Theoretical

THEORY AND APORY IN HEALING RESEARCH:

"Influence" Versus "Correlational" Models

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ABSTRACT

Healing Energy Research, like any research area, has to make presuppositions, which are normally not discussed. Among them are assumptions about how the mind-matter problem should be solved, and whether the events observed in healings are causal or not. The mind-matter problem is briefly discussed. It is pointed out that a dualist stance in healing research, positing a mind independent from matter, creates specific problems on top of the unsolved duality problem of normal science, especially when combined with a local and causalist view of healing. Problems with a localist view are pointed out and an alternative model for understanding healing effects is proposed. This model operates along the lines of generalizing conditions for entanglement or EPR-like correlations. It is shown that macroscopic entanglement in analogy to the classical EPR correlations of quantum mechanics is, in principle, a possibility under certain conditions. I hold that understanding healing along the lines of a correlational model, with healing being an instance of macroscopic entanglement is more likely to be a correct reconstruction of healing than a causalist one. Nevertheless it could be important for practitioners to adopt a causalist and localist view in order to be able to perform those operations, which in a correlational view are the preconditions for healing to occur.

KEYWORDS: Healing, model, locality, non-locality, mind-body, entanglement, causality

INTRODUCTION

Any research has to make presuppositions which are implicit and rarely discussed. Collingwood and Fleck have both, independently at about the same time, between 1930 and 1940, pointed out that at the base of the scientific endeavor are not facts and theories but implicit processes of social agreement which determine the basic principles about how the world is structured, what entities inhabit it, how theories should be built, and the like.[1,2] These implicit presuppositions, as Collingwood called them, are rarely discussed openly. Being the foundations of scientific work they cannot be the topic of science themselves. This is a kind of Gödelian structure, which has been elaborated recently by Penrose.[3] The foundations on which a certain system rests cannot be proven or disproven by the means of the very system itself. Thus, science cannot "prove" or "disprove" the presuppositions which it implicitly makes. For this purpose a kind of meta-theoretical effort is needed, which was traditionally supplied by philosophy.

The same is true for research within the domain of healing energy, subtle energy, or any type of complementary and alternative medicine approach, for that matter. Here also implicit presuppositions are made which are not questioned. My effort in this paper will address exactly these implicit presuppositions and bring forward some, possibly problematic, presuppositions, which might be the reason for this branch of research of being ignored if not ridiculed by mainstream science. I will then try to point to some elements of a model which could avoid some of the pitfalls of other approaches, and thus possibly could link up healing energy research (HER) with mainstream science.

SOME PROBLEMATIC IMPLICIT ASSUMPTIONS OF THE HEALING ENERGY APPROACH

The Mind-Body Problem

What is rarely reflected in science is the mind-body or matter-mind problem. This addresses the question what the basic "stuff" of the world is made of and whether there is only one kind or two kinds of basic "stuff," and if only one, which one is more basic. Traditionally there have been three major propositions

in the history of thought of mankind, which come in various blends. The one probably espoused by most people, because it is the intuitive starting point for our relationship to the world is a *dualist position*: There is matter, which is hard and extended, is positioned in space and time, and which makes up the objects of the outer world. The 17th century philosopher René Descartes called it "res extensa—extended stuff."[4] Then there is mind, which is non localizable, does not have a precise place and no extension, which can produce thoughts and images, but which cannot be grasped, as matter can be grasped, which cannot be looked at from the outside, but can only be experienced from the inside. It is subjective, and not objective, as matter is. Descartes called it "res cogitans—thinking stuff." This dualist stance within the mind-body debate is the most obvious analysis and has been important for the development of modern science. It lies at the base of our division of disciplines into the real, hard sciences, which deal somehow with "matter," and the Arts and Humanities, which deal with "mind" and its manifestations. And even modern hard science, looking only at matter, like physics, cannot but start from this "Cartesian cut," since it always presupposes a measurement apparatus which is at some point taken notice of by consciousness. Therefore, at least epistemically, that is, concerning the way how we reach our knowledge of the world, modem science usually adopts a dualistic stance.[5]

