Implications

Philosophical Aspects of ANPA 22

A. Griffor, *Editor*

The Alternative Natural Philosophy Association

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EDITORIAL

OR

ON THE SPEED OF DARKNESS

Quoting Keith for those who don't read his editorial

> This year we have split Proc. ANPA into two parts, ***Philosophical Aspects***, replacing both the Newsletter and the old Philosophical Appendix and edited by Arleta Griffor and ***Scientific Aspects***, edited by myself [KB]. We hope to continue this format in the future. This year's Scientific Aspects is named **Implications** in honour of Basil Hiley's contributions.

It needs to be added that both parts are named *Implications* not only for the reason mentioned above, but also because of two reprinted papers on David Bohm's philosophy included in this issue. Bohm's physical ideas are famous for being consistently misunderstood. His philosophical ideas are not only misunderstood, but also unknown, generally disregarded, and yet often and widely referred to. It would be of some value, I suppose, to reprint the two papers discussing some aspects of his philosophy that seem to be relevant to many issues taken up at our meetings in recent years. Obviously, since the papers happen to be written by myself, I hope that as *double-philosophy* they counterbalance last years *double-maths* talk at the ANPA meeting.

Other papers in this issue of *Philosophical Aspects*, except that by Mike Manthey, relate to talks given at the last ANPA meeting. Mike was gently blackmailed to write a paper. He did write, but his revenge, I think, was to include a sentence of *nine lines long*. Still Marcel Proust had them (single sentences) running for numbers of pages, and is generally regarded as a great writer.

Bernard Carr's *Mappa Mundi* of Psi phenomena and related matters is very welcome. It is very clear, as was his talk, and pretty universal. (I have to add, it even included a computer virus which came with it. My iMac was very brave and effective in handling it. It was *me* who crashed.)

In David Robson's paper the longest sentence is of seven lines. However, since it is actually a definition of reality (or rather a part of it), it could be forgiven. Reality is very large and may need large sentences to define it. I may be biased but what I like about David's paper is his suggestion that alien physicists are female. I think they are. The purpose of his paper is to "stimulate some debate, discussion and feedback". Though he himself cannot attend this year, the questions he raises in his paper can be discussed, I hope, on Monday and Tuesday at this year's ANPA meeting.

Concerning Ted Bastin's *Participant Observer Philosophy* I am still pondering the question: Is the understanding of cricket *necessary* for understanding the paper? For certain it is *not sufficient.* What, for example, is *haptic* experience? The Shorter Oxford English Dictionary on Historical Principles does not say.

Viv Pope actually inspired the title of this editorial. He might have been talking about the *speed of dark*, but the *speed of darkness* sounds better. Viv is against a modern form of *sophism* or, as he calls it, a *jargon-addiction,* or *umbala* in physics. He believes that physics, unlike art and fashion, needs not sell itself in terms of bizarre forms of (linguistic) expression. Well... I guess he is an idealistic optimist. Arguing his point, Viv uses examples of irresistible beauty, for instance "... space is interspersed with time-wells into which falling particles exist backwards or sideways...." Even though Viv is ridiculing expressions of that kind, I have to admit that I witnessed a cat who existed *sideways* as it were. It was in Poland, and it was actually a tiny kitten that was just making its first steps. For some reason, it didn't enter its mind to move forward or even backward, it moved *sideways* only. I don't know about particles, but if kittens can exist sideways....

Arleta Griffor, TPRU, July 2001

CAN PHYSICS BE EXTENDED TO ACCOMMODATE PSI?

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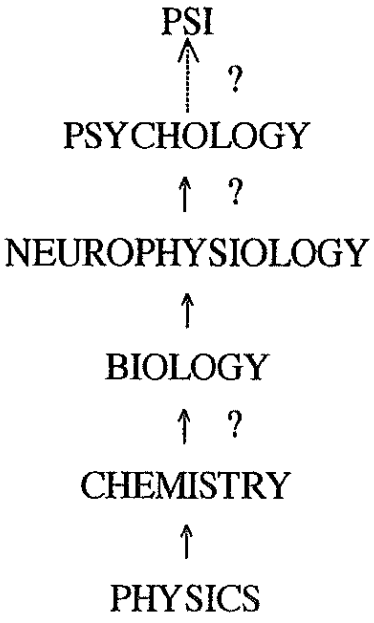
INTRODUCTION

The issue I wish to discuss in this paper is whether physics, either in its present or some future form, will ever be able to accommodate psychic phenomena. This requires that one first consider whether physics can give a complete description of the "normal" world, in particular the existence of consciousness, and one must disentangle this level of controversy from those which are specific to psi. My main claim is that physics can be extended to describe psi but that one will need a different paradigm from the one that currently prevails. Although some phenomena which are labelled "paranormal" may turn out to be explicable in terms of current physics, I will argue that most are not. Invoking a new paradigm is not too outrageous since physics regularly undergoes paradigm shifts and I will present my own view as to the form the new paradigm might take. This invokes a higher dimensional reality structure, which I relate to recent developments in Kaluza-Klein theory.

CONSCIOUSNESS AND PHYSICS

Science assumes that the world is governed by natural laws and so the success of the scientific enterprise suggests that psychic phenomena, if real, should also be subject to such laws. This implies that they should be amenable to the usual kind of scientific investigation and theoretical modelling. Not everybody accepts this - some people have argued that psi represents a genuinely anarchic feature in the world - so one should certainly allow for the possibility that the scientific assumption will turn out to be unjustified. However, it seems to me a sensible starting point, to be abandoned only as a last resort.

Figure (1): Scientific Reductionism



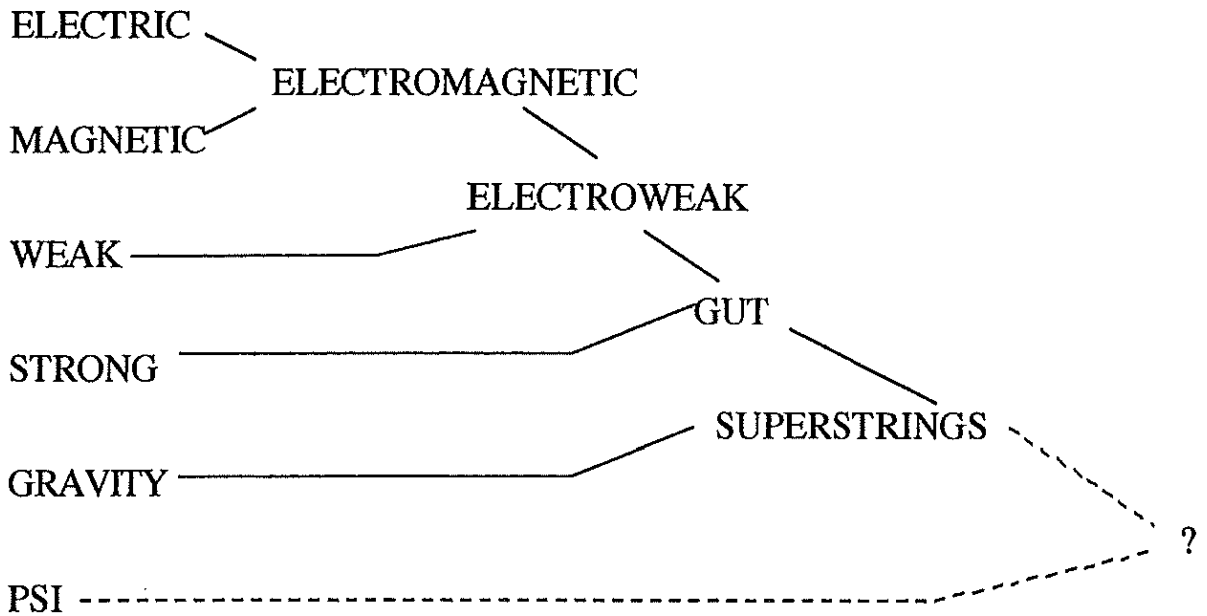
This shows the reductionist chain which is supposed to link the various branches of science, the entire edifice ultimately being based on physics. Several links in this chain are controversial and the inclusion of psi at the top is entirely tentative.

There are many branches of science (e.g. psychology, neurophysiology, biology, chemistry, physics). For many purposes each of the branches may be regarded as self-contained, with its own language and conceptual framework. However, according to reductionism, they are logically interdependent and form a hierarchy in which the fundamental concepts at each level can be explained in terms of the laws pertaining at the lower one. This is indicated in Figure (1). Physics is at the bottom of the hierarchy, which implies that it is the most *fundamental* branch of science. If reductionism is correct, the claim that psi is part of science also implies that it is part of physics.

Of course, many links in the reductionist chain remain controversial. For example, many biologists do not believe that all of biology can be reduced to DNA, and many psychologists do not accept that all mental processes can be explained in terms of brain function, so the claim that everything in the world will ultimately be reduced to physics is far from secure. The existence of psi would not necessarily be incompatible with reductionism. Indeed it might even be regarded as an extra step in Figure (1), as shown by the dotted line. However, many people claim that it throws doubt upon the claim that the mind can be understood entirely in terms of physical processes, so that the case for reductionism is weakened.

Despite these reservations, there can be no doubting the success of physics within its own terms. Particular impressive has been its unification of the different forces of nature, as illustrated in Figure (2). Indeed many people have proclaimed that the end of physics is in sight, in the sense that our knowledge of the fundamental laws and principles governing the Universe is nearly complete. They argue that we are on the verge of obtaining a "Theory of Everything". This description may seem pretentious, because one is really only purporting to have a final theory of *physics*, but we have seen that this may indeed extend to "everything" if one adopts a reductionist point of view.

Figure (2): Unification Of Forces



This shows the successive steps by which physics has attempted to unify the four known forces of Nature. Electroweak theory is experimentally confirmed but GUT (Grand Unified Theory) and Superstring theory remain theoretical constructs. Possibly psi requires the existence of some further "force", which is still to be unified, but this is not inevitable.

One feature of the Universe which would seem to refute the claim that physics is close to a "Theory Of Everything" is the existence of consciousness - or more generally mind (Pippard 1988). This is because consciousness is intrinsically private (or subjective), whereas physics deals with things which are public (or objective). Certainly physics in its *classical* mechanistic form cannot incorporate consciousness. This was appreciated more than a century ago by William James, who stressed the incompatibility between the localized features of mechanism and the unity of conscious experience. Although attempts by behaviourists to extend mechanism to the mind have now been rejected, a

mechanistic outlook still persists among some physicists and this probably contributes to their discomfort with discussing the topic of consciousness.

Of course, the classical picture of physics has now been replaced by a more holistic one and there are some indications that the new physics *can* include consciousness. Indeed, physics seems to be playing an increasingly important role in the rapidly burgeoning science of consciousness studies. The most obvious connection comes with quantum theory because some physicists - though by no means all - have argued that consciousness must be involved in the collapse of the wave function and the non-local aspects of quantum theory may also be relevant. These issues are very familiar to this group, so there is no need to discuss them here.

Another context in which the notion that mind is a fundamental rather than incidental feature of the Universe has crept into physics is through the *Anthropic Principle*. This claims that there are unexplained coincidences involving the constants of Nature (e.g. the dimensionless numbers which describe the strengths of the four forces) which are required in order that life can arise. There are several possible interpretations of the Anthropic Principle, some of them based on conventional (if somewhat speculative) physics. None of this helps to extend physics to the domain of psychic phenomena but it does predispose one to the notion that mind (and even psi) may not be entirely irrelevant to the functioning of the physical Universe. Whether this means that psi involves some new form of "force", which might eventually be unified with the other forces, as indicated tentatively by the dotted line in Figure (2) remains to be seen.

PHYSICS AND PARADIGM SHIFTS

The history of science shows that the prevailing model of physical reality regularly undergoes paradigm shifts (Kuhn 1970). The paradigm determines the sort of picture one has of the world, the type of questions one asks about it and the experiments one performs. Much scientific progress is made within the context of a particular paradigm but eventually anomalies arise and these result in a crisis which ultimately leads to the adoption of a new paradigm. During the crisis, a variety of new theories will be advanced. The upholders of the old paradigm will try to resist these but eventually they die off and the new paradigm takes hold.

* The first paradigm was the classical *Newtonian* one, in which the physical world is regarded as a 3-dimensional continuum in which solid objects move according to Newton's laws of dynamics. Time is absolute, in the sense that it flows at the same rate for everyone, and there is also an absolute space associated with inertial (non-accelerating) frames. Objects attract each other through the force of gravity, although the paradigm does not explain *why* that force exists.

* The next paradigm, *atomic theory*, arose from developments in statistical physics and thermodynamics. These showed how the interactions of billions of atoms naturally lead to the observed macroscopic laws and how the structure of the atoms themselves provides an understanding of chemistry. The new paradigm also contained the laws of electricity and magnetism. In particular, it showed that light consists of electromagnetic waves travelling through an "ether", which was naturally identified with Newton's absolute space.

* The advent of the third paradigm, *Special Relativity*, demolished the idea of the ether and showed that space and time are not absolute but part of a spacetime continuum (called Minkowski space). Thus a consistent picture of

how different observers perceive the world requires that it be 4-dimensional rather than 3-dimensional, the fourth dimension being time and the history of an object being regarded as a 4-dimensional world-line.

* The next transformation came with *General Relativity*, which showed that - in the presence of matter - spacetime is curved like a surface in a higher dimensional space. This explains the origin of gravity but gives slightly different predictions from Newton's theory. General Relativity also forms the basis of cosmology, the branch of physics concerned with the structure of the Universe in the large.

* Paralleling these developments in macroscopic physics was the paradigm shift associated with *quantum theory*. This showed that microscopic objects can simultaneously behave like waves and particles. Measurements always interfere with objects in some way and this leads to the Uncertainty Principle. In particular, a particle cannot simultaneously be ascribed a position and velocity, which means that the spacetime description of relativity is itself only an approximation since the concept of a world-line breaks down.

* The *Kaluza-Klein* paradigm arose out of attempts to give a geometrical explanation of electromagnetic interactions, analogous to the geometrical explanation of gravitation provided by General Relativity. Kaluza-Klein theory suggests that the Universe is 5-dimensional; the fifth dimension is wrapped up so small that it cannot be observed directly but its existence neatly explains the laws of electromagnetism. Modern extensions of this idea propose that the other interactions can be accounted for by invoking further wrapped-up dimensions. In the "supergravity" theory, for example, the total number of dimension is 11, while in the "superstring" theory it is 10. One thus has an 4-dimensional *external* space and an 6 or 7-dimensional *internal* space. As discussed later, the most recent variant of this idea suggests that some of the extra dimensions may not be compactified after all.

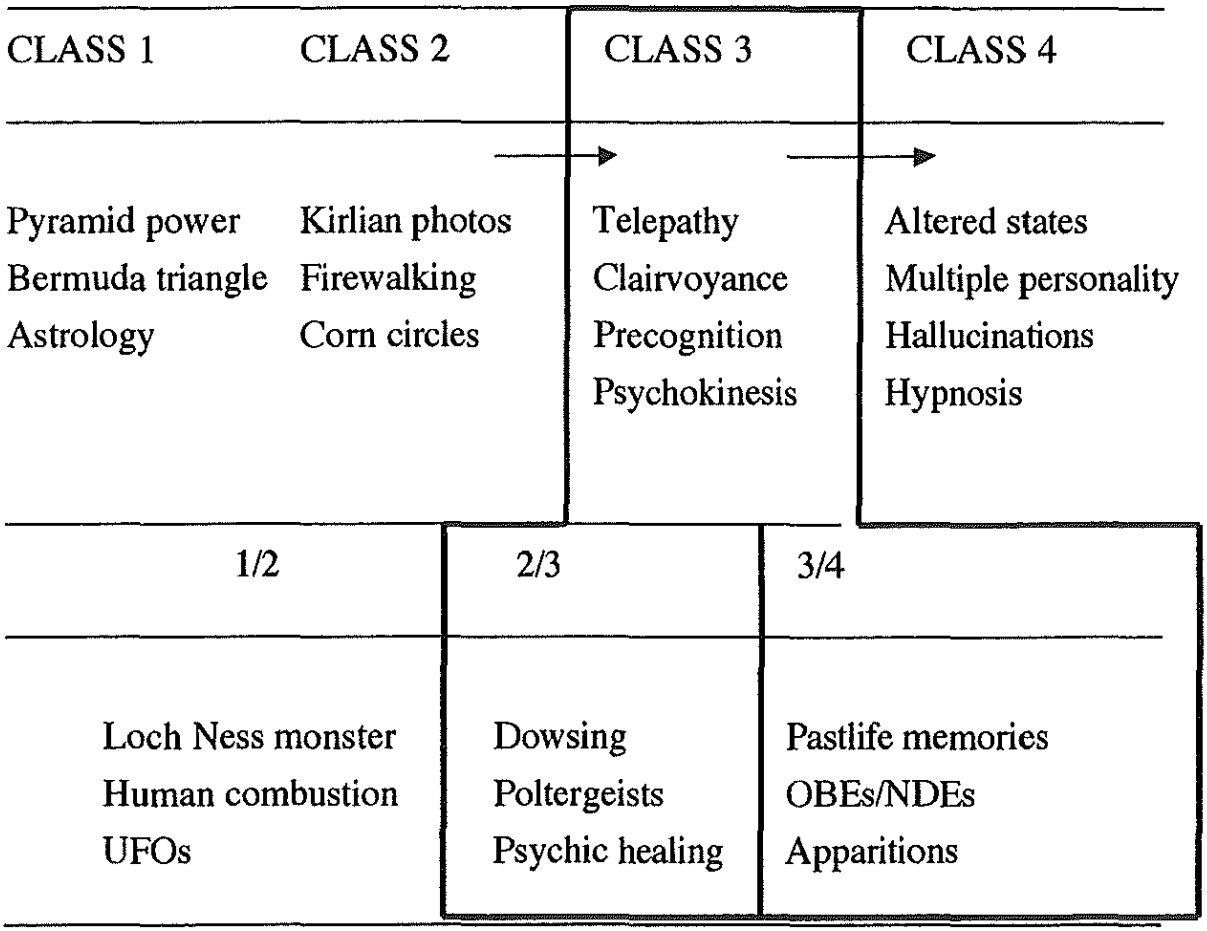
* The final and as yet incomplete paradigm shift is associated with *quantum gravity*, the attempt to unify General Relativity and quantum theory. According to this paradigm, the notion of space breaks down on scales less than 10^{-33}cm. It must be regarded not as a smooth continuum but as a sort of topological foam. Quantum gravity effects must dominate whenever classical physics predicts "singularities" (i.e. points of infinite density) such as arise inside black holes or at the beginning of the Universe. This means that classical physics breaks down at times earlier than 10^{-43} s after the Big Bang.

This brief history of paradigm shifts shows that the "ultimate reality" revealed by modern physics is very different from the sort of reality experienced by our usual senses. Indeed one can regard successive paradigms as providing a sequence of mental models, each of which is progressively removed from common-sense reality. Thus atomic theory removes our everyday notion of solidity, relativity theory destroys our intuitive ideas of space and time, quantum theory shows that reality is fuzzy, unification theories reveal dimensions of which we have no direct experience and quantum gravity goes beyond space and time altogether. It therefore seems that the ultimate nature of reality can only be appreciated intellectually, so it is ironic that many physicists wish to play down the significance of mind!

A CLASSIFICATION OF PSYCHIC PHENOMENA

Since parapsychology has been discussed at previous APNA meetings, I will not attempt to either describe the phenomena themselves or assess the evidence for their reality. However, for present purposes, it will be useful to divide psychic phenomena into four classes and these are illustrated in Figure (3). It should be stressed that the examples given should be regarded as neither definitive nor exhaustive. Also not everybody agrees on which phenomena should have the appellation "psychic'.

