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COULD THERE BE A PHYSICAL EXPLANATION FOR PSI?

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A characteristic feature of our civilization is our belief in the potential omnipotence of science and technology. And, indeed, they are, perhaps, the one truly progressive enterprise on which humanity has embarked since the beginnings of history. We all have, therefore, a natural inclination to believe that, given time, everything will in due course be explained in an acceptable scientific way and become absorbed into the ever expanding body of scientific knowledge. A typical expression of this belief is the phrase we often hear about the brain being the last great frontier of science, the implication being that once we have really got to grips with the mechanisms of the brain the whole of human behaviour and experience will fall into place in the scientific scheme of things.

What, then, are we to say about the so-called paranormal phenomena which are our special concern on this occasion? Are they the exceptions to the rule? Or are they anomalous in a provisional sense only, so that, after another revolution or so in science, they will cease to qualify as paranormal and instead will take their rightful place in the natural order? Until recently I would have said that a case could be made for either point of view. However, I have come increasingly to the conclusion that the possibility of a physical explanation of psi phenomena is not just doubtful, in the sense that all the existing candidates look so unpromising, but is, from the very nature of the case, an absurdity that can be ruled out on *a priori* considerations. I am not alone, of course, in holding this view; for one thing most scientists who reject the parapsychological evidence do so primarily because they see no way of reconciling it with physical theory. How-

ever, my position is, in a sense, the reverse of theirs: they assume that what cannot be explained in physical terms does not exist; I believe that since psi phenomena do exist not everything in nature can be explained in physical terms.

This is of course, a heresy and, in proclaiming it, I am sensible of the possible harm I may be doing to the cause of parapsychology. To begin with, the physicalistic approach to psi, as I shall call it, is a very useful protective camouflage for us to adopt in dealing with the scientific establishment. So long as it is thought that we are engaged in the same game as the physicists and other natural scientists, there is more hope that we shall be given funds and facilities to pursue our researches while, if word got around that really we were in the business of showing up the limits of scientific inquiry, we would be given short shrift. I am sure that Soviet parapsychology, for instance, would never have got off the ground if its proponents had not contrived to make it sound like the science of the future. Moreover, some of the liveliest and most talented individuals who are currently active in parapsychological research have come into the field from a background in the physical sciences and have done so precisely because they see it as the next big challenge to physics. They are all agog to take up this challenge and, hopefully, to make their name by finding a solution. My only defence therefore, for my indiscretion, is the faith on which all academic life is predicated, namely that, in the long run at least, it cannot hurt to tell the truth. Besides, if what I have to say is not true, then the quickest way of getting at the error of my arguments is by proclaiming them for you to criticize.

Even so, some of you may be thinking that it is the height of presumption, after all that has happened, to say about any phenomenon at all that science will never find an explanation. For, how can we possibly know what surprises science still has in store for us? Might not our Victorian forebears have argued, in like vein, that television was a manifest absurdity? That is a good question but I shall try to answer it. The plan I shall adopt is to start by stating what I understand by a physical explanation and then attempt to show that a theory which is physical in this sense cannot possibly cover psi phenomena while, conversely, a theory which could encompass psi phenomena could not be strictly physical.

Briefly, then, what I mean by a physical explanation is one that is expressed exclusively in physical terms, i.e. in terms of space, time, mass, energy, etc. plus whatever logico-mathematical expressions may be necessary to frame the particular law or equation involved in such an explanation. If there are any terms left over in our explanation which cannot be expressed in these basic physical parameters, which can be understood only in intuitive or subjective terms or

whose connotation is irreducibly qualitative, then we know at once that we have not got a truly physical explanation. It is also preferable, though not essential, that the relevant laws and equations be formulated in quantitative terms for it is conceivable that there may be phenomena that cannot be measured on any scale or metric but could be described only with the aid of some logical or topological calculus.

There is also a somewhat weaker type of explanation which may qualify as physical even though it dispenses with any explicit laws or equations. This is the type of explanation which relies on a working model of the underlying mechanisms involved. Here we must be careful, however, because there are some kinds of explanatory models of a purely abstract kind which are, in fact, no more than diagrammatic redescriptions of the phenomena in question. To qualify as physical such a model must be capable of being embodied in concrete physical form. This type of explanation is of particular importance when it comes to explaining how our cognitive functions might operate. Thus, if we can program a computer so that it is capable of performing certain tasks of, say, pattern recognition, problem solving or information retrieval then it would seem sheer dogmatism to deny this affords a physical explanation of, at any rate, *one* way in which such tasks could be performed. On the other hand, the mere fact that human mental functions can readily be discussed in information processing terms, does not necessarily imply that we have a physical explanation of such processes. Information theory is, after all, just a branch of applied mathematics and, as such, tells us nothing about whatever mechanisms may be involved.

