



# DAVID BOHM AND THE IMPLICATE ORDER

An epistemological revolution in quantum theory  
By Pierre Beaudry, October 13, 2014



## FOREWORD

Last month, Ernie Shapiro asked me to collaborate with him on several new concepts developed by the quantum physicist, David Bohm (1917-1992), and, most notably, on his idea of the *“implicate order.”* The central question that Bohm investigated was how to unify into a coherent whole the theory of quantum mechanics and the theory of relativity. The present report is my response to Ernie’s request.

Underlying Bohm’s unified theory lies a simple but difficult epistemological question which is: How can one unite the two incommensurable dimensionalities of mind and of matter into a single unified whole? In one word: “how can you conceive of amatterofmind?” The idea is presented by Bohm in his 1980 book, [\*Wholeness and the Implicate Order\*](#).

Bohm’s idea first struck me like the idea of riding a bicycle: How can you go forward vertically and turn horizontally at the same time without falling? In other words, when you first learn to ride a bicycle, you are confused by those two different motions, because they are acting at right angle to each other. If you think about those two simple circular actions separately, chances are that you are going to fall. For the bicycle ride to go smoothly, you need to think of the two motions as being a single one, a unique and different principle of motion which is of a higher order than the other two motions taken separately. In a way, this is how Bohm was looking at how to deal with mind and matter from a similar unifying principle, but his thinking was more like that of a gyroscope; that is, a triply-connected motion of Spin, Torque, and Precession. The report has four sections:

1. DIALOGUE WITH ERNIE SHAPIRO ON DAVID BOHM’S IMPLICATE ORDER
2. NICHOLAS OF CUSA’S CONCEPTS OF ENFOLDING AND UNFOLDING
3. HOW TIME REVERSAL IS THE MEASURE OF CHANGE
4. DAVID BOHM’S ENFOLDING/UNFOLDING UNIVERSE OF MIND AND MATTER

## INTRODUCTION

When you look at the state of the world today, you might be tempted to abandon what you know to be the truth, and you might wish to agree with the most common denominator of what most people think is right in order to go along to get along. Most people don't realize that when they do that, they become victims of Procrustes. This is what has been happening to the scientific institutions of the world since the Solvay Conference of the beginning of the twentieth century, and more specifically since quantum theory was taken over by the Copenhagen school of Bohr and Heisenberg.

Procrustes (*Προκρούστης*) or the stretcher, who hammers out metal, was a sadistic character of Greek mythology, a relative of Zeus, who tortured clueless travelers at his resting place on Mount Korydallos at Erineus on the road to Athens. He lured people into his place to spend the night and rest in his very special sleeping arrangements. In either of his two beds, Procrustes would lay tall people in the short one and short people in the long one. Then, when they were sleeping, Procrustes would proceed to cut the head and feet of whoever was too tall for the short bed, and would stretch out whoever was too short for the long bed. Thus, everyone had to be made to fit the conformity of either of his two beds. It was only poetic justice that, one day, Procrustes was beaten at his own game, when Theseus visited his place and served him with his own treatment by catching him in his own bed.

Today, the world is filled with Procrustean victims because most of the leading scientific institutions of the world have been manned by the descendents of Procrustes, and most notably the followers of the Copenhagen school of quantum physics. Wherever one turns in our education system,



one finds similar accommodations for molding young minds by forcing them to put the truth on the chopping block and reduce their minds to probabilities and indeterminacy. The irony, however, is that when one accepts to adjust his mind to such a common denominator, he doesn't realize he has given up his own creative powers. He might entertain the illusion that he is free to sleep in the bed he has chosen to make for himself, but the Zeusian oligarchical society we live in has seen to it that his mind will be tailored to feel comfortable with that illusion.

**Figure 1** Theseus measuring Procrustes to fit in his own bed.

What science is confronted with today is the need to make an axiomatic change and restore the human mind to its mission of redefining the limits of knowledge by eliminating Procrustean beds from the education system, and fostering the creative process of every human being on this planet. About fifty years ago, a very courageous physicist took on this Theseus challenge. His name is David Bohm and his mission was to eliminate the Procrustean bed of reductionism that has dominated the scientific community for the last century. His mission was to fight the mechanistic fragmentation of the human mind and restore its integrity to the wholeness and oneness of mind with the universe.

## 1. DIALOGUE WITH ERNIE SHAPIRO ON DAVID BOHM'S IMPLICATE ORDER

New Jersey, September 10, 2014,

Hi Pierre:

I enjoyed your article on Leibniz's inversion of tangents. Only recently I have devoted a lot of effort to understanding Monge's method of characteristics for solving partial differential equations. He works backwards to the solution from the tangents to the characteristic curves embedded in the solution considered as a surface. I first studied characteristics 50 years ago in a course at Brooklyn Polytechnic Institute. I am hoping this will help me understand the optics-mechanics metaphor which was used by Hamilton, Schrodinger, and De Broglie as well as Riemann's shock wave.

I have been looking into an area on which I would like your input. A biochemist Rupert Sheldrake has developed the revolutionary idea that nature has memory. He finds this to apply to the noetic, biologic, and abiotic domains. He attributes it to the presence of fields which he calls morphic or morphogenetic, and says these fields have resonance with present processes. The field discovered by Gurwitsch and described in Michael Lipkind's article in the summer, 1998 TCS is a perfect example. It's a field that apparently doesn't involve energy, but seems to be working with the biophotons which Gurwitsch was the first to identify. His book *Morphic Resonance, the Presence of the Past*, develops these ideas.

In the Winter 1995-1996 TCS on page 52 of the section on Riemann's Philosophical Fragments (just google Riemann Philosophical Fragments) there is a statement by Riemann which I many times overlooked until I was reminded of it by reading Sheldrake. Riemann speaks of the characteristics of living species being taken into the mind of the earth (or biosphere, as our translator put it) and used to create higher forms by evolution. He seems to be suggesting the inheritance or transmission of acquired characteristics. I sent this on to Sheldrake, who replied that such a belief was very common in the 19<sup>th</sup> century. Since we still don't know how evolution comes about, I wonder why that idea is so thoroughly rejected today.

The physicist David Bohm agreed with Sheldrake and they have a dialogue which is easy to find on the internet. Bohm felt that Sheldrake was describing aspects of what he referred to as the implicate order. I think you are very familiar with Bohm since you have worked through De Broglie.

Regarding our earlier topic of discussion, the periodic table and Mendeleev, I came across in writing my TCS article a book by Henry Bent "New Ideas in Chemistry from Fresh Energy for the Periodic Law." He takes seriously Mendeleev's distinction between simple substances and atoms and builds the book around the idea that current placement of helium above neon as a category error. Rather than its physico-chemical status as an inert gas, he cites its electronic structure, spectroscopy, and atomic properties, Mendeleev's criterion of first element of a group distinctiveness, as well as a global as opposed to local harmony, to place it above beryllium and to the right of hydrogen in what he calls the left step periodic table. In doing this, suddenly a wonderful hitherto unsuspected regularity is caused to emerge. Having devoted

years to studying inorganic chemistry, I find it like On First Looking into Chapman's Homer. I am planning to put together a memo for the Basement Team on Bent's work.

I would like your view on Sheldrake and the implicate order of Bohm. My feeling is that this directly pertains to Lyn's ideas about the continuous manifold, as well as Cusa's enfolding and unfolding. I recently reread Lyn's paper The Meaning of the Term Transfinite Do you own that memo?

Best wishes,

Ernie

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Leesburg, Va., September 11, 2014

Hi Ernie,

Glad to hear from you, and I am happy you liked my little piece on Leibniz. I have been slowed down a bit during the last few months, because I had a car accident and a mild concussion. But, I am getting up to speed now and recovering well. It was nothing serious, though my old car was a total lost.

I'm not sure about Sheldrake. The surface criticism that I have of what I know of his work is that the vagueness of his all-encompassing "morphic resonance" may be very spurious. The deeper problem I have with him, however, is that his hypothesis excludes the joy of discovery. In fact, there is no discovery, except for the new language. This sort of approach reminds me of the noosphere of Pierre Teilhard de Chardin, when I was a student. The new language was brilliant, but his language meant nothing once you compared it with the conception of Vernadsky. Compare Sheldrake with Vernadsky and you will see what I mean.

