

*Morten Tolboll*

## Quantum mechanics and the philosophy of Niels Bohr

I have in my book **Dream Yoga** looked at the abuses of quantum mechanics, which we see so widely-spread in New Age circles, and wherein the misinterpretation consists. However there has right now been published a new book by my professor in philosophy, David Favrholt, about the philosophy of Niels Bohr. Favrholt followed Bohr's lectures and talks closely from 1951 to his death in 1962. He has read all his letters from his earliest youth, has edited parts of the world edition of *Niels Bohr: Collected Works*. He has worked together with many of Bohr's students, inclusive Aage Bohr, has had discussions with Werner Heisenberg and corresponded with many of the great names within nuclear physics. So, Favrholt is one of the World's leading experts in quantum mechanics, and is probably the only person, who in depth has investigated Bohr's philosophy.

It is David Favrholt who has taught me about the philosophical aspects of Niels Bohr's thinking. His new book is called *The Philosopher Niels Bohr*, and I will here summarize the most central aspects of this book, in order to show the misinterpretation in a new way.

On Manchester University in 1913 Niels Bohr produced his atomic theory, which with his own words broked with the "customary forms of experience within the physics". The atomic theory was nothing less than a showdown with classic physics and the way, in which we look at the world. Mind you, Bohr's atomic theory doesn't *replace* classic physics, as many are claiming. Here we find one of the misinterpretations. It is showing where the limit is for our way of observing the world. But it ushered the atomic age, as David Favrholt is writing in his book.

The quantum mechanics, as it came to be called, and which is about physics on atomic level, was so great a dispute with rational thinking, that only a few physicists at that time were willing to accept it. Bohr's most famous opponent, Albert Einstein, tried in many years to disprove the theories of the Dane, but David Favrholt claims, that there today is common agreement about, that Niels Bohr won that debate.

Bohr found out, that we have to establish certain rules in quantum mechanics, which we can't use in classic physics. He discovered, that when we have to measure an electronic movement around the atoms, we come, with our units of measurement, to intervene in what we are investigating. In the same moment, we want to decide the location of the electron, we have disturbed its course.

Shortly said, then Bohr discovered, that we can't observe the physics on atomic level without coming to influence it. In 1927 he goes forward and ends a discussion, which had taken place through centuries. It had been about, what light is consisting in – is it waves or particles?

Bohr shows, that light in some experiments behaves, as if it is particles, and in others as if it is waves. And here we have the foundation for the next misinterpretation, that goes on, that it is the *consciousness* of the physicist, which affects the light. This has led to the misunderstanding in the public, that quantum mechanics should imply, that there isn't given any objective or true description of the physical reality, consequently that it is the human consciousness, which produces the phenomena: subjectivism. The same misunderstanding characterizes by the way also Einstein's theory of relativity, that this should support relativism.

But it is *not* the consciousness of the physicist (the subjective), which makes the electron behave like a particle or a wave. It is the macrophysical (material) experimental devices, which affect the electron in a certain way, so that you *unambiguous* know, that if you work with this type of apparatus, then it will *always* behave like a wave, and with another type of apparatus, like a particle.

Nonetheless there has been created a lot of philosophical theories, which claim to be supported by quantum mechanics, and which have lead a war against the time of enlightenment, as well as against the classic physics and the connected rationalistic thinking. You could gather them under the word constructivism. Constructivism claims, that it is Man, who through his language and interpretations, creates the reality/truth. And you can swiftly see, that it for example is this idea the New Thought movement and law of attraction are based on (see my articles **Constructivism: the postmodern intellectualism behind New Age and the self-help industry** and **The New Thought movement and the Law of Attraction**).

The theories is in this way characterized by relativism and subjectivism, since they claim, that there doesn't exist any objective order, which defines what is true or false, and that truth therefore exclusively is due to our own idea- and language constructions. Relativism exists in many forms, but generally you can talk about an individualistic relativism, subjectivism, which claims that it is the individual himself

who creates his truth, and a collectivistic relativism, social constructivism, which claims, that it is groups of people, that create their own truth.

