The following are two excerpts from:

# WHOLENESS AND THE IMPLICATE ORDER

by David Bohm

**Excerpt from Chapter One:**

The title of this chapter is 'Fragmentation and wholeness'. It is especially important to consider this question today, for fragmentation is now very widespread, not only throughout society, but also in each individual; and this is leading to a kind of general confusion of the mind, which creates an endless series of problems and interferes with our clarity of perception so seriously as to prevent us from being able to solve most of them. . . .The notion that all these fragments are separately existent is evidently an illusion, and this illusion cannot do other than lead to endless conflict and confusion. Indeed, the attempt to live according to the notion that the fragments are really separate is, in essence, what has led to the growing series of extremely urgent crises that is confronting us today. Thus, as is now well known, this way of life has brought about pollution, destruction of the balance of nature, over-population, world-wide economic and political disorder, and the creation of an overall environment that is neither physically nor mentally healthy for most of the people who have to live in it. Individually there has developed a widespread feeling of helplessness and despair, in the face of what seems to be an overwhelming mass of disparate social forces, going beyond the control and even the comprehension of the human beings who are caught up in it.

Indeed, to some extent, it has always been both necessary and proper for man, in his thinking, to divide things up, and to separate them, so as to reduce his problems to manageable proportions; for evidently, if in our practical technical work we tried to deal with the whole of reality all at once, we would be swamped. So, in certain ways, the creation of special subjects of study and the division of labour was an important step forward. Even earlier, man's first realization that he was not identical with nature was also a crucial step, because it made possible a kind of autonomy in his thinking, which allowed him to go beyond the immediately given limits of nature, first in his imagination and ultimately in his practical work.

Nevertheless, this sort of ability of man to separate himself from his environment and to divide and apportion things ultimately led to a wide range of negative and destructive results, because man lost awareness of what he was doing and thus extended the process of division beyond the limits within which it works properly. In essence, the process of division is a way of thinking about things that is convenient and useful mainly in the domain of practical, technical and functional activities (e.g, to divide up an area of land into different fields where various crops are to be grown). However, when this mode of thought is applied more broadly to man's notion of himself and the whole world in which he lives (i.e. to his self-world view), then man ceases to regard the resulting divisions as merely useful or convenient and begins to see and experience himself and his world as actually constituted of separately existent fragments. Being guided by a fragmentary self-world view, man then acts in such a way as to try to break himself and the world up, so that all seems to correspond to his way of thinking. Man thus obtains an apparent proof of the correctness of his fragmentary self-world view though, of course, he overlooks the fact that it is he himself, acting according to his mode of thought, who has brought about the fragmentation that now seems to have an autonomous existence, independent of his will and of his

desire. . . . In this chapter, attention will be focused on the subtle but crucial role of our general forms of thinking in sustaining fragmentation and in defeating our deepest urges toward wholeness or integrity. In order to give the discussion a concrete content we shall to some extent talk in terms of current scientific research, which is a field that is relatively familiar to me (though, of course, the overall significance of the questions under discussion will also be kept in mind).

What will be emphasized, first of all in scientific research and later in a more general context, is that fragmentation is continually being brought about by the almost universal habit of taking the content of our thought for 'a description of the world as it is'. Or we could say that, in this habit, our thought is regarded as in direct correspondence with objective reality. Since our thought is pervaded with differences and distinctions, it follows that such a habit leads us to look on these as real divisions, so that the world is then seen and experienced as actually broken up into fragments.