Figure (3): classification of alleged paranormal phenomena



Class 1 may be delusional. Class 2 are real but probably explicable by current physics. Class 3 are inexplicable by current physics but apparently involve an interaction with the physical world. Class 4 are purely mental and may have no relevance to physics. Phenomena lie on the boundary of two classes either because their classification is uncertain or because they may involve a combination of effects. The 2/3 and 3/4 boundaries are expected to evolve with time, as indicated by the arrows. The phenomena inside the heavy border are the ones most relevant to paraphysics. All the entries (especially in Class 1) are tentative and reflect my personal bias. The list of phenomena is illustrative and far from complete.

* The first class comprises those *alleged* psychic phenomena which are delusional, in the sense that they result from the mind's innate tendency to see patterns in random data. I have tentatively listed Pyramid Power, the Bermuda Triangle and astrology under this heading but I do this with trepidation since each of these attracts many believers. The selection just reflects my own bias and I am quite prepared to be proved wrong. However, I think we will all agree that some psi phenomena are spurious, even if - due to our different "boggle" thresholds - we disagree on which ones they are. Were it not for this disagreement, one could simply dismiss class-1 phenomena from the remit of psychical research at the outset.

* The second class are real but have a simple explanation within the current physical paradigm, despite some people's attempts to endow them with paranormality. I would tentatively include Kirlian photography (explicable as a corona discharge effect) and fire-walking (explicable as a thermal conduction effect) in this class. There is an explicit connection with physics here - indeed any psychical investigator needs to be sufficiently familiar with physics to recognize such phenomena when they arise. I will also include phenomena which are the result of fraud in this category, since fraud normally involves some physical mechanism. Thus Corn Circles (explicable by some combination of hoaxes and meteorological effects) is included in this class.

Some phenomena are regarded as being on the class 1/2 boundary because there is uncertainty as to their status. For example, the Lock Ness monster may not exist at all but, even if it does, it presumably has a standard zoological explanation. Likewise, even if some UFO sightings really are explained by extraterrestrial visitations (rather than more mundane factors), this is more relevant to astronomy than parapsychology. If accounts of spontaneous human combustion are vindicated, this may have a purely physiological/biochemical explanation.

* The third class consists of phenomena which are inexplicable by current physics - and whose reality is therefore controversial - but which nevertheless seem to involve an interaction with the physical world. One would clearly include clairvoyance, precognition and psychokinesis in this class. If minds are regarded as physical in origin, as presumed by reductionists, telepathy would also be included. The emphasis on "current" physics is, of course, crucial since one might hope that the boundary between class-2 and class-3 would gradually shift as physics advances (so that "paranormal" phenomena become normal). This is the significance of the arrow on the 2/3 boundary in Figure (3).

Even within the context of the physical paradigm which prevails at a particular time, people will disagree on where the 2/3 boundary comes. An extreme sceptic would regard all psychic phenomena as class-2 and even people more favourably disposed to the paranormal might like to relegate some of them to class-2. For example, some people attribute dowsing to electromagnetic effects (in which case it is class 2), whereas others attribute it to clairvoyance (in which case it is class 3). Some phenomena may be associated with both class-2 and class-3 effects. For example, poltergeist effects may involve a combination of natural factors (like geomagnetic or seismic activity) and subconscious psychokinesis. Likewise psychic healing may involve a combination of some unexplained physical interaction (class-3) and psychosomatic effects, which - from a reductionsist standpoint at least - would be regarded as class 2.

* The fourth class consists of phenomena which are purely mental and may involve no interaction with the physical world at all. I would include altered states of consciousness, hypnosis, hallucinations and secondary-personality manifestations in this category. Although such phenomena may be studied scientifically and come under the domain of psychology, it may be inappropriate to categorize them as psychic *per se*. However, they have all come under the scrutiny of psychical researchers at various times because they are often *associated* with psychic experiences.

Most of the psychic phenomena in this category - for example, apparitions, past-life memories, out-of-the-body experiences (OBEs) and near-death experiences (NDEs) - are placed on the 3/4 boundary rather than in class-4 itself. This is because it is unclear whether or not they involve an interaction with the physical world (the defining feature of class-3). Is one really out of one's body and really remembering a past life or is one merely hallucinating? The issue here is not the reality of the phenomena - because there can be no doubt that people have the *experiences* - but their interpretation.

In proposing this classification of psychic phenomena, I should emphasize that the most profound issue in constructing a theory for psi concerns the nature of the 3/4 boundary. The problem is that the distinction between class-3 and class-4 is fuzzy since we do not know for sure what is entailed in the terms "physical world" and "purely mental". While it is clear that there is no room for the contents of mind in the classical Newtonian world-view, we have seen that modern physics gives a very different perspective. Later I will argue that most psi experiences require the existence of some form of "space" (albeit distinct from what is currently regarded as physical space), in which case one might hope that the domain of physics could be eventually extended to incorporate this. Therefore I would contend that at least some "mental" psi phenomena may transpire to be class-3. In this case, as indicated by the arrow in Figure (3), the 3/4 boundary will eventually penetrate into what is presently regarded as class 4

It must be cautioned that *some* aspects of mental phenomena may always transcend physics (i.e. always remain class-4). For example, mental experiences also involve "secondary" qualities (like colour and taste), as well as emotional and aesthetic components. Some people react against paraphysics because they feel it aims to reduce such qualities to equations. However, this reaction may be unwarranted because it probably only makes sense to try to extend physics to incorporate those "primary" features of mental experience involving the sensory contents themselves.

It should now be clear that the psi phenomena which are relevant to the theme of this talk are the ones which are *currently* outside class-2 and will *always* be outside class-4. The question of whether psi can connect with physics then reduces to determining how far the 2/3 boundary will eventually penetrate into what is currently regarded as class-3 and how far the 3/4 boundary will eventually penetrate into what is currently regarded as class-4. Ideally, class-3 might eventually disappear altogether. In any case, in the context of the present discussion, the key phenomena are the ones classed as 2/3, 3 and 3/4, so these are bounded by a heavy border in Figure (3).

DOES PSI NEED A NEW PARADIGM?

In deciding whether psi can connect with physics, we first need to decide which phenomena we are trying to explain, since some clearly present a greater challenge to theory than others. However, I think most paraphysicists would agree that one should try to obtain as unified a description of psi as possible. Invoking a new feature of physics for each type of phenomena would not have much appeal. One also needs to decide which psi process is most *fundamental* and there is a wide range of views on this. Some people argue that all psi phenomena should be explained in terms of psychokinesis but others put the emphasis on telepathy, clairvoyance or precognition.

Next we need to decide whether we are demanding a new paradigm of physics or merely tinkering with the current paradigm. Many paraphysical theories adopt the second approach [see Stokes (1991) for an excellent review]. For example, explaining ESP in terms of electromagnetic waves (Taylor 1975, Persinger 1979) or neutrinos (Ruderfer 1980) or psychokinesis in terms of electrostatic forces (Lucas & Maresca 1976) involves purely conventional physics. Models which explain precognition in terms of tachyons or advanced waves (Feinberg 1975, Costa de Beauregard 1979) or wormholes (Toben &

Wolf 1982) might also be regarded as being within the current paradigm, even though they involve rather exotic aspects of it.

It is natural to start off by trying this less radical approach but the danger is that one will end up grafting so many extra bits onto the old paradigm (like adding epicycles to the Ptolemaic model of the solar system) that it becomes hopelessly complicated. In particular, one can criticize any signalling model of psi (like those mentioned above) because our bodies have no obvious transmission or reception organs and there is also the problem of encoding and decoding the signal (Beloff 1980). This criticism would also apply to models which go somewhat beyond the existing paradigm by invoking particles like psitrons (Dobbs 1967) with the specific purpose of explaining psi. Certainly none of these theories has gained general acceptance among paraphysicists.

Another approach which is at least partially within the current paradigm is the Observational Theory, which is an attempt to explain psi within the context of quantum theory (Schmidt 1975, Millar 1978, Walker 1984). According to this, consciousness not only collapses the wave function but also introduces a bias in how it collapses. In this picture all psi effects are interpreted as the result of psychokinesis (PK). For example, clairvoyance is supposed to occur because the mind collapses the wave function of the target to the state reported. Another feature of the Observational Theory is that the brain is regarded as being akin to a random number generator. Thus telepathy is supposed to occur because the mind of the agent uses PK to influence the brain of the percipient and an ordinary act of will occurs because the mind influences its own brain.

This approach has the virtue that it can at least make quantitative predictions. For example, one can estimate the magnitude of PK effects on the basis that the brain has a certain information output (Mattuck 1984) and the results seem compatible with what parapsychologists claim to observe. On the other hand, the observational theories also face serious criticisms. One can object to them

on the grounds that psi sometimes occurs without any feedback. For example, there are pure clairvoyance experiments in which only a computer ever knows the target (Beloff 1988). Also Bohm (1986) has cautioned that the conditions in which quantum mechanics apply (low temperatures or microscopic scales) are very different from those relevant to the brain. He therefore invokes a more subtle concept which he terms the superwave function.

Although quantum theory is likely to play some role in a physical model for psi, my own view is that a full explanation will require a paradigm shift which goes beyond standard quantum theory. Even though some of the milder phenomena of psi might be amenable to explanation within the current paradigm, I do not believe most of them can be. But what sort of paradigm shift would be required to accommodate psi? One ingredient of the new paradigm must presumably be consciousness. For since this is a common feature of all psychic phenomena, any connection between psi and physics must surely make reference to it. We have seen that there is some indication even from physics itself that mind is a fundamental rather than incidental feature of the Universe.

Another ingredient of the new paradigm will surely be a transcendence of the usual ideas of space and time, a notion which already arises in the context of quantum gravity. Sheldrake's model of "causative formation" and Jung and Pauli's model of "acausal synchronicity" (Koestler 1972) are of interest in this respect. However, both of these are too qualitative at present to constitute a proper scientific explanation. Also of interest are the claims of Bohm (1980) that there is a wholeness about the Universe, such that everything is interconnected, an implicate order which underlies the explicit structure of the world. This approach is still under active investigation.

One way to go beyond our present model of space and time is to invoke extra dimensions and I anticipate that this will also be a feature of the new paradigm. Even before relativity theory, it was popular to invoke the fourth dimension in

this context (Ouspensky 1970) and this idea is still popular (Rucker 1984). In the post-relativity era, there have been various attempts to extend Minkowski spacetime in order to incorporate ESP. For example, Targ et al. (1979) and Rauscher (1983) have invoked 8-dimensional models in which one complexifies the four coordinates, while Raman & Rauscher (1980) have a 12-dimensional model with 3 complex time dimensions. All these post-relativity theories suppose that points can be contiguous in some higher dimensional space even though they are separated in spacetime. One can also invoke strange topological features, such as folding in higher dimensions (Schmeidler 1972), to achieve this. Since we have seen that modern theories of physics also invoke extra dimensions, it is natural to relate the two approaches and I expand on this later.

PHYSICAL AND MENTAL SPACE

A long-standing problem in philosophy concerns the relationship between our perception of the world and the world itself. Some people have adopted the *naive realist* view, in which one's perceptions are taken to be a direct apprehension of reality, while others have adopted the *representative* view, in which one's perceptions are just an internalized imitation of reality. According to the latter view, the space in which our percepts reside - perceptual space - is subjective and private, while the space in which the objects themselves reside - physical space - is objective and communal. According to the former view, the two spaces are identical, so no such distinction applies.

In discussing the relative merits of these two views, one must distinguish between those contents of perceptual space which have a direct counterpart in physical space (*physical* percepts) and those contents such as dreams or hallucinations (*mental* percepts) which have no such counterpart. Nowadays very few people would support the naive realist standpoint in the first context.

The physical and physiological processes whereby an object emits a signal, which is then registered by the sensory system and transformed into a pattern of neuronal firing in the brain, is well understood. Thus the conclusion that the physical world is primary and the perceptual world secondary seems inescapable. Nevertheless, we have little understanding of how the neuronal firing actually *creates* the perceptual space. The image I have of the world certainly *seems* to be "outside" and it is very improbable that extensive probing of the brain would ever locate the images themselves "inside" (like some sort of filmstrip). Thus representative theory does not provide a complete picture, even in the context of physical perception.

The issue takes on a somewhat different significance in the context of mental percepts. In this case, one might argue that the percept is primary since there is no object in the outside world which directly gives rise to it. There is no need for a signalling mechanism since the percept is already within the mind *a priori.* This does not necessarily disprove the representative theory, because one might still argue that the percept derives *indirectly* from the outside world (e.g. via memory). However, if this is the case, the nature of the representation is clearly more complicated.

This raises the question of how the perceptual spaces of different consciousnesses are related to each other. If the usual representative theory is correct, there is only a relationship for physical percepts. For only in this context is the perceptual space a representation of some outer space. On the other hand, some psi phenomena suggest that this might also be true of mental percepts. For example, the existence of telepathy suggests that mental percepts can be shared and therefore possess some of the same attributes of externality as physical percepts. Thus, if I visualize an image in my mind and somebody else "sees" it, perhaps it really does exist "somewhere", although presumably not in physical space. I argue below that many other psi phenomena would seem to require the existence of some form of non-physical space. This would

not vindicate naive realism but it would severely embarrass representative theory. At the very least, one would have to conclude that the world which is being represented is larger than the usual physical one.

The situation becomes even more murky if one accepts the evidence for clairvoyance, which apparently involves the direct perception of the physical world without use of any of the physical senses. If this really happens, it suggests that the mind can directly apprehend the outside world after all (just as it directly apprehends a mental percept). Some people have even suggested that ordinary physical perception is ultimately clairvoyant in nature (Moncrieff 1948). The distinction between internal world and external world, so crucial to the representative theory, thus becomes obscured and one is dangerously close to readopting naive realism. The only way out is to suppose that clairvoyance itself involves some sort of sensory system, though one which is non-physical in nature.

Recent developments in theoretical physics also indicate that representative theory is satisfactory. In the 19th century (when many of these issues first arose), one could adopt the simplistic view that physical space is 3-dimensional. However, since then our world-view has changed profoundly and the earlier discussion emphasizes that the way in which the physicist now sees the world bears very little resemblance to how we actually experience it. Indeed our physical sensory systems reveal only a very limited aspect of physical reality. This suggests that the representative theory in its usual form is far too simplistic (cf. Velmans 1990). For while our perceptual experience of the world may indeed be a limited version of reality, the version of external reality assumed by the usual type of representative theory is also very limited. Classical physical space is itself only a representation.

A SPACE FOR PSYCHIC PHENOMENA

In this section I will expand on the suggestion that many psychic phenomena - in particular, the ones classified as 3/4 in Figure (3) - seem to involve some form of communal space, which is not the same as physical space but subtly interacts with it. This space will turn out to be higher dimensional, which is why this approach was emphasized in the earlier discussion.

* Apparitions. Many people claim to see apparitions occasionally (e.g. in a hypnogogic or hypnopompic state). Although the images appear to be "outside", they are normally interpreted as hallucinations created by the mind and this would seem to be supported by the fact that they persist when the eyes are closed. Also hypnosis experiments (Russ 1962) suggest that the mind is certainly capable of superposing an apparition onto one's perception of the physical world. On the other hand, some aspects of apparitions suggest that they really exist in some sense. For example, they are sometimes seen by more than one person at a time or by different people at different times (as in the classical ghost case). There are even cases where the apparition appears to be viewed from different perspectives, as though in the same space as the observers. However, the fact that apparitions rarely (if ever) leave any physical trace (e.g. on a photograph or film) suggests that they certainly do not exist in ordinary physical space.

* Out-of-Body Experiences. In an OBE, the point of consciousness appears to move away from the location of the physical body, sometimes even being associated with another "astral" body. One feels "awake" and seems to be moving around in some sort of space but it is subtly different from physical space. For example, the lighting or the shape of objects may be wrong (Blackmore 1985) and appearances can be changed by an act of imagination (Muldoon & Carrington 1929). Also at some stage one may encounter "higher" planes which are not related to the physical world at all. A sceptic

might argue that the space encountered in an OBE is just a mental construct, with no relationship to the world encountered in the normal waking state. On other hand, there are occasions when one's consciousness appears to acquire veridical information about the physical world or even cause events there. Since this might also be attributed to clairvoyance or psychokinesis, one cannot infer that the point of consciousness really is outside the body. The only way to demonstrate that would be to have some objective way of detecting the astral body (e.g. by detecting a weight change in the physical body or some electromagnetic field disturbance). There is little evidence for this but this need not exclude the OBE providing access to some other form of space.

* Near-Death-Experiences. In an NDE the consciousness also seems to be moving around in a quasi-physical space, just like the one encountered in an OBE. However, various other experiences are involved, such as the "tunnel" effect, encounters with the "light" and deceased love ones, and memory playbacks. Another component of the NDE is encountering some form of "bridge", whose traversal symbolizes the irreversible passage from life to death. The conformity of these experiences in a variety of different cultures might suggest that NDEs provide access to some higher form of reality, although sceptics might prefer to attribute this conformity to the similarity of the brain states of dying people. Even for people more favourably disposed to psi, NDEs raise many of the same issues as OBEs: does one really need another space or can the veridical aspects of the experience be explained by psi?

* Dreams. All percepts would *appear* to exist in some form of space (Smythies 1994). For example, ordinary dreams - even those with no psychic content - seem to take place in a space which in many ways resembles everyday physical space. Psychologists have even made efforts to study the geometry of this sensorial space and its relationship to the geometry of physical space. Although one usually assumes that this space is private, we have seen that the existence of psi challenges that assumption.

In the next section I will suggest that the space required to accommodate psychic experiences can be regarded as a sort of higher dimensional reality structure (cf. Price 1955). The arguments for this are rather formal but the main conclusion is that this space is intimately connected with the higher dimensional space invoked by modern physics. I am led to this proposal by consideration of the following question. If our physical sensors only provide us with a 3-dimensional aspect of a Universe which in reality has many more dimensions, and if the physical objects themselves occupy only a limited part of that higher dimensional space, does anything else exist in this space? Since the only non-physical entities in the Universe of which we have any experience are mental ones, and since the existence of paranormal phenomena (or even normal mental phenomena such as dreams and memories) would imply that percepts have to exist in some sort of space, it seems natural to identify the latter with Kaluza-Klein space. To be more precise, my proposal invokes a particular form of the Kaluza-Klein paradigm, which was recently proposed by Randall and Sundrum (1999). In this the physical Universe is regarded as 4-dimensional "brane" in a higher dimensional "bulk".

HIGHER DIMENSIONAL REALITY STRUCTURES

In this section I will try to give the notion that there can exist some non-physical reality structure a more formal basis. One of the problems in discussing whether something is "real" is that there is no universally accepted definition of the term. I wish to propose a definition which is somewhat more general than usual - in that it need not pertain exclusively to physical objects - but which still conforms to the general idea that something is real if it exists in an external space to which other consciousnesses have access. My approach may seem rather abstract but this is required if it is to be general enough to incorporate any model of psi.

If one were to ask a philosopher of the 19th century in what sense the physical world is real, he might have replied as follows: There exists a 3-dimensional space in which are localized both the sensors through which we observe the world and the physical objects themselves. Each observer has only partial information about that space because of the limitations of his sensory system. (For example, his eyes will provide him with a projection of the space which is essentially 2-dimensional.) However, the crucial point is that, given his location and the direction in which he is looking, one can always predict how he *ought* to see it. The fact that one can find a 3-dimensional configuration which predicts a set of 2-dimensional projections concordant with those which are actually presented to the different observers is what is meant by stating that the physical world is real. One may say that the physical world is a 3-dimensional *structure* which consistently reconciles how everybody within that world perceives it.