Ever since its beginnings with the Presocratic writers science in the West has now and again embraced a *monist materialist position.* Formulated first by the Greek atomists, Democritos and Leukippos, this position is probably the one which has dominated natural science and is very much en vogue with most philosophers and mainstream scientists nowadays. Its basic position is that there is really only one stuff in the world which is matter. Everything else, simple or complicated, of different appearance and all varieties, can be explained as the complexion of basic entities which were called atoms already by these Greek writers. Mind will be explainable once we have understood the functioning and working of the brain and its material basis. Mentality is just one property of systems of a certain complexity, like the brain, and arises out of it, like liquidity is a property of a certain ordering of oxygen and hydrogen molecules. The modern materialist-monist stance within the mind-matter debate comes in many varieties, and it is not my purpose here to present them all. But it is important for this paper to understand that at the base of most of the modern scientific approaches is a materialist-monist worldview, which looks at the world as the complexification and ordering of

basic material entities. Although there is a hot debate ongoing within the newly arisen field of Consciousness Studies, whether consciousness can really be explained by a materialist position, like, for instance postulated by Dennett and Churchland to name but a few prominent writers, it certainly is the most prevailing view within modern science.[3,6-8]

What makes matters more complicated is the fact that traditionally and historically a materialist-monist position has nearly always been combined with emancipatory struggles of science to free itself from the bonds of religion and the church. This is true for the first scientific effort to "explain" everything within a materialist framework and thereby find freedom of the mind, namely Lucretius' "De rerum natura," and this seems to be true for most of modern science. For it is not only the explicit aim of science to explain how the world functions. It can be seen in its first beginnings in the middle ages that explaining the world in terms of natural laws also often had an anti-traditionalist and anti-religious emphasis.[9] Thus the struggle of science to free itself from religion and church-rules was intimately connected with its striving to understand the natural world. And the enterprise of science to explain the world was an implicitly anti-religious movement, if not by intention, then certainly by its results. Therefore, the implicit scientific ontology about how the world is structured, namely implicit materialism is welded together with an anti-spiritual or anti-religious preconception in the West. Science, this has to be taken into account, is not only about explaining the world. It is also about explaining the world without taking resort to any supernatural explanations not being in principle amenable to scientific methods. This must, by definition, exclude dualist and religious world views right from the scratch and creates a tension between researchers who do not want to give up their religious views or who do research at the interface.[10]

There always have been writers who held the opposite opinion saying that the basic stuff of the universe is a universal mind, which is normally called a *monist-idealist* position. Matter, then, is just a derivation of this universal mind, a kind of crystallized mind, "the habits of nature," as Peirce called it. The most prominent thinkers adopting such a view were Plato, Plotinus, Berkeley, Hegel and in modern times Charles S. Peirce. It has been espoused also by some physicists, because physics has somehow to come to grips with the fact that it is the conscious observer who determines the facts by making a measurement,

and one way of solving this riddle is to make consciousness and mind prior to matter.[11-15]

There have also been attempts to combine both views within a *neutral-monist* position. In such a view there would be a basic stuff to the world which only when differentiated becomes mind and matter, which thus are somehow complementary notions, like two sides of a coin. This position was for the first time formulated by Benedictus de Spinoza in the beginning of the 17th century, and taken up again by other modern writers.[16-21] Recent data show that this is, by the way, a position intuitively adopted by the majority of students questioned in a recent survey in Freiburg.[22] C. G. Jung also thought along those lines, if only implicitly, when he postulated a basic unity, which he called "unus mundus," one world, which then was differentiated into two aspects, matter and mind.

Classical parapsychological research, the predecessor of modern subtle energy research, has very often implicitly or explicitly adopted a dualist stance postulating that anomalist phenomena are a proof or at least a hint at the fact that mental phenomena are influencing causally material events.[23] This is exactly the type of argument which creates tension with the prevailing world view.[24] And the fierce opposition of the scientific establishment against anomalistic research and results can only be understood, if the implicit background of materialist ontology and emancipatory struggle from the grip of institutionalized religions is taken into account. It is not only a doubt about sound methodology, significance and veridicality of the report. It is a basic adversity about the topic itself; namely of implicitly reintroducing spiritual or religious themes and a possible duality in the basic ontology. If it were only for pure and sober scientific standards the so called anomalistic phenomena of psychokinesis or extrasensory perception would long have to be accepted, considering the overwhelming evidence of the data.[25-27] The problem are the prior belief systems of reviewers, which have to be incorporated and which, depending on the willingness to accept the plausiblity of anomalistic events to occur in the first place, can push significance levels for a single study to be accepted as proof to unrealistic minuteness.[28] And these prior beliefs depend on the implicit ontology which in most cases is materialist-monist and anti-spiritual.

