Morphic Fields and the Implicate Order: Rupert Sheldrake & David Bohm

***David Bohm was an eminent quantum physicist. As a young man he worked closely with Albert Einstein at Princeton University. With Yakir Aharonov he discovered the Aharonov-Bohm effect. He was later Professor of Theoretical Physics at Birkbeck College, London University, and was the author of several books, including* Causality and Chance in Modern Physics [1] *and* Wholeness and the Implicate Order. [2] *He died in 1992. This dialogue was first published in ReVision Journal, and the editorial notes are by Renée Weber, the journal's editor.* [3]**

Bohm: Suppose we look at the development of the embryo, at those problems where you feel the present mechanistic approach doesn't work. What would the theory of morphogenetic fields do that others don't?

Sheldrake: The developing organism would be within the morphogenetic field, and the field would guide and control the *form* of the organism's development. The field has properties not just in space but in time. Waddington demonstrated this with his concept of the chreode [see Fig. 5], represented by models of valleys with balls rolling down them towards an endpoint. This model looks mechanistic when you first see it. But when you think about it for just a minute you see that this endpoint, which the ball is rolling down the valley towards, is in the *future*, and it is, as it were, attracting the ball to it. Part of the strength of this model depends on the fact that if you displace the marble up the sides of the valley, it will roll down again and reach the same endpoint; this represents the ability of living organisms to reach the same goal, even if you disrupt them – cut off a bit of embryo and it can grow back again; you'll still reach the same endpoint.

Bohm: In physics the Lagrangian law is rather similar; the Lagrangian falls into a certain minimum level, as in the case of the chreode. It's not an exact analogy, but you could say that in some sense the classical atomic orbit arises by following some sort of chreode. That's one way classical physics could be looked at. And you could perhaps even introduce some notion of physical stability on the basis of a chreode. But from the point of view of the implicate order, I think you would have to say that this formative field is a whole set of potentialities, and that in each moment there's a selection of which potential is going to be realized, depending to some extent on the past history, and to some extent on creativity.

Sheldrake: But this set of potentialities is a limited set, because things do tend towards a particular endpoint. I mean cat embryos grow into cats, not dogs. So there may be variation about the exact course they can follow, but there is an overall goal or endpoint.

Bohm: But there would be all sorts of contingencies that determine the actual cat.

Sheldrake: Exactly. Contingencies of all kinds, environmental influences, possibly genuinely chance fluctuations. But nevertheless the endpoint of the chreode would define the general area in which it's going to end up. Anyway, the point about Waddington's concept of the chreode, which is taken quite seriously by lots of biologists, is that it already contains this idea of endpoint, in the future, in time; and the structure, the very walls of the chreode, are not in any normal sense of the word material, physical things. Unfortunately Waddington didn't define what they were. In my opinion, they represent this process of formative causation through the morphogenetic field. Waddington in fact uses the term 'morphogenetic field'. Now the problem with Waddington's concept is that, when he was attacked by mechanists, who maintained that this was a mystical or ill-defined idea, he backed down and said, well, this is just a way of talking about normal chemical and physical interactions. René Thom, who took up the concepts of chreodes and morphogenetic fields and developed them in topological models (where he called the endpoints 'morphogenetic attractors'), tried to push Waddington into saying more exactly what the chreode was. Waddington, whenever pushed by anyone, even René Thom, backed down. So he left it in a very ambiguous state.

Now Brian Goodwin and people like him see chreodes and morphogenetic fields as aspects of eternal Platonic forms; he has a rather Platonic metaphysics. He sees these formative fields as eternally given archetypes, which are changeless and in some sense necessary. It is almost neo- Pythagorean; harmony, balance, form and order can be generated from some fundamental mathematical principle, in some sort of necessary way, that acts as a causal factor in nature in an unexplained but changeless manner.

The difference between that and what I'm saying is that I think these morphogenetic fields are built up causally from what's happened before. So you have this introjection, as it were, of explicit forms, to use your language, and then projection again.

Bohm: Yes. What you are talking about – the relation of past forms to present ones – is really related to the whole question of time – 'How is time to be understood?' Now, in terms of the totality beyond time, the totality in which all is implicate, what unfolds or comes into being in any present moment is simply a projection of the whole. That is, some aspect of the whole is unfolded into that moment and that moment is just that aspect. Likewise, the next moment is simply another aspect of the whole. And the interesting point is that each moment resembles its predecessors but also differs from them. I explain this using the technical terms ‘injection’ and ‘projection’. Each moment is a projection of the whole, as we said. But that moment is then injected or introjected back into the whole. The next moment would then involve, in part, a re-projection of that injection, and so on indefinitely.