The relationship between thought and reality that this thought is about is in fact far more complex than that of a mere correspondence. Thus, in scientific research, a great deal of our thinking is in terms of theories. The word 'theory' derives from the Greek 'theoria', which has the same root as 'theatre', in a word meaning 'to view' or 'to make a spectacle'. Thus, it might be said that a theory is primarily a form of insight, i.e. a way of looking at the world, and not a form of knowledge of how the world is. . . . The Newtonian form of insight worked very well for several centuries but ultimately (like the ancient Greek insights that came before) it led to unclear results when extended into new domains. In these new domains, new forms of insight were developed (the theory of relativity and the quantum theory). These gave a radically different picture of the world from that of Newton (though the latter was, of course, found to be still valid in a limited domain). If we supposed that theories gave true knowledge, corresponding to 'reality as it is', then we would have to conclude that Newtonian theory was true until around 1900, after which it suddenly became false, while relativity and quantum theory suddenly became the truth. Such an absurd conclusion does not arise, however, if we say that all theories are insights, which are neither true nor false but, rather, clear in certain domains, and unclear when extended beyond these domains. This means, however, that we do not equate theories with hypotheses. As the Greek root of the word indicates, a hypothesis is a supposition, that is, an idea that is put under' our reasoning, as a provisional base, which is to be tested experimentally for its truth or falsity. As is now well known, however, there can be no conclusive experimental proof of the truth or falsity of a general hypothesis which aims to cover the whole of reality. Rather, one finds (e.g., as in the case of the Ptolemaic epicycles or of the failure of Newtonian concepts just before the advent of relativity and quantum theory) that older theories become more and more unclear when one tries to use them to obtain insight into new domains. Careful attention to how this happens is then generally the main clue toward new theories that constitute further new forms of insight.

So, instead of supposing that older theories are falsified at a certain point in time, we merely say that man is continually developing new forms of insight, which are clear up to a point and then tend to become unclear. In this activity, there is evidently no reason to suppose that there is or will be a final form of insight (corresponding to absolute truth) or even a steady series of approximations to this. Rather, in the nature of the case, one may expect the unending development of new forms of insight (which will, however, assimilate certain key features of the older forms as simplifications, in the way that relativity theory does with Newtonian theory). As pointed out earlier, however, this means that our theories are to be regarded primarily as ways of looking at the world as a whole (i.e. world views) rather than as 'absolutely true knowledge of how things are' (or as a steady approach toward the latter).

When we look at the world through our theoretical insights, the factual knowledge that we obtain will evidently be shaped and formed by our theories. For example, in ancient times the fact about the motions of the planets was described in terms of the Ptolemaic idea of epicycles (circles superimposed on circles). In Newton's time, this fact was described in terms of precisely determined planetary orbits, analysed through rates of fall toward various centres. Later came the fact as seen relativistically according to Einstein's concepts of space and time. Still later, a very different sort of fact was specified in terms of the quantum theory (which gives in general only a statistical fact). . . . More generally, then, given perception and action, our theoretical insights provide the main source of organization of our factual knowledge. Indeed, our overall experience is shaped in this way. As seems to have been first pointed out by Kant, all experience is organized according to the categories of our thought, i.e., on our ways of thinking about space, time, matter, substance, causality, contingency, necessity, universality, particularity, etc. It can be said that these categories are general forms of insight or ways of looking at everything, so that in a certain sense, they are a kind of theory (but, of course, this level of theory must have developed very early in man's evolution).

Clarity of perception and thought evidently requires that we be generally aware of how our experience is shaped by the insight (clear or confused) provided by the theories that are implicit or explicit in our general ways of thinking. To this end, it is useful to emphasize that experience and knowledge are one process, rather than to think that our knowledge is about some sort of separate experience. We can refer to this one process as experience-knowledge (the hyphen indicating that these are two inseparable aspects of one whole movement).

Now, if we are not aware that our theories are ever-changing forms of insight, giving shape and form to experience in general, our vision will be limited. One could put it like this: experience with nature is very much like experience with human beings. If one approaches another man with a fixed 'theory' about him as an 'enemy' against whom one must defend oneself, he will respond similarly, and thus one's 'theory' will apparently be confirmed by experience. . . . What prevents theoretical insights from going beyond existing limitations and changing to meet new facts is just the belief that theories give true knowledge of reality (which implies, of course, that they need never change). Although our modern way of thinking has, of course, changed a great deal relative to the ancient one, the two have had one key feature in common: i.e. they are both generally 'blinkered' by the notion that theories give true knowledge about 'reality as it is'. Thus, both are led to confuse the forms and shapes induced in our perceptions by theoretical insight with a reality independent of our thought and our way of looking. This confusion is of crucial significance, since it leads us to approach nature, society, and the individual in terms of more or less fixed and limited forms of thought, and thus, apparently, to keep on confirming the limitations of these forms of thought in experience.