This new biology stuff leaves me in a state of perplexity without ever giving me the "Aha!" of the discovery. What's the change? What's the new universal principle? What is the singularity that broke the former system of knowledge? What's the difference of manifolds between the old and the new? What is the nature of the inversion of his axiomatic change? Is this coherent with Lyn's epistemology? Does Sheldrake reflect in any form the crucial principle of increase in energy-flux-density? The problem with Sheldrake is that the answers to all of these crucial axiomatic questions are negative.

I think that David Bohm is a much more serious thinker, because his epistemology of "hidden variables" is open to causality and agrees with Einstein's EPR paradox. I think this EPR paradox is equally applicable to the Sheldrake stuff. Hence, there is a need for as rigorous, epistemological approach, as Einstein was trying to initiate around the idea of *quantum entanglement*. I started looking into this question a few months ago, but I don't have enough background in science at this point in time. I will need your help on this one. (See my July 4, 2014

report [ON THE CURVATURE OF INFERENCEAL THINKING](#).) With this letter of yours, you have given me a new guiding light; such that by your helping me, I may be able to help you.

I am not familiar with the “*implicate order*” of Bohm, but it sounds inferential enough for my taste, and I will look into it. I will read *Wholeness and the Implicate Order*, since his book is on line, and I will give you a report back of my progress. I think this is where the question of “*hidden variables*” will find its limitation and where the question of *quantum entanglement* might be resolved. But that is just a hunch. I just don’t know how much of an epistemologist Bohm is. I will now find out. At any rate, such an investigation not only requires putting mathematics out of the equation, but it also requires a serious attempt at giving some answers to the above questions that I raised about Shelldrake. For myself, I don’t have any answers. I only have questions and I just try to make sure they are the right ones.

Your excitement about discovering the Chapman’s Homer of Chemistry has piqued my curiosity. What has Henry Bent discovered? Does the Periodic Table have chirality? What is the significance of the *Left-Step Periodic Table*?

You are right about Lyn’s continuous manifold. It is the same as the Leibniz Principle of Continuity: It is the progress of increase in energy-flux-density. That’s what Bohm is looking at, but it is nowhere to be found in Shelldrake. Please send me that memo you are writing on the periodic table when you are finished. Also, please send me a copy of Lyn’s old paper on *The Meaning of the Term Transfinite*.

Salut,

Pierre

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New Jersey, September 12, 2014

Hi Pierre:

Please send me your address and I’ll mail you *The Meaning of the Term Transfinite*. I look forward to our collaboration on the implicate order and entanglement.

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Leesburg, Va., Septembere 18, 2014

Hi Ernie,

I don't know how much I can help you with this project, because I don't understand half of what David Bohm is trying to say in his book on *Wholeness and the Implicate Order* and, therefore, it is very difficult for me to have an insight into what I don't understand. I think the only way I can precede is to try to get an insight into what I don't know and try to determine how I can get to what I don't understand in Bohm from there. So, let me start by giving you an example.

Bohm first posed a question which appeared to be simple and all encompassing, that is, a unified concept of mind and universe, but I found the question was neither simple nor all encompassing in the way that he developed it, because he was writing for a small group of people that he is trying to win over onto his side. This is how he formulated the question in his introduction: "How are we to think coherently of a single, unbroken, flowing actuality of existence as a whole, containing both thought (consciousness) and external reality as we experience it?" (Introduction, p. xi) What I found interesting about this question is that it was trying to do exactly what it was saying it was attempting to do. It was a sort of paradox where the answer was already in the question itself. That sort of performative action is very commendable and I wish more people understood how it works.

However, the problem was that the "we" of his "we experience it," was reserved for a happy few; that is, to quantum physicists as opposed to the experience of Joe Public that we organize on the street, everyday. That makes a lot of difference, because the epistemological form that he chose for his model might be appropriate for the happy few, but not for all. And then, on the next page, he added: "To meet the challenge before us our notions of cosmology and of the general nature of reality must have room in them to permit a consistent account of consciousness. Vice versa, our notions of consciousness must have room in them to understand what it means for its content to be 'reality as a whole.' The two sets of notions together should then be such as to allow for an understanding of how reality and consciousness are related." (Introduction, p. xii) This is how he defined the boundary conditions for the mindset that he has chosen for his selective reader.

My first clinical reaction to this was to ask myself: Why does he treat mind like a measuring cup? Indeed, if it were true that mind is some sort of container, then, I would understand why he did not want to include God, or the Principle of the Creative Process into his cup. He might experience a disproportionate overflow. His choice of words, here, is very interesting and very telling, because he has a very special sort of mathematical idea of how to deal with both mind and the physical universe. Both entities are considered as containing each other by some common ordering measure as opposed to some common ordering reason. There appears to be a very small difference between the two orderings, however, there is a transfinite difference that makes them axiomatically incompatible. In the paper on the "*The Meaning of Transfinite*" that you just sent me, Lyn began with the same point on the definition of "reason" from the Webster Dictionary: "1. To analyze; to think logically about; to think out systematically." This is a problem because one cannot equate logic with reason. Reason can only be identified with the creative process while logic renders creativity impotent. The same fallacy of composition applies to Bohm's mathematical approach.

On the other hand, the point to be understood is why the mind and the universe can be dominated by the same creative process. And that is why Plato wrote in *The Timaeus*: "...God created and bestowed vision upon us so that we, contemplating the orbits of intelligence in the heavens, might put them to use by applying them to the orbits of our reason, which are related to them..." (*The Timaeus*, 47b.) That, contrary to Bohm, appeals to universal human beings. That is a crucial catenary skyhook anchor to have in order to get anywhere. So, what do the mind and the universe have in common besides the fact that their relationship is an incommensurable proportionality that cannot be measured except from the orbits of our reason?

The fundamental condition for this to happen is that mind cannot be understood as a container. The mind is an acting performer of change in the world like the universe as a whole; it is not a receptacle that you can fill up or empty once in a while. This is the point that Bohm seems to be missing. The Bohm question, therefore, of the mind containing the universe and the universe containing the mind leads to all sorts of fallacies of composition which appear to all be coming from his underlying assumption of measurement.

What seems to have motivated Bohm in writing this book is a certain preconception of space and a special relationship to the visual world of sense perception which is entirely dependent on the science of mathematical measurement. I think that his overall underlying assumption is that everything can be measured and, therefore, the theory of quantum fails when it is confronted with the incommensurable. I think this is precisely what is wrong about his view of quantum theory, and his attempts at deciphering the Heisenberg principle of indeterminacy. That is also the way to understand the so-called "hidden variables."

I have not yet read Chapter 6, but I await your reply before doing the rest. I thank you for the reports you sent me, especially the report by Lyn which was never published. I will definitely read it and probably write something about it. Do you have anything by Bohm on "*quantum entanglement*?"

Until I hear from you, again.

Pierre

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Leesburg, Va., September 25, 2014,

Hi Ernie,

I decided not to wait for your reply to my letter of September 18, and send you a draft of my report on Bohm, because it appears that you have been a step ahead of me from the beginning. I can now see why you wanted me to read Bohm on the *implicate order*. It is of the same order as what I have been emphasizing about *inferential thinking*. In case you have not seen this one, see my report [ON THE CURVATURE OF INFERENCEAL THINKING](#).

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The last part of his book, *Wholeness and the Implicate Order*, Chapter 6 and 7 is a real revelation to me. I wasn't sure I understood what he meant after reading the first part of the book, but now, I see where he is getting at and it is of revolutionary significance. He is doing in Physics what Cusa did in Theology, and what Lyn is doing in economics: he is giving priority to the creative powers of the human mind.

The solution to the problem of the unity of mind and matter, as he formulated at the beginning of his book, came to me as a total surprise in Chapters 6 and 7. Bohm developed the notions that Cusa had used in his notion of God's clock; that is, enfolding (*complicatio*) and of unfolding (*explicatio*), but with the added touch of a performative demonstration. I was delighted to read this.