On the other hand, most researchers within the realm of anomalistic research or HER seem to have adopted an implicitly dualist or even idealist stance, without making this implicit. Thus, they are not only providing data about how the world functions, but they are also implicitly fighting a prevailing materialist world view, or at least this might be the appearance. In that case they have to be aware of the underlying issues.

Monist ontologies are scientifically more satisfying, because they are simpler, and simplicity is one of the methodological rules theories are judged by, ever since Ockham introduced his principle of parsimony stating that *entities should not be multiplied beyond necessity.*[29(p.59)] Good arguments are needed to convince scientists that a monist-materialist worldview is too restricted. And data, which are addressed at battering this worldview have to be exceedingly strong, at least by six orders of magnitudes than conventional data.[28] Researchers who want to address this issue should be aware of their own preconceptions, and those prevailing in the scientific establishment. If they want to promote a dualist ontology with mind affecting matter, not only within a single body, but across a distance affecting another mind or body, they have to face two theoretical problems at once; One is the traditional dualist problem, which has not been solved so far—and the solutions proposed by Eccles, for instance have not really been solutions.[30,31] This problem, out for solution since Descartes, consists of the question of how non-material events like mental events, can affect events of a different ontological make-up, like material events. Although we live with this seeming paradox all the time - waves of particles are converted in distinct and different (!) mental events like sounds, visual images, pain perceptions, and the like—in a strict scientific sense it is an unsolved problem.

A dualist position claiming that mind can affect matter or other minds at a distance posits yet another mind-matter interaction problem on top of the still unsolved traditional one. Not only has the traditional mind-mater interaction problem to be solved, but also the new, unconventional one. As long as there are insufficient theoretical models which can make such a proposition plausible in the first place, a host of data, no matter how convincing, will not do the job of making such a statement scientifically viable.

Researchers within the field of healing energy research should be aware of these problems and be prepared accordingly. My own stance would be a *comple-*

mentarist view: We can view mind and matter as phenomenologically different manifestations of one underlying nature. This will give credit to the phenomenological and epistemological dualism, which we all implicitly subscribe to. At the same time it also links up with the mainstream notion of simplicity in explanation and monist tendencies. Such a position is, I hold, also more helpful in overcoming the locality problem, which we now turn to.

The Locality Problem

Another implicit presupposition of modern science is that the major mode for causality to operate is that of locally active causes. Let us look at these notions separately. Aristotle had posed four different sorts of causes: *Material, formal, final and efficient causes.* Material causes are the material something is made of—the marble, say, which is the material basis of a statue. Formal causes are the blueprints which describe how things are made. In the example of a statue the plan which the artist has is the formal cause of it. Final causes are future states which function, in modern terminology, as attractors for something to become. They could be any type of desired end status. In the example of the statue it is the final figure which the artist wants to bring to the fore, which is the final cause of the statue. The efficient cause, finally, is the actual physical movements of parts, which produce changes in place. Thus, the movements of hammer and chisel are the efficient causes of the statue.

Modern science, now, has put away with final causes. They were still an option in biology, but when the modem evolutionist view prevailed there was no need for final causation. The evolution of species could be explained, so the mainstream story goes, purely by efficient causation of random combinations of genes and evolutionary pressure from the environment. Material causes have been absorbed in the domains of physics and chemistry explaining the varieties of substances from the combinations of nuclear particles. Formal causes are still somehow present in the shape of very general natural laws and theories which describe how things move. But the holy grail of modern science is certainly efficient causation: to understand how something is brought about by the impact of other matter. Although we have field theories which describe how, for instance, electromagnetism works, these fields are normally regarded

to propagate with final velocity according to the Special Theory of Relativity, and to be mediated by virtual particles, like photons. If I am not mistaken with my understanding, modern science can be understood as an attempt to reconstruct all causes as efficient causes: as mediated by material events physically impacting on each other or other material events. Photons, even if massless or of vanishing rest mass, are nevertheless particles, that is, material events.

