Teleological Causation

This paper was originally presented to the Second International Conference of the Society for Psychical Research at Cambridge in March 1978. I am indebted to my friend, Richard Broughton, whose helpful comments and suggestions on an earlier draft led me to rewrite the paper in its present form. Even so, I never sought to publish it, hoping always to develop it further. Hence it now appears for the first time in print although it was occasionally cited in the literature.

One of the peculiarities of psi phenomena, it would seem, is that not only do they defy an explanation in conventional terms, but they appear to involve a kind of causation different from that which we associate with familiar physical processes. We have already discussed the problem of backward causation and we have alluded to the concept of acausal correspondence or synchronicity. Here we go on to consider the case of "teleological" or, as some would prefer to call it, "goal-oriented" causation.

At last year's S.P.R. Conference (Beloff 1977), I discussed the question of whether a causal or an acausal analysis of psi phenomena was the more appropriate. The conclusion I reached on that occasion was that, while we could not *prove* that the causal interpretation was correct, as experimentalists we must *hope* that this was so, for there would be little sense in carrying out an experiment if we could not assume that our experimental conditions afforded some prospect at least of bringing about the relevant results, and to talk of bringing something about is just another way of talking about *causing* it to happen. I did not want to deny that there might be coincidences of a meaningful kind, as Jung supposed, although how one was to distinguish these from sheer coincidences remained unclear. Similarly, I did not wish to deny that there might be an inherent nonrandomness in nature such that certain kinds of events tend to occur in clusters, as Kammerer believed, although, here again, we are not told how we could ever know that we were not dealing with a freak run. But, to admit the possibility of synchronistic phenomena, as I am quite willing to do, does not mean that psi phenomena must be subsumed under this category. Jung's mistake was that he too hastily assumed that causation could only mean physical causation and so he invented synchronicity to account for psychic causation.

Let us take a homely example of mechanical cause and effect, namely turning on the electric light. What in this instance connects event A, pressing down the switch, with event B, the light coming on, is, of course, the flow of the current along the wires. Generalizing from this to all cases of mechanical causation, we may identify the cause with some disturbance introduced into some physical system and the effect with some subsequent change in that system. We may then say that the two are connected by the continuous propagation of energy through the intervening spatiotemporal interval. Now Jung was, I believe, perfectly correct in thinking that the psi process did not work in this way. And I do not believe that we can get round this discrepancy by inventing some kind of psychic field of force to deputize for the missing physical field of force. Where, I think, Jung and his present day successors have gone astray is in supposing that, without this continuous transmission of energy, there can be no causation. For, to say that A is the cause of B, implies only that B would not have occurred *but for* A, the actual nature of the connection between them is another matter; so long as I am satisfied that my light comes on when, and only when, I press the switch it would not matter, so far as the logic of the situation goes, whether there *were* any wires involved, the system could just as well work by magic!

But, if psychic causation is not like mechanical causation, what other options are open to us? Believing with Thouless and Wiesner (1947) that the prototype both of ESP and of PK is to be found in the interactions between mind and brain, I shall digress at this point to say something about what philosophers call the mind-body problem and then return later to the problem of psi which I hope may then appear as a special case of mind-matter interaction. In a new book, *The Self and Its Brain,* which is written partly by Sir Karl Popper and partly by Sir John Eccles, Popper makes the following point which provides a clue to our problem when he says: "The great difficulty of the Cartesian theory of mind-body interaction lies in the Cartesian theory of physical causality according to which all physical action must be by mechanical push" (Popper/Eccles 1977, p. 180). Push and pull, attraction and repulsion, is, indeed, the hallmark of *mechanical* causality but it has always seemed to those who have thought about the mind-body relationship exceedingly implausible that mind should operate the machinery of the brain and nervous system by any conceivable set of appropriate pushes and pulls. At the same time Popper, like me, is an interactionist who believes in the self as an active agent and not just a byproduct of brain processes; how, then, does he attempt to depict the action [illegible]? He does not answer this question directly but he does