I cannot evaluate what this Cusa concept does for quantum physics, yet, but the connection with Cusa and the domain of sub-quantum physics, that is, the mind of the renaissance and the domain of very high energies and very short distances, is a crucial hypothesis, because Bohm is the second physicist to have applied the explicit function of the Cusa inferential thinking to physics after Kepler. So, my curiosity was piqued, because this is one of the most significant contributions to the Italian Renaissance and probably the most important epistemological contribution for the future of science. From the standpoint of applied epistemology, I consider Bohm's implicate or enfolding order as important as Lyn's principle of increase in energy-flux-density. This is how Bohm introduced this Cusa process as a transfinite process underlying the whole of creation:

“In chapter 6 we go further to begin a more concrete development of a new notion of order that may be appropriate to a universe of unbroken wholeness. This is the implicate or enfolded order. In the enfolded order, space and time are no longer the dominant factors determining the relationships of dependence or independence of different elements. Rather, an entirely different sort of basic connection of elements is possible, from which our ordinary notions of space and time, along with those of separately existent material particles, are abstracted as forms derived from the deeper order. These ordinary notions in fact appear in what is called the explicate or unfolded order, which is a special and distinguished form contained within the general totality of all the implicate orders.” (Bohm, *Ibid.* p. xviii)

As far as I know, the notions of “implicate” and “explicate” have no existing reference outside of Cusa, whose notions of “enfolding” and “unfolding” are very unique in Christian Theology by the fact that they imply a unique reflexion of God's Time, that is, an ontological form of *simultaneity of physical eternity*, both enfolding and unfolding all things at the same time. (*The Vision of God*, trans. Salter, p. 52) Bohm implies the same meaning with respect to “implicate” and “explicate.” In fact Bohm seems to have simply reintroduced the same function that Cusa used, not merely for proving that the Copenhagen school was wrong, but more significantly, by demonstrating, performatively, that the creative principle underlying mind in the universe as a whole is the same as the creative principle of matter. Hence, the following extraordinary insight into the connection between mind and body:

“This connection of the mind and body has commonly been called psychosomatic (from the Greek ‘psyche’, meaning ‘mind’ and ‘soma’, meaning ‘body’). This word is generally used, however, in such a way as to imply that mind and body are separately existent but connected by some sort of interaction. Such a meaning is not compatible with the implicate order. In the



implicate order we have to say that mind enfolds matter in general and therefore the body in particular. Similarly, the body enfolds not only the mind but also in some sense the entire material universe. (In the manner explained earlier in this section, both through the senses and through the fact that the constituent atoms of the body are actually structures that are enfolded in principle throughout all space.) (Bohm, Ibid., p. 265)

Please let me know if this is of the same significance for you and let me know if you have any insight on this particular form of matterofmind. When you reply to this letter, I will implicate it to this report.

Pierre

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New Jersey, September 25, 2014

Hi Pierre:

I am very happy you connected Bohm with Cusa. A few weeks ago I gave the last chapter of the book to Daniel Burke, a younger member who recently spent 8 weeks in the Basement working on Cusa and gave some excellent classes on his return here. I did so because I sensed a deep connection between Cusa and Bohm. I'm glad I didn't mention that to you, which means you and I have arrived at this idea independently. I have quite a few ideas about the implicate order as it applies to each of Vernadsky's three domains and over the coming days I will be sending you my ideas. Hopefully opening up this new domain of physics will advance the work of the organization.

Ernie

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New Jersey, September 29, 2014

Hi Pierre:

I greatly enjoyed reading your draft essay on the implicate order. With your help I think I will be able to better understand Cusa and Bohm. My interest in Bohm actually goes back 50 years to when I was a graduate student in chemistry at Columbia. We used his book *Quantum Theory* along with other books. In a deeper implicate order of the mind sense it goes further back, because my father among his many interests had an annotated copy of Bohm's *Causality and Chance in Modern Physics* in his library. As I get older I seem to have become more like him in some respects. He was Aristotelian and in defiance of him. I tended to be Socratic, but he had a deep love of ideas. In the last year or two I have gone back to Bohm because I have been dissatisfied with quantum mechanics as presented and became aware of Dr Moon's affinity for DeBroglie. Also Eric Lerner's late 1970's article on the "Argonne experiments"

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pointing to an internal structure of the proton influenced me. For several months I have been devoting an hour a day to understanding Hamilton-Jacobi theory, which rests on the optics-mechanics (or is it optics-dynamics?) metaphor developed by Hamilton. In his paper back, *Science, Order, and Creativity*, Bohm discusses the role of metaphor as a common feature of creativity in art and science (like Lyn), and devotes five pages to Hamilton-Jacobi theory as a case in point. I think you'll enjoy that book.

I just reread the dialogue between Bohm and Sheldrake. It's readily available on the internet. I think there is a great deal of resonance between them, to such a degree that one would be hard put to accept one without a consideration of the other. In the dialogue as well as in that book, there is discussion of nonlocality and entanglement.

In terms of the implicate order, I think a number of the greatest minds were concerned with this domain. Our ongoing dialogue has reminded me of the Leibniz dialogue of 1676: *Pacidius to Philatheles: A First Philosophy of Motion*. Leibniz there develops the astonishing idea that motion is a continual creation and annihilation of the object in motion. In relation to Bohm, it is as if the object gets "injected" into the implicate order and then "reprojected". I believe Riemann had a similar idea in *Philosophical Fragments*. This Leibniz essay is to be found in *The Yale Leibniz, The Labyrinth of the Continuum. Writings on the Continuum :Problem 1672-1686* by Leibniz. The editor and translator, Richard Arthur, has written a number of enlightening articles on Leibniz and I had an exchange with him several years ago. If you like I can xerox you a copy of the dialogue. The Leibniz dialogue is cited in the *Principle of Powers EIR* composed by Lyn and the then LYM, but not in relation to this aspect, which I believe was overlooked.

Also, it just occurred to me that there might be more to be considered also regarding kinetic energy of a particle moving in a potential field and gaining speed. What we take for granted is that kinetic energy is cumulative. But what if a crucial step is left out? (One of my professors said: Wonder before the obvious!) Given what Leibniz said about motion, he could be implying something mind-like is directing both processes, i.e. a rudimentary sort of memory is at work. This might be related to Leibniz's discovery of the integral as a representation of cumulative physical processes. In my calculus article of 1999, I was struck by the sheer genius of this idea of the integral which we take for granted. It seems to me that Leibniz's work on calculus was heavily influenced by his work in physics. I am also reminded of what I read yesterday in Lyn's 2009 *Economics as History: The Science of Physical Economy EIR* Sept 18, 2009. I make it a habit to be continually reviewing Lyn's old papers. On page 126 in the section *The Physics of Time*, he talks about the ontologically infinitesimal of Leibniz as an expression of his Type B personality. Given Leibniz's dialogue on motion it becomes somewhat clearer what Lyn is talking about. I learned about the motion dialogue about five or six years ago from an essay by Larry Hecht, never published, where he develops Dr Moon's space lattice and among other things comes up with the relationship of Planck's constant to several other constants and the impedance of space. He relates these quantities to the geometry of the Moon model. Larry felt the propagation of particle and, by implication, wave motion involved Leibniz's original conception, which Larry also related to Huygens's principle. If you wish I can send you a copy of this paper.

In relationship to biology, Lyn for years was, and probably still is, fascinated by Gurwitsch. Take a look at *Twenty First century* Fall 1998 pages 54-57. *Remarks on Gurwitsch's Method Part 2*. On page 57, Lyn stresses that for the causality of morphogenesis, we must shift causality from the discrete

manifold to the higher domain which continuously subsumes the successive lower, discrete (Cartesian or quasi-Cartesian manifold), to the continuous, transfinite manifold. He goes on to discuss a kind of memory in the embryo, but as indicated, he seems to be implying it is not a genetic-mechanical phenomenon, but rather, at least in my view, it is to be sought in the continuous domain. I think Lyn's continuous domain is in a close relation to Bohm's implicate order. What do you think?

Ernie

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Leesburg, September 30, 2014

Hi Ernie,

I am beginning to see what you are trying to do, and I'd like to make a few suggestions on this question of continuity. When you deal with movement, you deal with change, and when you deal with change, the important question is: what happens when someone changes axiomatically from a lower to a higher state of existence? The irony is that you don't remember what happened when such a change took place in your mind; you only know that something has changed in you, after the fact, because everything became different in your mind afterward. The experiment is that you have gone from a lower manifold to a higher manifold. You know something has been lost and something has been gained. Everyone in the LaRouche organization should know what that is, but it is not every one who takes the time to look at what happened when such a change took place, and very few people investigate the reason why and how such a change happened in the way that it did. That has been my commitment in all of my reports in <http://www.amatterofmind.us/>.