Having, I hope, made clear what I understand by a physical explanation I would like next to turn to the attempts that have actually been made to explain some instance of ESP or PK and consider why they fail to meet the case. If anyone were to compile a catalogue of all the various theories that have been put forward in this connection it would make curious reading, for parapsychologists have not been lacking in imagination and ingenuity. Fortunately, for our purposes, there is no need to survey each of these proposals since they can conveniently be classified into two main categories. These I shall call respectively "communicational theories" and "observational theories". The former are very obviously based on the analogy with radio, radar or other known forms of telecommunication, the latter, which are of very recent vintage, are either based on, or inspired by, a special interpretation of quantum theory. It is, of course, arguable that there are physical theories of psi which belong to neither of these two main categories—one must never be dogmatic in such cases—but, if so, I do not know what they are. I have, for example, deliberately excluded from consideration synchronicity theories of

psi, despite the fact that they have gained so much in popularity in recent years, because they are not, in my opinion, physical theories; they belong, rather, to the occult world view. Accordingly, if, for the sake of argument, we take these two categories as exhaustive, my task will be concluded if I can show that neither of them answers our requirements. To anticipate, I shall seek to prove that the former, the communicational theories, are all necessarily non-starters inasmuch as they contrive to gloss over what is the key problem, namely how the information is encoded, while the latter, the observational theories, succeed only by dint of the fact that they surreptitiously import mentalistic concepts; which disqualifies them as physical theories. Let us start, then, with the communicational theories which go back to the earliest days of psychical research and still have their supporters at the present time. To simplify the discussion let us concentrate on the phenomenon that, on the face of it, appears most amenable to a physicalistic interpretation, namely the classic telepathic paradigm, what was originally called "thought transference". Now there are two aspects of the target material which may figure in a typical telepathic situation: there are, first, the thoughts and ideas that may be going on in the agent's mind as he contemplates a given target and there are, secondly, the percepts or images that enter into his consciousness. And the question is: how might the agent make the percipient aware of the one or the other? Now, if this were a question of normal sensory communication we know, in general, what the answer must be: to communicate his thoughts or ideas the agent must use language or, in other words, he must express them in propositional form and then convey them in speech, writing, or by means of any other set of conventional signals with which the receiver is familiar. In the case of the percepts and images a pictorial mode of communication is possible that does not depend on a conventional coding system. But what can we say in the case of extrasensory communication? What now corresponds to the linguistic, pictorial or symbolic content of normal communication? Let us grant, for the sake of argument, that my thoughts and ideas can be unambiguously represented by certain traces in my brain whatever these traces may be, and let us further grant that there exists some hypothetical radiation, field efforce or whatever, which could transmit signals from my brain to your brain. The question then arises as to how these traces could modulate this hypothetical radiation in such a way that they could be decoded by your brain to yield a coherent message? It has never been suggested that we can communicate telepathically only with other members of the same linguistic community, because what appears to be conveyed in a telepathic exchange is some meaning rather than some particular form of words. But how could a meaning,

as such, be communicated physically unless there were some agreed code between the parties involved? To suppose that we might be born knowing how telepathic messages are encoded is as nonsensical as to suppose that we might be born with a knowledge of the English language. It would therefore clearly have to be something that was learnt, but how and when could this learning take place? It is only necessary to ask these questions to see that they admit of no answer. Moreover, even if we confine the argument to the simplest case, that of transmitting a given pictorial symbol such as a star or circle, we would still have to suppose that the trace which represented that symbol in my brain could modulate the hypothetical radiation in a such a way that when it reached your brain it could be duly converted into a corresponding trace which would unambiguously represent a star, circle or whatever. And, even if we ignore all the other complications which confront us, such as how the signal would be discriminated against the background noise, this is utterly implausible.

In order to present the communicational model of psi in the most favourable light possible, as I am obliged to do if I am going to attack it, I have spoken so far as if there were no problem about representing thoughts or images by brain traces in some unequivocal way. In fact there are two insuperable problems. First, no two brains are identical, each reflects the individual's particular life history. Hence, the way in which my brain traces will represent the fact that I am thinking about