A modern-day philosopher would give a somewhat more sophisticated answer. Mindful of the implications of relativity theory, he would argue that the physical world is a 4-dimensional structure, with the objects and observers being represented by world-lines and the perceptual fields being 3-dimensional. However, the notion that the world is real because there exists a higher dimensional structure which reconciles our perceptions of it would be much the same. Indeed the prime message of relativity theory is that one can *only* reconcile how different observers perceive the world if it is 4-dimensional. Incorporating quantum theory into this approach requires some further degree of complication but we neglect this for the time being since it does not relate to our direct perception of the world.

This approach to defining reality is fine as far as it goes but it makes no reference to the other sort of sense-data which are presented to our consciousness: mental percepts with no physical counterparts. What I want to do is to extend the type of definition given above to include the possibility that

these may also be real (i.e. communal) in some sense. I will do this by assuming that the communal space has extra dimensions. Of course, people who dismiss psi at the outset and assume that mental percepts cannot have reality in the same way as physical objects will regard this as pointless. However, that is prejudging the issue and my intention is to provide a framework in which the question of whether mental percepts are real can at least be discussed. There is not space here to present a detailed analysis but I will summarize the main features of my approach in order to give a feel for what is involved.

I start with a toy model, in which at any particular time there exist a finite number of consciousnesses (m) who each experience a visual perceptive field P_i comprising the same number of points (n); the subscript i labels the observers and goes from 1 to m. I assume that each perceptive field is 2-dimensional, so that the n points in the perceptive field P_i can each be labelled by two coordinates. At this stage I make no assumption about whether these points correspond to physical or non-physical percepts. Confining attention to a world which consists of points which can only be experienced visually is obviously simplistic but we can make the picture more sophisticated later. In particular, if we bring time into the analysis, the perceptual fields become 3-dimensional.

The question is whether one can find a d-dimensional space in which the observers and objects have coordinates and in which every observer is predicted to perceive the n points just as he does. In order to specify how each observer perceive the points, I assume that there is some mapping from d dimensions to two dimensions which depends only on the location and orientation of the sensor. The orientation would in general be prescribed by (d-1) parameters, since this is required to specify a direction in the d-dimensional space. I call this the *aspect map* and denote it by the symbol Π_i for the ith observer. (For example, the aspect map in 3-dimensional space is simply the geometrical projection onto a 2-dimensional plane normal to the direction in which the eye is looking.) We regard the coordinates of the objects and sensors

as specifying a *structure* S. The perceptual field predicted for each observer is then described by a set of equations $\Pi_i S = P_i$. One has reconciled every observer's view of the world if one can find an S such that the P_i predicted by these equations match the observations for all i. Since there are n objects in each perceptual field, each specified by two coordinates, the number of equations to be satisfied is 2nm.

Now by choosing d large enough one could always find a structure. This is because the number of unknowns in the problem is md+m(d-1)+nd (viz. the number of parameters required to specify the location and orientation of the sensors and the location of the objects). One can therefore always find a solution if this exceeds 2nm, i.e. if d exceeds the critical value $d_{crit} = m(2n+1)/(2m+n)$. However, if this condition is not satisfied, one would not expect a solution to exist unless there actually were a real world. In this case, one has what I term a *reality structure*. One could obviously improve the analysis in various ways. For example, one could assume that the m sensors are themselves points in the reality structure (so that the observers can see each other). One could also allow for the possibility that certain observers might see less than n points because some of the points are hidden by other points. One might even allow the sensors to be *sets* of points whose relative location partially determines the aspect map; this is necessary anyway in order to define the orientation of the sensors but I also have in mind the possibility that perceptual anomalies could result from distorting the sensors (e.g. squeezing the eyeball).

So far, we have presupposed that the reality structure is *complete*, in the sense that it contains points corresponding to all of the sense-data in the different perceptual fields. However, we cannot assume this is *a priori*, so we next consider a more complicated toy model in which the number of elements (n_i) in each P_i is different and we do not know in advance which elements are part of

the reality structure. We must also allow for the possibility that not every observer is able to perceive every object.

A procedure for determining the reality structure in this case is as follows. For a given value of d, we first seek a reality structure containing n points and m observers, where m and n are large enough for d to be less than d_{crit} but less than the total number of observers and the smallest value of n_i, respectively. In order to do this, we must check for each possible set of m observers every possible identification between the n elements in their perceptual fields. The number of identifications to be tested may be enormous, but one would be reassured in this task by the knowledge that there is at least some value of n for which a reality structure exists (corresponding to the subset of physical objects). Once such a d-dimensional reality structure has been found, one tries to extend it by increasing n and m until they reach some maximum values n_{max} and m_{max}. One can prove that the resulting reality structure and the associated identification are unique. That is to say, one always ends up with the same m_{max} observers, the same n_{max} points in the d-dimensional structure, and the same n_{max} elements in each P_i. We will call this the *maximal* d-dimensional reality structure and denote it by S_d.

The next step in the procedure is to increase d to see if one can thereby increase n_{max} and m_{max}. At each increment in d, the values of m_{max} and n_{max} may increase but eventually one will reach a value $D=d_{max}$ beyond which increasing d does not extend the reality structure. At this point one has extended the reality structure as much as possible. This final reality structure is termed the *Universal Structure* and the objects which it contains are said to have *actuality*. I introduce this term merely to avoid using a word like "reality" which - because of its different usages - is fraught with ambiguity. Note that the way in which the Universal Structure has been constructed means that it has a hierarchical structure: S_D contains S_{D-1}, S_{D-1} contains S_{D-}

2, S_{D-2} contains S_{D-3} etc. It is natural to assume that the lowest member of the hierarchy is S_4, corresponding to the 4-dimensional physical world of Special Relativity, since our physical sensors do not directly access any higher dimensions. One can formally regard the extra elements which are incorporated when one introduces successive dimensions as defining *actuality planes*. In particular, the set of elements $A_r = \{S_{r+3} - S_{r+2}\}$ is called the rth actuality plane, with the lowest one $A_1 = \{S_4\}$ corresponding the physical world. The way in which the Universal Structure is constructed requires that the sensors through which it is perceived must also be hierarchical (i.e. they must be associated with particular actuality planes).

The idea of a Universal Structure is useful because it provides a frame of reference in which one can discuss the sorts of issues relevant to psi. It is a rather precise way of defining what one means by reality, without committing oneself in advance to any particular prejudice as to which sense data will turn out to possess it. Of course, I have merely outlined a procedure for finding the Universal Structure and there is no guarantee that the structure so found will be any larger than the physical world. Our procedure allows for the possibility that many elements in the various perceptual fields will not possess actuality and there is no reason, in principle, why those elements should not simply correspond to non-physical percepts. Obviously, however, my approach is motivated by the anticipation that at least some subset of non-physical percepts may turn out to possess actuality.

Although the concept of actuality proposed above seems to me to correspond to what most people intuitively mean by reality, it does make a number of implicit assumptions and these require elaboration. Firstly, the emphasis in the above analysis was entirely on *visual* perception and one has to ask how experiences of the world acquired through other sensory modes would fit into the picture. A blind man, for example, would not experience the world in the

way we have described it and a bat might not experience it in spatial terms at all but in terms of frequencies. However, the point is that all our experiences of the world must be equivalent to the Universal Structure in an informational sense. It must be accepted as axiomatic that the data obtained about the world through different sense modes are mutually compatible. Indeed, one might interpret the Universal Structure as an *informational space*, with D specifying the dimensionality of its information content.

Another important feature of the Universal Structure is that it gives rise to an extended notion of time. We have already emphasized that the Universal Structure must incorporate the ordinary time of special relativity (i.e. it includes the past and the future of physical objects). However, we have seen that it may also include non-physical elements, which can only be perceived through a non-physical sensor. But how does one assign a time coordinate to these elements? The answer given in this approach is rather surprising: the hierarchical nature of the Universal Structure necessarily reflects the hierarchy of different types of sensors and these in turn are associated with a hierarchy of *times* $\{t_r\}$, each one associated with a particular actuality plane $\{A_r\}$.

The first implication of this picture is that it allows one to solve a long-standing philosophical problem: how to describe the conscious experience of time at all (Lockwood 1989). The point is that relativity theory does not describe the basic experience of "now" which is such an essential ingredient of our perceptual world. For in the space-time description, nothing identifies the particular moment at which we make our observations. Thus, if I think of my consciousness as travelling up the world-line of my brain (like a bead on a wire), that motion itself cannot be described by relativity theory because past, present and future coexist in Einstein's theory. This problem is resolved in the present approach because there is a second type of time (t_2) - which we may loosely regard as "mental" time - with respect to which our motion through

physical time (t_1) is measured. One might then regard this second time as an extra dimension, through which the whole of 4-dimensional spacetime moves.

This is reminiscent of the notion of "serial time" proposed by Dunne (1967) but without leading to an infinite regress, viz. since consciousness is moving through t_2, one also needs a third time (t_3) in order to describe this motion, and then a fourth time (t_4) to describe the motion through t_3 etc. This unpalatable feature is avoided here because t_2 is introduced not to describe motion through t_1 but merely to assign a time coordinate to non-physical sense data (cf. Broad 1978). Indeed the number of times in the hierarchy, D-3, is determined by the dimensionality D of the Universal Structure.

How these different types of time relate to various kinds of psychic experience will not be discussed here. However, a crucial feature is that they are hierarchical in the sense that what is past and future relative to one level of time is experienced as simultaneous with respect to the next level. For example, at any moment t_2 in mental time, a physical object will still have a well-defined future world-line in t_1 but the intervention of consciousness at a later point in t_2 would allow the future world-line to change. This allows one to reconcile free-will with determinism and also permits a unified description of retrocognition and precognition. How this picture links up with Kaluza-Klein theory and quantum theory is discussed elsewhere.

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THE LIMITS OF "REALITY"

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The following ideas arose from some conversations that I had with Keith Bowden and Owen Maroney prior to this year's ANPA conference and from discussions following my talk there. I cannot claim these thoughts are new or likely to set the physics community alight with their brilliance, but they are very apposite to subsidiary issues that arose during many other post-talk discussions at the conference. So, what follows are thoughts and ideas intended to be kicked around and mulled over. I think it is useful to throw them out to a wider audience in the hope that they will stimulate some debate, discussion and feedback.

I hope to glean some small idea of what physicists might actually mean [and what they should mean] when they use the word "reality". If I were to ask a practising experimental physicist this, she might look at me quite askance [this is not such an unusual phenomenon]. This is because, whilst the question of what "reality" is forms the rationale behind doing experimental physics, it is rarely voiced directly. Too often it is an issue that is either swept under the carpet or seen to be peripheral and irrelevant.

As a convenient starting point, I shall use Professor Redhead's reality condition [modified from Einstein's EPR paper and quoted in Redhead's *Incompleteness, Nonlocality and Realism*]. I shall use it as a hub around which I can focus thoughts and ideas, and I shall use it in a wider context than originally intended. My criticism and gentle attacks, on the journey towards a modified definition, are towards the statement in generality, and certainly **not** on Redhead or Einstein or their use of it.

It states,

If we can predict with certainty, or at any rate with probability one, the result of measuring a physical quantity at time t, then at the time t there exists an element of reality corresponding to the physical quantity and having a value equal to the predicted measurement result.

This definition does not exhaust all possibilities. It is merely a sufficiency condition saying, to paraphrase, that if we can predict a physical quantity without doubt then there must be something real corresponding it. The question of reality in a wider sense is left open, as is possible existence of things that we cannot predict and/or cannot measure. It would be an aspiration to attempt a definition that provides both necessary and sufficient conditions for the application of the label "real". However, here we are only to be concerned with the restricted domain of physical theories. Whilst I shall take issue with the "reality" of electrons and other such things, I am sure that most experimental physicists are untroubled in asserting that the chairs that they sit in, the equipment they use, the sandwiches they eat and other such things are "real". To doubt this would take us on a journey into metaphysics, and that is a long way beyond where I wish to travel. Loosely the chairs, sandwiches etc are to be thought of as "directly observed phenomena" and I hope that the distinction between them and "indirectly observed phenomena" is sufficiently clear in the mind of the reader not to be troublesome here.

My first objection to the reality condition is perhaps a little petty but worth mentioning in passing: it is the use of "probability one". Essentially my objection is a quibble concerning the difference between certainty and "probability one". It is possible to predict the existence of a physical quantity at time t with a probability of one and find it does not have any correspondence to a real thing. For instance, imagine a piece of string that has a length somewhere between 1m and 2m. I predict that it does NOT have a length of 1.5m. I am saying that if I measure this string its length will not be 1.5m; it is clear that the probability that this is the case is one, assuming the probabilities are more or less nicely distributed across all lengths between 1m and 2m. When I measure the string, I find it is 1.5m long. So the definition asserts that such a piece of string does not exist, but all the while I am holding this "non-existent" piece of string in my hand. Perhaps we could avoid this difficulty by insisting that predicted results are to be expressed as specific numerical results rather than couched within negative statements. We should also remove the parenthetic "probability one" from the definition.

I am also somewhat bothered, in a slightly pedantic way, by the confusion in the statement between the predicted result of a measurement [which is a number and perhaps a unit] and the element of reality that is to be associated with the number. The definition as it stands asserts only the possibility that the label "reality" can be applied to properties and not to things that might sit behind these properties. Of course this is deliberate and can be traced back to the origins of the statement, namely the concern Einstein and others had about the completeness of quantum theory. However, I do not see how a physicist could assert the isolated existence of a length of 1.5m: it must be a length "of something", even if that "something" is to be no more than a *facon de parler*. I shall take the view that a definition of reality should allow us to **assert** the existence of an object that possesses the predicted property and it is the object that is to become our so-called "element of reality", not the property. This has the added advantage of allowing electrons to be termed "real" even within the

bounds of theories that may seem to disallow the simultaneous possession of certain sets of properties by the electron.

I should thus prefer the Redhead statement to say something like, *"If we can predict with certainty the result of measuring a physical quantity at time t, then at the time t there exists an element of reality that may be said to possess a definite value of the property associated with the predicted measurement result."*

The idea of prediction itself brings up interesting questions. Surely it is important to root it in an established physical theory and to exclude certain sort of spurious statements. This is easier said than done. What is "an established physical theory" and further, how do we know we are applying the theory correctly anyway? [This latter objection harks to Wittgenstein's problem concerning one's ability to follow a rule correctly.] An example of part of this paragraph's objections can be neatly constructed from my theory of unicorns:

1. Unicorns are weightless
2. Unicorns are invisible.

I am assured of the creatures' existence - I have certainly never seen one and every time I have weighed one, it has weighed precisely zero kilograms. The point here is that the statements are palpably silly [I hope this is evident]. They suffer from two faults in that they are not established – something I shall return to - and they make predictions about the results of measurements' being zero. We must therefore modify our definition to take both these potential difficulties into account. The zero measurement exclusion is quite important, as we could otherwise append 1 and 2 to quantum theory and, with some justification, call the resulting theory established.

We should write, " *If we can predict with certainty, using the rules of an established physical theory, the non-zero result of measuring a physical quantity at time t...*"

There is still, however, an inadvertent and subtle assumption in what has been written so far: the definitions include the idea of "a physical quantity" as a fundamental concept. This could lead to accusations of circularity as we define "a physical quantity" partly from within the language of the respective theory and partly from the practical way we measure it. The methodologies of the measurement, in turn, are given legitimacy through ideas of causality and predictability within some physical theory as well as through rules that associate the theory with the world. To resolve this difficulty in the definition, at least partially, we should write,

" *... the result of measuring a non-zero physical quantity [that is defined within the language of the corresponding physical theory]...*"

So, our modified definition now states:

If we can predict with certainty, using the rules of an established physical theory, the non zero result of measuring a physical quantity [that is defined within the language of the corresponding physical theory] at time t, then at the time t there exists an element of reality that may be said to possess a definite value of the property associated with the predicted measurement result.

But, even still there remain some partially unresolved questions:

1. How are we to know that we are applying the theory correctly when we use it to predict the results of a physical quantity?
2. What is an established physical theory?

3. Are "elements of reality" more than the sum total of their properties at any one moment?
4. What is certainty? [I shall not address this here]

To resolve the first problem, we shall say that a theory is correctly applied if there is a consensus [amongst a suitable professional group] as to the correctness of its application. This is an adequate definition to be getting on with but it does suffer from the additional difficulty concerning how we are to know that we are actually agreeing and have reached a consensus. This takes us into other areas of philosophy, which sit somewhat deeper than our present remit allows us to delve. I shan't pursue them here.

An established physical theory is to be one that has, up to the point of its use at time t, successfully been applied to predict the non-zero results of physical quantities. The success of the application will have in turn come from the actual results of experiments and allowed for acceptable variation between prediction and measurement. Here a theory is only established so long as it has been successful and is subject also to consensus-conditions, not only in its application but also in the acceptability of errors. It is a time dependent concept. We can also dismiss the quantum+unicorn theory by agreeing it is not established, even though our agreement is to be based on not allowing zero valued measurements to lead to meaningful terminology. [We could, perhaps, just dismiss the quantum+unicorn theory on the basis of taste but this would give too wide a remit to the concept of consensus. Of course, even the rules for agreeing that consensus has been reached are themselves subject to a consensus condition but that is not to be made a concern here, even though it is no small difficulty.]

The third question is actually not really as troublesome as it may appear. Our new definition allows us to assert the existence of an element of reality [which I have called an "object" for the moment] that possesses the physical quantity at

issue. This is perhaps a little presumptive of our definition but quite in keeping with the wider remit that the theory offer explanatory frameworks. Objects are then to be the possessors of properties and a convenient tool of explanation within the framework of a specific theory. It is not legitimate to assert their absolute existence outside the theories in which they are defined. Instead, a successful structure actually provides the limits of what we can talk about as being real. So, "reality" is defined from within a physical theory and this is as far as we can confidently go in our assertions. The question is relegated to an area beyond our current remit and beyond where we may legitimately tread.

I should thus propose the following as a final, rather tortured, definition of "reality" for discussion:

If we can apply an established physical theory, X, [in a manner that is acceptable to consensus] to predict with certainty the non-zero result of measuring a physical quantity [that is defined within the language of the corresponding physical theory] at time t, then we can legitimately apply the label "element of reality" to that object that the theory proposes as possessing the definite value of the property associated with the predicted measurement result at time t. The term "element of reality" should be supplemented, however, by the term "...in the context of the well established physical theory X." The "reality" may be considered to be confirmed by an actual measurement that concurs with the prediction within the bounds of acceptable error.

This tentative conclusion is quite disturbing and counter-intuitive in many ways. It asserts, for instance, that an "electron" cannot be **said** to be more than a convenient way of talking about the results of certain experiments. It is convenient in the sense that it allows us to talk concisely and coherently about what would otherwise be a rather random collection of results - that is, a random collection of measurements collected over time. The legitimacy and

convenience of the use of the term "electron" derives from the systematic brevity of the formal mathematics of the physical theories that model and assert its existence, together with successful predictions of experimental results. Of course, usually only subsets of properties are ever actually measured at any one time, often out of practicality, and thus the idea of an electron is composite. This fact is often overlooked, especially as it is more natural to think in realist terms of an independently existing particle whose properties we probe.

Theories provide us with categorisations of the world from within their structure. They instruct us as to how we are to break up and label the information that arrives in our brains as sense data, namely the numerical results of experiments. There remains a deeper question: that of how the language and mathematics in which the theories are written arise. This is to be left both unasked and unanswered here.

So, statements about certain sorts of objects can only gain legitimacy within the context of a successful physical theory and are meaningless beyond those boundaries. This is not to be taken as advocating either any form of realism or idealism. As I mentioned above, I am not even advocating any great conclusions as to the actual nature of "object", as either sum-of-properties or as possessor-of-properties. To an extent, I am saying that the label "element of reality" is redundant. It is merely reaffirming that theories assert the existence, within the frameworks they set up, as convenient methods of communicating. These assertions are tested, but not confirmed with certainty, every time we make predictions and then confirm it by experiment.