Bound up with this attempt to reconstruct all causes as efficient causes, is the locality postulate. This derives from Einstein's Special Theory of Relativity which postulates that the final velocity in the universe is the speed of light. Thus no cause can travel quicker than that, because, in the first place, it is tied up to an exchange particle of a particular force, the electromagnetic force, for instance, e.g. the photon, which as any particle cannot travel faster than light. The locality condition means that only those parts of the universe can be causally connected which lie within the "light cone," a coniform area covered by a potential radiation source of exchange particles. The moon at night, for instance, at the very moment I look at it, is always causally unconnected to me, because the light needs roughly one second to travel from it to my eye. Thus, I never see, what is momentaneously happening on the moon, but what has happened one second earlier. There is no local connection from the earth to the moon at the very same moment.

Causality and locality are thus tied up in the modern worldview. It is an impossible notion, at least within the prevailing world view, to have a causal relationship with anything, which is not mediated by one of the known exchange particles of forces. And if this is so, this takes a minimum amount of time, namely the time light takes to travel.

When it comes to reconciling experiences and phenomena of healing with this worldview difficulties arise which are intimately connected with our view of modern physics. If one claims that the healing intention of a mind has affected the physiology of an organism, as is typically done in HER research, and this possibly over a distance, or with no other local connection, this is a recipe for trouble.[32-35] It goes directly against the modern scientific dogma that all causes have to be mediated locally and have to be efficient causes. Healing is decidedly and by definition different. It claims that a mental event—a prayer, an

intention, a visualization—can affect the physiology of a different body, even from a distance.

There are at first sight three options to circumvent this awkward situation. One can try to brush out the seeming offense by claiming that the "energies" at work are not so different from the classically known energies, that they are radiations in the range of the electromagnetic spectrum, thus adopting both the locality and the causality principle of modern science and adapting it to HER. This is the most obvious, the least deviant, the most conventional, but probably also a wrong approach. These causal and local approaches, as I would like to term them, which, to be honest, I find misplaced, have the appeal of obvious scientific proximity. But they are like in the tale of the hare and the hedgehog always too late.

It is difficult for a conventional scientist to see what relevance this should have except as a nice side dish to the mainstream menu. Such models would have to make plausible how such "energies" or radiations of the electromagnetic spectrum can either be strong or coherent enough or both to be able to affect a living organism even over a large distance. Why would a healing intention be more effective than the electromagnetic impulses of cellular phones, the electromagnetic smog surrounding us, or the ever present sferics impulses which come from meteorological events and bombard us with elecromagnetic radiation in the low frequency range many thousand times a day without us normally noticing this?

Another option frequently adopted is to stick to the causality principle and to postulate different types of "energies." Although this seems to have some scientific appeal, preserving one cherished principle, there will be conflict with the rest of physics. For this postulate would amount to recreating physics in order to incorporate some "new" or "unknown" force. This is not a likely strategy to succeed with mainstream science.

The third way of dealing with this problem is connected with the implicitly dualistic view of the mind-matter problem: One can just postulate that a Grand Mind is nonlocally active to outplay the locality and causality principle. But this will have to be payed with the problem mentioned in the previous paragraph: to explain how mental events affect material events. Enter the mind-body problem again.

A POSSIBLE SOLUTION

Is there a solution to this predicament? I think there is, and I will try to sketch it. My own presuppositions in doing so are the following:

1. I go along with mainstream science in trying to "naturally" explain events as much as possible. This is, what I call a naturalist stance or a "naturalization" of spirituality.

2. I go along with mainstream science in that simplicity, parsimony, unity are guiding principles of research and theory. Specifically I think that a monist ontology is preferable to a dualist one, not only because this makes things easier, but because this is at the base of every great religious insight that basically there is only One Universe and at the base everything is One.

3. I do not think that this monism has to be or can be only a materialist monism. There are at least two other options: An idealist monism or a neutral one with mind and matter as complementary aspects. To me the latter is the most satisfactory model, both theoretically and empirically.

4. The notion of causality as being efficient causality only, tied up with the locality principle is too restrictive.

These are the presuppositions I am starting from.