talk at some length about what he calls "downward causation." Ordinarily in science we like to think reductively and to think of the properties of macroscopic bodies being determined by the behavior of the microscopic particles of which they are composed. We say, for example, that the pressure and temperature of the gas in a container is determined by the motions of the gas molecules. But we could, if we wish, look at the situation the other way round and say that the kinetic energy of the gas molecules and the frequency of their collisions are determined by the size and shape of the container. As I understand the concept, downward causation refers to the influence of an organized system on the components of that system whether that system be a manmade machine or a living organism. Since the hierarchical principle in nature is ubiquitous, as Koestler (1978) is never tired of reminding us, there is everywhere considerable scope for the operation of downward causation. Popper's own ontology comprises three distinct worlds: "World 1," the world of matter, "World 2," the world of mind, and "World 3," that peculiarly Popperian world of culture and objective knowledge that man has created. Within this ontology there is both upward and downward causation but Popper argues forcibly that we cannot understand human behavior without acknowledging the downward causation on the mechanisms of the brain of both World 2 and World 3.[a]

Since such downward causation is common alike to psychophysical beings like ourselves as well as to inanimate machines like automobiles, we may have to look further afield for a type of causation that characterizes the activities of mind. Fortunately, it may not be necessary to invent a type of causation that has never previously been considered. Instead, we may have to reconsider an idea which science discarded some centuries ago but which, before then, under the influence of Plato and Aristotle, was not merely familiar but was regarded as the supreme expression of causal law, namely teleological or final causation. In the world view which prevailed before the scientific revolution of the 17th century, the behavior of objects, organisms and all natural systems had to be explained primarily in terms of those ends or purposes which represented their natural goal and only secondarily in terms of whatever mechanical forces were acting on them, the extent of whose effect was to make them deviate temporarily from their natural goal.

As we now know, teleological causation was swept away by the scientific revolution along with all the other discredited remnants of Aristotelian science. One obvious objection to the concept from a scientific point of view was that one could never be sure, in advance, what *was* the natural goal which a given system was set to pursue; except, that is, by waiting to see what happened and then it was too late to explain anything except retrospectively, which was of no use to an experimental science. Mechanistic explanation, on the other hand, was soon to prove itself an immensely powerful tool for predicting and controlling the forces of nature. Later a further blow was dealt to teleological causation during the 19th century with the advent of Darwinism.

The ostensible design and purposefulness that is evident in plants and animals could thereafter be viewed as no more than the incidental consequences of a mechanistic process of selection which had eliminated all but those organisms which displayed these adaptive features. Eventually, what appeared to be the coup-de-grâce for teleology was delivered during the present century as a result of the combined assault of behaviorism and cybernetics. Behaviorism is best understood as the attempt to explain the behavior of conscious, intelligent beings using the same sort of terms that would be appropriate to an explanation of the behavior of simple organisms, inanimate systems or machines. Cybernetics furnished behaviorism with its most powerful conceptual tool with its concept of "feedback." What, hitherto, had been taken as indisputable evidence of purpose or intention in human behavior could be reinterpreted in mechanistic terms using the idea of feedback loops and of self-correcting servomechanisms. The voluntary behavior of man, though doubtless more subtle and complex, was no different in kind from the behavior of a self-propelled missile or rocket or any other self-steering robot. Since these latter could be understood without recourse to any metaphysical notion such as free will, so ultimately could the former. Thus did the scientific revolution, which began by destroying the anthropomorphic conception of nature, end with the creation of a mechanomorphic conception of man.

But, while the behaviorist and mechanist program makes good enough sense if you believe that having a mind is just an incidental consequence of having a brain and nervous system like ours, if you believe, as I do, that mind has at least *some* degree of autonomy and performs *some* function in the determination of behavior, then you cannot escape such questions as how does, and where does, the mind influence the brain? Eccles, for his part, in this same volume on which he collaborated with Popper, does not flinch from this question and is, indeed, exceedingly bold in speculating both on the locus of the mind-brain interface and on its mode of interaction. Thus, he speaks at one point of the mind acting upon certain critically poised "modules" of cortical cells and of its "modifying the dynamic spatiotemporal patterns of the neural events" (Popper/Eccles 1977, p. 495). But, beyond implying that this is some kind of holistic process, typical of downward causation, he does not, any more than Popper, commit himself to the view that some radically different kind of causal process is involved to anything we find in the rest of nature. It is at this point, I suggest, that we need the concept of teleological causation.

