PHYSICS, PHILOSOPHY AND PRECOGNITION: SOME REFLECTIONS

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ABSTRACT

The peculiar nature of time has puzzled serious thinkers for millennia. The existence of ostensible precognition, which the author regards as established beyond reasonable doubt, only adds to the problem. This paper examines various time theories, including the block universe of relativistic physics and the work of Dunne, McTaggart, Broad, Dobbs, Lawden and Mundle. The author argues that human freedom of will must be accepted as a datum of our experience, thereby ruling out all deterministic theories. An open future, along the lines suggested by Polkinghorne, seems closer to our experience and more in accord with quantum physics and chaos theory. Alternative explanations of apparently precognitive experiences are discussed in the light of this principle.

INTRODUCTION: THE BLOCK UNIVERSE

Sceptics often argue against the reality of psi phenomena on the grounds that they are 'anomalous'. The implication is that orthodox science has a coherent view of reality into which psi phenomena cannot be fitted without making a number of gratuitous and improbable assumptions (cf. Taylor, 1980). In fact, orthodox science is very far from coherent. In particular, the two great theories of twentieth-century physics—relativity and quantum mechanics—rest on assumptions which are mutually contradictory. Despite the fact that some theorists (e.g. Hartle & Hawking, 1983) have combined formulae from these two branches of physics in order to construct what is usually known as 'quantum cosmology', the conceptual foundations of the two theories remain irreconcilable. Furthermore, many theoretical physicists privately think that the whole subject of quantum cosmology is misconceived (Isham, 1996).

The clash between quantum mechanics and relativity is particularly obvious when we come to consider the nature of time. Relativity envisages a 'block universe', in which time and space are combined to form a space-time continuum of four dimensions. The geometry of this continuum is non-Euclidean (hyperbolic), and observers moving at different speeds relative to one another divide it up in different ways (cf. Eddington, 1929). In the general theory of relativity, gravitation is interpreted as a deformation of the geometry of space-time in the vicinity of heavy bodies, leading to the well-known effect of the bending of light rays as they pass near the Sun. Now in order to be able to geometrise time in this way it is necessary to assume that what we call 'the future' already exists. As Hermann Weyl remarked, "events do not happen; we merely come across them". That this is indeed a clear implication of relativity theory is confirmed by a statement given in a letter from Sir Arthur Eddington to J. W. Dunne, and reproduced in an appendix to the third and later editions of the latter's famous book, *An Experiment with Time*:–

> I agree with you about 'serialism'; the 'going on of time' is not in Minkowski's world as it stands. My own feeling is that the 'becoming' is really there in the physical

> world, but is not formulated in the description of it in classical physics (and is, in fact, useless to a scheme of laws which is fully deterministic). [Letter dated 1/2/28]

Lawden (1981, p.115) makes the same point more succinctly: "... the concept of motion in time is quite foreign to the relativistic mode of thought."

If we are to take the relativity description seriously, then, we have to believe that we live—or, rather, exist—in a static world in which the distinction between past, present and future is a purely arbitrary one, and the moving 'now', the slot through which we seem to observe a passing world outside ourselves, must be some sort of illusion. There is no logical reason why precognition should not occur in such a static world. It would involve some sort of trans-dimensional coupling between events existing at different points in the space-time manifold, perhaps linked by particles travelling faster than light (tachyons).

Turning now to quantum mechanics, we find a totally different picture. Here the future is most definitely *not* fixed. A physical system is represented by a state vector or wave function which evolves deterministically with time, but which is unobservable. The act of observation causes this state vector to collapse into one or other of its possible outcomes (eigenfunctions), but exactly which one is unpredictable in principle. The best that can be done is to compute the probability of a particular outcome. It seems to be generally agreed among quantum theorists that their science points to a future which is truly open or indeterminate, not merely hidden from us. Thus, the celebrated 'Heisenberg Uncertainty Principle' would be more accurately described as the Heisenberg *Indeterminacy* Principle. In this respect the 'uncertainty' of quantum mechanics differs from that of chaos theory, which also deals with unpredictable events. Here, the unpredictability is caused by the large number of variables involved and their sensitivity to small changes in the initial conditions. Large-scale phenomena such as those dealt with in meteorology are unpredictable because a very small change in any one of the relevant variables can produce a 'knock-on' effect which drastically alters the entire system. However, a Laplacean Calculator (an imaginary being who has complete information about the state of the system at any one time) could presumably predict even the British weather with one hundred per cent accuracy, were it not for the indeterminacies present at the quantum level.[1]