It is modern physics itself which supplies a possible solution. Quantum mechanics (QM) is one of the most successful theories ever developed. It has passed virtually hundreds of empirical tests and seems to describe the material world very well. It is a particular feature of QM that at a very basic level matter is non-local. What does this mean? When trying to defeat QM, Einstein, Podolsky and Rosen (EPR) have pointed out that the formalism of QM predicts that a quantum system behaves holistically, as long as its structure is not broken by a measurement process. Thereby it does make no difference how widely the system is distributed in space and time. In a holistic quantum system it makes no sense to, strictly speaking, discern particular elements, since the system has not fallen apart yet into single parts. Practically and experimentally quantum entanglement, also called EPR-correlation, because Einstein,

Podolsky and Rosen were the first to point at that peculiarity of quantum mechanics, is realized in a twin-particle system. In such a system a radiation source radiates twin-particles, like two photons, which, by virtue of their simultaneous generation form one system, although they travel into two opposite directions at the speed of light, remain part of one system and thereby connected, correlated, or entangled. QM predicts that they are holistically correlated, or entangled, no matter how far they are apart. That is, if one of the particles is polarized or deflected, the other twin particle will be found in a corresponding state instantaneously, at the same moment, even if the distance is too large for a signal to travel between the two parts. The two parts behave as one system, in a correlated fashion. It is very important to realize that this concerted behavior is not mediated causally; there is no underlying signal travelling between the particles to "signal" the state of the corresponding part. Such local explanations in terms of "hidden variables" have practically been ruled out by experiment.[36] Thus this correlated behavior of parts of a quantum system is called "nonlocal," because there is no signal mediating the respective states of the particles. This basic nonlocality of nature and quantum entanglement meanwhile is a well established theoretical and empirical fact of modern physics.[37] What is totally unclear is how far entanglement goes, when it breaks down, and whether it might also be relevant for macroscopic systems.[38,39]

It is very important here to note that in mainstream physics it has been accepted that principally, the conditions for entanglement to occur are not tied up with particular systems, like microscopic twin-particle systems, but have very general conditions described in a technical paper by Landau.[40] He makes clear that the conditions for entanglement to occur are:

1. There are two kinematically independent systems

2. Both systems contain a set of complementary variables.

This was taken up by Primas who suggested that this could be a basis for understanding synchronistic events, in the sense of Jung.[41]

If these conditions are met, we would expect entanglement between the two systems. Thus, the basic situation and formalism of QM opens up the possibility to extrapolate entanglement to other systems which fulfill some minimum requirements. It has to be noted here that "being a quantum system"

is not a property which is defined by size, or by the fact that Planck's constant has to be taken into account in calculations, or by the degrees of freedom of the system.[42] It is only defined by the fact that "complementary observables" play a decisive role in the definition of the system. Complementarity is one of the key notions of QM. Originating in psychology, it was coined by Niels Bohr to describe the basic situation in QM.[21] Bohr used "complementarity" in three shades of meaning the most important of which expressed the fundamental aspect of matter, namely that matter has to be described using observables whose values cannot be observed simultaneously at arbitrarily sharp values, e.g. momentum and place. It can be shown that complementarity is at the heart of QM and the generic notion of the Heisenberg uncertainty relation, and that there is no classical way to get rid of this fundamental complementarity.[43]

An operational and precise formal definition of complementarity can only be given for material quantum systems. Here complementary variables are defined by their non-commutativity. The mathematical terms 2 x 3 and 3 x 2 are commutative and thus equivalent. It does not matter, whether we first take two and multiply by three or the other way round. In a complementary relationship the two observables or variables are non-commuting. It thus would make a difference, whether we would first take the "2" and then "3" or the other way round. This is the basic structure of complementarity in QM.

If we leave the realm of QM proper and want to use the generalization condition of EPR entanglement, we need to define a system in terms of complementary observables. Outside of the strict quantum formalism it is as yet unclear what that could mean. Some initial ideas have been voiced which show that some aspects of the cognitive system are in fact reminiscent of quantum descriptions. The operator algebra used by Gernert in order to describe the operations of the cognitive system is a non-commutative algebra akin to the one used by QM.[44] We have shown that such notions as "individual" and "society," or "separateness" and "connectedness" are complementary notions, which might be used to fill in the abstract notions of a non-commutative algebra of a general algebraic description of systems.[21]

We are at present working on an algebraic model of generalized quantum theory and EPR correlatedness.[45] If our ideas are correct there is a very simple precondition

for entanglement to occur within a system: a local observable and a global observable of the system have to be complementary, and then entanglement ensues between those parts of the system the observables refer to.