A teleological process may be defined as one that cannot be explained or understood except by reference to the end state of that process. Perhaps the most familiar example that we could take of an ostensibly teleological process in behavior is that of simply raising one's arm. What appears to happen in such a case is that the physiological machinery of the body is set in motion in obedience to a volitional command in order to bring about the state of affairs envisaged by the agent. Now we can, of course, adopt a materialistic

interpretation of the case and regard the raising of one's arm as no different from any other physical process except, note, that, for some inexplicable reason, the earliest identifiable stage of the process is accompanied by the subjective experience we call a volition which gives us our illusion of being free agents. We can also adopt what I would call a paramechanical interpretation of the events, that is we could suppose that the mind has complete knowledge of the anatomy and physiology of the body and is able to activate the appropriate neurones at the appropriate moments in order to execute its intentions. But, what I am suggesting as a much more parsimonious and plausible interpretation, is to suppose that it is the volition itself that sets in train the sequence of events and constrains them to produce the intended result by whatever means may be available; in other words, that we are dealing with an irreducibly teleological process. A volition may be ineffective if the means are *not* available; I may intend to raise my arm only to discover that I am in fact paralysed so that nothing ensues. What makes volition teleological in this sense is only that, given the appropriate conditions, it produces an effect which would not otherwise have come about through any purely mechanical causes. To take an analogy from the physical realm, we could, perhaps, think of a volition as like a mold. A mold does not produce anything unless some suitable substance is injected into it but, given these circumstances, the substance is then constrained to take on the form of the mold.

There is much to be said, in my opinion, for the view advocated by William James, a psychologist who thought long and hard about the problem of the will in the days before behaviorism has excised words like "will" from the psychologist's vocabulary as indecent. In James' "ideo-motor theory" of action the main function of the will was to sustain one idea or image in the focus of attention against any countervailing idea or image that might come before the mind. Given this situation, this idea *per se,* James thought, would automatically translate itself into action without requiring any additional fiat of the will (James 1890, chapter 26, section 518). The Jamesian "idea" was thus a pure teleological cause. Curiously, there is a remarkable parallel to this conception in the recent parapsychological literature where Haakon Forwald, perhaps the most successful PK subject on record in tests with dice, offers his own view of the PK process based on his own experience as a subject. He worked specifically on placement tests where the aim is to make the die deviate, to whichever side is designated as target for that trial, when it reaches the bottom of the chute down which it falls. This is what he has to say:

> In order to obtain positive results in a PK experiment, the subject must put himself in a special psychological situation, generally characterized as "willing" or "desiring." According to the author's experiences, however, results can be obtained in other psychological situations. A person with the ability to produce strong mental images of physical events may well succeed in obtaining PK results without relying on the mental capacities *will* and *desire*. This would mean that the mental image is projected to the physical world outside the subject and produces there a real, meaningful effect. A mental picture which the author has successfully used on many occasions in the actual placement experiments is an imagined wall at the foot of the incline where the cubes roll out on the horizontal plane. The wall is imagined as forming an angle with the moving direction of the cubes so that, when hitting the imagined wall, the cubes would be deflected to the target side of their movement [Forwald 1969, p. 71; italics in original].

I do not think Forwald is asking us to believe, here, that an imaginary wall can take on the mechanical properties of an actual wall; the way I interpret this passage is that the idea of the cubes being deflected to the right, as represented by Forwald's image of the wall, acted as the teleological cause of their swerving to the right.

We are now ready to look again at psi phenomena generally. However, to simplify my task I shall deal only with the case of PK because, although I believe that teleological causation is relevant to an understanding of ESP, it is not usually clear in the case of ESP just what constitutes the cause. Now a typical PK phenomenon may be conceptualized in a number of different possible ways. One of these is what I would call the "paracybernetic model." Suppose that the task in question is to make a die fall with a given face uppermost. We could, if we wished, imagine that we kept track of the orientation of the die as it tumbled down the chute by means of a clairvoyant feedback and that, at the appropriate moments, we put forth ghostly fingers, as it were, so as to impart the requisite PK impulse in order to make it land finally in the right position. However, this model is, in my opinion, grotesquely extravagant in assumptions. Thus, for one thing, unless we had clairvoyant ability far beyond anything we could demonstrate independently this mode of operation would be useless, there would be too much scope for error to allow even for the modest success rate of a good PK scorer. But the model becomes even more grotesque if we move from the macroscopic to the microscopic level and consider what is involved in the electronic type of PK test. Thus, in Schmidt's experiments, where the subject has to influence the output of a random number generator in order to score a hit, it would be necessary to assume that the subject could somehow arrange for the electron, emitted from the radioactive source, to arrive at the Geiger counter at the precise moment when the high-frequency oscillator was in the right phase. No wonder that Schmidt, for one, has abandoned the paracybernetic model in favor of his own teleological theory of PK. As he puts it: "it may be more appropriate to see PK as a goal-oriented principle in the sense that it aims successfully at a final outcome, no matter how intricate the intermediate steps are" (Schmidt 1974, p. 272).