And both directions consequently, in richly way, use quantum mechanics to support their theories. But does it actually do this? No, the absurd is, that it actual directly pulls the carpet away under such theories. And these theorists could have discovered this, if they had read a bit of Niels Bohr's own scriptures, instead of repeating from others, who continue the misinterpretation. But now David Favrholt consequently has written a book about the *philosopher* Niels Bohr.

First of all: if we now take the claims of for instance New Thought, then it say, that if you think in a certain way, then the universe will reward you in a certain way. This is actually a claim, which in extreme way is based on the principle of causation, namely that a certain way of thinking will cause an effect from the universe.

But what nuclear physics and the quantum mechanics learn us, is, that there exists processes, which precisely *not* is cause determined, and which do *not* follow the old rule about, that everything has to be continuous. In our brains and thoughts, as well as in nature and evolution, there exist processes, which in a wide extent are quantum mechanical, and since the quantum mechanics breaks with the principle of causation and determinism, then neither the human brain/thought, or nature and evolution, are fully cause-determined systems. And then you precisely *can't* explain processes in our brains and thoughts, or in nature and evolution, from theories such as New Thought.

Secondly, then Niels Bohr actually claims, that it is not us that put reality in order, as for example New Thought, and other relativistic and subjectivistic theories, claim, but reality, that puts *us* in order; a claim that involves that both materialism and idealism (subjectivism and relativism) are invalid point of views. Let us investigate it.

Bohr's new discovery made of course the physicists ask: "So what is light then?" And Bohr answered, that this you can't ask about. The only thing we can do, is to say, that in some experiments we can make wave-descriptions, in others particle-descriptions. They supplement and contradict each other, but we can't go behind our experiments and say what they are in themselves. From this Bohr founds the complementarity theory.

It appears, that when you are using a certain type of experimental device, then the electron *always* behaves as a particle, and when you use another type of apparatus, the electron *always* behaves as a wave (again: it is *not* the consciousness of the observer, which creates these phenomena!!). The two types of experimental devices mutually exclude each other, so that you – by choice of experimental device – can

determine, whether you want, that the electron shall behave as a wave or as a particle. The same relationships exist in a number of areas within nuclear physics.

However, both types of examinations are equally necessary, if you want to understand the microphysical world. Bohr speaks about, among a lot of other things, that particle and wave experiments are complementary to each other, because they mutually exclude each other and at the same time necessarily must supplement each other. Generally the same relationship exists in all quantum physical examinations.

General you can formulate Bohr's conception of complementarity in the following way: A complementary description from an area of phenomenon is a description by means of two sets of concepts, which mutually exclude each other, but where both the incompatible sets of concepts are equal necessary for a fully description of the area of phenomenon. You call the mutually excluding sets of concepts complementary.

Bohr himself had the opinion, that complementarity relations are a fundamental feature of the human cognition, which you can find analogies of in many other connections than in quantum physics. And it is exactly this, which the wisdom traditions also speak about, for example in the teaching of yin and yang, and in Nagarjuna's teaching.

As an example, among countless, of an analogy, you can observe the experience of music. In a concert hall you can experience the music so strongly, that you not at all are aware that you are sitting and listening to music. You can describe this as "*to become completely lost in the music*".

On the other side you can also relate *analyzing* to the music, because you are concentrating about noticing, for instance the performance of the violin soloist, the orchestration, the tempo etc. You can switch back-and-forth between these two ways of experience, but you can't have them both at the same time. Both ways of experience are necessary in order to understand, what music is. They mutually exclude each other, at the same time as they supplement each other, they are both necessary in a fully description of the area of phenomenon; they are in other words complementary.

In the same way with subject and object; inside-and-out perspective, and outside-and-in perspective; macrophysical phenomena and microphysical phenomena; etc., etc.

And now back to the problem of light. Could you then not imagine, that light is an entirely third phenomenon, which both consists of light and particle properties? No,

Bohr claims. No matter how we try to imagine it, it is not possible to imagine, that anything can be a wave and a particle at the same time. It is not possible.