Arthur's Seat, or even looking at Arthur's Seat, will be specific to my brain so that even *if, per impossibile* , my brain processes *could* somehow duplicate themselves in your brain this would still mean nothing to you. But there is an even more radical objection to this conception of telepathy and it is this. The whole idea that every mental event must correspond to some specific brain state will not bear examination. Thus the idea that, when I am thinking about Arthur's Seat, my brain is in state A while, when I am thinking about the Scott Monument, it is in state B and when I am just thinking about Edinburgh in general it is in state C, etc. cannot be right if only because the way in which we partition our mental life into such segments is so clearly arbitrary, nature could not have provided for a specific brain state which unambiguously represented a particular thought of mine on a particular occasion. I am not denying that brain activity of some sort is necessary if we are to have any thoughts at all but to suppose that the semantic content of our thought must correspond in a one-one fashion to discrete brain states is, as Stephen Braude (1978) has recently been at pains to emphasize, a complete fallacy. Thus the popular science-fiction notion that, if we had a machine that could scan a person's brain with sufficient thoroughness we would be able to read his thoughts is based on a misunderstanding. And yet, once we have

exposed this fallacy the whole broadcasting analogy of psi collapses.

It is ironical that, although philosophers have been pointing out the logical shortcomings of the communicational model at least since H. H. Price wrote his classic paper of 1940, parapsychologists have discussed the problem as if the question at issue were what properties the hypothetical radiation would have to have if it were to explain the evidence for ESP, whether such radiation could span the appropriate distances without too much attenuation, whether it could penetrate a Faraday cage, whether it could jump an interval of time and so forth. Yet such discussions are a complete irrelevancy if one cannot suggest at least in principle how this energy could carry the relevant information. A striking example of such misapplied ingenuity is the recent article by John Taylor and Eduardo Balanovski in *Nature* (1978) which is entitled: "Can electromagnetism account for extra-sensory phenomena?". After several years of experimental research they came to the conclusion that it could not. We could surely have saved them much time and effort. Furthermore, it is not just electromagnetism which cannot account for ESP, the quest would be just as futile if, for EM radiation we were to substitute "thermodynamic radiation" (whatever that may mean), or beams of neutrinos, gravitons, tachyons, psitrons or any other of these entities drawn from science or science-fiction. If we are barking up the wrong tree then we shall not find what we are looking for no matter what kind of ladders we use.

The time has come, surely, to bury the communicational theories of psi and to give them a decent funeral. Certainly the vanguard of what I am calling the physicalist school of parapsychology realize that there is no future in this approach and that is why they have transferred their allegiance *en bloc* to the observational theories to which we must now turn. This is no easy task because such theories have been devised by physicists, they presuppose a certain familiarity with the basic concepts of modern quantum physics and are presented using mathematical equations. Fortunately, there is an excellent introduction to such theories written for the layman by Brian Millar to which I can refer you in the November 1978 issue of the *European Journal of Parapsychology.* For such theories there is no question of energy being transmitted from a given source to a given receiver, instead the psi effect is produced at the instant where an observer enters the situation. Their point of departure is the assumption, in line with the so-called "Copenhagen interpretation" of quantum theory, that any system comprising any degree of quantum indeterminacy remains strictly indeterminate until an observation or measurement is performed on it. Where they go beyond conventional quantum theory is in the assumption that there exist certain observers, usually called psi sources, who not only determine the state of the system but can bias it

in a prescribed direction. The paradigm situation with reference to which these theories have been developed is the PK test using a random number generator or RNG. Depending only on the strength of the psi source the output of the RNG can be made to deviate by a given ratio from its chance baseline. However, the application of these theories is not limited to PK, ESP can be similarly explained if we assume that the brain functions somewhat like an RNG with quantum indeterminacy. In a telepathic experiment, for example, we might suppose that the agent was able to bias the output of the subject's brain so as to make his guessing score exceed chance expectation. What is critical in all such theories is the provision of feedback, the moment of truth is the moment when we become aware of the results.

Now, whether these theories are sound physics is obviously something on which only other physicists are competent to express an opinion, I can merely mention, for what it is worth, that a colleague of mine at this university who is a quantum physicist and whom I have tried to interest in this approach is very dubious on this point. What worries me much more, however, is whether these theories are logically tenable. The trouble is that, however you dress them up using whatever mathematical formalism, they imply the existence of a casual loop in time, since observation and feedback must necessarily come *after* whatever effects are registered and observed. Hence we seem committed in the end to saying that the cause of my scoring above chance in a given test of PK or ESP is the fact that I subsequently observed that I *had* scored above chance and, equally, of course, the cause of my observing that I had attained such a score was the fact that these events had already taken place! Cause and effect here chase each other in a temporal loop rather like a dog chasing its own tail. Now I have, in the past, defended the idea that there is nothing logically vicious in the idea of backward causation (Beloff 1977) but I am not at all sure that I would be prepared to defend the logical propriety of a causal loop. There must, one feels, be a more convincing answer to the question why a given subject guesses correctly on a given trial than the mere fact that he was subsequently *found* to have guessed correctly!