I have often wondered what would happen were I to meet with an alien experimental physicist. Would she have the same structure of categorisation of the universe as me and would she assert that an electron exists as an object – perhaps it is just a foreign [or alien?] concept to her, not appearing anywhere in her lexicon. This issue arose, in a slightly modified from, in a comment [from

Professor Kilmister, I believe] after my talk. He asked if the "electron" that Thomson observed many years ago was actually the same type of object as that observed by physicists today. The answer is "yes". Whilst I have assumed that physical theories exist in some form of isolated bubble in this paper, in practice they are rather changing nebulous creatures. They do not sit alone within their own language but exist within a complex web of everyday language, mathematical compromise, common sense, consensus, history and so forth. The term used by Thomson and the term used by modern physicists do have the same applicability within the wider context of language as a whole, rather than within the physical theories of the respective times. A full and detailed description of my current viewpoint on "reality" would take us into my theories of language and mathematics and this is not the place to undertake such a journey. Instead, I hope enough has been said to provoke reaction, objection and discussion.

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ON THE EFFICACY OF MENTAL EVENTS

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In *Toward a scientific account of the paranormal* I sketched how the apparatus developed in my Bit Bang article of that same ANPA meeting (Aspects II) could be applied to describing the chakra system. In this note, I wish to take up an aspect of that apparatus, and discuss how it applies to the problem of the efficacy of mental events. That is, how is it that by merely thinking of something, we can cause this to happen in the world.

There are two spheres of such influence to consider, namely causing something to happen within our own body, like moving a hand, and causing something to happen outside the body, as in telekinesis.

Before embarking on the analysis of these two cases, let me first sketch the theoretical apparatus alluded to above. This consists of (1) a set of primitive sensors which constitute our body's material interface to the surrounding world; (2) a representation of our experience, in the form of co-excluding co-occurrences of these sensors' various changes, including an efficient means (the "event window" mechanism) of discovering said co-exclusions; (3) a ladder-like hierarchy of these co-exclusions, one leg of which captures the up-bubbling of the momentary sensory representation of the surround - and hence its associations and categorizations - and the other leg the down-trickling potentials for possible actions that can be taken on that basis. Connecting corresponding levels of the ladder are (rung-like) isomorphic mappings that connect a given

sensory state (from the up-bubbling) to the (down-trickling potential) actions this state can give rise to. [If this description is too dense, or vague, please refer to the above-mentioned two articles.]

At issue in the discussion of the efficacy of mental events is how, exactly, is action converted to state change. That is, what are the latterly mentioned mappings actually doing. This is in fact not entirely obvious, since the two legs of the ladder are, after all, only isomorphic - that is, (all!) they have the is same abstract **form** (which is the literal meaning of the term *iso-morph*).

To be a little more concrete, the up-bubbling of state begins at the sensory boundary, and the down-trickling of intent, correspondingly, ends at effectors that correspond directly to the sensors. [That is, an effector is defined as something which, given state X, converts that state to minus X (sensors are binary - plus/minus one - without loss of generality).] So we can in fact ignore all the hierarchy stuff, and simply examine the situation at the boundary, where the rubber meets the road: how does an intent X --> -X, trickled down from on high, turn into the actual change of state of X to -X ?

In the case of thinking *move my hand*, the boundary is in fact within the skin, at the point where the nerve impulse to activate a muscle causes an energetically dissipative event that, chemically rather than electrically, causes some muscle(s) to contract or expand. [I note in passing that the chemical *level* is thus *below* the level of the electrical, to put the physiological reality in terms of the theoretical apparatus.]

So what actually happened here? Centuries of scientific thought, brought principally to fruition by the advent of quantum mechanics, concluded that anything can happen if its preconditions are satisfied. [Buddhist logicians, cf. Dharmakirti (see [Stcherbatsky]), arrived at the same conclusion.] This conclusion puts us on the doorstep of the action that takes place: if a change's

necessary pre-conditions are fulfilled, then it **can** happen. But this is not to say that it **will** happen!

In the case of muscle movements, Mother Nature has evolved a system where this is almost certain. But things can always go awry - for example some very unlikely chemical pathway that is **also** possible might in fact occur. This unlikely pathway absorbs the energy and thus excludes its being used for the intended purpose.

Howsoever, in the case where the intended state change in fact occurs, what we observe is that because it **could** occur, it **did**. The laws of physics and the physical properties of matter observed, measured, and tabulated on the basis thereof, provide the time-frame within which the change **will** occur. That is, the isomorphic mapping - and thus the state change it represents - occurs because it **can**. That's the way Mother Nature works, 'twould seem, since things do in fact happen!

Having now seen how the apparatus works in the case where the boundary is within the material confines of the body, we now examine the case where the intent and consequent change address an effector and its corresponding sensor that are situated *externally*.

As I was at some pains to point out in the aforementioned chakra-oriented article, the location of the boundary is in fact quite arbitrary. Think about it: the (usual, material) sensors at the (usual, material) boundary are stimulated, which translates into the creation of a structure that exactly records this property of the surround. That is, the co-exclusion is a faithful **reflection** of what just occurred.

To see this more clearly, imagine a horizontal line with dots on it, representing the material boundary and its sensors. Imagine now a second line above the

first, again with dots on it, each dot now representing the result of the co-exclusion of (i.e. the **meta-sensor** for) the sensory event, which dots are connected with little dotted lines to the sensors on the original line that they are the abstraction of. But these meta-sensors are a faithful recording of the events **below** the original line of boundary sensors, so the boundary is like a mirror - what happens on the lower side is reflected faithfully above the line.

So we can imagine a third line, below the original line, again with dots on it, these dots now representing elements **in the surround** - and we might as well call them sensors - similarly connected to the (original, material) boundary sensors with little dotted lines, representing which 'external sensor' affected which material boundary sensors (i.e. those on the original line).

This means that we can in fact move our original boundary downward one line - that is, **outward**! - and, as it were, expand our body. This process of "reflective extension" of the boundary can clearly be iterated, so, as claimed earlier, the location of the boundary is **arbitrary**!

Thus the same explanation for why the thought of moving our hand results in the actual movement of our hand applies to *hands* to which we are not *materially* connected. This, then, is how I understand that telekinesis can take place (and which Ted and Clive have witnessed).

The hooker of course is that for such an effect to take place, the pre-conditions for said event must of course be fulfilled. For this to occur **reliably** the intent-on-high (hierarchy-wise) must be fully informed, that is, the conscious gestalt of the surround must be so extensive and exact that *alternative pathways* are minimized.

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THE PARTICIPANT OBSERVER PHILOSOPHY

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I. THE HIERARCHY DEMANDS CHANGE IN THE IDEA OF PERCEPTION

People think it mysterious that an abstract algebraic construction can be comparable with experiment in the same way as empirically based calculations. Theories which appeared to use calculations in such a way used to be castigated as "a priori". There can only be one answer to the mystery. The pure numbers must be the pattern of measurement, from which other measurements can be developed without any break in the argument.

I shall be talking about what kind of philosophy could accommodate this account of measurement or observation.

Evidently measurement, on this view, is not an analysable primitive notion but is built up from the requirement that its simplest case (the coupling constants and other dimensionless numbers of theoretical importance) have come to light through modern physical theory. It would be usual to conclude that any way of thinking based on this beginning must run counter to empirical science. This is not the case at all: it is merely that we shall find empirical testing in a different place. I do realize that the circumstances of experimental testing are rigidly fixed for most people and since philosophers adopted Newtonian physics as commonsense, modern ideas of observation have become the *sine qua non* of

empiricist philosophy. Here, as elsewhere, I find that philosophers as a class, though they may see themselves as the clarifiers and demuddlers of thinking, are only so from their entrenched positions in which they are of all people the least open to change. In particular the philosophers of the modern empirical tradition act as though the form that empiricism must take is laid down once for all, and so has become a dogma.

It may seem outrageous to base criticism of modern empirical philosophers on scientific evidence when that means we are casting doubt on what they say experience really is, but we should remember that there is a vast range of experience which their special form of empiricism has succeeded in marginalizing and in persuading people (against their intuitions) that it is of little account. I refer to everything that goes under the name of the paranormal and the mystical. It is really quite funny to see how ill educated and out-of-touch they are, as a class, over all that. More of that later.

II. THE PARTICIPANT OBSERVER IN ACTION

Using the hierarchy algebra as a model then, we start with a flux of significant elements of experience which have to be ordered and codified using the algebra. This flux contains all the rich structure of experience - in popular terms, all the information On this view there is nothing to correspond with the direct perception of tradition. Everything is seen through the structuring of the algebra which acts automatically, and the Kantian 'forms of intuition' springs to mind. The hierarchy construction cannot be an evergrowing set of points with no way of returning to what has been constructed. and therefore we must postulate that the construction is accompanied by deconstruction. Hence the flux. This principle of recursive iteration was embodied in "Program Universe".

My language all through has not separated an objective world from the percipient, yet we should not take this to mean that we are in a thorough subjectivism, where the percipient creates the reality, because the information that can be obtained through the processing of the flux is objective enough: the number of chairs in this room is contingent.

Two matters will now very properly be raised which require an answer. Firstly: is not all this knowledge that we get about the world seen from only one point of view, and if so how is any 'objective', in the sense of 'universal', picture to be established? Secondly: Where, in this construction is there place for an information store - given the continuous flux? Obviously it would be a sell-out if we were to give up completely at this point and import an observer with a human memory and pencil and paper or computer.

III. 3-DIMENSIONALITY IN A PLURAL WORLD

On the first matter our picture has to be of a plural world. For Pope this is an admission of defeat and we have to allow his clear sight in arguing that the current interpretations of the Michelson-Morley result mean the abandonment of classical realism. Most people would not agree with Pope that this abandonment is to be avoided at all costs - particularly in view of the size of the costs. However relativity has irrevocably broken the monist mould, even though its proponents still manage to talk in classical realist terms by imposing limitations on the applicability of those terms. It follows that our pluralism is tacitly present in modern physics and we differ only in the technical form it takes. We need an approach to relativity which would clarify the monist pluralist issue, but for the moment I turn to the second and larger of the two objections.

A word about our intuition of a three-dimensional world. The process of which I speak is supposed in the complex background of the flux of things and produces large numbers. How are we to imagine this process being the same as that which shapes our perception of things in space? In fact it is of the essence of our picture that these two apparently diverse things fit together. The bridge between them is our assimilation of the three stages of the construction (levels) to our perception of three-dimensionality. It is plausible that we can be aware of the changing of the levels as the measurement sequence develops whereas it is not *plausible* that we can be subliminally aware of all the details and the large numbers. In other words though the measurement process goes on all the time in the absence of an experimenter, we may suppose that an observer switches in to the process on these broad lines. I do not say that consciousness is an epiphenomenon as some philosophers hold. to start with the choice of level changes can be altered by awareness of it.

Last year I spoke of sequences within the flux of operations defined by the hierarchy algebra and said that they could be the definitive empirical steps in building a world picture if and only if they reached a *limit point.* The best way to understand a limit point is to recognize that the Parker-Rhodes bounds are *forced* limit points They occur when there are no more possibilities left. However reaching a limit point may be indefinitely delayed while the measurement sequence wanders about. Once there is a limit point, that, together with the sequence leading up to it, amounts to a definitely known fact which can be recovered, and the wanderings of the sequence incorporates the peculiar and special circumstances of the discovery.

Clearly we have now gone beyond the original provisions of the hierarchy since we now see it as merely the framework introducing, and providing access to the richer world. In that world we get a fuller kind of sequential development, nearer to what we should normally call time. It is important to appreciate that in this world we are free to rediscover what has already been established, but

only by going along already established sequences. This is what memory is; including human memory. Mike Manthey's expression "the computer metaphor" is very apposite since our picture is very different from that of conventional physics and indeed from that of conventional philosophy where there is a mind independent of the world to decide what to pay attention to next. That has to be decided starting from where we now are in a program, and with materials for the decision which are dictated by that point.

Last year I described how a measurement sequence is generated step by step by interchanging between levels. I described how experience forced the passage to a new level and resulted in the formation of a new term in the participant observer sequence. We see the participant observer as a sequence of steps at each of which a piece of empirical knowledge is acquired by advancing to the two-level or electromagnetic condition and then with reversion to the primitive level. Thus at each stage in the participant observer sequence there is a primitive intuition which breaks the bounds of the level structure followed by an 'understanding' of the situation involving a two stage process with memory and the accoutrements of composition, followed again by a reversion to the primitive intuition. It is most important that the element of composition throws us into the combinatorial process aspect.

What, then, about the 'observer'? He has lost his status as the fence separating off theory from experiment and every element of the theory has a cognitive aspect. The phrase 'participant observer' was in use at the time of program universe, but that approach was never followed up. Perhaps that was because when people began to take the program universe seriously, and to think it told you about how the world worked, its protagonists always got cold feet and said that it was not meant to describe the world directly but was more in the nature of a parable. That really was a sell-out.

We can say if we like that there has to be an observer or perhaps a consciousness which instigates and selects the wanderings through the sequences and limit points which have been generated, and that it is that which constitutes the memory of that observer. However it is vital to realize that there is no distinction between his memory and the physical reality. Obviously there is a major question: under what circumstances do the different physical realities agree with each other. Naturally we should start on that matter by seeing how far we can follow relativity in its solution, but we should expect to be breaking new ground soon.

IV. THE PARTICIPANT OBSERVER AND PARANORMAL EXPERIENCE

Well, there is the philosophical horror for you. Now I turn briefly to the paranormal. My guiding idea is that if we abandon the requirement that sequences must have a limit point then we can still have an experiential world but we have moved into the paranormal. A few general points suggest that we may be on the right lines.

1. The idea of the exploration along sequences rings true. So much depends on establishing connectivities in the imagination and following where they lead.

2. I find that in establishing a precognitive nexus (or a telepathic one - it doesn't seem to make much difference) as for example where one is predicting the appearance of a sequence of cards, much depends on maintaining a continuity of sequence. One has to be able to run easily through the imagined sequence of events including both the choice of card however that is performed and the discovery that the 'guess' is right. One will have to cast about for some while to see which choice has this character, and the process is quite slow - and, I may say, laborious. Of course all this is highly personal and I am by no means saying

that people who feel it necessary to run through a series of guesses rapidly are doing the wrong thing.

3. What I say seems to fit easily with the experience of distant viewing.

4. It more certainly fits with what I am told of the experience of psychometry, where a very long time is often necessary to sort out dozens of imaginative trains to see which are the really persistent ones, and where naturally an object under investigation may well have had a very complex history, all of which is at first jumbled up.

5. Telekinesis and Psychokinesis. Earlier I said that one could influence the changes of level by our awareness when I was arguing that consciousness was not an epiphenomenon. I evidently got away with that, though perhaps I should have not, because one is claiming that a vast amount of detail about the statistics of the construction process have cumulative effects which may override or dictate the detail. I would say that this is a very serious principle which would repay careful attention. At the moment I want to draw attention to something of that sort which evidently happens in psychokinesis. When people come to study psychokinetic effects carefully they are brought up against something so puzzling that they may break off their study. It is that there seems to be a goal directed activity which is capable of subsuming detail down to the atomic under it, whereas the reverse dependence is the normal basis of our thinking.

V. APPENDIX. THE L1NK BETWEEN THE OBSERVATION SEQUENCE AND ELEMENTARY DYNAMICAL CONCEPTS

We are trying to encapsulate the jump backwards and forwards from spatial intuition to the ordered sequence or process, that I have argued is at the heart of experience. In the language of Etter, we need to get the germ of the relation between composition and extension. The participant observer must have his immediate perception or intuition of dimensional structure, but we need to give a bit more of an imaginative picture of this happening.

Clive Kilmister likes my illustration of the batsman facing the fast bowler which I should be embarrassed to trot out otherwise given my cricket-bore propensity. As a first approximation you move your bat in the vertical plane which includes your eye and the motion of the ball *before and after* it hits the ground. This is universally called 'playing a straight bat', though no cricket writer has so defined it nor shown understanding of the variational principle which makes it necessary. The large uncertainty in the height of the ball after bounce brings in the principle. The distance from the batsman of the point of contact of the ball with the ground is very hard to estimate, and has to be covered by the bat which is long and thin. The action of the batsman is all at the limits of perception, and he does not see much except this plane. Meanwhile the activity of the bowler is concentrated on producing variation in the motion to defeat the batsman and so necessarily has to introduce a new dimension - either by aerodynamic action or by reaction off the pitch. The batsman is doing well if he has time to observe this change to the first approximation picture. The magnitude of the change (towards or away from him) is a second approximation. Thus he begins to build up another dimension, and so in the combinatorial way he has 3D. One can build progressively an understanding of

fine batsmanship which involves further subsidiary variational principles, though needless to say these are known to the batsman only through haptic experience. There will be howls of protest to the effect that this is all absurdly stylized. Well; perhaps. But now look at the usual story you get if you ask how we know that the world is 3D. One is supposed to settle the matter with a metre stick which one puts end to end in one 'dimension' a certain number of times. One then does this again in what one calls another dimension. One finds one can only do this three times. If you will believe that you are not putting the answer in yourself you will believe anything.

To get further along the road of direct spatial intuition (and I deliberately use the Kantian term rather than 'perception' since that term carries with it all sorts of physiological baggage which I do not want) a two stage procedure is needed. This takes the form of adding into the intuition an assumption about where the effects come from. In effect forces appear. If we continue with the cricket example for a moment we postulate some background which gives stability to the motion so that we can ask about the relationship of the deviation from the plane to whatever stabilizes the plane dynamics. It is time I came clean. I am talking about electrodynamic interactions, and it doesn't matter that electromagnetism is not used in normal cricket.

The point to make is very primitive. When we have in mind that – say - a particle motion is attributable to a force in a particular dimension and that an acceleration on it is produced by a force which we say is at right-angles to the plane containing the original motion then we say that the force is due to a magnetic field. All the terms in this statement can be changed but the basic message remains a fundamental characteristic of our world and it is the distinctive aspect of electrodynamics which is stated in combinatoric terms similar to those in the purely mechanical description of the batsman. However, the situation has passed beyond what was contemplated in the case of the batsman. By postulating knowledge of the initial forces, which is beyond the

batsman's remit, we force a new and more complicated picture. We are using a perception and corresponding language which is not provided by the first level, and have passed beyond that. This way of understanding the origination of electromagnetism explains the failure of Weyl to formulate a geometric account of it that could extend Einstein's work on gravitation to give a unified picture. The gauge theory still left mechanics and electromagnetism as two obstinately different things.

The next stage in my argument is to identify the passage to a new level, or rather the being forced by experience to a new level as the formation of a new term in the participant observer sequence. We see the PO as a sequence of steps at each of which a piece of empirical knowledge is acquired by advancing to the two-level or electromagnetic condition and then with reversion to the primitive level. Thus at each stage in the PO sequence there is a primitive intuition which breaks the bounds of the level structure followed by an 'understanding' of the situation involving a two stage process with memory and the accoutrements of composition, followed again by a reversion to the primitive intuition. It is most important that the element of composition throws us into the combinatorial process aspect.

UMBALA

A Polemic Against Jargon-Addiction in Modern Physics

VIV POPE

Verbatim

I once heard Patrick Moore tell a joke on TV. Forgive me if you've heard it, but I want to use it here to make a philosophical point. So far as I recall, it went like this:

A man was invited by an old college friend to visit him. The friend had moved abroad and settled in a district of the African continent where he had become a highly placed Government official. When the visitor arrived he was met at the airport by his friend, who was immaculately dressed in white suit and hat, in a shiny stretch-limo driven by a uniformed chauffeur. On the way out of the airport and at villages along the way to the official residence, the road was lined with crowds of people, who would not allow the car to continue until the official got out and addressed them in their native tongue. On each such occasion, after he had finished speaking to them, the crowd waved and shouted 'Umbala! Umbala!'