In 1927 Bohr invented the so-called two-split experiment, and it has been discussed ever since. He says, that if you send electrons against a plate with two openings, it produces a wave phenomenon. But what happens along the way? He answers, that along the way you can't see, what happens. But there must happen something? Yes, but you can't make a description of it. But this you will be able to some day? No. If you intervene into it in order to see, what happens along the way, the whole of the phenomenon disappears.

Using the conventionally conceptions which is lying in our culture, we say, that you must be able to make a theory of everything, as for example the New Age philosophers Fritjof Capra and Ken Wilber.

In New Age pseudoscience it is not (yet) so much a political agenda that distorts science, as occult and religious point of views. In the works of Fritjof Capra, though, you see the beginning of the combination. Fritjof Capra (born February 1, 1939) is an Austrian-born American physicist. He is a founding director of the Center for Ecoliteracy in Berkeley, California, and is on the faculty of Schumacher College.

Capra is the author of several books, including *The Tao of Physics* (1975), and *The Turning Point* (1982). The abuse of quantum mechanics within New Age seems to have originated with Capra in his book *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism*. The book's first two parts are excellent expositions on ancient religions and modern physics. The third part, which tries to connect the two, is an abysmal failure. Nevertheless, it has been this third part, which has influenced numerous New Age advocates to claim that quantum mechanics proves the reality of everything from Clairvoyance to Time Travel: the so-called quantum mysticism (see my articles **Quantum mysticism and its web of lies** and **Time travel and the fascism of The WingMakers Project**).

Capra's other book, *The Turning Point*, shows the ideology in it, where he combines quantum mysticism with reductionism, especially reductionisms such as historicism and sociologism (though he is very aware of the reductionism of the "old" mechanical worldview) – see my article **The pseudoscience of New Age and reductionism**.

Since the first publication of his ideas at the age of 23, Ken Wilber has also sought to bring together the world's far-ranging spiritual teachings, philosophies, and scientific truths into one coherent and all-embracing vision. This integral map of the *Kosmos* (the universe that includes the physical cosmos as well as the realms of consciousness

and spirit) should then offer an unprecedented guide to discovering your highest potentials.

Wilber introduces his vision by saying, that during the last 30 years we have witnessed a historical first: all of the world's cultures are now available to us. In the past, if you were born, say, a Chinese, you likely spent your entire life in one culture, often in one province, sometimes in one house, living and loving and dying on one small plot of land. But today, not only are people geographical mobile, we can study, and have studied, virtually every known culture on the planet. In the global village, all cultures are exposed to each other.

Knowledge itself is now global, Wilber claims. This means that, also for the first time, the sum total of human knowledge is available to us – the knowledge, experience, wisdom and reflection of all major human civilizations – premodern, modern, and postmodern – are open to study by anyone.

Wilber asks: What if we took literally everything that all the various cultures have to tell us about human potential – about spiritual growth, psychological growth, social growth – and put it all on the table? What if we attempted to find the critically essential keys to human growth, based on the sum total of human knowledge now open to us? What if we attempted, based on extensive cross-cultural study, to use all of the world's great traditions to create a composite map, a comprehensive map, an all-inclusive or integral map that included the best elements from all of them?

Wilber asks: Sound complicated, complex, daunting? In a sense, it is, he answers. But in another sense, he continues, the results turn out to be surprisingly simple and elegant. Over the last several decades, there has indeed been an extensive search for a comprehensive map of human potentials. This map uses all the known systems and models of human growth – from the ancient shamans and sages to today's breakthrough in cognitive science – and distills their major components into 5 simple factors, factors that are the essential elements or keys to unlocking and facilitating human evolution.

Ken Wilber calls these 5 elements **quadrants, levels, lines, states** and **types**; that is: quadrants of development, levels or stages of development, states of consciousness, and a human personality typing system, a typology. All of these elements are, right now available in your own awareness, he claims. These 5 elements are not merely theoretical concepts; they are aspects of your own experience, contours of your own consciousness.