Polkinghorne (1988, 1989, 1991) has argued powerfully in support of the view that we live in a universe in which the future is *partially* open, thus allowing for the exercise of free will by both ourselves and the Creator. This model has the advantage of accommodating our instinctive awareness of purpose, our sense of the passage of time and, perhaps, our religious sensibilities. It is clearly compatible with both quantum mechanics and chaos theory. However, it seems to be incompatible with both relativity and the existence of precognition, which require a fixed future. Isham and Polkinghorne (1996) attempted to reconcile the idea of a partially open future with the relativistic concept of the block universe at a conference held in the Vatican

[1] The unpredictability of large-scale phenomena is sometimes known as 'the butterfly's wing effect', since it is said that the flapping of a butterfly's wing in a tropical rain forest can have a knock-on effect on the weather systems over Europe.

Observatory in 1991; but although the points they made are interesting, they do not seem to me to resolve the fundamental issue, which arises from the geometrisation of time in relativity. It seems curious that one of the objections made by philosophers to Dunne's theory of 'serialism' was that he had hypostatized time; to the best of my knowledge, Einstein and Minkowski have never been arraigned on the same charge, although they did much the same sort of thing!

Theories of Precognition

It seems certain, now, that there are some people who obtain non-inferential information about events before they have happened. The evidence is overwhelming, and ranges from cases which have occurred spontaneously in dreams and in the waking state (Barker, 1968; Dunne, 1934; Lyttelton, 1937; MacKenzie, 1974; Saltmarsh, 1938; Vaughan, 1974) through to laboratory experiments with drawings, cards, various mechanical and electrical devices, and random event generators (Anderson, 1959; Carington, 1940a, 1940b; Honorton, 1971; Rhine, 1938; Schmidt, 1969; Tyrrell, 1936). Indeed, it would seem to be almost pointless to go on collecting evidence for the occurrence of a phenomenon which has been known from antiquity and which has such a solid body of nineteenth and twentieth century data in support. Clearly, what is needed is some sort of explanatory model or theory. A former President of the SPR once characterized parapsychology as "strange facts in search of a theory" (Mundle, 1973) and nowhere is this description more apt than in the case of precognition.

Theories of precognition are inevitably theories about the nature of time, of which St Augustine declared "If nobody enquires of me, I know; but if I wish to explain to an enquirer, I know not".[2] Philosophers and scientists have wrestled with the problems and paradoxes of time for millennia, but in the past hundred years or so there have been some novel developments which may, perhaps, enable us to make a little more progress than our predecessors.

First, I would draw attention to the work of what one might call the 'Cambridge School' of time philosophers, consisting of J. M. E. McTaggart, his pupil C. D. Broad, and *his* pupil Adrian Dobbs. McTaggart (1927) analyzed our experience of time into what he called the 'A-series' and the 'B-series'. These correspond roughly to what we may call the extensive and the transitory aspects of time. Viewed simply as a sequence of events bearing the relationship of earlier or later to each other, time becomes a dimension in which events occupy fixed positions (thus, the death of Henry VIII is *always* later than the battle of Hastings). In this respect, time is similar to space. The other aspect of time, McTaggart's B-series, involves labelling events as past, present or future, and this is a labelling which continuously changes (my next birthday currently lies in the future, but it will eventually become present, and then past). In trying to analyse this onward movement of time, McTaggart found himself falling into the arms of an infinite regress: if time is regarded as moving, then we need a second time to time its movement, and so on *ad infinitum*. McTaggart regarded this regress as incurably 'vicious', and used it

[2] Si nemo ex me quaerat, scio; si quaerenti explicate velim, nescio.

as the basis of an argument against the reality of time. Broad concluded that he was right to do so (Broad, 1935; see also Hinckfuss, 1975, chapter 5).