The visitor was much impressed by this, and no less impressed by the opulence of his friend's place when they arrived. Eventually, after they had fed and rested, his friend said to him 'Tomorrow you must see the sights, and first I will take you to see the famous Temple of the Sacred Bull.'

As the day dawned, the visitor asked a servant to advise him what he should wear for the occasion 'Wear what you like,' said the servant, 'But, be sure to put on some knee-length wellington boots.'

'Why is that?' the visitor asked.

'Well,' said the servant, 'the place will be knee-deep in umbala!

Now that introduces, in as delicate a way I can manage, what I want to talk about here, which is the accumulation, in modern theoretical physics, of sheer 'umbala'. In the jealous scrabble to present more and more exciting new ideas, our common understanding has become lost, to the extent that any talk of truth or reality is now an embarrassment - notice how often, in scientific texts, these words 'true' and 'real' have to be put in quotes to forestall inquisition.

This is particularly so in relation to the subject of space and time in the context of Special and General Relativity, where dissonance is even now increasing over the question of how, in these relativistic terms, distance-separated bits of matter are supposed to interact. But of course, there is no law of man or of nature that can prevent us from peopling the void with all sorts of mythical creations held responsible for what goes on between the various bits of matter in order to make them behave in the way we observe. In fact, our students of physics, of late, are encouraged to develop that kind of 'creativity'. The physics visions of the past, they are told, were too restricting, and that what we need now, to meet the increasing demands that new experimental evidences are thrusting upon us, is a new kind of sophistry, a freedom for genius to do 'just what the hell it likes'.

And so, released from the plodding necessity for maintaining that logical integrity of language which used to be called commonsense, scientific ingenuity has responded by picturing the *void* - literally the *nothing* - as possessing the same sorts of properties, qualities, dimensions and so on that are normally ascribed to ordinary, hands-on, material objects. A prime case of umbala is the notion we seem to be lumbered with, but which, from a linguistic analysis point of view cannot survive a moment's inspection, is encapsulated in the illustrious

phrase 'constant velocity of light *in vacuo*.' Now what on earth can that possibly mean? How can anything have a velocity, constant or otherwise, *relative to a vacuum*? A critic once yelled at me 'NO! What it means,' he said, 'is IN a vacuum, not RELATIVE TO a vacuum!' Now this is a nice example of conceptual hedging. How, I asked my critic, can you distinguish 'in a vacuum' and 'relative to a vacuum'? If I say that the speed of sound *in* water is so many feet per second, then that is the same as saying that it is the speed of sound *relative to* water; and if I say that the terminal velocity of a certain falling body in the atmosphere is - whatever it is - then I am saying that that is the terminal velocity of the body *relative* to the atmosphere. So what possible objection can there be to the variant phrase 'relative to a vacuum' if not that it reveals the absurdity of the '*in vacuo* statement!

But confront a modern physicist with this sort of scepticism; ask him how a vacuum, which is literally a *nothing*, can, in itself, act as a reference-frame for a velocity, constant or otherwise. He is not likely to reply 'Gee, I never thought of that!' and then go back conscientiously to question the statement at source. What he will do - what these teachers have traditionally done - is hedge like crazy. The 'void', he may say, is not really a *nothing*; it is a *something* - a 'field', an 'ether', a space-time 'substratum', you name it. He can say things like that without it bringing the police knocking on his door. So alright, then, you say to him, why not fill the void with 'ectoplasm' or 'virtual angels' beating 'virtual wings'? What difference can there possibly be, objectively speaking, between these outright mystical creations and 'field' or 'ether', since there is not the slightest chance, in either case, of detecting anything of such a purely speculative nature?

So what makes us feel that in physics conferences we are free to write and talk with equanimity about 'ether', 'fields', 'photons' and so on and yet remain coy about suggesting 'ectoplasm' and 'angels'? What other answer can there be but

that the one just happens to be fashionable in physics, right now, and that the other isn't?

There are, moreover, two academic premiums on creating this kind of nonsense. These are the professional jostling for scholarly preferment and the need to preserve one's name for posterity. These have created a conceptual slum in which just about every *ad hoc*, higgledy-piggledy theory gets academic planning permission to block the streets for future intellectual progress. To return to our original simile, we have created a veritable lake of umbala in which we are going down for the third time in a welter of pure jargon. And what is so amazing is that so many people seem to be happy with that! They talk for instance, with complete equanimity about 'wave-particles' travelling at a constant speed in the void with the mass and momentum of a projectile but with the resonant properties of a wave, which it is absolutely impossible to interpret literally or even consistently to imagine. Or they may talk about 'the ether' as though it were something familiar, that exists in itself, independently of matter, as though it were something primordial and enduring, to be described as 'curved', 'expanding', 'turbulent', 'sponge-like' ... or whatever. It is nothing, for instance, to hear physicists talking glibly, in conferences, about 'the beginning of time', about moving bodies 'dragging space-time around with them', and to see popular books on modern astrophysics displaying glossy pictures - *in colour*, would you believe! - of 'singularities' called 'black holes' from which no light can emerge! Indeed, to talk like that may even be regarded as obligatory, nowadays, in order to pass exams and get published.

To any honest, commonsense thinker there is plainly no objective difference between this so-called 'scientific' account of nature and the traditional stories about the doings of elves and pixies - except, of course, that it is understood by most people that elves and pixies are creatures of good honest fiction, whereas we are conned into believing that the 'singularities' of the scientists are somehow true representations of things that are, in some altogether

indescribable sense, real - but of course, not in any sense of 'true' or 'real' to which these scientists can be pinned down. And it is a well-known weakness of course, of the ordinary trusting person that he can be sold this 'umbala' by anyone in vested authority - in the same way that the priests of the Middle Ages sold the serfs assurance of a place for their souls in heaven.

Now one is by no means saying that all long and complicated, unfamiliar science words and phrases are 'pure jargon' (umbala). Words like 'indeterminacy' or phrases like 'quantum interaction', 'thermodynamical equilibrium', 'myelinisation', ... and so on, may sound unfamiliar and barbarous to some people, but they are scarcely longer or more complicated than words like 'wheelbarrow'. And in the same way, they have a perfectly clear and concise literary meaning which can be explained to anyone who is reasonably conversant with the language and who has gleaned at least some intimation of the areas of special knowledge in which these words are used. 'Jargon', on the other hand, is some form of usage which, even when fully explained to someone proficient in the language - indeed, especially to someone proficient in the language - makes no literal sense. Take, for instance, a phrase like 'expanding universe.' Ask the user of that phrase what on earth it means. Ask him, into *what* is a *universe* supposed to be expanding if not some other universe or space which is already there. And if there is *nothing* of that sort into which it can expand, then how can it expand? And take a phrase like 'the beginning of time', as relished in contexts of modern cosmology. This sounds poetic and profound. But since the word 'beginning' signifies a commencement *in* time, then the time in which that beginning began had to be there to begin with, which is just nonsense. Ask any one, as I once did at a conference, 'What time was it when time began?' and you will immediately be overwhelmed with sheer umbala.

By rights, however, any honest and forthright person should say to anyone who tells him that the universe is expanding that that is just pure nonsense. And

if the reply is that you are some kind of ignoramus because all the evidence points to it as a 'fact' then you must dig your toes in and say that you're not falling for that old 'emperor's cloak' kind of guff, that neither observational evidence nor mathematics can prove something that is so logically absurd. The onus is then on whoever hands you that kind of garbage to modify his description of what he believes, so that you can understand what he says. And if he can't do that, then you should tell him to push off and seek someone more gullible.

In short, then, what one is saying is that high-level, properly used language, is one thing and that jargon is another. Unfortunately, such plain speaking, especially among gatherings of those who are captivated by it takes nerve, like standing-up and challenging the vicar in Church. So we are socially conditioned into thinking that those who dispense these stilted forms of language, and who savour them in contexts of science like a kind of poetry or secular psalm-singing, that the fault is ours if we fail to understand the 'explanations' that are offered us. So anyone who is socially 'streetwise' knows that to kick against this sanctimonious nonsense is to ensure that no science journal will print what you say. So if your aim is to get into print or on television you have to con the media moguls into thinking that as a respected professor of physics you have discovered 'twisticons' or massless 'nonexistrons', that 'the void' is Paisley-patterned, with the texture of Harris-tweed, or that quasars are cosmic mushrooms, you will immediately capture the media interest. You may declare, without a blush, that space is interspersed with time-wells into which falling particles exist backwards or sideways, and that if you fall into one you will come out in another. Everyone will sit up and take notice. That way, you may become as famous in physics as some obvious charlatans have became in art. But 'Umbala baffles brains', honest people will quietly judge, after you have said your piece and sailed grandly out of the room.

However, unless the development of our understanding of nature is to be dictated by the same rules that apply in art and fashion, then those of us who are involved in science must do our best to broaden the democratic dialogue. That is to say, we must do our best to explain and get our colleagues to explain what we mean, *in ordinary commonsense terms* that intelligent people outside our own subjects can understand, not in terms that only we and our closest colleagues will settle for. And the editors of journals should cease pandering to this intellectual in-breeding of ideas and insist - as, indeed, more and more editors now seem to be doing - that their contributors explain themselves in the way they would be forced to do in front of a jury in a court of law. And if such plain explanations prove impossible, then those contributors should be advised to take another good critical look at what they are saying, so as to make sure that in using arguments which go 'over our heads' they are not simply fooling themselves.

What increases the confusion most of all, however, is that there are socially influential people in physics nowadays who believe, in the name of 'intellectual freedom' that what is true or false in the subject is something which anyone is free to judge for oneself, and that such personal judgements should be treated as sacrosanct. This turns the history of thought full circle. The Sophist Protagoras, in ancient Greece, used to claim that 'Such as appears for you is for you, and such as appears for me is for me.' This was the attitude which spurred thinkers like Socrates, Plato and Aristotle into analysing this dictum, which they identified as what has since become known as 'sophistry'. And it was in opposition to this that they developed objective logic, dialectical discussion and philosophy - and, of course, that philosophical spin-off we now call science. As these thinkers analysed it, the sophistic claim that 'nothing is really true but only in opinion' cannot be taken as true without contradiction. In other words, what the Sophists were selling was whatever, at the time, would have been the Greek equivalent of 'umbala'.

Logically, then, since it cannot be true that nothing is true, something or other *has to be* true, even though we may not know, *a priori*, what that something is. This, of course, does not mean that truth is always simply a matter of honest speaking or that in science it is there to be discerned by plain inspection of statements made purely on the basis of direct and/or instrumental observation. As perception-psychologists confirm, even the very best and plainest cases of observation are *interpretational* and are, in most cases, culturally and subjectively conditioned by the conventions of our time. But at least we are logically assured that objective truth is there, not only because denying it creates a contradiction but also because we can definitely discover error, and to admit that there is error is meaningless without admitting that there is truth. In other words, true and false are correlatives. The one can no more exist without the other than an inside can exist without an outside or an up without a down.

This is not to say that discovering an error is the same as being apprised of an absolute and incorrigible truth. It may be no more than to discover that, as a consequence of finding the error, that there is something we know which is *more true* or *less erroneous* than what we thought before. Unearthing truth in that way is the painstaking method of eliminating error, that led to the sort of science which, in its rational heyday, its famous exponent, T.H. Huxley, described as 'trained and organised commonsense'. It was simply, by careful observation and experimentation, to seek out new phenomena and interpret these, as conscientiously to oneself as to anyone else, in the plainest language available - that is to say, a form of language which, even if entirely new, aims to be as organically connected and consistent with the common language as can be managed.

This, of course, also means the gradual winnowing-out of purely poetic descriptions of observation such as 'black holes', or 'quarks' with qualities of 'upness', 'downness', 'charm', 'nakedness', 'beauty' and so on, usages which have nothing in common with those of ordinary language but are similar

enough to suggest that something sensible is being said which simply isn't. Moreover, if this analysis is carried through consistently, it also filters-out past descriptions of phenomena such as that of 'caloric' or 'phlogiston', or elementary 'charged' particles 'frizzing' away on their own, relatively to nothing but themselves, metaphysically possessed of some special kind of 'attractiveness' or 'repulsiveness', called 'electrostatic' or some other such exotic capability. In similar fashion it rules out talk of 'photons' travelling from A to B when that motion is no more detectable than that of angels between heaven and earth. To speculate, as an amazing number of physicists do, nowadays, about the 'mass of the photon' is about as useful as speculating about the momentum or power-to-weight ratio of an angel-in flight. If you accept what is plain fact, that what is called a 'photon' is the smallest amount of energy there is, then it follows that it has no energy to spare in manifesting itself anywhere, in any form, between where it is emitted and where it is absorbed, so that any question of how it 'travels' or what else it does in between A and B is simply a daft question.

Jargon-addiction, then, let's face it, is no more than a flagrant form of illiteracy. It is no more than the 'bar-bar-bar-' of a new barbarianism in which mere noise usurps the place of logical understanding. But of course, in the privacy of their own laboratories, consenting physicists may speak and do as they please. That, for many physicists, is what 'democracy' is all about. But when those beliefs and activities are sported in public - in textbooks, for instance, or on prime-time TV - that is anarchy, especially if it corrupts the young and tender-minded into thinking that this kind of jargon is, or should be, the norm. Well, alright, if there were no recourse but to talk in that mystifying way - if, for instance, there were no commonsense alternatives available - then to speak of those entities in that stylised and alien fashion would be a Hobson's choice. It would have to be allowed 'on lease', as it were, on a 'working-hypothesis' basis. However, when that lease runs out on these *ad hoc* expedients - as it should surely do as soon as some properly plugged-in commonsense alternative presents itself - the irony

is that these new representations are blocked by prior presupposition in favour of the existing ones, even when those existing ones transpire, on analysis, to be pure nonsense. It has been well-demonstrated for instance, by Bondi and others, that all the salient consequences of Einstein's notorious 'Theory of Relativity' can be deduced much more simply and efficiently from commonsense premises without any mention of the nonsensical 'speed of light *in vacuo*' and its paradoxical and brain-racking 'EPR' implications. No less well-demonstrated is that this can be done without compromising any known experimental fact or practical formula. But although these alternative explanations have now been around for nigh on half a century, they receive scarcely a mention in those halls of academic science where the stench of the sacred bull continues to be savoured as though it were a divine incense, and where no suggestion of opening a logical window or using an analytic deodorant is allowed.

What it all it comes down to, then, in the end, is simply a matter of whether one's aim in choosing to be a scientist is to become clever and famous, like Einstein, or whether, like Socrates, it is to seek good honest understanding, even at the risk of offending polite society. Socrates was a self-professed ignoramus, an intellectual bullfighter, you might say, rather than a worshipper of the academic sacred bull. His reward for expunging pure pretences at knowledge was to be given the judicial hemlock. True philosopher and father of science that he was, he would rather quaff the hemlock than spend a lifetime wading in the sacred umbala.

THE MENTAL AND THE PHYSICAL[1]

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In this paper we will consider how the notion of the implicate order can help in clarifying the relationship between mind and matter.

It is important to note that Bohm's proposal of the implicate order as the order of matter is actually a change from what is usually meant by matter. That is, the implicate order is not another description of *the same thing* which Descartes described as extended substance, but rather, it is a new way of understanding what matter *is*. Consequently, with this change in what is meant by matter, we may expect a change in what is meant by the relationship between matter and mind.

DESCARTES' CLAIM CONCERNING MIND AND MATTER

Descartes' attempt to formulate how mind and matter could be related was based on his way of understanding what mind and matter were supposed to be. That made the task particularly difficult. He assumed that the whole of existence can be fitted into two separate compartments of extended substance and thinking substance. Extended substance, or matter, he defined as existing in

space in the form of separated objects. Thinking substance, or mind, did not exist in space, nor did it involve spatial extension and separation in any way. And so the division between mind and matter seemed quite radical, exclusive, and exhaustive.

Having established the division, Descartes set out to formulate how mind and matter act on each other. That there is a kind of interaction in the sense of thought leading to a physical action and vice versa, was no less evident than the apparent fundamental difference between extended and thinking substances. The question was, how could such basically distinct substances interact. If it was postulated that the world consisted only of these two distinct modes of existence, of what could a link between them possibly consist? Without any kind of link that could bridge the ontological gap between the mental and the physical, the issue of their interaction remained entirely unintelligible.

One of Descartes' solutions to the problem was to propose the pineal gland as a point of connection of mind and body. During his lifetime the function of the pineal gland was unknown, and so at least it was not certain that the gland was not the point of connection. However, such a solution was not satisfactory, since it only moved the problem from one place to another. The question remained concerning how the pineal gland, being extended substance, was connected with thinking substance. Another solution which contemporaries of Descartes found to be consistent with his philosophy, was to regard god as a link between the extended and the thinking realms of existence.

Perhaps the problem of connecting the mental and the physical would not arise, if in the first place Descartes had not defined them as distinct substances. It is however interesting to note that his own approach forced him to establish this division: it was a logical consequence of his conviction that he had found a way of distinguishing knowledge which is certain from that which is not.

The issue was that Aristotle's map of the universe was revealed to have some serious flaws, not being able to account for the new discoveries about matter which came with Copernicus and Galileo. Because of that, Aristotle's authority ceased to be the criterion of truth. Descartes' attempt was to establish another criterion of the credibility of knowledge than the authority of Aristotle.

Indeed, he believed that he had discovered the general criterion of truth in the particular way he had arrived at the truth of the 'cogito', i.e., the truth of the proposition: 'I think, therefore I am'. This proposition was known clearly and distinctly. Descartes then came up with the notion that whatever is known clearly and distinctly is at the same time true. From that he only needed to go one step further in order to establish the 'truth' of the division between the mental and the physical. Since the thought '*what I think about* is different from the *act of my thinking*' seemed for him clear and distinct, he concluded that thinking substance is different from *what the thought is about.*

Of course, one could still question whether man's clear and distinct ideas were not, nevertheless, deceptive. Descartes' way of securing these ideas was by means of proving the existence of God who was not a deceiver. Such a god had therefore no intention to deceive man by implanting in him clear and distinct ideas which would be deceptive. In this way, Descartes' criterion of truth was guaranteed by God.

There are, however, doubts as to whether or not Descartes was arguing in a cycle here. He 'proved' the existence of God using the criterion of clearness and distinctness, but on the other hand, God established in such a way was supposed to guarantee the truth of this criterion.

In other words, one cannot see a logical need to maintain Descartes' argument, which got him trapped into the double framing of reality, causing in this way the split of the whole of existence into two ontological species of extended

substance and thinking substance. This was evident even for the contemporaries of Descartes, since they tried to improve his structure in various ways. However, the division between the mental and the physical remained in power in spite of its questionable logical status, dominating science and ordinary thought up to the present day.

Regardless of the logical status of Descartes' rationalizations, which were supposed to justify the difference between mind and matter, the postulated difference fitted both the ordinary experience and scientific knowledge of matter very well. It is clear that, as long as matter matched Descartes' definition of extended substance, its relation with thinking substance — if any — had to be provided in terms of some additional ontological order. A co-ordinate system that Descartes imposed on the realm of matter was not suitable for describing the thinking realm of existence. There was no common quality that could provide a reasonable basis for the relationship of the two substances. The notion of bringing in God as a link between the substances was a typical way to deal with the issue which apparently had no intelligible solution.

However, we may suppose that the situation changes if matter ceases to be understood as extended substance. In this sense we may say that a new way of understanding what matter is makes it possible to consider again the

THE IMPLICATE ORDER AS THE BASIS OF THE RELATIONSHIP BETWEEN MIND AND MATTER

Concerning the implicate order, it is of key significance that it applies not only to matter, but also, to consciousness. As Bohm indicates[2], the activity of consciousness can be regarded as being basically an enfolding-unfolding activity.