What is the point of using this integral map or model, Wilber asks. First, whether you are working in business, medicine, psychotherapy, law, ecology, or simply everyday

living and learning, the integral map helps make sure that you are “touching all the bases.” If you are flying over the Rocky Mountains, the more accurate a map you have, the less likely you will crash. An integral approach insures that you are utilizing the full range of resources for any situation, with the greater likelihood of success.

Second, if you learn to spot these 5 elements in your own awareness – and because they are there in any event – then you can more easily appreciate them, exercise them, use them...and thereby vastly accelerate your own growth and development to higher, wider, deeper ways of being. A simple familiarity with the 5 elements in the integral model will help you orient yourself more easily and fully in this exiting journey of discovery and awakening (read more in my article **A critique of Ken Wilber and his integral method**).

It is very popular in New Age, inspired by writers such as Fritjof Capra and Ken Wilber, to term their positions as “Holism”. But both Fritjof Capra and Ken Wilber’s systems, can be seen as substantive philosophies of history; that is: searches for overall meaning in human history; searches for theories of everything.

In the West, substantive philosophy of history is thought to begin only in the Christian era. In the *City of God*, Augustine wonders why Rome flourished while pagan, yet fell into disgrace after its conversion to Christianity. Divine reward and punishment should apply to whole peoples, not just to individuals. The unfolding of events in history should exhibit a plan that is intelligible rationally, morally, and (for Augustine) theologically. As a believer Augustine is convinced that there is such a plan, though it may not always be evident.

In the modern period, philosophers such as Vico and Herder also sought such intelligibility in history. They also believed in a long-term direction or purpose of history that is often opposed to and makes use of the purposes of individuals. The most elaborate and best-known example of this approach is found in Hegel, who thought that the gradual realization of human freedom could be discerned in history even if much slavery, tyranny, and suffering are necessary in the process.

Marx, too, claimed to know the laws – in his case economic – according to which history unfolds. Similar searches for overall “meaning” in human history have been undertaken in the twentieth century, notably by Arnold Toynbee (1889-1975) author of the twelve-volume *Study of History*, and Oswald Spengler (1880-1936), author of *Decline of the West*.

Anyway, Bohr says, that *you can’t make a theory of everything*.

The movements of the electrons are fundamentally not able to be experienced. But we can very well talk about it. Should we eventually create theories about everything, it is not in three dimensions, then it is in nine or several dimensions; this we can't. It would end in the thought distortions *Nondual bias* and *Endless split of the thought* (see my book **A Dictionary of Thought distortions**).

David Favrholt says, that Bohr's philosophy in this way originates from his physics. And Favrholt says, that Bohr's philosophy hasn't gained so much a footing as his discoveries within the physics. But this it ought to. Bohr's basic view on language is epochal, Favrholt claims, though he must admit that the epoch not yet has turned up.

What is Bohr's philosophical viewpoint?

According to Bohr's philosophy, then it is correct that we actually from our thoughts, language and interpretations construct our self-images and world-images. But we can precisely *not* do it as it fits us, in the way constructivism claims. On the contrary it is this idea, which creates the whole of our illusion about reality, and therefore our problems and suffering.

Bohr says: If a person moves from A to B, it takes a certain time, and the faster he moves, the less time it takes. Here we suddenly have the concepts location, distance, movement, speed, time. It is therefore not ourselves who determine, how reality looks like. It is the constitution of nature, which determines, how we shall use the concepts in order to explain reality. This is lying in direct opposition to what the constructivists claim, and by the way to a number of Western philosophers up through time.

It is not us who put reality in order, it is reality which puts us in order. That is the soul in Bohr's philosophy. Then comes the next, where Man as a rational being suddenly again has entered into the discussion. Bohr says, that when we have to establish the unambiguous language, then this is due to, that two persons can look at a thing and agree about, that the thing is round or square. They can't agree about, whether it is beautiful or ugly. That is subjective. But they have an intersubjective agreement about, what means what, which you then can establish a language of physics about. A language of physics is nothing else but specified every day language.

The rise of quantum mechanics has in this way *not made classical physics invalid*; it is still valid, but Planck's constant (the quantum postulate) has given it a *limitary area of use*.