This sort of unending confirmation of limitations in our modes of thinking is particularly significant with regard to fragmentation, for as pointed out earlier, every form of theoretical insight introduces its own essential differences and distinctions. . . . If we regard these differences and distinctions as ways of looking, as guides to perception, this does not imply that they denote separately existent substances or entities.

On the other hand, if we regard our theories as 'direct descriptions of reality as it is', then we will inevitably treat these differences and distinctions as divisions, implying separate existence of the various elementary terms appearing in the theory. We will thus be led to the illusion that the world is actually constituted of separate fragments and, as has already been indicated, this will cause us to act

in such a way that we do in fact produce the very fragmentation implied in our attitude to the theory. . . . In other words, it is just because reality is whole that man, with his fragmentary approach, will inevitably be answered with a correspondingly fragmentary response. So what is needed is for man to give attention to his habit of fragmentary thought, to be aware of it, and thus bring it to an end. Man's approach to reality may then be whole, and so the response will be whole.

For this to happen, however, it is crucial that man be aware of the activity of his thought as such; i.e. as a form of insight, a way of looking, rather than as a 'true copy of reality as it is'.

It is clear that we may have any number of different kinds of insights. What is called for is not an integration of thought, or a kind of imposed unity, for any such imposed point of view would itself be merely another fragment. Rather, all our different ways of thinking are to be considered as different ways of looking at the one reality, each with some domain in which it is clear and adequate. One may indeed compare a theory to a particular view of some object. Each view gives only an appearance of the object in some aspect. The whole object is not perceived in any one view but, rather, it is grasped only implicitly as that single reality which is shown in all these views. When we deeply understand that our theories also work in this way, then we will not fall into the habit of seeing reality and acting toward it as if it were constituted of separately existent fragments corresponding to how it appears in our thought and in our imagination when we take our theories to be 'direct descriptions of reality as it is'.

Beyond a general awareness of the role of theories as indicated above, what is needed is to give special attention to those theories that contribute to the expression of our overall self-world views. For, to a considerable extent, it is in these world views that our general notions of the nature of reality and of the relationship between our thought and reality are implicity or explicitly formed. In this respect, the general theories of physics play an important part, because they are regarded as dealing with the universal nature of the matter out of which all is constituted, and the space and time in terms of which all material movement is described.

Consider, for example, the atomic theory, which was first proposed by Democritus more than 2,000 years ago. In essence, this theory leads us to look at the world as constituted of atoms, moving in the void. The ever-changing forms and characteristics of large-scale objects are now seen as the results of changing arrangements of the moving atoms. Evidently, this view was, in certain ways, an important mode of realization of wholeness, for it enabled men to understand the enormous variety of the whole world in terms of the movements of one single set of basic constituents, through a single void that permeates the whole of existence. Nevertheless, as the atomic theory developed, it ultimately became a major support for a fragmentary approach to reality. For it ceased to be regarded as an insight, a way of looking, and men regarded instead as an absolute truth the notion that the whole of reality is actually constituted of nothing but 'atomic building blocks', all working together more or less mechanically.

Of course, to take any physical theory as an absolute truth must tend to fix the general forms of thought in physics and thus to contribute to fragmentation. Beyond this, however, the particular content of the atomic theory was such as to be especially conducive to fragmentation, for it was implicit in this content that the entire world of nature, along with the human being, including his brain, his nervous system, his mind, etc., could in principle be understood completely in terms of structures and functions of aggregates of separately existent atoms. The fact that in man's experiments and general experience this atomic view was confirmed was, of course, then taken as proof of the correctness and indeed the universal truth of this notion. Thus almost the whole weight of science was put behind the fragmentary approach to reality.

It is important to point out, however, that (as usually happens in such cases) the experimental confirmation of the atomic point of view is limited. Indeed, in the domains covered by quantum theory and relativity, the notion of atomism leads to confused questions, which indicate the need for new forms of insight, as different from atomism as the latter is from theories that came before it.

Thus, the quantum theory shows that the attempt to describe and follow an atomic particle in precise detail has little meaning. . . . The notion of an atomic path has only a limited domain of applicability. In a more detailed description the atom is, in many ways, seen to behave as much like a wave as a particle. It can perhaps best be regarded as a poorly defined cloud, dependent for its particular form on the whole environment, including the observing instrument. Thus, one can no longer maintain the division between the observer and observed (which is implicit in the atomistic view that regards each of these as separate aggregates of atoms). Rather, both observer and observed are merging and interpenetrating aspects of one whole reality, which is indivisible and unanalysable.

