

## THE WRONG, THE GOOD, AND THE BETTER

BOOK REVIEW OF BOHM AND PEAT: SCIENCE, ORDER, AND CREATIVITY  
BY DETLEF DÜRR

Do we live in the best of all possible worlds? Looking around us we should be inclined to think that we do not. Reading the book by Bohm and Peat one is almost assured that we do not. I do not want to suggest that the book could be better. In fact, quite the contrary, but the book is for a large part an encyclopedia of failures of science and society to be good. Bohm and Peat wish instead to lead the reader to a better society, to improve human education, and all in all to build a better world. They go about this with splendid effort and enthusiasm, elaborating on a huge variety of themes covering almost all scientific disciplines, as well as many aspects of human individualism versus togetherness.

Only a few writers would be able to cover such a broad landscape of ideas and themes without condemning themselves to shallowness. Bohm, who was one of the greatest thinkers and physicists of the last century, shows in this discourse with Peat a tremendous depth of understanding which makes the book a helpful resource for all those who have the urge to inquire into human understanding of our physical world, our behavior, and the development of society.

The easily accessible messages of the book (there are many more subtle ones) are quite simple. But isn't that what messages should be? If only the initiated were able to become informed, then the book would be the opposite of what Bohm and Peat aim for. The messages are: free your mind from dogmas, structures, and preconceptions; seek discussions, but remember that listening is your main role if you seek the road to understanding; remain open to other points of view; bear in mind that no single concept or value can be considered absolute or superior; if being useful is beneficial, then being useless is also beneficial; there is no absolute in anything, so the search for the absolute is futile, while the search for understanding is not. The path to understanding, the exchange of ideas, listening, absorbing, transforming, and answering, in the end that is all there is. This must be the never-ending story of humanity.

I guess almost all of us would agree with some of the messages, while at the same time we should admit that by agreeing we do little more than to pay lip service. That is false play, as Bohm and Peat call such non-reflected doing of things. That is why Bohm and Peat very carefully develop an interwoven scheme of historical events in science and humanities, music and painting, learning and self-awareness. They embark on a journey to the inner self. They reflect upon the mind, upon Darwinism, and upon the progress in physics from the ancient Greeks to modern quantum field theory. All this is done in nontechnical terms and all is said with the accuracy one would expect from such scientific authorities as Bohm and Peat. Special emphasis is laid on the discovery of chaos theory as a hallmark of revolution in science and as the best exemplification of implicate order: a seemingly chaotic sequence of numbers can have lots of hidden orders. The structure of the book itself is, one may say, an example of orders within orders, which represents David Bohm's main philosophical idea. By reflecting upon order, which is held as a primitive notion, underpinning rules and dogmas and (superficially) a priori structures, the book creates new ideas to approach the open questions in science, whereupon the circle closes in. The very title of the book could thus be continued in an endless spiral of science, order, and creativity repeating itself in ever more finely grained insights, relentlessly bringing the implicate order to light.

When one tries to grasp the meaning of Bohm's famous implicate order, one is at first reminded of Leibniz's monads, but one soon encounters the difference: Bohm refrains from naming or even searching for the absolute. There is no smallest being, there is only becoming and transforming from order to ever finer order. When there is a subtle understanding, there always exists a more subtle one, and so it goes on. I shall come back to this.

On a macroscopic scale, the book is divided into three parts, according with the promise of the title. It starts by explaining science, what it is about, what its aims and pitfalls are. Then comes the second part of the book, which deals with order. But order, i.e., sorting, categorizing, naming things, including things of platonic character, such as mathematical definitions or axioms, is worthless without the creating mind. The last part of the book is thus about creativity, and in particular how to define it.

Science:

What is the value of science? What is the value of scientific work? A possible, and likely often given answer is: progress, increased economic power, advances in medical treatment, improved mobility, and so on and so forth. But is this all true? Does everyone on earth benefit from science in this way? One should at least admit that some may have doubts about that, and Bohm and Peat try in the first part of their book to explain why such doubts would be justified, or better, why human society seems to have failed in reaching an acceptable status of happiness and well-being for all. Furthermore, they argue that it is futile to hope that, if we only continue long enough, all this will naturally come to pass of its own accord. The authors name the source of all evil: fragmentation! To oversimplify, fragmentation means specialization, losing sight of the question: what is it we want to understand? How does my research fit into the grand scheme of all scientific enterprise? Isn't the value of scientific research a common enterprise, which needs communication, exchange, give and take? Fragmentation counteracts a shared understanding. Of course, scientists experience that every day. In a physics department, the colleague next door works on things so far removed from my own research that communication is almost impossible.