[Editor’s note: As a simplistic analogy, take the ocean and its waves: each wave arises or is ‘projected’ from the whole of the ocean; that wave then dips back into the ocean, or is ‘injected’ back into the whole, and then the next wave arises. Each wave is affected by past waves simply because they all rise and fall, or are projected and injected, by the whole ocean. So there is a type of ‘causality’ involved, but it is not that wave A linearly causes wave B, but that wave A influences wave B by virtue of being absorbed back into the totality of the ocean, which then gives rise to wave B. In Bohm’s terms, wave B is in part a ‘re-projection’ of the ‘injection’ of wave A, and so on. Each wave would therefore be similar to previous waves, but also different in certain aspects – exact size, shape, etc. Bohm is suggesting that there is a type of ‘causality’, but one that is mediated via the totally of the implicate ocean, and not merely via the separated, isolated, explicate waves. This means, finally, that such ‘causation’ would be non-local, because what happens at any part of the ocean would affect all other parts.]

Each moment will therefore contain a projection of the re-injection of the previous moments, which is a kind of memory; so that would result in a general replication of past forms, which seems similar to what you’re talking about.

[Editor’s note: This is according to Bohm’s re-formulations of present day quantum mechanics. In the following discussion, Bohm will point out that present day quantum mechanics, as it is usually interpreted, completely fails to account for the replication of past forms, or the notion of temporal process, a failure that in part led Bohm to propose ‘injection’ and ‘projection’ via the implicate order.]

Sheldrake: So this re-injection into the whole from the past would mean there is a causal relationship between what happens in one moment and what subsequently happens?

Bohm: Yes, that is the causal relation. When abstracted from the implicate order, there seems to be at least a tendency, not necessarily an exact causal relationship, for a certain content in the past to be followed by a related content in the future.

Sheldrake: Yes. So if something happens in one place at one time what happens there is then re-injected into the whole.

Bohm: But it has been somewhat changed; it is not re-injected exactly, because it was previously projected.

Sheldrake: Yes, it is somewhat changed, but it is fed back into the whole. That can have an influence which, since it is mediated by the whole, can be felt somewhere else. It doesn't have to be local.

Bohm: Right, it could be anywhere.

Sheldrake: Well that does sound very similar to the concept of morphic resonance, where things that happen in the past, even if they're separated from each other in space and time, can influence similar things in the present, over, through, or across – however one cares to put it -space and time. There's this non-local connection. This seems to me to be very important because it would mean that these fields have causal (but nonlocal) connections with things that have happened before. They wouldn't be somehow inexplicable manifestations of an eternal, timeless set of archetypes. Morphogenetic fields, which give repetitions of habitual forms and patterns, would be derived from previous fields (what you call 'cosmic memory'). The more often a particular form or field happened, the more likely it would be to happen again, which is what I am trying to express with this idea of morphic resonance and automatic averaging of previous forms. It's this aspect of the theory that makes it empirically testable, because this aspect leads to predictions, such as: if rats learn something in one place, say a new trick, then rats everywhere else should be able to learn the same trick faster. That makes it different from Goodwin's theory of eternal archetypes, which wouldn't lead to that prediction, because they would always be the same. And this is where what I'm saying grows out of the tradition of thought that has been around in biology for 60 years, the idea of morphogenetic fields. These fields have always been very ill-defined, and have been interpreted either as Waddington did, to be just a way of speaking about conventional mechanistic forces, or by a Goodwin-type metaphysical approach.

Bohm: Yes. Now if we were to use the analogy of the radio wave receiver which you discussed in your book: If you take a receiver, it has the ability to amplify very small radio wave signals. As you say, we can regard the radio wave as a morphogenetic field. And the energy in the receiver (which comes from the wall socket) is being given shape or form by the information in the radio wave itself, so you get a musical sound coming out of the speaker. Now in that case you could say the radio wave possesses a very tiny energy compared to the energy in the radio coming from the wall socket. Thus, roughly speaking, there are two levels of energy; one is a kind of energy which is unformed but which is subject to being formed by very tiny impulses. The other is a field which is very much more subtle and which has very little energy in the usual sense of the word, but has a quality of form which can be taken up by the energy of the radio receiver. The point is that one might look at the implicate order that way; the subtler levels of the implicate order are affecting the energy in the less subtle levels. The implicate energies are very fine; they would not ordinarily even be counted as energies, and these implicate energies are giving rise to the production of electrons and protons and the various particles of physics. And these particles have been replicating so long that they are pretty well determined, or fixed in 'cosmic memory'.