Even though you can't know exactly what happens during such an axiomatic change, you can investigate how and when it took place. You can also set the conditions for another such change to take place in someone else's mind; especially if you know how to use Promethean fire and the Socratic dialogue. But the question is: what do you have to look for? This is where Leibniz comes in and is even more useful than Lyn. What Leibniz looked for were the discontinuities of the human mind. He looked into the change itself, how ideas change, and he tried to identify what had been lost and what had been gained for the better. The irony, however, is that you cannot find such discontinuities in nature, nor in mathematics. You have to look in your own mind to succeed, and you have to dig into epistemology rather than into physics. This is what Riemann also did. He looked into the foundation of geometrical thinking to discover that the truth was not deduced from the data or from mathematics.

Take the problem of continuity of motion in Leibniz, the wave question with Hamilton-Jacobi, the continuous transfinite domain with Lyn, and the implicate order with Bohm. What do they have in common? They are all different, and yet, they were all looking for the same thing. ***What is the underlying ordering principle of change?*** They were all looking for the limit, and when they reached the limit, they all discovered that continuity was discontinuous in their own minds, but all they could see was continuity in nature. The situation is less clear with Bohm, because he sees continuity everywhere, in the

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mind and in the universe. So my question is: How did Bohm generate axiomatic discontinuities in order to make his discovery? In what writings has he written about those discontinuities? That's what I am looking for. The problem is that people put logic before anything else, and they look, as Charinus put it, in the Leibniz dialogue, in ***"body, place or being into something."*** (p. 141) As Lyn would say: ***"It's in the in-betweenness."***

For example, in the case of Leibniz, I did not look in his works in physics, but rather in his works on epistemology and his ideas on God. You can do the same with Cusa. For instance, the principle of continuity in ***Philosophical Papers and Letters***, (Loemker) on page 351 and 52, Leibniz criticizes Malebranche and discusses the question of the non-linear discontinuity between the ellipse and the parabola by rotating a plane of projection inside of a cone. Those two pages, alone, told me how Leibniz understood an axiomatic singularity through proportionality. As he said: ***"As the data are ordered, so the unknowns are ordered also."*** For example, how does an ellipse pass into a parabola by means of a continuous conical projection? So, how do you deal with the in-betweenness? This is what most people miss when they read Leibniz: ***"It's in the proportionality."***

Moreover, I think that what is missing the most in all of our work in the organization, including in Lyn's work, is the importance of the principle of proportionality that Leibniz has been using as his most important principle of general order. I think that's the way to approach the question of the implicate order with Bohm: proportionality. At the heart of the Leibniz discoveries of the calculus and, most exquisitely, in his method of the inversion of tangents, is the question of proportionality.

The proportion between reason and power [See his ***Outline of a Memorandum ... (1671)***, our PEAR book] is the fundamental clincher, because if reason is greater than action, you are a sheep; and if action is greater than reason, you are a tyrant. The proportion of mind and power must be such that you cannot ask a mind to do what is beyond his power to do; and yet, mind always yearns to do more than what he is capable of doing. That is a very important discontinuity, because the very fact of posing this question opens the door to a higher manifold. Nothing can be deduced from this, and the knowledge of it can only come from experiencing the change. That's the performative question.

Isn't that the same emphasis that Bohm made on the Hamilton-Jacobi metaphor of the "particle is a wave?" Most notably when he said: "The energy of a "particle" (e.g., a light quantum) is proportional to its frequency, and de Broglie's relation, that the "particle's" momentum is inversely proportional to its wavelength." (***Science, Order, and Creativity***, p. 29) This is the Leibniz proportionality that Bohm restores to physics and which is precisely what we have been failing to master inside our own organization.

I am not advocating that we have to look for numerical proportionalities like the Planck constant, or any such things, but rather, that we assess the relationship of mind to the unknown on the basis of the proportionality that Leibniz had advocated and that Plato had established for human vision in ***The Timaeus 47 b-c***. As Leibniz put it: ***"When two instances or data approach each other continuously, so that one at last passes over into the other, it is necessary for their consequences or results (or the unknown) to do so also."*** (Ibid., p. 351)

I think we should dump all forms of mathematical artifact, whatever the theory may be. The time has come also to abandon, as Lyn emphasized, all interpretations. The time has come to cause change and

become playful in accomplishing it. Bohm has certain playfulness in his investigations because he knows that after a discovery, comes laughter.

I keep thinking that no great change has ever taken place in the world and no discovery of principle has ever been made without having to go through the three contradictory steps of perplexity, awe, and laughter. This is what I am looking for in Bohm. Is there some place you know of where he speaks, even if it is only candidly, about his discovery? And then laughs about it.

Pierre

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New Jersey, October 6, 2014

Hi Pierre,

[...] Regarding proportionality another instance from Leibniz comes to mind. When he is trying to measure forces, he suggests that the way to do so is by their effects. That allows him to develop his theorems on the interconversion of kinetic into potential energy. This was not an obvious idea and I think his notion of proportionality was necessary for this breakthrough.

Another possible example that just now came to mind is Gauss's idea of conformal mapping; i.e. in the course of mapping a least action type function, such as a trigonometric, logarithmic, or exponential function, the angles between two curves or lines is preserved, no matter what other distortions occur. (Except for SINGULARITIES). Conformal mapping was made possible by Leibniz's calculus, itself based on proportionality.

Kepler's use of the musical scale to locate and then BY WILLFUL CHOICE precisely adjust the ratios of the angular velocities of the planets relative to one another and to the sun might be an application of the principle of harmony, itself an expression of proportion. [...]

Ernie

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Leesburg, Va. October 7, 2014

Hi Ernie,

I am very happy you have seen the importance of this proportionality principle in Leibniz. I have found that principle so important that I cannot understand any of Leibniz's discoveries without it, especially the most outstanding proportionality of the inversion of tangents for discovering the unknown.

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You are absolutely right about the conversion from potential to kinetic energy in Leibniz. I never thought of it like that, but now that you say it, I can see how the relationship can be proportional. Like you say, "it's not obvious" and it is very helpful to think of that relationship as underlying that discovery in those terms, especially when there is no metric involved and there is a change of manifold. Thanks for your precious insight. That's also the kind of insights I need from you to better understand the quantum physics of Bohm, because once you see it, you cannot not see it afterwards.

You are right also on the conformal mapping of Gauss, which takes you directly to the stars. This is Plato's proportion between the orbits of our minds with the intelligence underlying the actions of the stars in the heavens. This is something that Hipparchus later used to project the celestial sphere onto the plane disk of an astrolabe. It was explicitly based on the same angular proportionality of spherics that Gauss and Riemann will later rediscover. Like in the case of the implicate order, how do you see gravitation in the Solar System as related to such a proportionality of a triply-connected action? Is the idea the same as that expressed by a gyroscope: Spin, Torque, Precession?

As for the works of Richard Arthur, I have only read the first attachment, but that is enough for me to give you an evaluation. I find him insightful, but only in the small. For example, what he calls the "difference principle" that he describes as "the sum [integral] of the differentials equals the difference of the sums." (*The Remarkable Fecundity of Leibniz's Work on Infinite Series*, p.1) That is a nice discovery that Leibniz made and called the fundamental principle of his calculus, but it has a much broader significance than Arthur attributes to it. Arthur fails to see the epistemological significance of the transfinite quality of the Leibniz concept of "integration" as a higher manifold.

The idea is not simply the discovery of how to calculate infinite series; the discovery is of a higher measure, a higher degree of freedom, an increase in higher energy-flux-density; and the proof of existence of this higher domain is in the performative pudding. He doesn't seem to have any idea of an actual transfinite. Arthur doesn't see that; he is too involved in adding sums of small pieces of fraction scrap. On the contrary, look at the Leibniz difference of manifolds as an epistemological axiomatic change from a higher dimensionality which actually determines a lower dimensionality from the future, as in the case of the determination of time by the higher principle of change.