Relativity leads us to a way of looking at the world that is similar to the above in certain key respects. . . . From the fact that in Einstein's point of view no signal faster than light is possible, it follows that the concept of a rigid body breaks down. But this concept is crucial in the classical atomic theory, for in this theory the ultimate constituents of the universe have to be small indivisible objects, and this is possible only if each part of such an object is bound rigidly to all other parts. What is needed in a relativistic theory is to give up altogether the notion that the world is constituted of basic objects or 'building blocks'. Rather, one has to view the world in terms of universal flux of events and processes. . . . So, approaching the question in different ways, relativity and quantum theory agree, in that they both imply the need to look on the world as an undivided whole, in which all parts
of the universe, including the observer and his instruments, merge and unite in one totality.
In this totality, the atomistic form of insight is a simplification and an abstraction, valid only in some limited context.

The new form of insight can perhaps best be called *Undivided Wholeness in Flowing Movement*. This view implies that flow is, in some sense, prior to that of the 'things' that can be seen to form and dissolve in this flow. One can perhaps illustrate what is meant here by considering the 'stream of consciousness'. This flux of awareness is not precisely definable, and yet it is evidently prior to the definable forms of thoughts and ideas which can be seen to form and dissolve in the flux, like ripples, waves and vortices in a flowing stream. As happens with such patterns of movement in a stream some thoughts recur and persist in a more or less stable way, while others are evanescent.

The proposal for a new general form of insight is that all matter is of this nature: That is, there is a universal flux that cannot be defined explicitly but which can be known only implicitly, as indicated by the explicitly definable forms and shapes, some stable and some unstable, that can be abstracted from the universal flux. In this flow, mind and matter are not separate substances. Rather, they are different aspects of one whole and unbroken movement. In this way, we are able to look on all aspects of existence as not divided from each other, and thus we can bring to an end the fragmentation implicit in the current attitude toward the atomic point of view, which leads us to divide everything from everything in a thoroughgoing way. Nevertheless, we can comprehend that aspect of atomism which still provides a correct and valid form of insight; i.e. that in spite of the undivided wholeness in flowing movement, the various patterns that can be abstracted from it have a certain relative autonomy and stability, which is indeed provided for by the universal law of the flowing movement. Now, however, we have the limits of this autonomy and stability sharply in mind.

Thus we can, in specified contexts, adopt other various forms of insight that enable us to simplify certain things and to treat them momentarily and for certain limited purposes as if they were autonomous and stable, as well as perhaps separately existent. Yet we do not have to fall into the trap of looking at ourselves and at the whole world in this way. Thus our thought need no longer lead to the illusion that reality actually is of fragmentary nature, and to the corresponding fragmentary actions that arise out of perception clouded by such illusion. . . . In the ancient view, the notion of formative cause was considered to be of essentially the same nature for the mind as it was for life and for the cosmos as a whole. Indeed, Aristotle considered the universe as a single organism in which each part grows and develops in its relationship to the whole and in which it has its proper place and function. With regard to the mind, we can understand this sort of notion in more modern terms by turning our attention to the flowing movement of awareness. As indicated earlier, one can, in the first instance, discern various thought patterns in this flow. These follow on each other relatively mechanically, through association determined by habit and conditioning. Evidently, such associative changes are external to the inner structure of the thoughts in question, so that these changes act like a series of efficient causes. However, to see the reason for something is not a mechanical activity of this nature: Rather, one is aware of each aspect as assimilated within a single whole, all of whose parts are inwardly related (as are, for example, the organs of the body). Here, one has to emphasize that the act of reason is essentially a kind of perception through the mind, similar in certain ways to artistic perception, and not merely the associative repetition of reasons that are already known. Thus, one may be puzzled by a wide range of factors, things that do not fit together, until suddenly there is a flash of understanding, and therefore one sees how all these factors are related as aspects of one totality (e.g. consider Newton's insight into universal gravitation). Such acts of perception cannot properly be given a detailed analysis or description. Rather, they are to be considered as aspects of the forming activity of the mind. A particular structure of concepts is then the product of this activity, and these products are what are linked by the series of efficient causes that operate in ordinary associative thinking — and as pointed out earlier, in this view, one regards the forming activity as primary in nature as it is in the mind, so that the product forms in nature are also what are linked by efficient causes.