Sheldrake: Yes, I think one could look at it that way. But whether these morphogenetic fields have a subtle energy or not – I don't really know what to think about that. When I wrote my book, I tried to draw a very sharp distinction between formative causation and the ordinary kind of causation (energetic causation), the kind that people are familiar with (e.g. pushing things, electricity). For two reasons: first, I wanted to make it clear that this formative causation is a different kind of thing from what we usually think of as causation. (It may not be so different when one takes into account causation through fields, as in physics.) But the second reason was that it is an important part of my theory that these morphic fields can propagate across space and time, that past events could influence other events everywhere else. Now if these fields are conceived of as energetic, in any normal sense of the word, most people assume that they could only propagate locally according to some sort of inverse square law, because most known energies light, gravity, magnetism, etc. – fade out over distance.

Bohm: But that doesn't necessarily follow, you see. One of the early interpretations of the quantum theory I developed was in terms of a particle moving in a field.

Sheldrake: The quantum potential.

Bohm: Yes. Now the quantum potential had many of the properties you ascribe to morphogenetic fields and chreodes; that is, it guided the particle in some way, and there are often deep valleys and plateaus, and particles may start to accumulate in plateaus and produce interference fringes. Now the interesting thing is that the quantum potential energy had the same effect regardless of its intensity, so that even faraway it may produce a tremendous effect; this effect does not follow an inverse square law. Only the form of the potential has an effect, and not its amplitude or its magnitude. So we compared this to a ship being guided by radar; the radar is carrying form or information from all around. It doesn't, within its limits, depend on how strong the radio wave is. So we could say that in that sense the quantum potential is acting as a formative field on the movement of the electrons. The formative field could not be put in three-dimensional [or local] space, it would have to be in a three-n dimensional space, so that there would be non-local connections, or subtle connections of distant particles (which we see in the Einstein-PodolskyRosen experiment). So there would be a wholeness about the system such that the formative field could not be attributed to that particle alone; it can be attributed only to the whole, and something happening to faraway particles can affect the formative field of other particles. There could thus be a [non-local] transformation of the formative field of a certain group to another group. So I think that if you attempt to understand what quantum mechanics means by such a model you get quite a strong analogy to a formative field.

Sheldrake: Yes, it may even be a homology; it may be a different way of talking about the same thing.

Bohm: The major difference is that quantum mechanics doesn't treat time, and therefore it hasn't any way to account for the cumulative effect of past forms. To do so would require an extension of the way physics treats time, you see.

Sheldrake: But don't you get time in physics when you have a collapse of the wave function?

Bohm: Yes, but that's outside the framework of quantum physics today. That collapse is not treated by any law at all, which means that the past is, as it were, wiped out altogether.

[Editor's note: This is the point where, as earlier mentioned, Bohm discusses some of the inadequacies of present-day quantum mechanics – in particular, its incapacity to explain process, or the influence of the past on the present. He then suggests his re-formulations – injection, projection, the implicate order, etc. – that might remedy these inadequacies. And these re-formulations, apparently, are rather similar to Sheldrake's theories.]

You see, the present quantum mechanics does not have any concept of movement or process or continuity in time; it really deals with one moment only, one observation, and the probability that one observation will be followed by another one. But there is obviously process in the physical world. Now I want to say that that process can be understood from the implicate order as this activity of re-projection and re-injection. So, the theory of the implicate order, carried this far, goes quite beyond present quantum mechanics. It actually deals with process, which quantum mechanics does not, except by reference to an observing apparatus which in turn has to be referred to something else.

Sheldrake: Would you say that process at that level is a re-projection?

Bohm: Yes.

Sheldrake: And a re-injection at the same time?

Bohm: Re-injection is exactly what the Schrödinger equation is describing. And re-projection is the next step, which quantum mechanics doesn't handle (except by the arbitrary assumption that the wave function 'collapses' in a way that has no place in the physical laws, such as Schrödinger's equation).

Now, there's one other thing that modern quantum mechanics doesn't handle. Oddly enough, physics at present has no contact with the notion of actuality. You see, classical physics has at least some notion of actuality in saying that actuality consists of a whole collection of particles that are moving and interacting in a certain way. Now, in quantum physics, there is no concept of actuality whatsoever, because quantum physics maintains that its equations don't describe anything actual, they merely describe the probability of what an observer could see if he had an instrument of a certain kind, and this instrument is there-fore supposed to be necessary for the actuality of the phenomenon. But the instrument, in turn, is supposed to be made of similar particles, obeying the same laws, which would, in turn, require another instrument to give them actuality. That would go on an infinite regress. Wigner has proposed to end the regress by saying it is the consciousness of the actual observer that gives actuality to everything.