One can see this, for example, by being aware of how consciousness is activated in response to sense perception. The perception activates memory, and gives rise to thoughts, feelings, intentions to act, etc., which unfold into further activities of consciousness. These activities involve not only yet more thoughts and feelings implied by those to which the original perception gave rise, but also still further perception which enfolds again.

It is clear that one may begin not with perception, but with a thought, feeling, or with any other aspect of the mind's activity, being aware of how all of these aspects enfold, imply, and pass over into each other. For example:

> The thought of danger unfolds into a feeling of fear, which unfolds into words communicating the feeling, and into further thoughts... Thoughts and feelings also enfold intentions. These are sharpened up into a determinate will and the urge to do something. Intention, will and urge unfold into more action, which will include more thought if necessary. So all the aspects of the mind show themselves as enfolding each other, and transforming into each other through enfoldment and unfoldment.[3]

That both matter and mind can be discussed in terms of an unfolding-enfolding activity, that is, in terms of the implicate order, may help us to understand how they are related. That was not the case with the Cartesian order (i.e., the co-ordinate system) which was suited to discuss only the extended realm of existence. The thinking realm was established somewhere beyond the Cartesian order, without an intelligible connection with whatever was accounted for by this order.

Bohm's suggestion that mind and matter are both in the implicate order, changes the situation in that it points to something basically common in these two apparently separate realms of existence. one may therefore reasonably suppose that the implicate order can be considered as a means of expressing consistently the relationship between mind and matter.

WHAT IS THERE TO BE RELATED?

Before we go into the question of how the mental and the physical could be related, it is important to note that Bohm's view entails an essential change in what is to be related, when we talk about the relationship of the mental and the physical.

It has already been mentioned that the implicate order brings about a change in what is meant by matter. However, yet another feature of the implicate order has to be emphasized in the present context. This is that the implicate order is essential to what things *are* in that it is a dynamic unfolding-enfolding activity, inseparable from all the forms which are generated by this activity, unlike the Cartesian order which applies 'externally' to pre-existent extended things that are independent of it.

To say that matter and mind are in the implicate order means that their basic structure is grounded in the whole of the unfolding-enfolding activity. In other words, both matter and mind are inseparable aspects or forms of this activity. The question of their relationship would therefore be the question of how the mental and the material forms of *activity* are related within the common context of the universal activity of unfoldment and enfoldment, or, how they are related within the overall structure of the implicate order. This is clearly different from the question formulated by Descartes; namely, how two distinct and independent forms of *substance* can be related.

This leads us to the question: what is the nature of the overall structure of the implicate order?

THE SELF-ORGANIZING NATURE OF THE IMPLICATE ORDER

In the present context it is of key significance that the implicate order can be regarded as a self-organizing activity. The self-organizing nature of the implicate order is emphasized in Bohm's causal interpretation of the quantum particle theory extended to the quantum field theory. In this interpretation he introduces the notion of information that is objective and active.

Since the notion of active information is crucial for understanding the self-organizing nature of the implicate order, we will consider it in the context of Bohm's interpretation of the quantum theory. However, as will be shown later, this notion has a much broader significance which goes beyond the context of physics.

As he proposed in his initial interpretation, each elementary particle can be considered as inseparable from a quantum wave that satisfies Schrödinger's equation. Both particles and their waves are assumed to be physical actualities. The important point is that a new kind of activity is displayed in the way in which the particle is affected by its wave. Namely, the wave *does not act mechanically on the particle.* That is, the particle responds not to the *intensity* of its wave, but to *the form.* As Bohm puts it "...the electron moves under its own energy, but the information in the *form* of the quantum wave directs the energy of the electron."[4] In other words, the self-active particle can be said to be guided in its movement by the *information content* of the wave function. Since the information content of the Schrödinger wave concerns the entire context of the particle, it follows that the behaviour of the particle cannot be consistently separated from the whole of its relevant environment[5].

For the many-particle system, the wave function of the system cannot be represented in the ordinary three-dimensional space (which is done for the one-

particle case) but has to be represented in a multi-dimensional space. Each point of this multi-dimensional space corresponds to a configuration of the entire system of the particles. In this way the wave function of the system depends on the positions of all the particles. The activity of each particle of the system is therefore guided not by its 'private' information, but by a common 'pool' of information contained in the wave function for the whole system[6].

We can say that in the case of the many-particle system, the activity of each particle reflects the state of the whole system. It should be added that by the activity of the particles we understand here not only their movement, but also their capability to enter into connections with each other. In other words, not only the *form of movement* of the particles, but also the *form of the connection* between them depends on the state of the whole system.

Extending the causal interpretation to the quantum field theory, Bohm gives up the notion of the particle as the basic actuality, and takes instead the field. This is because in the quantum field theory particle-like manifestations can be regarded as certain phases of the unfolding-enfolding movement of the field. These particle-like manifestations, together with their order of movement and interaction, arise as the effect of a superquantum field on the original field. This situation is similar to the quantum particle treatment where the form of the activity of particles arises as the effect of the quantum wave on the particles. In other words, the multi-dimensional superquantum field represents an information content which guides the activity of the three-dimensional field. However, in the present context not only the *activity* of particle-like manifestations, but also their *creation, sustenance and annihilation*, can be said to be guided by the information contained in the superquantum field.

The important thing to note is that both the original field and the superquantum field are forms of the implicate order. The original three-dimensional field represents the first implicate order, and the superquantum multi-dimensional

field represents the second implicate order that is of a more subtle nature than the first one[7]. The causal interpretation of the quantum field theory can therefore be understood in terms of two interrelated implicate orders. As Bohm says:

> In principle, of course, there could be a third, fourth, fifth implicate order, going on to infinity, and these would correspond to extensions of the laws of physics going beyond those of the current quantum theory in a fundamental way. But for the present I want to consider only the second implicate order, and to emphasize that this stands in relationship to the first as a source of formative, organizing and creative activity.[8]

As noted earlier, the relationship in which the second implicate order stands to the first one, is not of a mechanical nature. The second implicate order acts on the first in the sense that it informs the self-active movement of the first implicate order, organizing it into manifest structures of the explicate order[9].

As in the quantum particle theory, we deal here with the notion of active information[10], that is, information that gives rise to a certain activity. This activity to which information gives rise, Bohm calls *meaning*.

For example, in the case of a many-particle system, the meaning of the information content of the wave function would be the explicate order of movement and interaction of the particles. In the context of the quantum field theory, the meaning of the information enfolded in the superquantum field would signify the whole activity of the first implicate order. In other words, the meaning would signify here the enfolding-unfolding activity of the first implicate order, in which particle-like manifestations and the order of their movement and interaction are generated.

Since both the wave function and the superqauantum field are forms of the implicate order, it can be said that in both examples meaning signifies the activity of the unfoldment of enfolded information. This would imply that

information itself can be seen as meaning. For if we suppose that beyond the first and second there is a third, fourth, etc., implicate order, the information enfolded in the second implicate order can be regarded as the meaning of a more enfolded information content of the third implicate order, and so on.

When we deal with the many-level structure of the implicate orders, we can therefore discuss the self-organizing activity of this structure in terms of meaning, leaving out the notion of information. Such an approach seems to be particularly suitable when considering the activity of mind.

THE SIGNA-SOMATIC AND THE SOMA-SIGNIFICANT ASPECTS OF THE ACTIVITY OF MEANING

Discussing the activity of mind in terms of meaning, Bohm considers two aspects of this activity, the first one being the enfolding or *soma-significant* activity, and the other being the unfolding or *signa-somatic* activity[11].

An example of the soma-significant activity is the way in which sense perception takes place. In the act of sense perception the significance of a somatic structure (such as a printed page, a structure of sound, an image, etc.) is being apprehended. That is, the significance of a given somatic structure is being encoded into somatic processes (i.e., electrical, chemical, etc.) of the organism. These somatic processes have further, intellectual or emotional significance. This significance is, however, also encoded in some more subtle somatic processes of the brain and the nervous system. These more subtle somatic processes may in turn be significant for still more subtle, or more enfolded forms of significance, and so on.

What Bohm suggests further is that there is no need to assume any limits to the possible depth of enfoldment of this soma-significant activity. That is, it may

extend indefinitely beyond any specifiable level of meaning. Although the example of the soma-significant activity concerns sense perception, it is clear that perception of significance is not limited to sense perception. It can take place at any level of meaning, and it may involve quite subtle forms of mental activity[12]. In other words, what is suggested here is that an indefinite depth of inwardness is possible in our mental processes.

The signa-somatic aspect of the activity of meaning calls attention to the somatic unfoldment of significance. For example, whatever structure of significance is present as the content of consciousness at a given moment, it organizes the subtle somatic processes of the brain. These, in turn, organize or inform the less subtle somatic processes of the body. Finally, the original structure of significance unfolds as a manifest activity of the body which affects the environment. In this way, the signa-somatic activity extends into the environment.

In fact, we may say that the structure of our environment, that is the structure of the world in which we live, is for the most part the somatic result of various forms of significance that constitute the 'information content' of human consciousness. We should, however, note that the soma-significant activity of perception includes perception of new meanings. These new meanings, when somatically actualized, bring about new material, cultural, social, etc., forms of human life. In other words, the overall structure of meaning is capable of indefinite extension, both in the 'enfolded direction' of ever more subtle meanings, as well as, in the 'unfolded direction' of manifest actualizations. This implies that, at least in principle, mind is capable of going beyond any specifiable level of subtlety of meaning. This capability of going beyond any level of meaning, Bohm points to as the essential feature on which *intelligence* is based.

It is clear from the above discussion that 'soma' and 'significance' are relative notions. The significance of a somatic structure is conceived in a more subtle somatic form, and so on. What follows is that each level of the overall structure of meaning is both somatic and significant. That is, we deal here with one process that is *both somatic and significant*, or, both mental and physical. As Bohm says:

> ..nothing exists in this process except as a two-way movement, a flow of energy, in which meaning is carried inward and outward between the aspects of soma and significance, as well as, between levels that are relatively subtle and those that are relatively manifest.[13]

MATTER, MIND, AND MEANING

When discussing mind in terms of the activity of meaning, it became clear that mind has a somatic, or, 'material' side from which it is inseparable. Could it be that matter has, in a similar way, an inseparable 'mental' aspect?

Insofar as matter is considered to, be a self-organizing activity of information, it can be said to have a kind of 'mental' aspect. That is, the enfolded information content of the super-wave function can be viewed as significance which is somatically actualized in the form of the explicate order of activity of particle-like manifestations.

If we suppose, as suggested earlier, that the super-wave function is the somatic unfoldment of a more subtle level of significance, and so on, we come to a process similar to that which takes place in the case of mind. That is, we come to a process involving a series of levels of active meaning, where each level organizes the next more manifest one. In other words, we come to the signa-somatic aspect of the activity of meaning in the context of matter.

As Bohm suggests, it is also possible to show that the soma-significant aspect of meaning is part of the activity of matter. However, if the quantum theory were to account for the many level activity of meaning, and for the soma-significant aspect of this activity, it would need a fundamental extension. As it is now, it covers only the signa-somatic aspect of the two-level activity of meaning[14]. With regard to that, Bohm's position is that it is only a temporary state of affairs, and that further research can quite likely transcend the present form of the quantum theory.

But even the two-level activity of meaning that is accounted for by Bohm's causal interpretation of quantum theory, displays a close similarity of form to the activity of meaning as it is discussed in the context of the mind. We may therefore ask, whether we deal here with two kinds of activities, or with one and the same activity. Bohm's contention seems to be that both in the context of mind and in the context of matter we deal with basically the same overall process or activity of meaning.

MEANING AS BEING

We were concerned with the relationship of matter and mind, and we arrived at meaning. What has this relationship to do with meaning? If we inquire, as Bohm has done, into what matter is, and what mind is, we shall arrive at meaning In this way, instead of two distinct substances we have one overall *activity* that displays both material and mental aspects. The question of the relationship of mind and matter becomes there fore the more general question of the overall structure of meaning.

This structure, as we noted, is basically similar for matter and mind. Do we then, when asking about the overall structure of meaning, still ask about the relationship of mind and matter? or, do we ask about something else? When we

give up the assumption that matter and mind are fundamentally different, are they still in need of being related? The structure of meaning has been discussed in terms of the signa-somatic and soma-significant activity. Significance (i.e., the mental) was said to give form to the activity of soma (i.e., the physical). But by no means can it be narrowed down to saying that mind informs matter. Significance, or meaning in general, is not confined to mind, but as was pointed out, it is objectively present and active in matter as well.

In the present context, the relationship that Descartes attempted to formulate, and which he called the relationship of mind and matter, resembles in some respects the interaction of two levels of meaning. However, as Bohm proposes, the overall structure of meaning involves an indefinite, or perhaps infinite, number of levels. Furthermore, it applies both to matter and mind. Therefore, when discussing the overall structure of meaning, in some sense we include the traditional question of the relationship of mind and matter. But the structure of meaning comprises not *one* relationship, but a *whole series*, or, a whole order of relationships.

In this sense we can say that the question of the overall structure of meaning is far more general than the question of the relationship of matter and mind. However, to say that meaning applies both to matter and mind implies something more as well. It implies that meaning is intrinsic to the whole universe. What follows is that the signa-somatic and soma-significant activity, in terms of which mind has been discussed could be seen as part of a much broader universal activity of meaning. This leads us to deny Descartes' division of the whole of existence into two separate categories, or modes of being. Instead, we can say that meaning encompasses both modes of existence, or as Bohm says, that meaning is being.

THE NATURE OF MEANING

Since the statement that meaning is being may appear some. what puzzling, it may help to bring in Aristotle's concept of the formal and final causation that is in some sense similar to what Bohm understands as meaning.

Aristotle's claim was that to know things, was to know their four basic principles or causes. The causes were considered to be the proper subject of knowledge in the sense that to know them was to know how things come into being, how they act transform, and pass away. In this sense the causes were under stood as intelligible principles inseparable from what thing. are, constituting, as it were, the very mode of existence of things. He distinguished the following causes: (i) the material cause — as a kind of substratum in which the three other causes operate, (ii) the efficient cause — as an external source of motion[15], (iii) the formal (or, the formative) cause — as an immanent principle which makes things what they are, and (iv) the final cause — as an aim or 'telos' towards which any process of motion is directed.

Although these causes were said to constitute distinguish able factors of each mode of being, actually they were not always different. In general, the formal cause of a thing was simultaneously its final cause. That is, the aim of the full realization of forms, was at the same time the immanent principle of motion directed towards this realization.

In Aristotle's view, this immanent principle of motion concerned all nature. In fact, 'nature' at the time of Aristotle meant an intrinsic principle of motion operating within things[16]. He saw this motion as directed towards the full actualisation of forms, that is, as brought about by the formative cause. The formative cause was therefore considered to be an intrinsic principle that made matter to actualize its potentialities. The he saw this universal movement of actualization as ultimate] ordered by the 'unmoved mover' acting as 'telos' of

the who] of nature. In this way, the formative activity was seen as guide by the 'unmoved mover' whose role was to organize the activity into an integrated whole of the cosmos.

As Bohm points out, something akin to the efficient an the material causes is still recognized by modern science whereas the formal and the final causes are more or less put aside as not relevant to scientific needs.[17]

One may suppose that the situation is due to the philosophical tradition originated by Descartes. Descartes banished the intrinsic principle of motion from nature, reducing in this way the concept of motion to displacements caused externally. He also needed an 'unmoved mover'. However, Descartes' 'unmoved mover' was no longer the immanent 'telos' that integrated things into the cosmos, but rather, it served as a mechanical assumption that was necessary to explain the origin of movement in the universe. once moved, the universe was governed in its further movement by laws[18].

Formative activity directed towards some aim was therefore generally reserved for the 'thinking substance'. Perhaps this concept began gradually to function as a presupposition in science. Any attempt to explain a material process in terms of a self-organizing or teleological activity, keeping in mind Descartes' limitation of these to the 'thinking substance', would be equivalent to providing matter with consciousness. But the separation of matter and consciousness was believed by Descartes to be an essential part of 'certain' knowledge.

We may suppose that this tendency of avoiding teleological explanations in science is for the most part a habit whose origin has been forgotten. Moreover, as we mentioned earlier, Descartes' criterion of certainty does not make much sense. Therefore we are free to look at the issue anew, without any need to presuppose that teleological activity is confined to human behaviour.

Coming back to meaning as the activity in which somatic forms are created, sustained, and dissolved, that is, as the activity of making the forms 'what they are', we may say that meaning is being, in the same way in which Aristotle's formal and final cause of things *is* their being.

We should note that Aristotle's concept of formative (and teleological) causation provides only a limited analogy to meaning in that it leaves out the soma-significant activity. Aristotle's 'unmoved mover' can be said to be something like the second and ultimate level of meaning that informs the first one which comprises the whole universe. In other words, he assumes that the 'information content' of the 'unmoved mover' organizes the activity of the whole universe. However, if we take into account that the self-organizing activity of meaning consists of the signa-somatic *and* the soma-significant aspects, we do not need to assume that there is something like an ultimate level of meaning.

The soma-significant aspect points to the possibility o unlimited extension of the overall structure of meaning. That is, it is part of the nature of this meaning structure to be able to go into the meaning of meaning. But to go into the meaning of meaning is, in other words, to create new levels of meaning. This implies that the overall structure of meaning is never. complete or fixed in its content, but rather, it is in a constant movement of creation and transformation. The self-organizing activity of meaning is therefore inseparable from the creative movement of going into the meaning of meaning, which is to say, it is inseparable from what was called intelligence.

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[1] The paper was previously published in *The search for Meaning. The New Spirit in Science and Philosophy*, ed. P. Pylkkänen, Crucible 1989

[2] Bohm, D., *Wholeness and the Implicate order*, ARK Paperback 1984: pp.196-2O7.

[3] Bohm, D., *Unfolding Meaning*, ed. D. Factor, ARK Paper back, 1987: p.17.

[4] Bohm, D., & Peat, F.D., *Science, order and Creativity*, Bantam, 1987: p.9O.

[5]Taking into account that this new kind of 'informing' activity of the wave does not fall off with the distance, we get in this. way a simple explanation of the wave-particle duality.

[6] . This, as Bohm points out, explains a non-local correlation of particles that could be apart from each other, but nevertheless capable of being affected by the information content o their common wave function whose effect does not fall off wit! the distance.

[7] '...in the sense that not only is the actual activity of the whole field enfolded in it, but also all its potentialities.' Hiley B.J., & Peat, F.D., *Quantum Implications: Essays in honour of David Bohm*, Routledge & Kegan Paul, London, 1987: p.43.

[8] ibid: pp.43-44.

[9] By 'structures' we understand here not only explicate objects, but also forms of their activity (i.e. movement and interaction).

[10] See Bohm. D., Meaning and Information, in *The Search for Meaning. The New Spirit in Science and Philosophy,* ed. P. Pylkkänen, Crucible 1989

[11]The constituent terms of these two names referring to the activity of meaning are: *soma* as *the physical*, and *significance* as *the mental.*

[12] For example perception of the significance of a set of ideas, perception in art and science concerning subtle orders and relationships., perception of the significance of life in general, etc.

[13] Bohm, D., Unfolding Meanin& ed. D. Factor, ARK Paperback, 1987: p.78.
[14]As it is shown in Bohm's causal interpretation of the quantum field theory.

[15] The word 'motion' refers here not only to displacements of bodies, but also to all kinds of qualitative and quantitative changes (like becoming, modes of behaviour, transformations, disintegrations, etc.)