Much in the science section of the book is concerned with the quantum revolution. The classical physics world with its description of reality in terms of objects being there, like massive particles, has been proven to be a fake world. It's all false, as quantum physics tells us. New categories of thinking are needed.

Of course, that is nonsense, and Bohm, as one of dominant figures in creating a realistic quantum theory which is as unromantic as classical physics, in which particles move (what else could they do?), was fully aware of that. But instead of convincing the reader about how idiotic Copenhagen quantum physics is, he does the very thing the reader is supposed to learn from this book, that is, he calmly and intensely discusses quantum physics, tries to absorb the new insights, and then gently pushes the reader towards an understanding that quantum physics underlies classical physics, constituting a new, more subtle order than classical physics could ever present. Bohm, mistreated by his colleagues like no other physicist for his attempt to put quantum physics back on its ontological feet is forgiveness in person.

Order:

Order is a primitive notion. It underlies science and human behavior. It is a notion that tries, on philosophical grounds, to bring holism into the description of the world. Many examples are produced and elaborated upon, hierarchies of orders are discussed (like the classical/quantum transition), and the implicate order is briefly introduced as a level of order that is not further explicable, in the sense of being primitive in some ultimate, even unspeakable, sense. Chance and randomness, in particular chaos, are important tools with which to explicate the meaning of the hierarchy of orders. And orders appear in different guises, they have different names, they can be creative, they can be generative, explicate, implicate, in-between, and beyond. Orders may conflict with one another, which is bad for a society to function properly, and bad for science to progress in a healthy way.

Creativity:

The basic message relates to this: while physics is based on Western analytical modular kind of constructions of the physical world, it conflicts or contrasts with the wholeness of the Eastern view of the world. Now the authors would like to do away with this contradiction. They do not see the two philosophical standpoints as incommensurable. So the search for a common measure which puts the two views on a unifying basis is one of the much elaborated themes of the book, and it is here that creativity comes into play. There are many other places as well, but this is the most difficult one. Meditation, Buddhism, self-awareness, these are issues that Bohm was very familiar with, and they played a substantial role in his life. Now, creativity is hard to define and even harder to learn, and therefore the book evolves into a

kind of prayer wheel towards the end, which may tire some readers out. The simplified message is thus: do it the way we say, then you will see how everything turns out for the best.

Concluding remarks:

Since I work on Bohm's causal interpretation of quantum mechanics, and which my colleagues and I termed Bohmian mechanics, I feel competent to judge the presentation of that theory in the book, where it is placed in the transition from classical physics to quantum physics. Bohmian mechanics is a robust theory which leaves no place for quantum romanticism or quantum mystery, and in the present cultural period I feel the need to state that as clearly and absolutely as possible. Such a statement does of course go against the spirit of Bohm's philosophy which, for all it may be humbly presented, is at the same time very ambitious in that it tries to grasp eternal truth, in the midst of which Bohmian mechanics is nothing but a tiny event.

The book is an attempt to bring the reader closer to such an insight, which Bohm himself must have been rather convinced of, and it is highly recommended reading for all those who like to engage in reflection about what an understanding of the universe as a whole might entail.

While I enjoyed many details in the book about music, painting, physics, society, medicine, biology, and others, I could not follow a good number of the authors' conclusions, for while they present them as necessary, I see many other possible conclusions. Again, this might be because when it comes to physics urgent matters have to be dealt with, and Bohm's theory, Bohmian mechanics, is the best possible way to make, if not a better world, better physics. To some, like this reviewer, that is enough for a life's work.

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*E-mail address:* `duerr@math.lmu.de`

MATHEMATISCHES INSTITUT DER L.M.U., THERESIENSTR. 39, 80333 MÜNCHEN, GERMANY.