Sheldrake: But that doesn't seem very satisfactory to me.

Bohm: Nor to me, but apparently Wigner feels happy with this, as do some others. The point is, unless you extend quantum mechanics, there is no room in it for actuality, no room for any of the things you are talking about. So quantum mechanics as it stands now, I want to say, is a very truncated, limited, abstracted set of formulae which gives certain limited results having to do with only one moment of an experiment. But out of this truncated view, physicists are trying to explain everything, you see; the whole thing simply has no meaning at all. Think about it: modern physics can't even talk about the actual world!

Sheldrake: But how do you think we can get to a concept of actuality?

Bohm: Well, I think through the implicate order. We have a projection of the whole to constitute a moment; a moment is a movement. And we can say that that projection is the actualization. In other words, the thing that physics doesn't discuss is how various successive moments are related, and that's what I say the implicate order is attempting to do. If we extended quantum mechanics through the implicate order, we would bring in just that question of how past moments have an effect on the present (i.e., via injection and reprojection). At present, physics says the next moment is entirely independent, but with some probability of being such and such. There's no room in it for the sort of thing you're talking about, of having a certain accumulated effect of the past; but the implicate order extension of quantum mechanics would have that possibility. And further, suppose somehow I were to combine the implicate order extension of quantum mechanics [which would account for the accumulated effects of the past] with this quantum potential [which would account for these effects being non-local in nature], then I think I would get things very like what you are talking about.

Sheldrake: Yes, that would be very exciting! Of all the ways I've come across I think that's the most promising way of being able to mesh together these sort of ideas. I haven't come across any other way which seems to show such possible connections.

Bohm: If we can bring in time, and say that each moment has a certain field of potentials (represented by the Schrödinger equation) and also an actuality, which is more restricted (represented by the particle itself); and then say that the next moment has its potential and its actuality, and we must have some connection between the actually of the previous moments and the *potentials* of the next – that would be introjection, not of the wave function of the past, but of the actuality of the past into that field from which the present is going to be projected. That would do exactly the sort of thing you're talking about. Because then you could build up a series of actualities introjected which would narrow down the field potential more and more, and these would form the basis of subsequent projections. That would account for the influence of the past on the present.

Sheldrake: Yes, yes. Now how do you think this ties in with the alleged matter waves in de Broglie's equation?

Bohm: That's exactly where we started. These matter waves are the formative cause, and that was what de Broglie originally suggested. However, he wanted to regard the matter wave as just simply a real three-dimensional wave in time, and that doesn't work well. The formative field is a far better interpretation. The quantum potential is the formative field which we derive from the generalized de Broglie waves. And we say that the particle is the actuality, affected by the formative field. The set of particles, the whole structure of all the particles forming a system, is the actuality of that formative field.

But that model by itself still ignores time, so the next step is to bring in time, to say that there's a succession of moments of time in which there is a recurrent actuality. And we would say that what recurs is affected by the formative field. But then that formative field is affected by what has previously happened, actually. Now that would help to remove most of the problems in physics, if we can manage it. And it would tie up closely with the sort of thing that you're talking about.

See, at present we say that the wave function as potential spreads out very fast and then it suddenly collapses into some definite actual state for reasons totally outside the theory. So we say it requires a piece of measuring apparatus to do so. Then another collapse, and the only continuity of this system would be achieved by an infinite set of measuring apparatuses that would keep it in observation all the time, and these observation apparatuses in turn would have to be observed to allow them to exist actually, and so on. And the whole thing vanishes in a fog of confusion. Because people take the present mathematics as sacred, they say these equations in their general form are never to be altered, and then they say here we are with all these strange problems. But you see almost no one wants to introduce anything fundamentally different into this general framework.

Sheldrake: So the de Broglie interpretation is the way you're thinking of developing. You'd have this recurrent actualization of something which is continually associated with the formative field.

Bohm: And the present formative field is affected by past actualizations. In the present quantum mechanics there is no way to have the formative field affected by anything at all, including the past, because there's only one moment that you can talk about. You can't find anything that would affect the formative field, and that's the problem.

