of the Berlin Academy of Sciences, today's Academy of Sciences of the GDR. The election proposal, as formulated by Einstein, reads as follows /6/: "Was an Bohr als Forscher so wunderbar anmutet, das ist eine seltsame Vereinigung von Kühnheit und vorsichtigem Abwägen, selten hat ein Forscher in solchem Maße wie er die Fähigkeit des Erfassens verborgener Dinge mit scharfer Kritik besessen. Bei aller Kenntnis des Einzelnen ist sein Blick unverrückbar auf das Prinzipielle gerichtet."

It seems to me that this characteristic does not only apply to Bohr as the ingenious natural scientist, but equally to Bohr as the politically committed man who with the power of his entire personality has always stood up for humanity, peace and understanding among peoples.

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- 3 Ulrich Röseberg, Niels Bohr, Leben und Werk eines Atomforschers, Berlin 1985
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- 5 Leslie R. Groves, Now it can be told, New York, 1962.
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