J. W. Dunne was not a professional philosopher, but he was an extremely competent scientist, mathematician and aircraft designer. His books were written in a chatty style which made them more easily accessible to the public than the writings of Broad and McTaggart. Even so, Dunne's theory of time was none too easy to understand. Finding, like McTaggart, that the analysis of the phenomenon of temporal flow led him straight into an infinite regress, Dunne decided to accept the regress as a fundamental aspect of reality. He postulated the existence of an infinite series of time dimensions, each one appearing static from the viewpoint of the next. Thus, an observer with access to the time-2 dimension sees the whole of time-1 past, present and future laid out before him, and is therefore able to obtain information which appears to the time-1 observer to be precognitive or retrocognitive. To Dunne, the concept of a 'self-conscious observer' was also regressive, since there seems to be a 'self' who observes the 'self' who is observing . . . and so on. Once again swallowing the apparent infinite regress *in toto,* Dunne postulated a whole series of observers situated in the successive time dimensions and running away to the 'observer at infinity'. For obvious reasons, Dunne labelled his theory 'serialism'. The postulation of infinite series of times and observers has been thought to be wildly extravagant, but it is surely no more so than the 'many worlds' interpretation of quantum mechanics which enjoys wide support among physicists, and which postulates the splitting of the entire universe at every single quantum event.

Broad was clearly impressed with the Dunne theory, describing it as "the only theory [of precognition] known to me which seems worthy of consideration" and adding "it reflects very great credit on Mr Dunne's originality and ingenuity" (Broad, 1937). Nevertheless, he could not accept the theory as it stood. Like McTaggart, he shied away from the infinite regress, pointing out that in order to explain precognition it is not necessary to carry the analysis any further than the second time dimension. He also complained that Dunne's 'observer at infinity' is "the last term of a series which, by hypothesis, cannot have a last term" (Broad, 1935). Dunne responded by saying that, as a child, he had been taught to say that parallel lines meet 'at infinity', but no one thought that such a terminology implied that parallel lines do not exist. However, in deference to Broad he deleted the phrase "observer at infinity" from later editions of his book.

The Dunne theory is seldom mentioned nowadays, but for over half a century it dominated discussions on the nature of time and precognition.[3] Following the success of *An Experiment with Time,* Dunne tried to prove that his theory was compatible with both relativity and quantum mechanics and, indeed, that these twentieth-century developments in physics were special cases of the broader picture supplied by serialism (Dunne, 1934). G. F. Dalton (1954) argued that the theory can provide us with important insights into the structure of the human psyche, and could have a number of applications in

[3] The theory was still receiving critical attention in the 1970s; see Flew (1976). I have seen nothing about it since.

the study of psychopathology: "There is . . . overwhelming evidence that the human personality is divisible, and that the divisions are related in the manner required by Dunne's theory. But the Dunne observers are mere characterless 'abstractors' or 'now-marks', having no function beyond that of relaying sense-data in one direction and interventions in the other. The fractional personalities of real life are far more complex. They have characters, emotions, motives. They quarrel among themselves. Clearly the theory will require much elaboration in order to deal with this discrepancy" (p. 229).

The Dobbs-Lawden Theory

As far as I know, none of the later thinkers has been prepared to follow Dunne into the depths of his infinite regresses of time and personality, but several have made use of his concept of a 'time beyond time' in order to explain precognition. Broad himself suggested the adoption of a five-dimensional theory, in which two of the dimensions are time-like (Broad, 1937), and his pupil H. A. C. Dobbs contributed a lengthy paper to the SPR *Proceedings* on this topic (Dobbs, 1965). Dobbs accepted the static four-dimensional world of relativity, but added to it an additional time dimension, T2, which he referred to as 'real time'. The time embedded in the block universe of relativity he called T1, or 'imaginary time'; it possesses only the characteristic of extension. Presumably the terms 'real' and 'imaginary' are being used here in the technical mathematical sense, and imply nothing about the ontological status of the two times. In a later paper on Dobbs's theory, Lawden refers to the two times as physical time (t) and psychical time (τ), and regards both as having the same ontological status (Lawden, 1981).