Evidently, the notion of formative cause is relevant to the view of undivided wholeness in flowing movement, which has been seen to be implied in modern developments in physics, notably relativity theory and quantum theory. Thus, as has been pointed out, each relatively autonomous and stable structure (e.g., an atomic particle) is to be understood not as something independently and permanently existent but rather as a product that has been formed in the whole flowing movement and that will ultimately dissolve back into this movement. How it forms and maintains itself, then, depends on its place and function in the whole. So, we see that certain developments in modern physics imply a sort of insight into nature that is in respect to the notions of formative and final cause, essentially similar to ways of looking that were common in earlier times.

Nevertheless, in most of the work that is being done in physics today the notions of formative and final cause are not regarded as having primary significance. Rather, law is still generally conceived as a self-determined system of efficiency causes, operating in an ultimate set of material constituents of the universe (e.g. elementary particles subject to forces of interaction between them). These constituents are not regarded as formed in an overall process, and thus they are not considered to be anything like organs adapted to their place and function in the whole (i.e. to the ends which they would

serve in this whole). Rather, they tend to be conceived as separately existent mechanical elements of a fixed nature.

The prevailing trend in modern physics is thus much against any sort of view giving primacy to formative activity in undivided wholeness of flowing movement. Indeed, those aspects of relativity theory and quantum theory which do suggest the need for such a view tend to be de-emphasized and in fact hardly noticed by most physicists, because they are regarded largely as features of the mathematical calculus and not as indications of the real nature of things. When it comes to the informal language and mode of thought in physics, which infuses the imagination and provokes the sense of what is real and substantial, most physicists still speak and think, with an utter conviction of truth, in terms of the traditional atomistic notion that thr universe is constituted of elementary particles which are 'basic building blocks' out of which everything is made. In other sciences, such as biology, the strength of this conviction is even greater, because among workers in these fields there is little awareness of the revolutionary character of development in modern physics. For example, modern molecular biologists generally believe that the whole of life and mind can ultimately be understood in more or less mechanical terms, through some kind of extension of the work that has been done on the structure and function of DNA molecules. A similar trend has already begun to dominate in psychology. Thus we arrive at the very odd result that in the study of life and mind, which are just the fields in which formative cause acting in undivided and unbroken flowing movement is most evident to experience and observation, there is now the strongest belief in the fragmentary atomistic approach to reality.

Of course, the prevailing tendency in science to think and perceive in terms of a fragmentary self-world view is part of a larger movement that has been developing over the ages and that pervades almost the whole of our society today: but, in turn, such a way of thinking and looking in scientific research tends very strongly to re-enforce the general fragmentary approach because it gives men a picture of the whole world as constituted of nothing but an aggregate of separately existent 'atomic building blocks', and provides experimental evidence from which is drawn the conclusion that this view is necessary and inevitable. In this way, people are led to feel that fragmentation is nothing but an expression of 'the way everything really is' and that anything else is impossible. So there is very little disposition to look for evidence to the contrary. Indeed, as has already been pointed out, even when such evidence does arise, as in modern physics, the general tendency is to minimize its significance or even to ignore it altogether. One might in fact go so far as to say that in the present state of society, and in the present general mode of teaching science, which is a manifestation of this state of society, a kind of prejudice in favour of a fragmentary self- world view is fostered and transmitted (to some extent explicitly and consciously but mainly in an implicit and unconscious manner).