What this means will be spelled out in an initial attempt, and certainly will have to be scrutinized carefully. But from what is known and published already it can be gathered that:

1. EPR-like entanglement is not a prerogative of small material systems but of any type of system which fulfills certain conditions.

2. One minimal condition is that there be complementarity between a local and a global description.

Now, one basic complementarity which we have all part in is that between mental and material events. These two notions, I hold, fulfill the requirement for complementarity.[46,47] They are not just opposite but incompatible descriptions. A mental description cannot be reduced to a material one, and vice versa. There are different "measurement" operations which are needed to ascertain a material or a mental event. And they do not commute in the sense that the sequence of measurements does play a role. From a clinical point of view, for instance, it makes a decisive and important difference, whether I first look at the mental side of an illness, trying to understand the social and psychologic entailments, or whether I look at it as a bodily complaint, taking readings of blood hormone levels, and the like. It is even possible to look at the mental system in terms of complementarity of operations.[44]

Thus a very speculative but well founded consequence could be that the human mind itself can, under certain circumstances, form a quantum system, thus making entanglement possible. This might lead to a very natural understanding of Shamanic or "Energy" Healings. Just like in the classical EPR case the healings brought about by intention, ritual, or prayer could be reinterpreted as instances of entanglement within a system formed by this intention or ritual. Thus, they would not be causally mediated by "energies" of an electromagnetic or subtle kind, but they would be correlational events, acausal, if we like. Analogous to the classical EPR correlation there would be no local signal transfer but a correlational change in state of one remote part of a system.

This model makes, of course, some decisive presuppositions, some of which are rather probable, others of which have to be looked at closely:

1. There is a possibility for EPR-like entanglement to operate in different types of systems, even macroscopic ones. That this is a general possibility I have sketched above.

2. Systemic boundaries can be formed which are strong enough to create systems temporarily in which entanglement can occur. I hold that the rituals used in healing contexts, the images and intentions are strong enough to provide this.

3. There are complementary observables or variables within this system of healer-healee that allow for entanglement. This is a matter of reconstructing the particular situations. This area certainly needs more conceptual research and a deeper understanding of what complementarity means. One way of reconstructing the healing situation would be to say that the healer in his mind or by way of rituals first creates a systemic boundary. The healee is in physical need, which is a global description. The healer then does something, either materially or in his mind, which is complementary, and which is a local description. For instance, he "sucks" or "draws" out the "disease substance," visualizes the healee as healed, or blessed, or does something else instantiating the desired state. If this is done with "no doubt," simply and in a single minded attitude, it fulfills the requirement of a complementary description to the global one of the healee being in a diseased state.

There certainly remains a lot to understand, and it is by no means clear which descriptions actually fulfill the condition of complementarity. But the nice thing about this model is that there may even be multiple ways of reconstructing complementarity, and not only one single and correct one. The ideas of "causal influence" through "strong intentions," "energies," "vibrations" and the like, might be what the German parapsychologist Walter von Lucadou terms "pseudo-machines." Something which keeps the mind engaged and on the wrong track in order for entanglement to occur without disturbance.[48] Pseudo-machines are processes which supply a causal explanation for acausal or correlational events. By providing a causal explanatory framework the functioning of the machine is not questioned and its efficacy remains. In that sense it might be necessary for practitioners to think and operate in terms of causality and

locality, but crucial for researchers and theoreticians to not be sidetracked by that causalist talk but look into the true nature of what lies at the heart of all matter: entanglement.

CONCLUSION

In conclusion, my suggestion is the following:

Adopting causal and local views of the operation of healing is probably both wrong and potentially unviable, because strong implicit presuppositions of science would be thereby questioned. Another way, which has been rarely tried, would be to adopt the view that HER operates by a non-local principle, which could be modelled along the lines of quantum entanglement. I have shown that such a reconstruction is at least plausible. In such a framework, healing would be a correlational, non-local process which is not mediated by a signal but which operates using macroscopic entanglement between elements of a macroscopic system. The minimum requirements are that a systemic boundary is set up, which is normally provided by the healing ritual, and that a complementary relationship exists between global and local observables within the system. This could be the diseased state of the patient and the mental operation of the healer. While this might be a more useful way of describing the system in terms of scientific parlance, it could be necessary for its practical application and everyday communication between patient and practitioner to use language along the lines of casually active pseudo-machines.

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