[16] .'The word "nature" is etymologically derived from the word for "living thing". The Greek word *φυσιξ*, which we find reflected in *physics* and *physical*, has reference to the life of plants. Its Latin equivalent stems from nasci, "to be born". This has several forms: *na(c)tivitas*, "birth", and *na(c)tura*, "vitality", "vital operation", etc. This would imply that nature is conceived of as an intrinsic principle; that is, it refers to those basic operations which spring from the essence of an object, being developed in, from, and by the object rather than imposed on it from the outside. In other words, "nature" has always been considered as an existing pririciple of development from within. In short, "nature" is an intrinsic principle of operation within things.' L.A. Foley, *Cosmology, Philosophical and Scientific*, The Bruce Publishing Company, 1962: p.63.

[17] However, recent developments in science are beginning to recognize the formative and teleological factors. For example, R. Sheldrake's hypothesis of formative causation in biology and beyond (see R. Sheldrake, *The Presence of the Past*, Collins, 1988), and Prigogine's theory of dissipative structures, applicable in a quite general range of domains (see I. Prigogine and 1. Stengers, *Order out of Chaos*, Flamingo, 1985).

[18] It is interesting that as long as nature was equivalent to an innate principle of motion (which was assumed to be ordered), there was no idea of 'natural laws'. As far as we know, Aristotle's concept of law was applicable only to the

behaviour of people. Moreover, laws were said 'to be derived from "nature herself and the truth". The law that most conforms to "nature" is the best law.' (Lloyd G.E.R., *Aristotle: the growth and structure of his thought*, Cambridge University Press, 1968: p.34.) In other words, laws had to 'obey' nature. Since from the time of Descartes nature began to mean a disjointed collection of objects pushing each other from the out side, it was necessary to introduce the idea of laws which governed this multiplicity of movement, whereby providing it with some order. The laws began to function as a kind of 'outside' authority to be obeyed by the world of objects. In this context it is particularly interesting that the word αρχη which Aristotle used for what we, translate as 'cause' or 'principle', means also 'seat of authority'. We may thus suppose that for Aristotle the causes that were inseparable from what things are were at the same time their immanent 'law', or, their immanent 'authority'. That is, *to be* a thing and to follow 'laws' had an identical meaning for him. Therefore there was no need for any 'external' law, or for any additional authority to keep things on the right track.

MIND AND ITS WHOLENESS[1]

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In my previous paper in this volume it was said that mind can be understood as the many-level activity of meaning. This would imply that creative perception of ever new meanings should be natural for the human mind. Such a perception, as Bohm suggests, plays a crucial role in maintaining the overall harmony of human existence. on the other hand, we do not see much harmony in the life of individual human beings or in society, and even less in the international context. It is apparent that the global threat of annihilation and misuse of the planet cannot be taken as a display of cosmic harmony.

We may therefore ask, why perception of new, creative meanings does not take place. What is blocking it, or interfering with it to the extent that it seems impossible to see it as having any significant place whatsoever in the overall order of human life? We do not seem to be inclined to consider seriously even its possibility. In this paper we will inquire into these questions with the help of Bohm's 'meaning view'.[2]

ABSOLUTE NECESSITY OR THE TRAP PRINCIPLE

The important point which Bohm makes is that the meanings which constitute the content of consciousness are limited. There is obviously

nothing wrong with that to the extent that these meanings are not confused, and correctly inform our activity within a range of domains where they are relevant. This is actually what takes place in some areas of our technical, practical, and functional activity.

However, the limitation of meanings becomes very serious, if not destructive in its consequences, when we are not aware of it. What takes place in such cases is that meanings which may be relevant within certain limits, become confused when applied beyond these limits.

In the first place we are concerned here with general assumptions and presuppositions which constitute, as it were, a formative level of our activity. What is special about confused meanings at such a fundamental level is that once they are adopted, the whole of our activity becomes a kind of self-sustaining trap designed to defend them.

One form of such a trap is to hold rigidly to one's worldview. That is, to regard it, tacitly or explicitly, as a necessary truth about 'how things really are'. What takes place in such a case is that an absolute necessity is attributed to the meanings that are limited. In this way they appear to be unlimited and become a source of confusion. For since they are the 'truth', everything else has to give way to them. They take on an absolute priority, or an absolute value, dominating one's thinking, perception, and activity in general. As Bohm writes:

> This kind of trap is very difficult indeed to get out of. For the presupposition of absolute necessity operates before one can think reflectively. By the time one can think in this way that he must get out of the trap, he has been carried very far into it by the operation of the stored up presuppositions. It is generally already too late, because by then, one has begun to relieve his sense of uneasiness about what he is doing by means of various forms of self-deception. For example, one may invent false reasons (or rationalizations) that seem to justify not eliminating contradictions in his overall behaviour, and he does this because the sense of necessity is so absolute that it will yield nothing, while everything else, including truth and observation of fact must give way to it.[3]

Such a 'trap-principle', consisting in attributing an absolute necessity to limited meanings, is quite a common contradiction. It operates not only in individual human beings, but also in social groups, and in society as a whole, becoming in this way a dominant factor in the generative order of society.

> In society, the generative order is deeply affected by what has a very *general* significance. Indeed the generative order may be regarded as the *concrete activity* of the *general.* This takes the form of general principles, general aims, and generally accepted values, attitudes, and beliefs of all kinds that are associated with the family, work, religion, and country. In going from these general principles to the universal, it is clear that the effect on the generative order will become yet more powerful. When a given principle is regarded as universally valid, it means that it is taken as absolutely necessary. In other words, things cannot be otherwise, under any circumstances whatsoever. Absolute necessity means 'never to yield' . . . Over a limited period of time, certain values, assumptions, and principles may usefully be regarded as, necessary. They are relatively constant, although they should always be open to change when evidence for the necessity of the latter is perceived. The major problem arises, however, when it is assumed, usually tacitly and without awareness and attention, that these values, assumptions, and principles have to be absolutely fixed, because they are taken as necessary for the survival and health of the society and for all that its members hold to be dear... General principles, values, and assumptions, which are taken in this way to have absolute necessity, are thus seen as a major source of the destructive misinformation that is polluting the generative order of society.[4]

It is clear that this kind of misinformation[5] is destructive, because it is implicitly conflict. Individuals, social groups, and nations, entrapped in incompatible sets of basic presuppositions, cannot do otherwise than protect themselves against the threat which they represent for each other. This protection takes various forms, including, as was pointed out, self-deception, but also, all kinds of violence, and the recent development of nuclear weapons. In this way, the very means of protection bring about proliferation of further conflict.

The current state of fragmentation can be regarded as a byproduct of this general attempt to defend and maintain different fundamental meanings. In

other words, fragmentation of human beings and society can be seen as the somatic result of the self-defensive activity of these meanings.

In my previous paper it was said that the world in which we live is for the most part shaped by meanings that make up the content of human consciousness. Insofar as this manmade world is fragmented, full of conflict and violence, we may suppose that the meanings which make up human consciousness are fundamentally confused. They are picked up by each individual through upbringing, education, tradition, culture, etc. The content of consciousness of the individual human being can be therefore regarded as a particular outcome of these general meanings. What follows is that the pattern of self entrapping activity which these meanings entail, cannot be said to be something different from the activity of each human being. In this way, confused fundamental meanings seem to constitute the very essence of what we are, and it is only natural to protect the essence by all means, because if the essence is gone we are gone as well.

It is clear that the self-entrapping pattern of the mind's activity with its attendant conflict and disharmony, is nothing new. At least as far as the recorded history of mankind goes, there have always been attempts to bring harmony into human life. This suggests that conflict and disharmony were inseparable from human existence.

HISTORICAL EXAMPLES OF DEALING WITH MISINFORMATION

Concerning the historical attempts to bring about harmony, it is interesting to note that they were generally directed at somehow making human beings *see* the whole. Typically, however, this has taken the form of *providing an idea* of the whole.

One form of these attempts were religious systems. They may be said not only to give an overall scheme of things in terms of their value and origin, but also to provide a set of rules for people to follow in order to fit their whole activity into the overall harmony.

Absolute value was given to God as a source of all that is. Misinformation was acknowledged as taking place on the 'human level', but it was punished as a sin. To avoid sins meant in other words to hold to the correct information, and therefore, to maintain the overall harmony. In order to secure the credibility of the 'original information' concerning the universal scheme of things, this information was regarded as a revealed truth coming out of the very source of all that is. To doubt this was a sin to be punished.

In this way, the whole structure was quite consistent. It could really bring about some limited harmony, insofar as it was generally accepted, and the 'original information' was not confused. In fact, it has been working for several centuries, except that as a way of self-protection, other forms of religious meanings were constantly fought against. The point, however, is that the 'original information' eventually came to be questioned. The whole' provided by religion had to be a solid ground which would enable human beings to know not only how to behave in their everyday life, but also how to think about the material universe. This latter question was settled by making Aristotle's philosophy compatible with the religious meanings through replacing his 'unmoved mover' with the Christian form of God. This added quite a substantial content to the overall religious scheme of things.

There was a certain danger in that as well. For in ,this way Aristotle's view of the universe, or at least its theological interpretation, became a part of the only admitted truth with regard to 'how things are'. In other words, it became a necessary part of fundamental meanings which were to keep order in the life of human beings, if not in the whole universe. Thus, when Aristotle's map of the universe came to be questioned, it was dangerous for the whole religious structure of meanings. It seemed that to question any

part of the structure was to question the necessary and universal order arranged by God. In other words, to question was a sinful activity which had to be punished. Indeed, Giordano Bruno was sent to the stake, and Galileo was jailed, and that was part of the way to protect. this particular form of the universal order.

Nevertheless, evidence kept accumulating, suggesting that something might be confused concerning the set of meanings provided by religion. To prevent a total chaos, which the collapsing of the religious meanings was believed to imply, attempts were made to provide a corrected version of 'the whole'. Finally, the nature of the material was left to be dealt with by science, whereas what was non-material remained the concern of religion. In this way, the 'original information' go divided into two parts. One part of it was based on revealed truth and belief in it, while the other was based on experiment and logic. The initial idea was that these two parts were not of equal status. The revealed truth was regarded as being of a higher quality than the truth of logic and experiment which was dependent on man.

What is also important to note is that this division in the 'original meanings' went in the first place through man, splitting him into material body and non-material soul, and in the second place, through the whole universe, splitting it into material stuff and ensouled human beings. Since to be of nonmaterial quality was regarded as of a higher value than to be material, it is interesting to see that this may well have originated the process which at present manifests itself as ecological disaster. Of course, it is only one of the numerous consequences of this particular attempt to bring about harmony in human life. The corrected version of 'the whole' made it possible for science to develop, since scientists were left to investigate matter without being sent to the stake when they came out with facts incompatible with religious meanings. However there was also a danger in that, although of a more subtle nature.

Descartes, who set out to elaborate in more detail the corrected version of 'the whole', made it quite clear that there is very little need for non-material elements in the universe. He only needed God for designing the laws of nature, and for providing the universe with a certain amount of movement. All the rest he has shown to be possible for man to figure out by himself. There was also the problem of how to secure that part of the 'original meanings' which was dependent on man. Since one could not any longer use Aristotle's authority, Descartes came out with the notion that clear and distinct ideas are implanted in man by God. Consequently, our knowledge of the universe was regarded as ultimately secured by God who provided *cogito* with clear and distinct, and therefore true, ideas concerning the world.

Although the role of the religious part of the 'original meanings' was not big in Descartes' structure, it was nevertheless crucial. However, it was almost inevitable that with this explicit decreasing of the non-material element, and the increasing content of science, the religious meanings could in time be overlooked altogether. Indeed, the amount of accumulated knowledge appeared at a certain moment large enough to provide man with a new notion of 'the whole', without non-material elements being involved. It was put explicitly in the form of mechanistic philosophy. In this philosophy the 'original information' was based on the belief in the unlimited credibility of the mechanistic approach. This did not explicitly contradict the other belief in the revealed truth. However, since the highest value was given now to the methods of the mechanistic approach, religious 'truths', which could not be subjected to this approach, were disregarded as a kind of illusion`.

We can see that this form of 'the whole' did not help very much in bringing about harmony in human life. Insofar as human beings obeyed physical laws, they participated in the kind of harmony which the mechanistic philosophy was concerned with. Furthermore, it was not clear how the 'truth' of the mechanistic idea of the universe was secured. Descartes grounded in God the human ability to perceive the world in the correct way. But if God was

an illusion, who or what was to secure the credibility of our ideas of the universe? They might be an illusion as well. On the other hand, the immense success of Newton's physics at that time did not seem to be an outcome of illusion. Consequently, the next generative seed of 'the whole' can be seen in Kant's inquiry into the basis o human knowledge. He did not regard God as an illusion. But by looking more carefully into Descartes' *cogito* he found that the *cogito* is the only author of the structure of the phenomenal world of experience. This obviously solved, or rather dissolved the problem of how human ideas and the external world are related. There were simply no two kinds of things in need of being related. The mind's general forms of understanding, or as he called them the *categories* of the subject — were entirely responsible for the structure of the phenomenal world.

To put it in modern terms, Kant's claim was that the information content represented by the categories informed the phenomenal structure of the world. In other words, active information, contained in the subject's forms of understanding, organized unformed matter into the unified world of experience. However, Kant's version of 'the whole' was not secured enough. There was no guarantee that the categories were not arbitrary, and even different for each subject. The issue was, what made the categories necessary and universal? Another important point was the rather limited competence of Kant's subject. The categories organized only the phenomenal world of nature. To put the issue simply, Kant's 'whole' did not seem *total* enough. Accordingly, it was subsequently improved by means of extending the range of the subject's competence. It culminated with Hegel who replaced Kant's subject with the absolute spirit.

It is interesting to note that with Kant, Descartes' God became quite unnecessary with respect to the phenomenal universe which could manage to exist due to the subject's forms of understanding. However, through replacing the subject with the absolute spirit, a new form of God returned to serve as the formative cause of the universe. Thus God, although first taken

away, came back, as it were from another side, to secure again the necessity of the universal order.

There was a certain danger in that as well, since the absolute spirit of Hegel was far more concrete than the non-material God of Descartes. Roughly speaking, the absolute spirit worked on a similar principle to Kant's subject in that it informed the structure of the world. However, the important difference was that it informed not only the world of nature, but the totality of what is, including human beings, society, historical processes, etc. In other words, the absolute spirit unfolded as the whole of manifest existence.

There was a certain purpose in this objectification of the spirit, namely, to rediscover itself in the sense of its coming to self-consciousness in and through man. This teleological activity rendered absolute necessity to all finite forms of existence. In particular, it provided - in this way - the phenomenal world with a necessity to exist, which was evidently lacking in Kant's 'whole'.

However, necessity concerned here not only the phenomenal structure of the world, but also all forms of existence extended in space and time. All finite forms were necessary 'moments' of actualization of this immense process which dialectically progressed towards self-realization of the absolute spirit.[6]

There was evidently a danger in this kind of 'the whole'. It was too total, there was no room for sin here. Whatever happened was regarded as a necessary 'moment' of the universal order. Disharmony, conflict, confusion, violence and war, were all necessary aspects of the absolute harmony. Hegel's philosophy was in fact misused by some fascist 'philosophers', and may have played its part in bringing about the historical series of disasters that have followed since.

The other issue was that, concerning Hegel's 'whole', the 'original information' (enfolded in the absolute spirit) was regarded not to be different from the actual world. After the spirit's self-actualization, which Hegel supposed had already been accomplished, knowing became equivalent with being. It may well be so in some subtle sense, but looking superficially at the issue, one might suppose that there was a certain kind of excess concerning this kind of 'the whole'. If a map is not different from the territory, one of these two things might appear rather unnecessary.

To be precise, the very source of the manifest order was the spirit's striving towards self-realization, and in this way the manifest order could be understood as the absolutely necessary order. But it might be easily overlooked, or regarded as not very important. Therefore we should not be surprised that it actually was overlooked, or perhaps ignored, and subsequently Marx came out with the next 'corrected' version of 'the whole'.

In Marx's 'whole' the absolute spirit was taken away, and *dialectic* was replaced with *dialectical materialism.* Strangely enough, even without the absolute spirit, dialectical order remained in power over the manifest world. As we know, Marx's 'whole' got eventually actualized in the form of totalitarian social structures, bringing about the next series of divisions between groups of people and nations, with all the attendant conflict and destruction.

THE NATURE OF THE CHALLENGE

The above discussion concerns only a small, though representative fragment of the human activity of dealing with misinformation. The basic pattern of this activity is, as could be seen, that one set of limited meanings which are taken to be unlimited, is replaced with another set of limited meanings with the same necessity attached to them. In consequence, by trying to clear up one kind of misinformation, the very same thing is done again, that is

another structure of misinformation is introduced. In this way, misinformation multiplies because new 'necessary' meanings are superimposed on the old ones, making the structure of confusion more and more entangled.

It is not surprising that the present state of the individual and society is the state of thoroughgoing fragmentation, being basically the result of these contradictory attempts *to clear up misinformation by creating more of it.* Insofar as the past meanings have been somatically actualized, they brought about the present form of social structures (including divisions into nations, religions, etc.), and the structure of our material environment. However, what is even more important is that these meanings became inbuilt into the content of our consciousness, being absorbed, as noted earlier, by each of us through education, tradition, culture, etc. In this way, misinformation of the past is active now, informing both the outward order of human life and inward order of consciousness This order of consciousness, with all the conflict and destruction which it implies, seems to be the challenge that faces human beings at present.

As we pointed out, it is not a new situation, but its present display appears to have reached a critical point. It is almost evident that the historical pattern of trying to deal with misinformation cannot be repeated. Furthermore, contemporary approaches do not offer any solution either.

Science cannot help. It seems that in its striving to get more and more results, it has lost the capability of understanding not only its own results, but also, why it is doing what it is doing.

Philosophy cannot help. Modern philosophers work with details of small questions which they manage to accept as having sense within a limited framework. However, they cannot decide whether the very framework makes sense. The statement that the world is collapsing is regarded as too general to make sense.

Old religions have lost their meaning (if they ever had any) and fight with each other out of a long tradition. New religions enter the same old pattern with a fresh hope.

Thought cannot help, being basically part of the activity of accumulated meanings, nor can feelings, will, desires, beliefs, intentions, and plans, which are dominated by the same old meanings.

Then, there are contemporary political attempts to bring about harmony. The only thing which distinguishes these attempts from past attempts, is that somehow on the way to protecting some basic meanings, human beings have managed to produce an amount of nuclear weapons capable of annihilating the life of the planet many times. Consequently, the first of these nuclear-based attempts is bound to be the last. This makes it more or less clear that the historical pattern cannot be repeated, unless we do not care about surviving as the human species, or about the life of the planet in general.

To put the whole matter simply, the present challenge cannot be met in terms of the actual order of the mind's activity. The issue is whether this order is the only possible order of the mind's operation. In other words, is this order necessary in the sense of being built into us, so that we cannot do otherwise than to program ourselves in this ultimately destructive way?

Of course, if that is the case, there is no way out. But on the other hand, this would imply a rather strange state of affairs. It would force us to state, taking into account all that has been said thus far about nature, that except for man-made machines, the only mechanical order in nature is the order of consciousness. This would be an exact reversing of the Cartesian view. However, it may well be so, insofar as the present order of consciousness is, as well, man-made, and insofar as we assume that there is no way out.

Another way of looking is not to assume anything about the question. Yet the point is to see that to meet the challenge in a relevant way, means no less than to transform the order of consciousness. Whether there is actually such a possibility is another mater, but the urgency to consider it is evident.

In a sense, Bohm's view is a step in the direction of taking more seriously this possibility. The transformation of consciousness is far more compatible with his view than, for example, with Descartes' view of the universe. Though we should not take Bohm's view as the next set of 'necessary meanings' (nor does he ever propose that it be taken this way), we may consider how his position maps the situation.

WHAT IS THERE TO BE HEALED?