That classical physics can be regarded as a borderline case of quantum mechanics appears from the fact, that the equations in the matrix mechanics of Heisenberg become identical with the equations in classical mechanics, when you set Planck's constant to zero; an act which is allowed by the observation of macrophysical relationships. In accordance with Bohr *quantum mechanics is a generalization of classical physics* and the complementarity viewpoint is a generalization of the classical causality principle. The theory of relativity is also a generalization in another direction of classical physics.

Nor can you – in Bohr's opinion – replace classical physics with quantum mechanics, because *the validity of classical physics is a necessary precondition for, that you can describe the quantum mechanical phenomena* and make account for the macroscopic ("classical") experimental arrangement. Bohr is writing in a famous discussion contribution against Einstein, who didn't want to accept, that the causality principle has no validity in nuclear physics:

"...the account for all experiences – regardless how far the phenomena are lying outside the reach of classical physics – must be expressed in classical concepts. The reason is simply, that we by the word "experiment" refer to a situation, where we can tell others what we have done and what we have learned, and that the experimental device and measuring results therefore must be described in the usual language with appropriate use of the terminology of classical physics."

Niels Bohr: "*Atomfysik og menneskelig erkendelse*", Schultz' Forlag, København 1957, s. 53.

Note, that Bohr here speaks about the usual language (*everyday language*) supplemented with the terms of classical physics. This is due to, that he regards the *concepts of classical physics as a more explicit formulation of everyday language*. In that sense *everyday language is a necessary precondition for all natural scientific realization*, and nor can everyday language be replaced by an unambiguous and formalised, logical scientific language. David Favrholt has developed this important theme in Bohr's epistemology further in his own philosophy. He works with, what he calls *The Core* in everyday language.

Favrholt asks us: please observe following concepts: Time – object – space – logic – body – person – experience – memory.

*The phenomenalist/idealist* claims, that we only with certainty can know, that the here italicized concepts stand for something real; that is to say: something from the concepts different: *Time* – object – space – *logic* – body – person – *subject* – *experience* – *memory*.

*The materialist* claims, that we only with certainty can know, that the here italicized concepts stand for something real; that is to say: something from the concepts different: *Time – object – space – logic – body – person – subject – experience – memory*.

Favrholdt claims, that since these concepts are interdependent, they all represent something. Together they are what he calls *The Core* in everyday language. That they are interdependent means, that they have to be used in a certain way in relation to each other, if we at all want to talk meaningful. The relations between them are not established by arbitrary definitions. We have discovered, that we shall respect the relations between them, if we want to describe something, whether we want to describe, that there is lying a phone book on the desktop, or that we have an experience of the phone book.

What we must say is as follows: When we as ordinary people – before we have heard anything about philosophy – orientate in life, we form a concept about reality. We associate with humans and animals and plants and non-living things in our daily lifes, and we learn to discriminate between, what is dream and reality, - and what is lie or illusion, and reality.

Any human being understand, what we mean by saying, that the witness explained in the court, that the thief had a pistol, but *in reality* the thief was unarmed. We also learn to talk about the poetic reality, about the experienced reality etc. We learn to talk about things, which exist, despite that no one experiences them, or have consciousness about them. When they found the Golden Horns at Gallehus, they found something, which no one knew were there. But they *found* them. Is wasn' t so, that they *arised*, because they were experienced.

Then certain philosophers are coming and saying, that we don't know, whether there is anything behind our experiences. What can you do but ask them about, what they mean with "experiences". Then they explain this. But it turns out, that they only can do this by using the whole of *The Core*. And in this set of fundamental concepts is included the concept "object" or "thing" which represent "things, which exist whether they are experienced or not".

This is included as a necessary precondition for, that we can define or explain, what we shall understand by experience. So, because they have explained, what they mean by "experience" - so that we know the correct use of this concept - they have already accepted, that we in our description of reality must assume a correct use of the concept "things, which exist, whether they are experienced or not".

Why the conceptual relations in the *The Core* not are conventional or accidental, but unavoidable as the relations in the number theory, is precisely because reality - the from our experiences and consciousness independently existing reality - is included in the determination of, how we have to use our concepts in order to be able to realize it, and describe it.