For instance, if you were to say: *Time reversal is the measure of change ... because change is the measure of time reversal*. The transfinite determination comes from the reciprocal. This is always how new knowledge is acquired from the future as Lyn showed in his *Transfinite* paper: "In the case of physical-economic growth, as we have defined the rudiments of that above, the curve of growth is not a simply continuous one. It is marked by singularities, and that in the manner a Riemannian Surface Function implies." (p. 47)

When you think of it, proportionality with the unknown is the only true way to grasp the infinite, because that is the only way to take in and assimilate the incommensurable. As Cusa put it in his famous insight: God is to Man as the circle is to the polygon. And, there is that discontinuity again. My question is: how does that help us relate to the least action pathway in the Solar System that Lyn wants us to look at? [...]

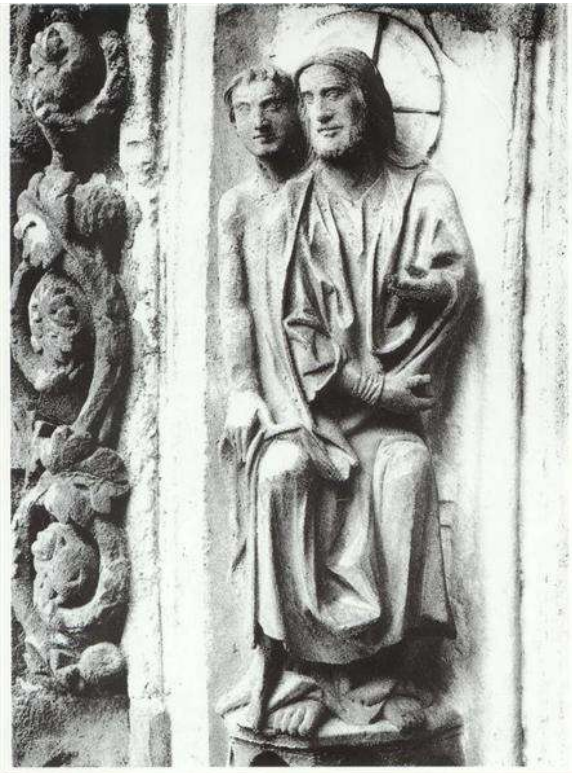
Pierre

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## 2. NICHOLAS OF CUSA'S CONCEPTS OF ENFOLDING AND UNFOLDING

In his masterwork *On Learned Ignorance*, Cusa developed two concepts relating to how God created the universe that he derived from Ramon Llull of the Ecole de Chartres in the twelfth century: enfolding (*complicatio*) and unfolding (*explicatio*). Enfolding and unfolding is the complex function of a metaphoric process relating to how what is created comes out of God's mind as an undifferentiated oneness and wholeness of becoming (enfolding) and as a differentiated state of succession in space and time (unfolding). The same difference takes place between the top-down and the bottom-up approaches, as Llull expressed the difference between *ars descendendi et ascendendi*. See my paper on [CREATION AS THE MEMORY OF MANKIND](#). Now, take the example of time as an expression of what Lyn had identified as the *simultaneity of physical eternity*. Cusa wrote:

“In like manner, if you consider [the matter] carefully: rest is oneness which enfolds motion, and motion is rest ordered serially. Hence, motion is the unfolding of rest. In like manner, the present, or the now, enfolds time. The past was the present, and the future will become the present. Therefore, nothing except an ordered present is found in time. Hence, the past and the future are the unfolding of the present. The present is the enfolding of all present times; and the



present times are the unfolding, serially, of the present; and in the present times only the present is found. Therefore, the present is one enfolding of all times. Indeed, the present is oneness. In like manner, identity is the enfolding of difference; equality [the enfolding] of inequality; and simplicity [the enfolding] of divisions, or distinctions.” (Nicholas of Cusa, [De Docta Ignorantia II, 3](#), Translation, Jasper Hopkins, The Arthur J. Banning Press, Minneapolis, 1985, p. 65)

Thus, the idea of *enfolding/unfolding* is the equivalent of the idea of *simultaneity of physical eternity*. It is like the unifying reflexion of different times and different places which captures the dynamic relationship between the original design of God's creation and the realization of its composition, all in one. Therefore, *enfolding/unfolding* is the epistemological function of the relationship between man and God.

**Figure 2** Chartres Cathedral: How God Conceived the Creation of Man in His Mind.

When Pope Eugene IV convoked the Council of Florence (originally started at Ferrara) in 1438, Cusa's intention was not to impose the Papacy on the world, but to plant the seeds of an ecumenical movement aimed at unifying all of the peoples of the world, and most emphatically the East and the West, starting with the reunion of the Catholic Church and the Orthodox Church. His most provocative and revolutionary conception was based on the power of developing the human mind with the principle of creativity. The artist that best represented Cusa's idea of creativity was Raphael Sanzio.

*The School of Athens and the Dispute of the Holy Sacrament* by Raphael is probably the greatest example of Cusa's *enfolding/unfolding* concept in an art form, because it brings into a unique space and unique time, the Room of the Signature of the Vatican at the time of the Italian Renaissance, the coming together of an axiomatic change taking place between the past and the future of the world. Those two frescos, painted on opposite walls, mark the coincidence of the opposites as a discontinuity between the Middle-Age and the Renaissance as exemplified by the irreconcilable mental processes underlying the philosophies of Plato and Aristotle. See my report: [RAPHAEL SANZIO, THE SCHOOL OF ATHENS AND THE DISPUTE, PART I.](#)



**Figure 3** Raphael Sanzio, *The School of Athens* and *The Dispute of the Holy Sacrament* (1509-1510)

The situation where the spectator finds himself standing between those two frescos is a unique experiment of the Cusa *enfolding/unfolding* of the creative process. At the same time, the two frescos express the historical axiomatic crisis of the *enfolding/unfolding* unity of faith and reason within the Catholic Church itself. This experiment is the greatest example of a classical artistic composition capturing, in the *simultaneity of physical eternity*, the mind's power to internalize and solve the historical crisis between the Platonic and the Aristotelian schools. A similar setting could be imagined today by bringing together a still higher inclusion: the unity of human civilization between the Platonic School and the Confucius School in conflict with the British Empire.

When taken together, there is another aspect of the *enfolding/unfolding* process to be taken into account. It is the question of the coincidence of the opposite that Cusa put at the center of his doctrine. For instance, what is currently *enfolding/unfolding* on the international political scene with the BRICS countries is the unity of the entire planet for the benefit of all of mankind. This is reflected today in the extraordinary interventions that Prime Minister Narendra Modi has been making, notably, at the New



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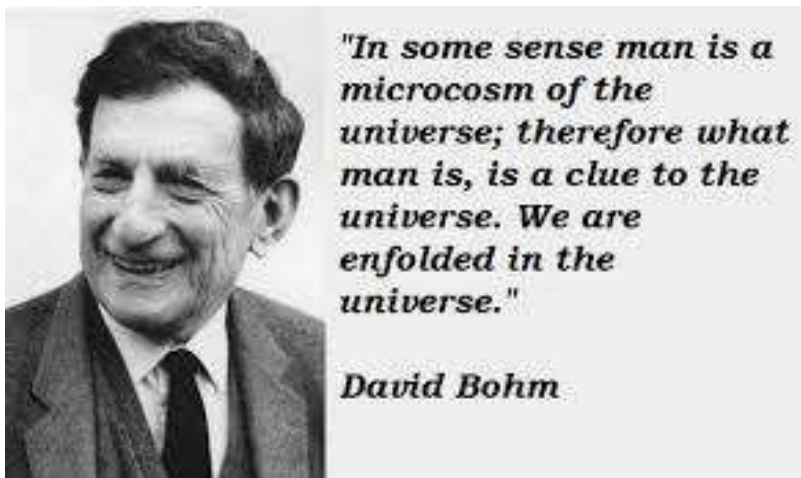
York Madison Square Garden on Saturday, September 27, 2014: "Let us make development a mass movement, just like Mahatma Gandhi made the freedom movement a mass movement." (<http://larouhepac.com/node/31839>.) As Helga emphasized in her recent call for a *New, Inclusive World Security Architecture*:

"The human species will survive only if we learn the lessons of the two world wars of the 20<sup>th</sup> Century and stop thinking in geopolitical categories. We must replace this imperial, oligarchical approach with a new paradigm: that the common aims of mankind are the priority for everyone. This is also the view of 'the coincidence of opposites' that Nicholas of Cusa put forward in the 15<sup>th</sup> Century, in his *Coincidentia Oppositorum*: that this is the only way to achieve 'concordance in the macrocosm.'" (Helga Zepp LaRouche, [We Need a New, Inclusive World Security Architecture](#), LaRouchePAC, September 24, 2014.)