Bohm notes that humanity "has three principal kinds of dimensions—the individual, the social, and the cosmic—and each of these must receive its appropriate attention"[7] The cosmic dimension, he explains,

> ...is concerned with human relationship to the whole, to the totality of *what is*. From the earliest times it has been considered crucial, for the overall order of the individual and society, that a harmonious relationship be established with this whole. Indeed it was commonly believed that such a relationship would serve to prevent or dissolve the various sorts of difficulties... in connection with destructive 'misinformation' and with the tacit infrastructure of consciousness.[8]

Furthermore, an actual contact with the whole was thought to give the ultimate significance to human life in that it would enable man to see how his life fits into the universal context of all that is.

Human beings have always been trying to establish this contact. It is difficult to say how it got started, but since nothing has fundamentally changed since the beginning, we may well see the basic pattern of these attempts in the historical examples already discussed.

Thus, as we noted, an idea of the whole is introduced and articulated more or less explicitly. What eventually takes place a little later, is a sort of collapse of its credibility. That is, the limitation of the 'original meanings' manifests as a failure of these meanings to produce an expected universal harmony. It is generally felt that 'the whole' is not exactly what it was supposed to be. Consequently, it gives rise to attempts aimed at making 'the whole' better and more credible. The very concept of introducing 'the whole' has not been questioned. What was questioned was its quality. Therefore the subsequent attempts concerned themselves only with improving the quality of 'the whole'.

As could be seen, this has taken various forms, like changing the content of 'the whole' through, for example, adding or taking away the absolute spirit, extending the content by adding to it more knowledge in order to make it more universal, improving the means to make it more certain, etc.[9] Although the content of 'the whole' changed in this way, the basic principle remained the same, namely an absolute necessity attached to whatever would be its content.

To use Bohm's terms, by introducing 'the whole', a certain information content enters the formative level of the mind's order. This content then determines the structure of the signa-somatic and soma-significant activity. Absolute necessity attached to the content turns this structure into a kind of self enclosed trap. That is, one's whole activity consists in carrying out the somatic consequences of the meanings which make up the content, and in assimilating whatever is perceived in terms of these meanings.

What is the way out of the structure which is set up by a not quite viable set of meanings? As traditionally pursued, it is by means of setting up another structure. That is, by means of superimposing a new order on the old order of the mind.

Such an approach is evidently quite a relevant approach in dealing with the material environment, where things can be improved by fitting them into a better kind of designed order. The question is whether this mechanistic approach can be extended into the realm of mind or meaning. We should also ask whether such an extension is not based on the same principle which is behind the failure of the original structure, namely applying meanings beyond the limits of their relevance. This clearly seems to be the case, and thus the traditional way of healing disharmony is in fact the very means of sustaining and perpetuating the confusion which it is supposed to heal.

We may ask what has actually been accomplished in this whole endeavour of trying to heal disharmony, which has continued throughout the ages, or perhaps millennia of human existence? It seems that nothing special has been done, or rather, *nothing at all with regard to the very aim.* There are some byproducts of this activity, like the development of science and technology. But it is clear that the use of these byproducts is ultimately informed by whatever constitutes the basic meanings of mankind.

There is, however, one quite remarkable result of all this endeavour. This is the present somatic set-up of the brain, its basic pattern of activity, engraved into the brain cells through thousands of years of repetitive activity. The challenge to change the mind's order of activity involves, therefore, disentanglement of this somatic set-up of the brain.

The question arises whether this is possible. What seems to be implied by Bohm's view is that this somatic structure, like any other somatic structure, is not an independent form of 'substance', but rather it is a form of 'subsistence'. That is, *its apparent substantial nature is due to a constant activity of more subtle levels of meaning.* A change in these meanings would be therefore a change in the order of this somatic structure.

As has been noted in my previous paper, the overall structure of meaning is capable of unlimited extension. For the mind this implies that it may go

beyond any level of meaning. That is, whatever structure of meanings constitutes the content of consciousness, the meaning of these meanings can be perceived. But such a perception is already a change in these meanings in the sense that it makes it possible to see whether they make sense.

Such a capability of going beyond any level of meaning has been called *intelligence*. We may thus say that intelligence is the activity which is able to change the meanings, and therefore to affect the somatic set-up of the brain that is sustained by these meanings. This would entail a new order of the mind's activity in the sense that if this kind of perception takes place, the mind ceases to be dominated by the meanings in which its activity is entrapped. In other words, *the mind would enter another order which is informed by free, creative perception, or intelligence.*

What has been said here implies something different from replacing destructive meanings with some kind of 'correct' meanings, which obviously would be nothing new. Rather, the concern is a total shift at the core of the mind's order of activity, from the existing pattern of programming and reprogramming itself, to the order guided by intelligence. For that to take place, perception has to be very profound indeed, so as to reach the generative source of the pattern. As Krishnamurti used to say, there has to be a total insight which can make it possible to see the very essence of the pattern, that is, its basic structure and origin. Such an insight seems to be the necessary step for the mind if it is to enter another order of activity.

To put it differently, what is to be healed is not this or that set of confusions, but *the very way of healing* as it has been pursued from the beginning of mankind up to the present. Taking into account all of what the traditional way of healing entails, we may suppose that the notion of healing the mind by modification of its accumulated content is altogether misdirected. It may be said that by entering this pattern of activity, mankind has taken a 'wrong turn', as Krishnamurti and Bohm call it,[10] which however, as they say, can be diverted through insight into its very origin.

That would imply that the order of the human mind, as it is now, is not necessary, nor is it inevitable for human beings to go on with the 'wrong turn'. In other words, the thought-created order of the human mind does not seem to be its only possible order.

We may suppose that the mind which ceases to be dominated by accumulated meanings would be capable of free, creative perception. If it is not caught again at some stage — that is, if perception is sustained, there seems to be no limit to its activity of going beyond any level of meaning. There is nothing fixed about such a mind, nor is its order limited in any arbitrary way. And that is already different from being bound by the necessity inherent in the accumulated meanings, which is what the present activity of the mind is all about.

As was pointed out in my previous paper, the possibility of going into the meaning of meanings is inseparable from the whole signa-somatic and soma-significant activity. That is to say, it is not limited to any particular context, but rather, it is a key feature of the ordering and forming activity of the whole. That seems to imply that the order of the mind which is capable of sustained and intelligent perception is basically not different from the order of this whole signa-somatic and soma-significant movement. In other words, it is not different from the order of the universe.

All this suggests that it is possible for the human mind to participate in the universal order. One may suppose that if this possibility were actualized, the need to impose any additional, thought-created order on the mind would cease to exist. This means that the present structure of human consciousness would cease to exist, along with all the confusion and conflict that it entails.

A STEP IN A NEW DIRECTION

One has to note that there is a traditional danger here of taking this whole discussed map as a description of 'how things really are', which is again an attempt to order the mind starting, as it were, from the wrong end. This, however, does not deny that the map can be viable up to a point. What we need to emphasize is that a rigid commitment to any map entails the notion of absolute necessity, and that is bound sooner or later to bring about the same kind of confusion which was supposed to be cleared up by the map. This is an important point, since that is what usually seems to take place in human approaches to the issue of healing disharmony.

As we noted earlier, there are religious approaches which try to heal the situation by providing a view of the cosmic order, with all the rewards and punishments involved that are supposed to make human beings conform to this order. There are also philosophical approaches which, even if they do not involve rewards and punishments, nevertheless try to show that it is a logical necessity to accept a given view of the universal order. Both of these approaches are similar in that they aim at a modification of the accumulated meanings in the way which would make the activity flowing out of them more harmonious. The problem, however, is that none of these approaches have produced the expected harmony in human life. On the contrary; absolute commitment to different notions of the universal order has resulted in the proliferation of further fragmentation and conflict.

These approaches do not exhaust human attempts to deal with the situation. There is also another, more radical tradition. What it proposes is that instead of modifying the content of accumulated meanings, we should get rid of them altogether, because it is just these meanings that are regarded as the source of disharmony.

There are two main lines of this tradition. The one associated with Vedanta maintains that there is ultimately something ordered and permanent in

human beings, which is not different from the very essence of the universe. If it could only be uncovered, by getting rid of all the unnecessary accumulation of meanings, the human mind would become one with the cosmic order. Another line, namely Buddhism, goes a step further. It claims that even this notion of something ordered and permanent in man, which is supposed to be covered up by misinformation, has to be taken away, because it is still a part of misinformation.

Although these approaches are not explicitly attached to any particular notion of the ultimate order whose nature, they say, cannot be articulated, they are evidently attached to their advocated ways of getting rid of all the superimposed orders. And so, they do not bring about much more harmony than the other approaches. Their commitment to different ways of trying to heal the situation entails the same notion of absolute necessity which entraps groups of people within a host of incompatible concepts, giving rise in this way to the same proliferation of divisions and conflicts.

Perhaps the kind of perception around which the formalized attempts to heal disharmony got built was not always bound by the accumulated meanings. For example, a few individuals whom religious traditions regard as their originators are reputed to have had quite different mode of perception from that of the ordinary mind. If that were an actual fact, we may suppose that in some cases perception might well have been free and creative.

If there were indeed such individuals, their value for the rest of humanity would be considerable if only an actual communication could be established with them. That is, if their perception could be shared, i.e., actualized as common for human beings. The question is, however, whether free, creative perception can be communicated, and what it would mean. Evidently, it is not a matter of conveying an idea or description which then becomes a part of the accumulated meanings.

Suppose that there is a perception that the overall order of consciousness does not make sense. Such a perception is strongly resisted by the self-defensive activity of the accumulated meanings. Usually this resistance takes the form of either ignoring whatever is pointed out as entirely irrelevant, which is the end of communication, or turning it into a belief, that is, into a fixed meaning superimposed on all the other meanings which make up consciousness, which is another form of escaping communication. In this way, communication is not only cut off, but the possibility of learning is denied, since absolute commitment to any belief holds the mind entrapped within a limited pattern.

How then can communication take place? Krishnamurti, for example, says that it is necessary to listen. However, the kind of listening he is referring to is not a case of accepting or rejecting whatever one hears according to whether it fits or does not fit one's idiosyncrasy. What seems to be implied is that the kind of listening which is called for is already a form of free perception in that it is not bound by the necessity inherent in the listener's idiosyncrasy. This means that it is already a change in how the mind works, and that may eventually open the way to a more fundamental transformation of the mind's overall order of activity.

But suppose that there are no such individuals around, which quite generally appears to be the case. Then all that is left seems to be that we have to listen to each other. In fact, the very listening may be more important than the actual presence of an individual who apparently is no longer bound by the accumulated meanings. If there is no listening, whether such an individual is present or absent makes no difference. This presence may have a profound significance in some other sense, but considering the nature of the present challenge, something else seems to have a priority, since not so much time is left. Whatever potential of the mind would be represented by such an individual, there is a very small chance of its general actualization, if the rest of humanity remain as they are.

One may ask how the notion of listening to each other can be at all relevant in the situation when we all seem to be dominated by the same meanings. A significant insight into this question is given by Bohm's proposal to explore and experiment with what he calls 'dialogue'.

> The term *dialogue* is derived from a Greek word, with *dia* meaning 'through' and *logos* signifying 'the word'. Here 'the word' does not refer to mere sounds but to their meaning. So dialogue can be considered as a free flow of meaning between people in communication, in the sense of a stream that flows between banks.[11]

As he emphasizes, dialogue is something different from an ordinary conversation or discussion where people argue from their fixed positions, and that leads either to confrontation or to agreement, if whatever may present a threat to any of the positions is not avoided altogether. In other words, an ordinary discussion does not lead beyond the meanings which constitute the participants' collective idiosyncrasy. It is thus seriously limited by the form of the 'banks' represented by the various points of view of the participants.

What Bohm seems to suggest, using the metaphor of the stream, is that the flow of meaning involves both the stream and its banks. That is, a free flow is primary, and it is actualized as a constant two-way activity of the stream shaping the banks and the banks shaping the stream.

> In dialogue it is necessary that people be able to face their disagreements without confrontations and be willing to explore points of view to which they do not personally subscribe. If they are able to engage in such a dialogue without evasion or anger, they will find that no fixed position is so important that it is worth holding at the expense of destroying the dialogue itself.[12]

For that to be possible —

> What is essential is that each participant is, as it were, suspending his or her point of view, while also holding other points of view in a suspended form and giving full attention to what they mean ... Such a thoroughgoing suspension of tacit individual

> and cultural infrastructures, in the context of full attention to their contents, frees the mind to move in new ways... The mind is then able to respond to creative new perceptions going beyond the particular points of view that have been suspended.[13]

It should be emphasized that what needs to be suspended in this way is the self-defensive activity of each participant's idiosyncrasy which prevents listening. If that takes place, the mind's activity ceases to be dominated by the accumulated content of meanings, and in this sense we may say that the mind begins to move in a new way.

Basically this is what is called for in the case of each individual: to be able to give attention to one's accumulated meanings, while suspending the necessity of carrying out their activity. This is what is required, if the mind is ever to-be free of its self-created program. The content of dialogue provides, as it were, better conditions for that to take place. In a group of people with various backgrounds, it is easy to see that the commitment of others with all the destructive consequences involved is not different from one's own commitment, and that the absolute necessity inherent in all these commitments is in fact of a relative nature. In this way, the notion of 'being right' loses its importance which in turn opens the way to the possibility of a creative response to the whole dialogue situation.

What is particularly important however is that by giving full attention to one's own and others' content of accumulation, suspending at the same time its activity, one's particular content ceases to be different from the collective content of the group. In other words, one can see that what is going on in the group is a manifest display of the activity of one's own mind. This provides the participants with the possibility of learning about the 'individual mind' as it is reflected in the 'group mind' and vice versa. This movement of learning may lead to creative perception of a new meaning, which in the dialogue-context of no separation between the individual and collective mind would be a common meaning for all the participants.

Thus one aspect of the significance of dialogue is the creation of a new, common meaning shared by the whole group. As Bohm says, this may be called 'microculture', insofar as "... in essence culture is meaning as shared in society. And here "meaning" is not only *significance*, but also *intention*, *purpose*, and *value*."[14]

However, as was suggested, precondition of this creation of a common meaning is that the rigid socio cultural commitments of the participants are dissolved. This brings out another significant aspect of such a creative dialogue. As was noted earlier, idiosyncrasy is a particular outcome of the general accumulation of meanings. In other words, the content of one's consciousness, that is, one's misinformation, commitments, ideas, etc., have their ultimate source in the general sociocultural accumulation. Therefore dissolution of this general accumulation seems to be the necessary step in clearing up one's individual misinformation. Besides, it is evident that misinformation in the socio cultural context is most destructive in its consequences.

Although it is very valuable to create a common meaning, it does not seem to be the ultimate end of dialogue. When both socio-cultural and individual misinformation is cleared up, it is only the beginning of a new order of the mind's activity. Then the mind participating in dialogue is in fact participating in a creative movement of unfolding ever more subtle and new meanings, and as was suggested, there are no barriers to this movement. It might be that participation in this movement is the actual contact with the whole that human beings have always been seeking to establish.

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[1] The paper was previously published in *The search for Meaning. The New Spirit in Science and Philosophy*, ed. P. Pylkkänen, Crucible 1989.

[2] See, for example, Bohm, D., *Unfolding Meaning*, ed. D. Factor, Foundation House Publications, Mickleton House, 1985: p. 82.

[3] Bohm, D., 'Insight, Knowledge, Science and Human Values', Teacher's College Records 82, 380-402: p. 54.

[4] Bohm, D., & Peat, F.D., *Science Order And Creativity*, Bantam, 1987: p. 238-9.

[5] 'It should be clear that by "misinformation" is meant a form of generative information that is inappropriate, rather than simply incorrect statements of fact. In a similar way a small "mistake" in DNA can have disastrous consequences because it forms part of the generative order of the organism and may set the whole process in the wrong direction.' (ibid: p. 237).

[6] Hegel's extension of Kant's structure is in some respects similar to the extension of the quantum particle theory to the quantum field theory (as discussed in my previous paper). That is, manifest forms and the structure of their activity are regarded by Hegel as phases (i.e., moments) of the overall (dialectical) movement whose structure is 'informed' by the information content of the absolute spirit (i.e., by what he calls 'logos').

[7] ibid: p. 248.

[8] ibid: p. 251.

[9]It is interesting to note that the concept of trying to make 'the whole' more certain may have to do with what Heidegger points to as a change in the meaning of the notion of *truth* which took place over the ages. That is, from the ancient notion of *aletheia* as *unhiddeness* or *unconcealment*, through the Medieval notion of *revealedness*, to the modern notion of *certitude*. Evidently, this requirement to guarantee the correctness of the idea of the whole by logical means is quite a modern one. The more ancient method of making the idea of the whole convincing, which we can see, for example, in the Old Testament, is for the most part violence, and occasionally, miracles.

[10] See Bohm, D., & Krishnamurti, J., *The Ending of Time*, Victor Gollancz, London, 1985.

[11] Bohm & Peat, op. cit: p.241.

[12] ibid: p. 242.

[13] ibid: p. 243.

[14] ibid: p. 354.

Alternative Natural Philosophy Association

Statement of Purpose

1. The primary purpose of the Association is to consider coherent models based on a minimal number of assumptions, so as to bring together major areas of thought and experience within a natural philosophy alternative to the prevailing scientific attitude. The Combinatorial Hierarchy, as such a model, will form an initial focus of our discussions.

2. This purpose will be pursued by research, publications and any other appropriate means including the foundation of subsidiary organisations and the support of individuals and groups with the same objective.

3. The Association will remain open to new ideas and modes of action, however suggested, which might serve the primary purpose.

4. The Association will seek ways to use its knowledge and facilities for the benefit of humanity and will try to prevent such knowledge and facilities being used to the detriment of humanity.

Organisation

1. The Executive Council is the governing body of the Association. It consists of:

(a) All past presidents of the Association.

(b) Officers (acting president, vice president, treasurer, secretary and co-ordinator if one is appointed).

(c) Ordinary members nominated by classes (a) and (b), who serve for three years, with the possibility of re-nomination.

2. Members of the Association are (a) members of the Executive Council and (b) others nominated by the members and approved by the Executive Council.

3. The membership and the Executive Council nominate vice-presidential candidates during the first year of the President's term of office. Any nomination must be accompanied by a statement from the nominee that he will serve a full term if elected. If there is more than one nominee, selection will be made by mail ballot to the Membership decided by plurality of votes. The Vice-President is elected to serve concurrently with the President during his last year of office. He will then serve as President for at most five years and cannot run for re-election until three years after his initial term has elapsed. If the President decides to stand down before his five year term has elapsed, he should give the Executive Council one year's notice of his intention, so that a Vice-President may be elected.

4. The President is the official representative of the Association in external affairs, and has the responsibility for calling meetings of the Membership, at least annually, for the determination of overall policy.

5. The Treasurer is the responsible financial officer of the Association for the receipt and disbursement of funds and shall maintain appropriate records of the Association Activities, membership, mailing-lists, etc.

6. The Secretary is responsible for keeping minutes of the Membership and Executive Council meetings, production of a newsletter to keep members of the Association informed of its activities, and such other duties as may be assigned.

7. President, Secretary and Treasurer will not be paid for their services but may, as appropriate, receive funds for travel expenses, secretarial help, etc.

8, The Co-ordinator, if one is appointed, may be paid an appropriate salary for his services, funds permitting. These services will include the organisation of meetings and the editing of the Proceedings of such meetings for publication, co-ordination of and participation in the research activities of the Association, preparation when appropriate of research reports and publication of such reports, and other such duties as may be assigned.

9. The Executive Council has selected an independent Advisory Board. It may adopt its own rules for the operation and replacement of members. The Executive Council may nominate candidates to the Board. Any member of the Board, or the Board collectively, may make recommendations to the Executive Council, or directly to the Membership. Action taken on such recommendations must be promptly reported by the Executive Council to the Board in writing.

10. Dues are currently £20.00 per annum.

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