As has been indicated, however, men who are guided by such a fragmentary self-world view cannot, in the long run, do other than to try in their actions to break themselves and the world into pieces, corresponding to their general mode of thinking. Since, in the first instance, fragmentation is an attempt to extend the analysis of the world into separate parts beyond the domain in which to do this is appropriate, it is in effect an attempt to divide what is really indivisible. In the next step such an attempt will lead us also to try to unite what is not really unitable. This can be seen especially clearly in terms of groupings of people in society (political, economic, religious, etc.). The very act of forming such a group tends to create a sense of division and separation of the members from the rest of the world but, because the members are really connected with the whole, this cannot work. Each member has in fact a somewhat different connection, and sooner or later this shows itself as a difference between him and

other members of the group. Whenever men divide themselves from the whole of society and attempt to unite by identification within a group, it is clear that the group must eventually develop internal strife, which leads to a break-down of its unity. Likewise when men try to separate some aspect of nature in their practical, technical work, a similar state of contradiction and disunity will develop. The same sort of thing will happen to the individual when he tries to separate himself from society. True unity in the individual and between man and nature, as well as between man and man, can arise only in a form of action that does not attempt to fragment the whole of reality.

Our fragmentary way of thinking, looking, and acting, evidently has implications in every aspect of human life. That is to say, by a rather interesting sort of irony, fragmentation seems to be the one thing in our way of life which is universal, which works through the whole without boundary or limit. This comes about because the roots of fragmentation are very deep and pervasive. As pointed out, we try to divide what is one and indivisible, and this implies that in the next step we will try to identify what is different.

So fragmentation is in essence a confusion around the question of difference and sameness (or one-ness), but the clear perception of these categories is necessary in every phase of life. To be confused about what is different and what is not, is to be confused about everything. Thus, it is not an accident that our fragmentary form of thought is leading to such a widespread range of crises, social, political, economic, ecological, psychological, etc., in the individual and in society as a whole. Such a mode of thought implies unending development of chaotic and meaningless conflict, in which the energies of all tend to be lost by movements that are antagonistic or else at cross-purposes.

Evidently, it is important and indeed extremely urgent to clear up this deep and pervasive kind of confusion that penetrates the whole of our lives. What is the use of attempts at social, political, economic or other action if the mind is caught up in a confused movement in which it is generally differentiating what is not different and identifying what is not identical? Such action will be at best ineffective and at worst really destructive.

Nor will it be useful to try to impose some fixed kind of integrating or unifying ‘holistic’ principle on our self-world view, for, as indicated earlier, any form of fixed self-world view implies that we are no longer treating our theories as insights or ways of looking but, rather, as ‘absolutely true knowledge of things as they really are’. So, whether we like it or not, the distinctions that are inevitably present in every theory, even an ‘holistic’ one, will be falsely treated as divisions, implying separate existence of the terms that are distinguished (so that, correspondingly, what is not distinguished in this way will be falsely treated as absolutely identical). . . .

Generally speaking, if one asks how one can solve some technical problem, for example, it is presupposed that while we begin not knowing the answer, our minds are nevertheless clear enough to discover an answer, or at least to recognize someone else’s discovery of an answer. But if our whole way of thinking is penetrated by fragmentation, this implies that we are not capable of this, for fragmentary perception is in essence a largely unconscious habit of confusion around the question of what is different and what is not. So, in the very act in which we try to discover what to do about fragmentation, we will go on with this habit and thus we will tend to introduce yet further forms of fragmentation.

This does not necessarily mean, of course, that there is no way out at all, but it does mean that we have to give pause so that we do not go with our habitual fragmentary ways of thinking as we seek solutions that are ready to hand. The question of fragmentation and wholeness is a subtle and difficult

one, more subtle and difficult than those which lead to fundamentally new discoveries in science. To ask how to end fragmentation and to expect an answer in a few minutes makes even less sense than to ask how to develop a theory as new as Einstein's was when he was working on it, and to expect to be told what to do in terms of some programme, expressed in terms of formulae or recipes.

One of the most difficult and subtle points about this question is just to clarify what is to be meant by the relationship between the content of thought and the process of thinking which produces this content. A major source of fragmentation is indeed the generally accepted presupposition that the process of thought is sufficiently separate from and independent of its content, to allow us generally to carry out clear, orderly, rational thinking, which can properly judge this content as correct or incorrect, rational or irrational, fragmentary or whole, etc. Actually, as has been seen, the fragmentation involved in a self-world view is not only in the content of thought, but in the general activity of the person who is 'doing the thinking', and thus, it is as much in the process of thinking as it is in the content. Indeed, content and process are not two separately existent things, but, rather, they are two aspects of views of one whole movement. Thus fragmentary content and fragmentary process have to come to an end together.