Sheldrake: Yes, I see. Now this is a closely related topic: What I'm talking about with morphogenetic fields has to do with physical forms and habitual patterns of behaviour. The connection of these ideas to the thought process itself is not obvious, although they're certainly related. If you start framing the whole topic in physical terms, as I do with morphogenetic fields, then you have to speak in terms of morphic resonance, the influence of past forms on present ones through the morphogenetic field by a kind of resonance. If, however, you start using psychological language, and you start talking in terms of thought, then you've got a handier way of thinking of the influence of the past, because with mental fields you have memory. And one can extend this memory if one thinks of the whole universe as essentially thought-like, as many philosophical systems have done. You could say that if the whole universe is thought-like, then you automatically have a sort-of cosmic memory developing. There are systems of thought that take exactly this view. One of them is a Mahayana Buddhist system – the idea of the Alayavijnana, store consciousness, is rather similar to the idea of cosmic memory. And the Theosophists I think took over some of that in the idea of the Akashic record. The entire universe is, in one school of Hindu thought, Vishnu's dream. Vishnu dreams the universe into being – it has the same kind of reality as a dream, and because Vishnu is a long-lasting god, who goes on dreaming for a long time, it retains a certain consistency. There's memory within that dream; what he dreamed about in the past tended to repeat itself, having its own laws and dynamics. All of those systems of thought have memory built into them. So you could phrase the whole thing in psychological language. But that doesn't really help to make much contact with modern physics and our modern scientific way of looking at the world. So, in, a sense notions like the implicate order seem to be a better way of approaching the problem, because implicate order is neutral in connotation. It is something that can underlie both physical reality and thought. So it transcends the usual materialist-idealist dichotomy, which says either all of reality is thought-like or all of reality is, matterlike. The implicate order idea has the big advantage of transcending that distinction.

Bohm: In fact its very essence is that transcendence.

Sheldrake: If we take a broader view of creativity, we have the idea of the overall evolutionary process; now that's clearly a creative process. How do you think that kind of evolutionary creativity is related to this model?

Bohm: You could speculate that a great deal of life is the constant replication of forms which are given with small variations, and that's similar to our experience of thought: a constant replication of pattern within variation. But then we wonder, 'How does it ever come about that we get variations – that we get beyond that pattern?'

Sheldrake: Yes, creative 'jumps'.

Bohm: 'Jumps' – yes; you see we call it 'jumps' when it's projected into the fixed categories of thought. If you were to say that there's a proto-intelligence or implicit intelligence in matter as it evolves, that it's actually not moving causally in a sequence but is constantly created and replicated, then there is room for such a creative act to occur, and to project and introject a creative content.

Sheldrake: The thing that's involved in this creativity seems to be something which links things together, a wholeness which embraces parts and sets up relationships between them. They're linked together within a new whole, which didn't exist before. In this creative realization, two previously separate things have been linked together within a whole.

Bohm: Yes. They're now seen as mere aspects of the whole rather than independent existences. You have realized a new whole, and from that realization you may create an external reality as well.

Sheldrake: So the creative process, which gives rise to new thought, through which new wholes are realized, is similar in that sense to the creative reality which gives rise to new wholes in the evolutionary process. The creative process could be seen as a successive development of more complex and higher-level wholes, through previously separate things being connected together.

Bohm: And being realized now as not only independent parts, but aspects of a greater whole that has new qualities.

Sheldrake: Right, and that realization of a greater whole is what actually creates the greater whole

Bohm: Yes, and it could even propose it, as in imagination, or a flash of insight, you realize the whole in the mind and you further realize it outside by work. So you might suppose, say, that somehow nature realizes that it's being presented with various things that now have to be brought together. Nature realizes this greater whole at a deeper level, which is analogous to imagination, and then it unfolds it into the external environment. In a way a flash of creative insight occurs in the biological system.

Sheldrake: Exactly. Now do you think that these relations between things which make them part of the greater whole could, way back in time, have given rise to the fundamental forces of physics? For example, could the gravitational forces that link together all matter have arisen through an original creative insight that all matter was one?

Bohm: One could say that in bringing together various things which previously had been disparate, suddenly there was a realization of their oneness and this created a new whole that is the universe, as we know it anyway. We can say that nature has an intent, you see, which is much deeper than what appears on the surface.

Sheldrake: Now, as to whether natural laws are eternally given or whether they are gradually built up – how do you see that?