We can choose not to describe it and instead soak ourselves in Hinajana Buddhistic meditation (or music, as already described), but *if* we want to describe it, *if* we want to find out, what is subjective and objective, *if* we want to achieve realization within physics, biology, psychology etc., then we must use our fundamental concepts in a correct, non-arbitrary way.

This involves, not an ontological dualism, but an epistemological, a so-called gnoseological dualism. Unambiguous description has the distinction between subject and object as a necessary precondition. And the fact itself, that we have to discriminate between subject and object in order to communicate unambiguous, actually indicates, that both materialism and idealism (subjectivism, relativism) are mistaken points of views.

And the same is the case in order to think clearly. Critical thinking is about spotting thought distortions created by dualistic unbalance, both in yourself and in others (again: see my book **A Dictionary of Thought distortions**).

Magical thinking, for example, has a lot of thought distortions built into it, for example the thought distortion *arbitrary inference*, which means, that you make a causal linking of factors, which is accidental or misleading. The main reason for the rise of magical thinking is that you don't discriminate between image and reality, the map and the landscape; or said in another way: between subject and object.

Central in critical thinking is the discrimination between subject and object. And discrimination is also a central virtue in true spirituality. The Dominican mystics call this steps *discriminatio*, the ability to discriminate between how the energy is used temporal or religious. And despite that magical thinking actually can create something magical, then in true spirituality it is still something temporal, or relatively (black magic/occultism), which will create negative karma if practised. The Orientals call it *viveka*, discrimination, the ability to use your will on that part of the energy, you can steer yourself, and steer it towards exercises, prayer, mantras, meditation, instead of towards career, worldliness, self-unfolding, as for example New Thought does.

So, all this is implying an opinion about, how we observe the world – and here Bohr picks inspiration from his own discoveries within the atom theory. We can't place

ourselves outside our own idea about reality, Favrholt explains. The physicist can't be a kind of God's eye, who looks at the world from outside, because he is himself a part of the world. We can't possibly think ourselves out of reality. But that is what for example Fritjof Capra and Ken Wilber are doing in a cultural relativistic way, and New Thought in a subjectivistic way; that is: in constructivistic ways.

Personally I have had the honour of participating Favrholt's lectures on Chinese philosophy, which is another of Favrholt's passions. And the Taoist teaching in China matches well with Bohr – it is therefore that Bohr's coat of arms, when he got the elephant order, carries the yin and yang-symbol.

In accordance with Taoism there is nothing beyond the world, Favrholt explains. You can't see the world from outside. You are in the world, and you can only define something from its opposition. What is the good? This you understand, if you know what the evil is. You can't say anything about the world as a whole, because you can't put the whole in opposition to anything.

In my article **What is karma?** I suggest, that a human being seems to have two aspects: an energy-aspect and a consciousness-aspect. Seen from the energy-aspect lawfulness rules: your body is subject to the physical laws of nature; your psychic system is subject to the lawfulness of the energy fields and of the energy transformations. Seen from the consciousness-aspect, then a human being seems to be akin to the wholeness, to be transcendent in relation to these lawfulnesses.

These thoughts you find in all wisdomtraditions, in all the spiritual directions within the religions. There exists a fundamental dualism, which the spiritual practitioner must understand, in order to reach into non-dualism. That is also the soul in Nagarjuna's argumentation. You can't say anything about the wholeness, and if you do it will be a distortion.

The problem with holistic theories such as Theosophy, Capra, Wilber, is in short **that they want to reduce the mystical nondualistic experience, to a theory.** In this they completely misunderstand the spiritual traditions, and commit the thought distortion called *Nondual bias*.

Bohr often told the story about the ethnographer, who is send out to learn about Indians in the Amazon jungle. He begins to dress and dance, as they do, but he is still an observer. He learns their language, but is still Danish. Gradually he has eventually forgotten his Danish, and he throws his camera and the typewriter in the river. Now he knows, how it is to be Indian, but now he can't write about it.

Favrholdt says, that Bohr always ended this history saying with a smile: "Well then we must send a new ethnographer."

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