However, for my present purposes, I am perfectly willing to suppress all the philosophical misgivings I may feel about the observational theories and proceed on the assumption that there is nothing logically or theoretically objectionable about them. The question I now want to raise is whether they are, indeed, genuine physical theories? Let us therefore examine two concepts that are fundamental to all such theories, the concept of an observer and the concept of information. Let us begin with the observer. Is it necessary to the

theory that some *person* become consciously aware of the results displayed in feedback or is it sufficient if that person be replaced by some piece of apparatus? If the latter, then the theories must specify the properties of such an apparatus so that we could construct one which could then duly produce psi phenomena. However, my reading of observational theory is that the former is implied; certainly Walker explicitly identified the hidden variables of the quantum equations with what traditionally we would call consciousness and will. But, granted that it is a person that is involved, is it his mind or his brain that is critical? We are told by observational theorists that such factors as the observer's attitude, expectations, beliefs, hopes, even his mood and his prevailing needs may all be critical for the outcome of the experiment. Indeed, one of the selling-points of the observational theory is that it alone appears able to account for the so-called psi experimenter effect. But the question is, can these psychological factors be identified with states of the brain? And when we ask this question we find that we are back again in the same impasse as we encountered when we were discussing the communicational model of psi. Thus, the possibility of specifying in physical terms the state of the brain when subject O is expecting good results must always elude us if only because such a state would never be the same for any two individuals or on any two occasions. We hear much talk about quantum events in the brain but these seem to be as irrelevant as the hypothetical

radiation of the communicational theorists. The stark fact of the matter is that the observational theories are, when you start to probe them, really dualistic theories in disguise.

Once again, in order to present these theories in their most favourable light I have so far tried to discuss them in their own terms, that is to say as explanations of the quantitative effects such as are found in laboratory experiments in ESP or PK as typified by the RNG set-up. Indeed, a moderate observational theorist, like Schmidt (1978), does not claim that his theory has much relevance outside this context. But, as parapsychologists not to say philosophers, we cannot confine our attention to these wholly artificial situations. How, we want to know, are we to interpret qualitative psi effects? For the difference between one target and another in a free response test is never a matter of information or entropy, nor is the difference between one thought and another or one image and another. And this holds equally of PK if we consider its wider manifestation which would include cases of psychic photography, psychic healing, teleportations, materializations etc. Each of these cases exemplifies the fulfilment, by paranormal means, of some intention (whether that intention be conscious or unconscious). But such intentions can no more be differentiated in quantitative terms than can any other item of experi-

ence. Accordingly, the observational theorist is faced with a dilemma. Either he must give up the theory or he must ignore all the qualitative aspects of psi phenomena, which is to say everything that gives them relevance to real life. And, even then, one of the key assumptions of observational theory, namely that the brain can be regarded as a quasi RNG seems wrong to the point of perversity when it is well known that the one task no subject can ever do is to generate any sort of a random series—patterns and meanings invariably intrude.

I regret having to speak so critically of observational theory because there is no doubt that it has been one of the more exciting developments of recent years, which has infused new life into experimental parapsychology and has attracted to the field valuable talent from outside. Indeed, thanks to it parapsychology has once again become a topic of concern to physicists as it was in the early days of psychical research. Nevertheless, whatever may be its incidental merits, I cannot but agree with Thakur (1979) in his critique of Walker that the theory, for all its mathematical trappings, cannot be expressed in purely physical terms. This, then, concludes -my argument. I have argued that, if we are to seek a physical explanation for psi our choice lies between a communicational theory or an observational theory. However, the former comes unstuck over the logical impossibility of encoding the necessary information, while the latter, even if it could survive all the logical or theoretical objections it has to face, would not constitute a physical theory, not at any rate by the criterion which I proposed. Before I finish, however, I would like to add a few words to avoid possible misunderstandings.

I have *not* been arguing that physics is irrelevant to parapsychology. On the contrary, inasmuch as I see parapsychology as concerned with mind-matter interactions I welcome any light which physics can throw on the physical aspects of the mind-matter interface. What I *have* sought to challenge is the assumption that these so-called mind—matter interactions can all ultimately be reduced to matter-matter interactions. Further, in arguing that there can be no physical explanation for psi, I have not been claiming that I know of a better, non-physical, explanation whether mentalistic, mystical or occultist. Rather, I would take leave to doubt whether there would be any explanation of psi in any sense of explanation that would be recognized as such in the exact sciences.

Consequently, if I were a materialist I would remain a sceptic, that is to say I would deny for as long as possible that there were any genuine psi phenomena; and that, let us not forget, is still the position that most scientists take at the present time.

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