Bohm: I think, in view of the implicate order, that the notion of formative fields gradually becoming necessary is what is called for. Even modern physics is pointing to that idea by saying there was a time (i.e., prior to the Big Bang) before any of these units (molecules, quarks, atoms), on which we are basing the necessity, even existed. So, if you said there were certain fixed and everlasting laws of the molecules and atoms, then what would you say if you traced it back to the time before the atoms and molecules existed? Physics can say nothing about that, right? It can say only that there was a formation of these particles at a certain stage. So there would have to be an actual development in which the necessity in a certain field grew more and more fixed. You can even see that happening as you cool down a substance that liquefies; at first you get little clumps of liquid which are transient, and then they get bigger and more determinate. Now physicists explain all this by saying that the laws of the molecules are eternal; molecules are merely consequences of those laws, or derived from those laws. But if you follow that back and ask, Where were molecules? Well, they were originally protons and electrons, which were originally quarks, which were originally sub-quarks. And it goes right back to a stage where none of the units we know even existed, so the whole scheme sort of fades out. It's then open to you to say that, in general, fields of necessity, are not eternal; they are constantly forming and developing.

Sheldrake: I think that the current conventional and scientific picture hasn't really faced up to this at all. You see, science started with a sort, of neoPlatonic, neo-Pythagorean notion – the idea of timeless laws – which has been taken for granted in science for a very long time. I think that when the evolutionary theory in biology came in, it triggered the beginning of change. We then had an evolutionary view of reality regarding animals and plants, but it was still considered that there was a timeless background of the physical world, the molecular and atomic world. Now we've gone to the cosmology of the Big Bang, which is widely accepted. So now we've got the idea of the entire universe as being a radically evolutionary universe. And this, I think, provokes a crisis, and should provoke a crisis. The idea of timeless laws that have always been there, somehow pervading space and time, ceases to have much meaning when you have an actual historical Big Bang, because you then have this problem: where were the laws before the Big Bang?

Bohm: There is also the belief, commonly accepted, that at the core of black holes the laws as we know them would also vanish. As you say, scientists haven't faced up to it because they are still thinking in the old way, in terms of timeless laws. But some physicists realize that. One cosmologist was giving a talk and he said, 'Well, you know, I used to think everything was a law of nature, and it's all fixed, but as far as a black hole is concerned, anything can happen. You see, if it suddenly flashed a Coca Cola sign, this would still be a possibility.' [Laughter]. So, the notion of timeless laws doesn't seem to hold, because time itself is part of the necessity that developed. The black hole doesn't involve time and space as we know it; they all vanish. It's not just matter that vanishes, but any regular order that we know of vanishes, and therefore you could say anything goes, or nothing goes.

Sheldrake: The interesting thing about the Big Bang theory is that the minute you have to address the question of the origins of the laws of nature, you're forced to recognize the philosophical assumptions underlying any sort of science. People who think of themselves as hard-nosed mechanists or pragmatists regard metaphysics as a waste of time, a useless speculative activity, whereas supposedly they are practical scientists getting on with the job. But you can force them to realize that their view of the laws of nature as being timeless, which is implicit in everything they say or think or do, is in fact a metaphysical view. And it's one possible metaphysical view, it's not the only possible one. I talk with biological friends, and they say, Oh, what you're doing is metaphysics. So I say, Wait a minute, let's look at what you're doing. And then you confront them with the question of where were the laws of nature before the Big Bang. And most of them say, Well, they must have always been there. And you say, Where? There's no matter in any sense that we know of before the Big Bang. Where were these laws of nature, sort of free floating? And they say, Well, they must have been there somehow. And then you say, Don't you think this is a rather metaphysical concept, in any literal sense of metaphysics, because it's quite beyond existing physics? They have to admit it sooner or later. As soon as you get into that sort of area, the certainty that so many scientists think their view of the world is founded on simply disappears. It becomes clear that current science presupposes uncritically one possible kind of metaphysics. When one faces this, one can at least begin to think about it rather than accepting one way of thinking about it as self-evident, taken for granted. And if one begins to think about it, one might be able to deepen one's understanding of it.

1. Bohm (1957).
2. Bohm (1980).
3. Sheldrake and Bohm (1982).

Note: When Bohm talks about his concept of the implicate order and explicate order I point out to my readers that my concept of an implicit order and explicit order are the same. These were renamed in my Awareness model of physics to avoid confusion between the two. I discuss my ideas in this area in my blog entitled "The dualistic nature of reality", website address: http://www.jonathonfreeman.org/the-dualistic-nature-of-reality/

http://perception.inner-growth.org/2017/03/25/morphic-fields-and-the-implicate-order-rupert-sheldrake-david-bohm/