The idea of an "Implicate Order" as developed by David Bohm represents such a *principle of inclusion*.

### 3. HOW TIME REVERSAL IS THE MEASURE OF CHANGE

It is the failure of an inappropriate concept of measurement of physical space-time which led to the interpretation of the indeterminacy relationship that Heisenberg and the Copenhagen school advocated since the Solvay Conferences of the beginning of the twentieth century. So, the time has come to change



the past. Eliminate this inappropriate fiction of measurement known as the Copenhagen School, throw out this Procrustean bed, and you will have solved the problem. This is what David Bohm had been doing ever since he published his 1957 book, [Causality and Chance in Modern Physics](#). Whether he has succeeded or not is not important. The point is that he did it.

**Figure 4** David Bohm, (1917-1992)

What Bohm has accomplished in that book is nothing short of a revolution, and he did it by replacing the concept of chance and indeterminacy by using a Cusanus form of causality. In his section 7. *One-to-many and many-to-one causal relationship*, Bohm stated: "Of course, the fact that a causal relationship fails to determine future effects uniquely does not mean that nothing determines these

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effects.” ([\*Causality and Chance in Modern Physics\*](#), page 16.) The implied irony, here, is not merely that causality is opposed to chance, but that causality exists by design and its purpose is to change the universe.

The point to emphasize is that causality does not replace chance or statistical probability. The function of causality is of a completely different nature. Its purpose is to identify an axiomatic failure in the thinking process of science and actually force an axiomatic change through the coincidence of the opposites.

Therefore, causality is not the result of the combination of time and chance, like Prigogine proposed for the primordial soup to produce life. Life did not appear on Earth as if you were to say that, given enough time, all sorts of chemical combinations can occur out of which one specific combination will make the entire process of life irreversible and cause, by chance, a new upward shift in the universal arc of progress. This might be the way that most scientists think about the origin of life, but this is not how causality works.

The process of the progress of life takes place by design of the unity of the opposites in the universe as a whole. In other words, life didn't just sprout by the universe stirring the pot in some lost part of the galaxy. Life on Earth did not come up from the primordial chemical soup by chance causality as if Oparin's dream had been the one chance in a million. Things don't become what they are from the past but from the future, as a result of the universe acting on the implication of a higher step to come, which is already built into the present state of existence of everything that exist in the universe, as an intention; that is to say, as a memory function. Causality, therefore, is intention; that's the real measure that has been missing in science since Kepler and that Bohm has now revived. However, science had no chance to make that discovery by means of mathematical measurements. The design was intentional.

And, the intention was the coincidence of the opposites within the *enfolding/unfolding* process. As Cusa demonstrated, however, this process surpasses our mental capabilities, because this is a process which can only be understood in God's Mind. However, don't give up on trying to understand God's Mind; just accept the fact that you can't succeed. As Cusa put it:

“However, the mode of enfolding and unfolding surpasses [the measure of] our minds. Who, I ask, could understand how it is that the plurality of things is from the Divine Mind? For God's understanding is His Being; for God is Infinite Oneness. If you proceed with the numerical comparison by considering that number is the multiplication, by the mind, of the common one: it seems as if God, who is Oneness, were multiplied in things, since His understanding is His Being. And yet, you understand that this Oneness, which is infinite and maximal, cannot be multiplied. How, then, can you understand there to be a plurality whose being comes from the One without [there occurring] any multiplication of the One? That is, how can you understand there to be a multiplication of Oneness without there being a multiplication [of Oneness]?” (Nicholas of Cusa, [\*De Docta Ignorantia II, 3\*](#), p. 67)

In this matter of the coincidence of the opposites, the mind has reached an absolute limit of human understanding in which it becomes impossible for a human mind to know how God unfolds His Oneness within the multiplicity of things in the universe; therefore, not only mathematics must be set

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aside as being impotent in this matterofmind, but all manner of imagery of the Infinite Oneness of God reflects nothing but our learned ignorance. Thus, the creative process of God is unknowable, except in a negative manner. As Cusa, concludes:

“If so, then you will have to admit that you are thoroughly ignorant of how enfolding and unfolding occur and that you know only that you do not know the manner, even if you know that God is the enfolding and the unfolding of all things, that insofar as He is the enfolding, in Him all things are Himself, and insofar as He is the unfolding, in all things He is that which they are, just as in an image the reality itself (veritas) is present.” (Nicholas of Cusa, [\*De Docta Ignorantia II\*](#), [3](#), p. 68)

Therefore, we are prisoners of Plato’s Cave, through which Lyn had shown how the human mind can only access the unknown through a transfinite series of higher manifolds. This is the process of changing manifolds which represents the underlying intention behind the Bohm conception of new quantum and sub-quantum physics is based on the hypothesis of a sub-quantum level of hidden variables which are determined by a transfinite function as Lyn defined the term “Transfinite” in his 1988 paper: *The Meaning of the Term Transfinite*. As Lyn emphasized in that paper:

“If we know how our perceptual apparatus distorts the image of reality, we know that the shadows on the wall of Plato’s Cave are distorted images of the real persons and objects. Hence we may reconstruct the image of reality by knowing the factor by which the shadows are distorted.

“If we are ignorant of the history of science’s treatment of this fallacy of naïve sense-perception, and if our ignorance encourages us to combine naïve ideas of sense certainty, with the false notion that deductive method is “reason,” the result is formal, deductive geometry. The adoption of such a view of Euclidean geometry as the axiomatic basis for a physics, yields the views of that hoaxster Galileo Galilei, of Rene Descartes, the mathematical schema adopted by Isaac Newton.” (Lyndon LaRouche, *The Meaning of the Term Transfinite*, Internal Memorandum, Nov. 7, 1988, DOCS: [00] 88462LAR001.)

David Bohm uses the same Platonic Cave device in his considerations of sub-quantum level containing hidden variables. He acknowledges the deficiencies of sense perception observation which cannot define the determining factors of hidden variables at the first quantum level, and reaches out into a deeper level, where a new and higher principle must express a higher transfinite order in the domain of much higher energies and much shorter distances. Bohm shows the limiting modality of these hidden variables with the analogy of random Brownian motion of molecules that go through an axiomatic transformation between the liquid state and the gaseous state. The pedagogical purpose is to show how this crucial experiment must focus on the metaphoric nature of the axiomatic transformation in the process of creating new states of existence in the universe.

Take the following pedagogical example of an axiomatic change between a liquid and a gas and note the emergence of a new state of existence when the substance becomes transformed. All of the characteristics of the substance subject to change in the liquid form are axiomatically different from the characteristics of the same substance in a gas form. At one level, the particles seem to be moving in

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random directions without any apparent causal order; then, suddenly, when the temperature is raised to a critical level, a change takes place whereby a new behavior appears in which the same substance becomes changed from liquid state to a gaseous state. As Bohm writes:

“The critical temperature and pressure define a point at which the distinction between gas and liquid disappears. Above this point, there is no sharp qualitative transition between liquid and gas, while below it such a transformation can take place. If we heat a liquid confined in a strong container past its critical point, the meniscus separating gaseous and liquid phases disappears, showing that there is now only one phase, which may be thought of as a very dense gas.” (Ibid, p. 109)

This is the process that the human mind has in common with the physical universe; a process such that the characteristics of the change are not only predictable as an expression of progress, but also predictable as a future state that did not yet exist before anywhere in the universe. In other words, using the Leibnizian catenary principle: *given the property of a process that is both wave and particle, find the curvature*. The interesting feature of this thought experiment is that the mechanical cause of the change may be different in the mind and in physical chemistry, but the intention is the same.