What we have to deal with here is a one-ness of the thinking process and its content, similar in key ways to the one-ness of observer and observed; that has been discussed in connection with relativity theory and quantum theory. Questions of this nature cannot be met properly while we are caught up, consciously or unconsciously, in a mode of thought which attempts to analyse itself in terms of a presumed separation between the process of thinking and the content of thought that is its product. By accepting such a presumption we are led, in the next step, to seek some fantasy of action through efficient causes that would end the fragmentation in the content while leaving the fragmentation in the actual process of thinking untouched. What is needed, however, is somehow to grasp the overall formative cause of fragmentation, in which content and actual process are seen together, in their wholeness.

One might here consider the image of a turbulent mass of vortices in a stream. The structure and distribution of vortices, which constitute a sort of content of the description of the movement, are not separate from the formative activity of the flowing stream, which creates, maintains, and ultimately dissolves the totality of vortex structures. So to try to eliminate the vortices without changing the formative activity of the stream would evidently be absurd. Once our perception is guided by the proper insight into the significance of the whole movement, we will evidently not be disposed to try such a futile approach. Rather, we will look at the whole situation, and be attentive and alert to learn about it, and thus to discover what is really an appropriate sort of action, relevant to this whole, for bringing the turbulent structure of vortices to an end. Similarly, when we really grasp the truth of the one-ness of the thinking process that we are actually carrying out, and the content of thought that is the product of this process, then such insight will enable us to observe, to look, to learn about the whole movement of thought and thus to discover an action relevant to this whole, that will end the 'turbulence' of movement which is the essence of fragmentation in every phase of life. . . . What is primarily needed is a growing realization of the extremely great danger of going on with a fragmentary process of thought. Such a realization would give the inquiry into how thought actually operates that sense of urgency and energy required to meet the true magnitude of the difficulties with which fragmentation is now confronting us.

**The following is an excerpt from Chapter 5:**

Now, the word ‘implicit’ is based on the verb ‘to implicate’. This means ‘to fold inward’ (as multiplication means ‘folding many times’). So we may be led to explore the notion that in some sense each region contains a total structure ‘enfolded’ within it.

It will be useful in such an exploration to consider some further examples of enfolded or implicate order. Thus, in a television broadcast, the visual image is translated into a time order, which is "carried" by the radio wave. Points that are near each other in the visual image are not necessarily ‘near’ in the order of the radio signal. Thus, the radio wave carries the visual image in an implicate order. The function of the receiver is then to explicate this order, i.e., to ‘unfold’ it in the form of a new visual image.

A more striking example of implicate order can be demonstrated in the laboratory, with a transparent container full of a very viscous fluid, such as treacle, and equipped with a mechanical rotator that can ‘stir’ the fluid very slowly but very thoroughly. If an insoluble droplet of ink is placed in the fluid and the stirring device is set in motion, the ink drop is gradually transformed into a thread that extends over the whole fluid. The latter now appears to be distributed more or less at ‘random’ so that it is seen as some shade of grey.

But if the mechanical stirring device is now turned in the opposite direction, the transformation is reversed, and the droplet of dye suddenly appears, reconstituted. . . . When the dye was distributed in what appeared to be a random way, it nevertheless had some kind of order which is different, for example, from that arising from another droplet originally placed in a different position. But this order is enfolded or implicated in the “grey mass” that is visible in the fluid. Indeed, one could thus ‘enfold’ a whole picture. Different pictures would look indistinguishable and yet have different implicate orders, which differences would be revealed when they were explicated, as the stirring device was turned in a reverse direction. . . . All this calls attention to the relevance of a new distinction between implicate and explicate order. Generally speaking, the laws of physics have thus far referred mainly to the explicate order. Indeed, it may be said that the principle function of Cartesian coordinates is just to give a clear and precise description of explicate order. Now, we are proposing that in the formulation of the laws of physics, primary relevance is to be given to the implicate order, while the explicate order is to have a secondary kind of significance (e.g, as happened with Aristotle’s notion of movement, after the development of classical physics). Thus, it may be expected that a description in terms of Cartesian coordinates can no longer be given a primary emphasis, and that a new kind of description will indeed have to be developed for discussing the laws of physics.