According to Dobbs, what is cognised in a so-called 'precognitive' experience is not the future event itself. That would be impossible, since the future event does not yet exist, and a non-existent entity cannot produce an effect. Instead, what happens is that the percipient becomes aware of certain *objective probability factors* lying ahead of him along the T1 axis. The ontological status of these factors is peculiar; they seem to lie somewhere in a never-never-world between the wholly real and the wholly imaginary. They represent the future event, not as it will *certainly* happen, but as it will *probably* happen. Dobbs tells us that "the quantum physicist is well accustomed to the notion of objective probability factors of this sort; that is to say objective physical factors which determine the probabilities of events happening at different times" (p. 292). Dobbs makes the further suggestion that these objective probability factors emit particles having a mathematically imaginary rest mass and a velocity greater than that of light, enabling them to travel backwards along the time-1 dimension and affect the neurons in the percipient's brain. These hypothetical particles he calls 'psitrons' but, as Lawden rightly remarks, this part of the Dobbs theory is vague and incoherent. No one has ever detected the presence of a 'psitron', and Dobbs gives no field equations from which predictions can be made.[4]

[4] Dobbs's use of 'objective probability factors' may have been inspired by an earlier paper by Ninian Marshall (1960); see also Zohar (1982, pp. 147 et seq.).

Feinberg and Reversed Causality

Many physicists have remarked upon the fact that the fundamental equations of physics, whether classical, quantum or relativistic, seem to be totally symmetrical with respect to time; that is, they do not distinguish between past, present and future, and reversal of the sign of the time variable leads to a solution which appears to be just as viable as the original. Usually the second law of thermodynamics, which is statistical in nature, is invoked to provide an 'arrow' for time (Eddington, 1935; Coveney & Highfield, 1991).

Gerald Feinberg (1975) pointed out that the field equations allow a wave to be transmitted backwards in time from a source as well as forwards; the time-reversed wave is known as the 'advanced' wave, and the wave moving in the usual direction (from past to future) is called the 'retarded' wave. In practice physicists usually discard the 'advanced' solutions to their equations on the assumption that such things are merely mathematical artefacts. As far as I know, no experimenter has ever detected an advanced wave. However, Feinberg thinks that they may exist, albeit at a much lower intensity than the familiar retarded waves. He also suggests that precognition is simply a 'memory of things future'; in other words, what we cognise in an experience of precognition is simply our own future brain-state. This future brain-state makes its existence known to us by sending an advanced electromagnetic wave of low intensity to react with the neurons of our brain at the present moment. The fact that these waves are of low intensity explains why precognitive experiences are generally weak compared with the experiences of ordinary memory.

The foregoing survey of time theories shows that we are here dealing with a matter of great complexity. There is no consensus of opinion among philosophers or scientists about the true nature of time or the comprehensibility of the notion of precognition. In the remainder of this article I offer some reflections of my own about how we might go about seeking an understanding of these matters.

Back to Basics: Eligo, ergo sum?

René Descartes tells us that he began his enquiry into the nature of reality by doubting everything that could possibly be doubted, and then examining what he had left (Descartes, 1637/1968). The first fruit of this procedure was the conviction of his own existence, summed up in the famous phrase *cogito, ergo sum* (I think, therefore I am). Despite the criticisms of some philosophers, I think that Descartes was correct. Our own existence is a *datum,* one of those things which have to be taken for granted if we are to make any progress in rational thought whatsoever. However, I would go further. In deciding upon this particular mode of analysis rather than some others Descartes was exercising his faculty of *choice.* The ability to choose one course of thought or action rather than another (in other words, to exercise our freedom of will) is just as much a *datum* of our existence as is existence itself. I am aware that some theorists, especially those working in the area of machine intelligence, have tried to argue that freedom of will is an illusion, but it seems to me that if we deny the reality of free will we automatically negate the entire reasoning process. If my thoughts are predetermined by physical processes I have no

reason for believing them to be true rather than false. Therefore I believe that we must accept freedom of will as a *datum* of our existence, something which cannot be negotiated or explained away. Descartes might well have written "I *choose,* therefore I am."