A similar increase in energy-flux density takes place in the mind as in the physical universe. It is that common denominator which makes that proportionality incommensurable. The reader should note that the randomness of the motions has nothing to do with causality. That randomness can be completely statistical, for all I care, because the causal process is located at the higher level of the idea of axiomatic change expressed by the appropriate experiment of Plato’s Cave. The important point to retain, therefore, is that the thought experiment of Plato’s Cave is not a logical process. It is a transfinite process in the meaning that Lyn gave to the term in the reported paper.

The transfinite process is Riemannian in character, that is to say, a representation of the universe which is “the image of the discrete manifold never better than a distorted shadow of reality. In other words, elementary physical reality is ‘ontologically transfinite.’” (LaRouche, *Ibidem*, p. 5)

The same process applies to very high energies and very short distances or any other form of Cusa minimum-maximum relationships. This is why Bohm chose the Cusa conception of enfolding and unfolding in much the same way that Cusa applied the concepts to the creative process of God. Very reminiscent of Raphael’s form of *simultaneity of historical eternity* as expressed in the simultaneity of physical eternity of *The School of Athens* and the *Dispute of the Holy Sacrament*, Bohm applied the enfolding-unfolding process of Cusa to a sub-quantum level of *implicate and explicate orders*. Bohm wrote:

“In the enfolded order, space and time are no longer the dominant factors determining the relationships of dependence or independence of different elements. Rather, an entirely different sort of basic connection of elements is possible, from which our ordinary notions of space and time, along with those of separately existent material particles, are abstracted as forms derived from the deeper order. These ordinary notions in fact appear in what is called the “explicate” or “unfolded” order, which is a special and distinguished form contained within the general totality

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of all the implicate orders.” (Bohm, David, [\*Wholeness and the Implicate Order\*](#), London: Routledge, 1980, p. xv).

As in the situation of *simultaneity of physical eternity*, the succession of space and time no longer exists and events of different periods and different places can come together in a unique state of existence that holds distant spaces and distant times as one. On the contrary, when such *simultaneity of physical eternity* of multiple events is dissolved, the succession of space and time determines events as in separated unfolded or explicate states of existence.

#### 4. DAVID BOHM’S ENFOLDING/UNFOLDING UNIVERSE OF MIND AND MATTER

In *Chapter 7. The Enfolding-Unfolding Universe and Consciousness*, Bohm shows how to include the mind, which he calls consciousness (including thought, feeling, desire, will, etc), into the implicate order. This is a little strange at first, but once you understand that he is referring to Cusa and to the *simultaneity of physical eternity*, then, his concept of implicate order is easier to grasp. Look at it from the vantage point of Raphael. Bohm treats “matter” (the living and the non-living) and “consciousness” like Raphael does to *The School of Athens* and *The Dispute of the Holy Sacrament*.

When you examine a motion, you can trace its pathway and examine the footprints like the shadows of Plato’s Cave. Different points a, b, c on the pathway indicate a succession at different times and spatial positions. The points that are past no longer exist and the points in the future don’t yet exist. Now, imagine that you conceive of them all together at the same time. This is what Bohm calls enfolding or implication. As Bohm put it:

“When we think of movement in terms of the implicate order, however, these problems [of succession] do not arise. In this order, movement is comprehended in terms of a series of interpenetrating and intermingling elements in different degrees of enfolding all present together. The activity of this movement then presents no difficulty, because it is an outcome of this whole enfolding order, and is determined by relationships of co-present elements, rather than relationships of elements that exist to other that no longer exist.

“We see, then, that through thinking in terms of the implicate order, we come to a notion of movement that is logically coherent and that properly represents our immediate experience of movement. Thus the sharp break between abstract logical thought and concrete immediate experience, that has pervaded our culture for so long, need no longer be maintained. Rather the possibility is created for an unbroken flowing movement from immediate experience to logical thought and back, and thus, for an ending to this kind of fragmentation.

“Moreover, we are now able to understand in a new and more consistent way our proposed notion concerning the general nature of reality, that *what is* is movement. Actually, what tends to make it difficult for us to work in terms of this notion is that we usually think of movement in the traditional way as an active relationship of what is to what is not. Our traditional

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notion concerning the general nature of reality would then amount to saying that *what is* is an active relationship of what is to what is not. To say this is, at the very least, confused. In terms of the implicate order, however, movement is a relationship of certain phases of *what is* to other phases of *what is*, that are in different stages of enfoldment. This notion implies that the essence of reality as a whole is the above relationship among the various phases in different stages of enfoldment (rather that, for example, a relationship between various particles and fields that are all explicate and manifest.)” (David Bohm, [\*Wholeness and the Implicate Order\*](#), London: Routledge, 1980, pp. 257-58)

Thus, the essence of this *matterofmind* is a performative form of the ontological transfinite manifold as opposed to the logical deductive manifold. The secret to this process, however, is not that mind is a container which includes as well in the implicate order the structure, the function, and the activity of its own process, as a cup would hold coffee. The transfinite manifold of the implicate order is essentially musical in character; that is to say, it is based on the principle of classical artistic composition.

The irony of this process, however, is that the implicate order is not dependent on the past but on the future. Something paradoxical happens here, which is that the explicate order is clock-time, while the implicate order is based on time reversal. The implicate order functions from the future. In that sense, the implicate order is the order of change and of creativity located in the intention, and therefore it has primacy over the explicate order. Most people live their lives in the explicate order while only the creative minds live in the implicate order. Now is the time to change your own past and improve on your memory from the future. When Bohm applies the same implicate order of mind to the physical universe, he adopts the Leibniz monad as a model. As he said:

“In certain ways, this notion is similar to Leibniz’s idea of monads, each of which ‘mirrors’ the whole in its own way, some in great detail and others rather vaguely. The difference is that Leibniz’s monads had a permanent existence, whereas our basic elements are moments and are thus not permanent.” (Ibidem, p. 263)

The point to emphasize, here, is that a physical and a mental implicate order moment has memory, and that memory changes with time in the mental domain in a similar way that it changes in the physical domain. And, therefore, if memory changes, then, the past is the most important thing to be changed. As Bohm noted:

“One may indeed say that our memory is a special case of the process described above, for all that is recorded is held enfolded within the brain cells and these are part of matter in general. The recurrence and stability of our own memory as a relatively independent sub-totality is thus brought about as part of the very same process that sustains the recurrence and stability in the manifest order of matter in general.” (Ibidem p. 264)

The implicate order, however, has its most important implication in music and in the form of resonance that it produces on the mind; that is to say, in the form of classical artistic composition which is the closest to God’s mind. The reason this is of the utmost significance is because music is the form of resonance which is best suited for expressing the *simultaneity of physical eternity*. Here is how Bohm addresses the matter:

“In the music, there is, as we have seen, a basically similar transformation (of notes) in which a certain order can also be seen to be preserved. The key difference in these two cases is that for our model of the electron an enfolded order is grasped in thought, as the presence together of many different but interrelated degrees of transformations of ensembles, while for the music, it is sensed immediately as the presence together of many different but interrelated degrees of transformations of tones and sounds. In the latter, there is a feeling of both tension and harmony between the various co-present transformations, and this feeling is indeed what is primary in the apprehension of the music in its undivided state of flowing movement.

“In listening to music, one is therefore directly perceiving an implicate order. Evidently this order is active in the sense that it continually flows into emotional, physical, and other responses that are inseparable from the transformations out of which it is essentially constituted.” (Ibidem, p. 253)

Although Bohm did not develop the question of music with examples of the classical repertoire, his emphasis on measure of right proportion in intensity of sound, right proportion in tonality, etc. is in the right direction. His reference to the visual arts based on the golden section is similarly based on “measure.” However, it is not enough, for our purpose, here, to address these general formal aspects. The idea has to go deeper into how classical artistic composition must become the actual basis for understanding the relevance of science in the future, most notably on the question of axiomatic change.

For example, take the case of Beethoven’s Piano Sonata Opus 27. The internal Lydian transformation of the composition demonstrates how the creative process works. See my report on [\*\*THE TRUTH ABOUT BEETHOVEN’S SO-CALLED “MOONLIGHT SONATA”\*\*](#). The point that Beethoven made was to use the principle of Lydian artistic composition for the purpose of resolving the axiomatic crisis that he was going through with his loss of hearing. He resolved the problem successfully by turning an existential state of victimization into a sublime state of discovery of principle.

