

Summary

This book, *Complementary Thinking of Niels Bohr in the Context of Physics, Philosophy and Biology*, is the first comprehensive publication written about Bohr in Czech. The author considers a varied range of themes and diverse fields of study. The author deals both with Bohr's life and career path, his complementary way of thinking and his approach to various questions in science. In addition, the book is supplemented with six translations of Bohr's articles about the phenomenon of the living within the framework of biology, and is specifically designed for Czech readers. This book aims to introduce Bohr as an extraordinary and versatile thinker who eludes clichés about how science works or where its "essence" lies. An avid philosopher-scientist interested in other fields of study, a philanthropist with a sense for high-brow literature, and, last but not least, humour, are intertwined in this exceptional man. This book, which is not devised as a classical scientific biography or narrative history, brings together some interpretations and conclusions that readers are unlikely to find elsewhere in Czech or any other language.

The first chapter deals with Bohr's family and cultural background. His personality was shaped by studies of physics and interest in philosophy, psychology, and his life-long relationship with epistemological questions in biology. The dispute between mechanistic, vitalistic and teleological visions of organic nature, which was extremely topical at the time of Bohr's youth, is described in the second chapter. This chapter provides a starting point and guidance for Bohr's translated texts. The second chapter also acts as an introduction for extensive third and fourth chapters of the book. The third chapter describes another crucial conflict between ideas common in classical physics and the quantum theory of inorganic nature. The fourth chapter details Bohr's epistemological approach

in biology on the basis of the above-mentioned conflict of ideas in relation to organic and inorganic nature. Moreover, the origin of quantum theory and nuclear physics is introduced in the third and fourth chapters along with an assessment of Bohr's significant physical, philosophical and epistemological contributions. His strategic role in the scientific community at that time, his work as the head of the Institute for Theoretical Physics at the University of Copenhagen, and his contribution to the rescue of Jewish scientists from Nazi occupied countries are also highlighted.

This book presents Bohr's complex personality and his unorthodox approach. The result of Bohr's contribution made a decisive impact not only on the origin and interpretation of quantum theory and nuclear physics, but also on the direction and the development of other fields of study, including biology. His influence on scientists at the time was enormous, due in large part to his unorthodox thinking; and it was no accident that leading minds perceived Bohr as a founding father of a new, revolutionary scientific format in the field. The common denominator of his immense influence – and also the central theme of this book – is Bohr's complementary (and to this day incorrectly understood) range of thinking. It is Ariadne's thread that enables us to navigate our way through often incompatible presuppositions or requirements of cognition in the labyrinth of disintegrated specialized fields and subfields. It also allows us to hermeneutically perceive these realities with their explicit and implicit "pre-understandings". Bohr's desire for harmony and unity of knowledge nurtured from his youth and found its climax in this unique epistemological range. It is this that should eventually find its way into modern teaching, similar to bygone generations, as did, for instance, Nicolaus Copernicus' heliocentric system. This complementary range enables scientists and analysts today to avoid biased generalizations when considering questions in social and natural sciences.

Bohr's captivation in relation to the whole of existence and his desire to penetrate the core of this is naturally not new. This is an expression of the ancient philosophical claim, introduced in the past by, for example, Plato in his analogy of the divided line, in which he, among others, distinguished between scientific and philosophical thinking. Similarly in this book, the author introduces Bohr as a typical thinker-scientist who thinks and conceives on the basis of learnable field presuppositions, which he does not doubt in any way in his every-day scientific work. Bohr is at the same time an example of a thinker-philosopher who, when considering general questions or crises, solving difficult scientific problems – situations in which principles, methods and existing perceptions of the world do not suffice, grasps these presuppositions like mere

presuppositions. Only at this point is the thinker able to conceive the full context of these hypotheses, as written about by Plato, from the very dimension of “arche”, and in which human knowledge and its hypothesis, including subconscious contexts, acquire meaning. At last Bohr returns, thus enriched, and suggests different ideas, a different vision of the world and is able to conceive the connection between even seemingly unrelated facts nobody has connected before. Therefore Bohr was, like Jørgen Kalckar said, a natural-born philosopher and in physics he found an effective means to probe and interpret the essence of human knowledge or the conditions, which determine our understanding of the world.

Not only scientists but also philosophers specialize in their subject of study. For each philosopher, several lives would not suffice in order to fully grasp and interpret the legacy left behind, the rich tradition of the field with a whole range of genius philosophers or thinkers who practised science. Time is not yet ripe for a discussion of Bohr’s philosophy of science in such a small country as the Czech Republic. As regards Czech physicists, chemists and biologists, they have not yet found the time to stop to collect their thoughts and return back one hundred years in order to produce a detailed study on Bohr that would be accessible to a wider Czech audience. This inspired the present author to produce this interdisciplinary book. In certain parts, when considering physical, chemical and biological problems, the author relied on the ideas of current experts in the field. These are listed in the introduction of this book with appreciation.

Regarding the philosophical-methodological context, through which the author attempts to characterise Bohr’s thinking, the author notes that general reflections or conclusions about philosophy and methodology of science, commonplace in the intellectual mainstream of the 20th century, are not the object of this study, and the author turns instead to Husserl’s and Heidegger’s phenomenology. It appears that phenomenology is a more precise form for formulating thoughts, drafting the genesis of sense and communicating various pre-understandings, with which scientists approach questions and solve problems, and delineate the meaning of science, how it developed and how it works in reality. The goal of this book is not to outline Husserl’s and Heidegger’s analysis of science, although they provide a methodical guideline for reaching an understanding of Bohr’s thinking, which, contrary to prevalent literature, highlights understated features of Bohr’s philosophy of science – notably the concept of complementarity and the understanding of the phenomenon of the living. That is why some of the implied comparisons between phenomenology and philosophical starting points in quantum theory, between Husserl’s intentionality,

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Heidegger's hermeneutic phenomenology, their concept of the phenomenon, and Bohr's concept of the phenomenon, double dimension of speech or the problem of measuring, should be an impulse for further research.

Apart from the key idea of this study, to hone into the narrow area of phenomenology, this book also aims to – by concentrating on interdisciplinary themes – shine a spotlight on Bohr's work for modern-day Czech philosophers and historians of science.