It follows from this that any particular theory of time or precognition which denies the freedom of the will must be regarded as false. This automatically excludes all block universe theories in which we merely 'come across' events laid out in the time dimension. It also excludes theories which involve backward causation, since these imply that the future 'cause' is already in existence.[5]

By choosing this criterion I seem to be excluding a large part of modern physics as well as several promising theories of precognition. I am not sure to what extent the validity of Einstein's theory of relativity depends upon the four-dimensional interpretation put upon it by Minkowski. Perhaps alternative formulations are possible. However, it is worth pointing out that the Minkowski interpretation—the 'block universe'—is arrived at by what amounts to a mathematical trick. Minkowski's 'space-time' does not consist of space combined with time as we experience it, but space combined with *mathematically imaginary time.* This latter is measured time multiplied by ic, where c is the velocity of light *in vacuo* and i is the imaginary number $\sqrt{(-1)}$. It is this same imaginary time which features in Hawking's model of a universe which is finite in time, but unbounded (i.e. has no beginning or end). It seems that if we are going to build a block universe, we must do so using imaginary time.

Eddington, the great expounder of Einstein's theory (and at one time said to be one of only three people who understood it!) was clearly slightly uncomfortable about the use of imaginary time. In *Space, Time and Gravitation* he brushed the matter aside with a terse comment (1929, p. 48):–

> It is not very profitable to speculate on the implication of the mysterious factor $\sqrt{(-1)}$ which seems to have the property of turning time into space. It can scarcely be regarded as more than an analytical device.

Dunne makes use of the same 'analytical device' in *The Serial Universe,* where he uses the 'mysterious' i to denote the rotation of a vector through a right angle. Again, it is not clear to me that such a move is anything more than a mathematical trick which enables us to pretend that time is just another dimension of space.

Despite a century of speculation to the contrary, I think it is clear that time is *not* a 'fourth dimension' of space. It can only be made to appear so by depriving it of its dynamic or transitory aspect, and then multiplying what remains (the metrical or extensive aspect) by i. The fact that this particular trick has been used succesfully by a long line of theorists (Minkowski, Einstein, Eddington, Dunne, Dobbs, Hawking, etc.) shows that it has the merit of mathematical simplification, but not that it corresponds to anything in reality.

Leaving aside the block universe theories as mere mathematical devices, we find ourselves left with the open future implied by quantum mechanics. This is much more satisfactory in that it conforms to our inner conviction that we

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[5] As I understand it, the apparent reversal of causality in certain microphysical processes occurs only within the constraints of the uncertainty relation, $\Delta E.\Delta t \geq \hbar/2\pi$, and cannot be used to signal from future to past.

have the freedom to shape our own futures, at least within certain limits. However, it makes the existence of precognition much more problematical. If I am free to choose what I shall do next week, how can the result of that choice be observed before I have made it? I agree with Mundle, who, having surveyed the various time theories, came to the conclusion that they all carry paradoxical implications and added "I am therefore inclined to think that we should explain precognition *away*" (Mundle, 1972). There are a few philosophers who have argued that the existence of precognition is *not* incompatible with free will (cf. Brier, 1976), but I do not find their arguments convincing. It seems to me obvious that if anyone, even God, knows what I am going to choose to do, then my choice is not free in any meaningful sense. Since I am accepting, Cartesian fashion, my own freedom of will as a *datum,* I must reject precognition in the literal sense of the word. It remains to see whether or not we can find an alternative explanation for the existing evidence.

Explaining Away Precognition

Mundle suggests two possible counter-explanations of ostensibly precognitive phenomena. They are not mutually exclusive, and could conceivably operate together. They are as follows:–

1 The percipient uses non-precognitive ESP to acquire information about certain factors in the environment or in the minds of other people from which he or she then deduces subconsciously what is likely to happen.

2 The so-called percipient is actually a PK agent, bringing about the very events which he or she ostensibly precognises. This could be done directly, or with the telepathically invoked help of others.

To these two alternatives we might perhaps add Dobbs's idea of the perception of 'objective probability factors', although the reality status of such entities is not clear to me. If such things exist, the Dobbs suggestion could be subsumed under Mundle's first explanation.

There would seem to be three possible objections to the first Mundle hypothesis:–

(i) It would involve the exercise of very large-scale ESP in the gathering of a huge mass of relevant data. However, as Braude points out, we do not know the upper limits of psi, which is likely to exceed anything we have observed in the laboratory or séance-room (Braude, 1997).