Schmidt prefers to talk of a "goal-oriented principle" rather than of a "teleological cause," as I have been doing, perhaps because, being a physicist, he tends to think of causality as equivalent to physical causality and hence wrongly assumes that a goal-oriented principle must be noncausal, but I do not

think that anything more here is involved than a question of semantics. What *is* important is that Schmidt has designed and carried out a successful experiment specifically to throw light on the nature of teleological causation (Schmidt 1974a). Briefly, what happened in this experiment is that two different types of RNG were involved, the one based on a relatively simple circuit diagram, the other a more complex design. However, the subject knew nothing about the electronic equipment used which was even housed in a separate room. All that the subject had to go by was the feedback display which, in this instance, consisted simply of two lamps of different color, the one representing a hit, the other a miss. His instructions were just to increase the frequency of the hit-lamp coming on relative to the frequency of the miss-lamp. PK was implied inasmuch as there were no normal ways by which this could be done. Now, trials on which the feedback display was controlled by the simple RNG were randomly and automatically alternated with trials on which the complex RNG was operative. Some 35 subjects participated in the confirmatory test and the results were as follows. Although scoring on those trials on which the simpler RNG was operative was slightly higher than the scoring on those trials on which the more complex RNG was operative, there was no significant difference between the two, both conditions yielding highly significant deviations from chance with scoring rates of around 54 percent as against a 50 percent baseline.

This crucial experiment was carried out in 1973 and, unfortunately, I know of no subsequent work that has been done to confirm it. But Schmidt's findings are very much in accord with the earlier research with dice where it transpired that using a multiplicity of dice or similar target objects did not depress the rate of scoring. All such evidence supports the teleological model which assumes that, so long as the means are available, the same end will be attained no matter how complex those means, but it contradicts the paracybernetic model which would predict that an increase in the information load should lower the rate of success.

Schmidt has attempted to formulate his model in terms of what he calls his "mathematical theory of psi" (Schmidt 1975). What is critical in this conceptualization of PK is the feedback received by a motivated subject or "psi source" as Schmidt would have it. It is only at the point where the subject obtains confirmation of success that the psi process is activated and, tracing back events to the start of the experiment, these can then be shown to follow a teleological course to produce in the end the very results whose observation constitutes the feedback. Schmidt goes further and extends his theory to all instances of psi, all of which now become a species of PK. Precognition, for example, is no longer a case of the future fulfilling event causing a present precognitive response in the subject, rather it is now a question of the observation of that event, when this eventually comes to pass, retroactively and psychokinetically eliciting the precognitive response from the subject's brain which, in Schmidt's model, here corresponds to a random number generator.

Schmidt has repeatedly insisted that his theory is a mathematical or formal one and he is understandably cagey about allowing any concrete interpretation of that theory, he has even expressed reluctance to acknowledge the expression "retro-PK" (1975, p. 227). However, if we are to take what he is saying as anything more than a pure formalism and try to give it intuitive meaning, there is no escaping the conclusion that what is being implied here is that psi is not just teleological in its operation but also retroactive. For, since the process cannot get started until the outcome is known, the only effect it can produce is a retroactive one. Thus, when Schmidt uses a set of prerecorded digits as the PK target sequence, a successful run *means* that when the subject, or psi source, becomes aware of his score he thereupon influences retroactively the random number generator which originally recorded those digits!

However well shrouded in mathematical symbols, this is, without doubt, a fantastic theory. Why, we may well wonder, should anyone wish to hold it? The reason, it turns out, is both empirical and theoretical. The chief empirical grounds, apart from Schmidt's own experiments, is the discovery of the so-called "psi experimenter effect." It has become increasingly clear that, when all normal explanations have been eliminated, certain individual experimenters tend consistently to get positive results, no matter what hypothesis they test, while others no less consistently obtain only chance results. Now, if we posit a retroactive effect at the point where the experimenter inspects his data and if, further, we assume that some experimenters are natural psi sources, then this psi experimenter effect becomes intelligible. For now it is the experimenter or "checker," not the ostensible subjects, who is responsible for the success of the experiment by retroactively and teleologically getting his subjects to produce whatever scoring pattern his hypothesis has predicted.