Unless such epistemological singularities of classical artistic composition are established as the foundation principle of the education of science in the future curriculum of the nations of the BRICS, for example, there will be no guarantee of a future for science.

Bohm’s notion of discovery of principle is of a similar process of change. Here, Bohm is confronted with an interesting paradox: how can you speak of something about which mere comments cannot be made because any explanation of it will contradict the very process of producing it? Bohm asks:

“What is the process of thought? Thought is, in essence, the active response of memory in every phase of life. We include in thought the intellectual, emotional, sensuous, muscular and physical responses of memory. These are all aspects of one indissoluble process. To treat them separately makes for fragmentation and confusion. All these are one process of response of memory to each actual situation, which response in turn leads to a further contribution to memory, thus conditioning the next thought.” (Ibidem, p. 64)

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Here, Bohm proceeds performatively, and not by explanation, to develop, step by step, the discovery of the thinking process through its living motion of consciousness. He treats all aspects of thought as one indissoluble process which calls for the discovery of an insight with the whole meaning of the insight function. That is the right orientation, but there is an added feature that must be considered for the process to work in a truthful manner. There is a need for a singularity, and axiomatic discontinuity, which has to be present in the process, which will cause a complete inversion of the previous thinking process. The solution appears as something that is completely foreign to the problem, and yet, it is the required solution. This is how Bohm described the process without actually performing it:

“There is in this mechanical process [of creating a new thought] no inherent reason why the thoughts that arise should be relevant or fitting to the actual situation that evokes them. The perception of whether or not any particular thoughts are relevant or fitting requires the operation of an energy that is not mechanical, an energy that we shall call *intelligence*. This latter is able to perceive a new order or a new structure that is not just a modification of what is already known or present in memory. For example, one may be working on a puzzling problem for a long time. Suddenly, in a flash of understanding, one may see the irrelevance of one’s whole way of thinking about the problem, along with a different approach in which all the elements fit in a new order and in a new structure.” (Ibidem, p. 65)

What Bohm calls “*intelligence*” is what I call the *principle of insight*. But there is a very interesting problem which arises when one attempts to establish the relationship of the mind to the brain. This is a problem that Lyn has been emphasizing very much in the recent years and to which Bohm provides us with an interesting answer. Bohm writes:

“Now, there is a great deal of evidence indicating that thought is basically a material process. For example, it has been observed in a wide variety of contexts that thought is inseparable from electrical and chemical activity in the brain and nervous system, and from concomitant tensions and movements of muscles. Would one then say that intelligence is a similar process, though perhaps of a more subtle nature?

“It is implied in the view we are suggesting here that this is not so. If intelligence is to be an unconditioned act of perception, its ground cannot be in structures such as cells, molecules, atoms, elementary particles, etc. Ultimately, anything that is determined by the laws of such structures must be in the field of what can be known, i.e. stored up in memory, and thus it will have to have the mechanical nature of anything that can be assimilated in the basically mechanical character of the process of thought. The actual operation of intelligence is thus beyond the possibility of being determined or conditioned by factors that can be included in any knowable law. So, we see that the ground of intelligence must be in the undetermined and unknown flux, that is also the ground of all definable forms of matter. Intelligence is thus not deducible or explainable on the basis of any branch of knowledge (e.g., physics or biology). Its origin is deeper and more inward than any knowable order that could describe it.

“What, then, is the relationship of intelligence to thought? Briefly, one can say that when thought functions on its own, it is mechanical and not intelligent, because it imposes its own generally irrelevant and unsuitable order drawn from memory. Thought is, however, capable of



responding, not only from memory but also to the unconditioned perception of intelligence that can see, in each case, whether or not a particular line of thought is relevant and fitting. (Indeed, it has to comprehend the very order of definable forms of matter through which we would hope to comprehend intelligence.) (Ibidem, p. 65)

This is very intelligently thought through, indeed, because if it were not true, there could be no intelligent judgment that could prove it is otherwise. The proof has to be in the performative pudding. No other sort of demonstration will work, because everything else would be simply descriptive. And that doesn't work. To this effect, Bohm concludes:

“Intelligence and material process have thus the same origin, which is ultimately the unknown totality of the universal flux. In a certain sense, this implies that what we have been commonly calling mind and matter are abstractions from the universal flux, and that both are to be regarded as different and relatively autonomous orders within one whole movement.” (Ibidem., p. 68)

Bohm realizes that what is needed is not a description of the process but an actual performative experience of the process of discovery. As he added a few pages later:

“What is required here, then, is not an explanation that would give us some knowledge of the relationship of thought and thing, or of thought and ‘reality as a whole’. Rather, what is needed is an act of understanding; in which we see the totality as an actual process that, when carried out properly, tends to bring about an harmonious and orderly overall action, incorporating both thought and what is thought about in a single movement, in which analysis into separate parts (e.g., thought and thing) has no meaning.” (Ibidem, p. 71)

Thinking and consciousness that thinking is going on are, therefore, two different levels of the same mental process of creative thinking, but it is not enough to recognize this difference to be creative, you have to compose it yourself. Creativity involves a third level of consciousness which involves the intention to improve mankind. A creative insight cannot take place without this last step. This is the reason why British oligarchs, for example, cannot be creative; they can only repeat the same empiricist method, over and over again. From that vantage point, a British oligarch is nothing but a predictable Sherlock Holmes.

## CONCLUSION

The discovery of Bohm does not imply that mind and matter cause each other to exist, but that the creative process of both are the outcome of a higher manifold of energy-flux-density which causes them to exist based on the same method of development. When you have a higher dimensionality which projects its effects into elements of a lower dimensionality, you have a relationship of manifolds that have different degrees of energy-flux density. This is what is implied in the Implicate Order. As Bohm wrote:

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“In this higher-dimensional ground the implicate order prevails. Thus, within this ground, *what is* is movement which is represented in thought as the co-presence of many phases of the implicate order. As happens with the simpler forms of the implicate order considered earlier, the state of movement at one moment unfolds through a more inward force of necessity inherent in this overall state of affairs, to give rise to a new state of affairs in the next moment. The projections of the higher dimensional ground, as mind and body, will in the later moment both be different from what they were in the earlier moment, though these differences will of course be related. So we do not say that mind and body causally affect each other, but rather that the movements of both are the outcome of related projections of a common higher-dimensional ground.” (Ibidem, p. 266)

This is the axiomatic form of transformation that Lyn identified as a progress based on *increases in energy-flux-density*, which takes place in the human mind as in the matter of the universe as a whole. Lyn made the point exceedingly clear in his paper on the Transfinite, when he said:

“In this way, we have implied that fundamental scientific process is a continuing process, to such effect that the preceding state of progress conditions the possibility of its successor. Since that process is demonstrably a real one, it is implied that there must exist some intelligible representation of the process of a continuous function in the sense the general notion of a mathematical physics implies.

“However, this process is one in which the most characteristic feature of the process is an ordering and density of what ‘finite mathematics’ regards as mathematical discontinuities. It must be a mathematical function which adopts ‘the density of such discontinuities per interval of continuing action’ as the characteristic feature of the function to be supplied. Indeed, the search for the basis on which to represent such a continuing function is the characteristic feature of the leading currents in nineteenth-century science, from Gauss through Riemann, Beltrami, and Cantor.” (Lyndon LaRouche, *The Meaning of the Term Transfinite*, pp. 14-15.)

In his [Wholeness and the Implicate Order](#), Bohm delivers a true “Aha!” of discovery. And with that discovery, Bohm realized that no such “mathematical function” can do the job, as Lyn later assigned exclusively to the creative human mind. As a result, there is now, in modern physics, a clear axiomatic difference between an intentional implicate/explicate ordering process and statistical indeterminacy based on reductionist mathematics. That principle of *enfolding/unfolding* should be properly identified as the *Cusa-Bohm Principle*, a singularity that has been present in the minds of a handful of creative thinkers for the more than 400 years and which represents a definite break with the former systems of knowledge of both Procrustean beds of quantum mechanics and oligarchism. The important point to remember, however, is that this *Cusa-Bohm Principle* must be entirely congruent with Lyn’s *Principle of Energy-Flux-Density*.

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