(ii) It would require extensive and elaborate computations to be carried out at a subconscious level. Again, we do not know the limits of the faculties involved. The existence of 'calculating prodigies' suggests that the subliminal mind may have powers which far exceed those of waking consciousness. Also, there are a few studies which suggest that psi may be capable of circumventing very complex tasks (Morris, 1968; Schmidt, 1974).

(iii) Chaos theory suggests that most large-scale systems are unpredictable because of their extreme sensitivity to minute changes in the initial conditions. This would seem to impose severe limitations on Mundle's hypothetical mechanism, even if we accept the existence of 'super-psi' and enormous powers of subliminal computation. However, we do not need to assume that psi prediction is one hundred per cent effective—indeed, it cannot be if we accept

the reality of free will. Information collected and processed in the manner described here would be sufficient to increase the *probability* of guessing some future events correctly, and that is all we require it to do. No laboratory experiment or real-life experience has suggested that precognition is infallible; and weather forecasting is reasonably successful, despite the constraints of chaos.

We turn now to Mundle's second suggestion. Explaining ostensible precognition in terms of PK has many advantages. It avoids all the logical paradoxes involved in the concept of reversed causality, and makes it unnecessary to invoke higher-dimensional theories of time. It also preserves our sense of free will, and extends our ability to act in ways which some may consider alarming. The earliest description of this hypothesis that I have come across is due to W. G. Roll (1961), although Zorab mentions an earlier exposition on the same theme by Tanagras (Zorab, 1961). Roll's paper attracted a good deal of interest and some ridicule, notably from G. F. Dalton (1961), who wrote:–

> A rough check through a few recorded sources suggests that, on this theory, ostensible precognitionists have been responsible for at least 100 deaths, 8 railway accidents, 5 fires, 2 shipwrecks, 1 explosion, 1 stroke of lightning, 1 volcanic eruption, 2 world wars. If PK is really operating on this scale, no one is safe.

However, the psychiatrist Jule Eisenbud took up the cudgels on Roll's behalf, arguing that it is by no means unreasonable to suggest that people may bring about events by PK on the scale indicated by Dalton, since we know that people do, in fact, bring about similar events by more conventional means (Eisenbud, 1962, 1982). There are plenty of examples of mass disasters brought about by deliberate sabotage (Lockerbie) or negligence (Aberfan); why should not similar disasters be brought about by PK? We might add, in the later light of chaos theory, that if the flapping of a butterfly's wings can change the weather systems over Europe, what is to stop a relatively weak PK effect from triggering a volcanic eruption?

The PK theme has been carried further by Stephen Braude, in an important book which deserves to become a classic of psychical research (Braude, 1997). He points out that we have no reason whatsoever to assume that the feeble manifestations of psi which we encounter in the laboratory, or even the stronger effects produced by the physical mediums, represent the limits of its influence. We simply do not know all the causal factors which contribute to the occurrence of the majority of events in our world, so that PK could be operating all the time without our being aware of it.[6]

The suggestion that there may be a widespread, perhaps ubiquitous, psychic influence operating in the world is not one which most people can contemplate with pleasure. Many parapsychologists have drawn attention to the 'ownership resistance' attaching to paranormal phenomena. PK effects usually become detectable only if they are buried in a mass of statistics, or if the agent is able to assign them to some entity other than himself or herself. Ancient peoples attributed these phenomena to the gods, Victorian mediums to the spirits. It

[6] I made a similar suggestion some years ago; for a discussion of some of the possibilities of PK in everday life, see Randall (1982, chapter 13).

is possible that one day we may have to face up to the unpalatable truth that there is a form of 'magical' causation operating in the physical world, causing the latter to respond in sometimes terrible ways to the fears and hatreds lurking in the depths of the human psyche. Such a mind-dependent world is not incompatible with the findings of quantum mechanics. I will conclude by quoting Eddington again; he may have been nearer to the truth than he realized:–

> We have found a strange foot-print on the shores of the unknown. We have devised profound theories, one after another, to account for its origin. At last, we have succeeded in reconstructing the creature that made the foot-print. And Lo! it is our own. [Eddington, 1929, p. 201]

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