The main theoretical reason for introducing this kind of retroactive theory of psi has to do with quantum physics and, more particularly, with the so-called Copenhagen interpretation of quantum theory. While this aspect of the problem clearly weighed with Schmidt when he came to formulate his mathematical model, it is made much more explicit in the work of Walker (1975) and his followers. Leaving aside the equations and technicalities, the point of departure for these theorists was the quantum-theoretical assumption that a given physical event or state acquires a determinate value only when it has been observed. So long as the object in question is *not* being observed, all that quantum theory can say about it is that it obeys the Schrödinger equations and exists simultaneously in a range of possible states, each associated with its respective probability, the totality representing what is known as the "state vector." Only when the critical measurement or observation is eventually made do we get a collapse of the state vector giving us the one determinate outcome or result of the experiment. So long as we are dealing with neutral observers everything proceeds as in conventional physics. If, however, we introduce an observer who happens also to be a psi source and is motivated to obtain one

rather than another outcome of the experiment, then we get the systematic bias which we interpret as a significant psi score. Thus, theoretically, a paranormal event is no more than a highly improbable event brought about by the psi source who can modify the distribution of probabilities defining the state vector. On this showing, PK does not act like a physical force, rather it is, as Schmidt points out (1975a, p. 226), a stochastic phenomenon that "violates the second law of thermodynamics without violating the conservation laws for energy etc." Since virtually every physical object in nature exhibits at the microscopic level a certain fuzziness or noisiness, there is always ample scope for PK providing that object is coupled with a motivated psi source which feeds information into the system.

Following Schouten (1977), I shall use the expression "observational theory of psi" indifferently for all such theories as those of Schmidt and Walker in which feedback is critical for the psi process. It represents an entirely new theoretical approach to parapsychology and whatever it portends there can be no doubt of the strong attraction it has already had for such experimentalists of the new generation as Richard Mattuck, Brian Millar or Richard Broughton. The reasons for this appeal are not hard to seek. In the first place this approach holds out the promise of linking parapsychology with advances in quantum physics and thereby ending its long isolation as an unattached and anomalous field of inquiry. In the second place it offers, perhaps for the very first time in parapsychological history, the possibility of precise, deductive, quantitative predictions. For example, we could deduce that the noisier the target system the more sensitive it should be to a PK effect. Admittedly there are still some awkward implications that need sorting out, for example the so-called "divergence problem" raises the question of who is to count as the ultimate observer? Until this question is settled we cannot even know when an experiment is concluded. But the theorists are actively struggling with such questions and we must give them time.

As a mere layman, I can, of course, offer no opinion as to the soundness of such theories, whether, for example, they represent a legitimate extension of quantum theory, whether Walker (1974) is justified in identifying consciousness and will as hidden variables of the quantum process, and so on. But, even as a layman, there are certain logical aspects of the observational theory that I find disconcerting and to which I feel justified in drawing attention. Now, as I have argued elsewhere (see the preceding paper in this volume) there is no fundamental objection, that I can see, despite what some philosophers have said, to the idea of backward causation *per se,* hence I have no *a priori* objection to its apparent circularity. Such circularity exists already in connection with the so-called intervention paradox in precognition. Thus, if an accident about which I have dreamt should occur because of certain steps which I took in consequence of my dream, we would have a typical self-fulfilling prophecy while, equally, if the accident is avoided only because of certain steps I took in consequence of my dream, we would have a typical self-defeating prophecy. In either case we become involved in what I would call a causal loop, in this instance an event A (the accident) retroactively causes an earlier event B (the precognitive dream) which, in turn, becomes a causal ancestor of the original event A; of, even more paradoxically, in the negative example, becomes the causal ancestor of an event not-A. What, on the face of it, we appear here to be saying is that an event may be indirectly the cause of itself or even the cause of its own nonexistence! Various more or less far-fetched theories have been advanced in order to deal with the paradox of intervention including the idea of multiple universes and potential futures. But while we may have to resign ourselves to living with paradoxes in the case of precognition, the price we are being asked to pay by the protagonists of observational theory is to have to tolerate such paradoxes in every case where psi is involved since, whether it be an instance of ESP or PK that we are considering, we are confronted with an event A, the feedback event, influencing an earlier event B, the psi response, which in turn, eventually produces the event A. The theorists themselves do not appear to be specially worried by these consequences of their theories; Schmidt (1975), for example, claims that his mathematical formalism can take care of the intervention paradox, but whether we, their customers, ought to be so unconcerned, I am less sure. Even if, from the formal point of view, there are no inconsistencies in their theories, we still have a duty to try and make sense of it all intuitively. Hence, while I would hesitate to proclaim that what I have been calling causal loops are logically inadmissible, in the way, for example, that self-referring statements are logically improper, they are, to say the least, troublesome.[b]

Finally, on the assumption that a psi effect is involved in normal voluntary action, can the observational theory be extended to cover this situation as well? This would mean that my capacity to raise my arm when I will to do so depends not only on the intention, volition or Jamesian "idea" which can translate itself into motor responses, plus a muscular system that is in working order, but also on my subsequent perception of my arm as having risen. At first it struck me that such an interpretation of what was involved in every voluntary action was altogether too far-fetched and implausible to be worth defending. However, when I came to try and formulate specific objections to it, I found that none of them stood up to examination. Hence, rather than sacrifice the symmetry between normal and paranormal action, or PK, I am inclined to think that if the observational interpretation is valid in the latter case, it must be valid in the former case also. What complicates the issue, where ordinary voluntary behavior is concerned, is that it is a continuous process involving a continual feedback cycle between output and input. When we perform some skilled action, such as writing a word, for example, there is a constant visual and kinesthetic monitoring of the action from start to finish. Certain skilled actions, it is true, are executed so swiftly that such continuous feedback is not

theoretically possible and accordingly they are presumably simply run off from a preprogrammed sequence—piano playing would come into this category—but the point is that all our perceptuo-motor skills *can* be understood in terms of the accepted principles of cybernetic control. At what point, then, would the intervention of mind, in the form of a volitional act, take effect?

It is here, above all, that we have to distinguish between ends and means. Behavior consists very largely of automatizing our habitual skills so that our conscious attention can be directed towards the novel contingencies in life that call for special decision-making. Raising an arm is a case in point, so is walking towards a chosen destination. We have schooled our body in the past to execute such performances like a well-programmed cybernetic robot. All that we then require is to initiate, or, in the case of a repetitive or extended sequence of movements, to sustain the relevant process which then automatically unfolds in a self-regulating way. The teleological element in all this would enter only at the higher level of control which supervenes to make the whole performance an intentional action as opposed to a mechanical routine.

To sum up what I have been saying in this paper, I would make the following points:

(1) Psi phenomena, properly so called, are causal phenomena although this fact neither asserts nor denies the possibility that there may also be acausal or "synchronistic" phenomena such as meaningful coincidences.

(2) Causality may be either mechanical or teleological. Psychic causation is teleological in its mode of operation, that is to say psychic phenomena can be understood *only* in terms of the ends which they are designed to bring about.

(3) The observational theory of psi, which has only recently been propounded, implies that psychic causation is both teleological *and* retroactive in its effect. It is too soon to say whether this new theory of psi will be vindicated by further experimental work but, if it is, then for the first time since the demise of Aristotelian science, we would have an acceptable scientific theory which uses the notion of an irreducibly teleological cause for explanatory purposes.

(4) I have suggested that the explanation of PK cannot be divorced from an understanding of normal voluntary action. Both involve teleological causation at the point where mind intervenes in an otherwise physical process.

Notes

a. I have elsewhere discussed this work in a review article I wrote for The British Journal for the Philosophy of Science *under the title "Is Mind Autonomous?" (Beloff 1977).*

b. The debate continues: Stephen Braude (1979), in his article in J.A.S.P.R., *"The Observational Theories in Parapsychology: A Critique," presents a rigorous formal analysis of the causal loop paradox. Recently, however, he has been challenged by Brian Millar, a well known exponent of observational theory. See Millar (1988) "Cutting the Braudian Loop: In Defense of the Observational Theories" and Braude's (1988) rejoinder, "Death by Observation: A Reply to Millar."*