Paranormal Aspects

Appendix to the Proceedings of ANPA 20

A. Griffor, *Editor*

The Alternative Natural Philosophy Association

CONTENTS

INTRODUCTION

In September 1998, immediately after the 20th annual Alternative Natural Philosophy Association meeting held in Wesley House, Cambridge, a group of twelve people gathered together under the auspices of the Epiphany Philosophers, to discuss approaches to the Paranormal. The group were mainly seasoned members of ANPA, but also included members of the Epiphany Philosophers and some newcomers with an interest in this area. The discussions were wide and free ranging and the remit of the group was very open, but with an eventual aim to come to ways of approaching this difficult area from a scientific point of view, whatever that may mean to the particular researcher concerned. The meeting itself proved extremely enjoyable and productive and I, for one, look back on it with fond memories.

After the meeting the attendees were asked to contribute a paper summarising their thoughts as a result of the two days. This Appendix to the ANPA Proceedings resulted from that request. It was kindly edited by Arleta Griffor. The papers clearly reflect the individual positions of the particular authors and thus constitute a satisfying and varied catalog of views (aspects) on the subject in question. The title of this proceedings is also something of a pun on a particular obsession of ANPA which is current (indeed the title of the main body of the Proceedings is 'Aspects'). This document also contains summaries of the ten minute position statements that all attendees were asked to make at the beginning of the meeting. These were recorded by Clive Kilmister and edited by Ted Bastin (and also somewhat by myself, although I am probably simply responsible for any mistakes that have crept in).

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THE CONSEQUENCES OF ASPECT: BROAD PHYSICAL PICTURE

Ted Bastin

This short paper for ANPA 1998 (paranormal extension) is based upon the joint paper of Clive Kilmister (the 'aspect' extension) and myself in the main section of ANPA Proceedings. Most of it is a recapitulation of the main physical ideas of the latter paper with only a few remarks on the application to the paranormal.

Through a long and very rigorous investigation of the hierarchy foundations we find it necessary to postulate a 'pre-geometry' (Zimmerman's expression) which has the following characteristics:

1. It is sequential and refers to experience which is sequential (and therefore recursive) if it is to have any power of construction or 'memory' (reference back).

2. It is at once mental and physical -this distinction not having yet appeared.

3. The basic operation of discrimination already used in the hierarchy is postulated without a distinction between knowing and constructing.

4. These three characteristics can be summarized in the notion of process, in which the immediacy of the current step in each sequence is primary and logically prior to any objective or universal background 'space'.

The purpose of this note is to suggest that the ground between the aspect (or pre-geometrical) manifold, and the formal combinatorial hierarchy, is the place to locate paranormal phenomena. The units out of which we build a picture of the objective physical world are best called measurements or observations. However we stress that we are defining those terms in our own way, though of course we expect it to emerge that our use of them is reasonable and illuminating. It is not the case, for us, that the epistemological element of theory enters for the first time and in one action with the making of a measurement, since epistemology is already present in the definition of discrimination at the beginning of the hierarchy algebra.

Every construction in the hierarchy is sequential, but we cannot have the measurements identified with the same constructive sequences since if we did we should be using the same mathematical mechanism in two distinct ways without making the distinction explicit. This is where aspect comes in. What we propose

is that measurement is a two way iteration between the established hierarchy and the aspect manifold with new information being incorporated into the former from the latter at each stage, so that the complete picture is the hierarchy structure with sequences of these stages constituting a measurement sequence. Two principles are essential:

1. Each sequence must be finite with a recognizable limit point, since otherwise it can wander indefinitely. This limit comes from the zig-zagging between CH and aspect CH in ways we are vague about at the moment. The numerical value associated with the limit is supplied by the Parker-Rhodes theorem. We know it experimentally through the coupling constants, and by current convention the quantity which incorporates this finiteness is one of the factors of the electromagnetic coupling constant, namely the velocity of light. We observe that most of the measurements may be short due to running through the construction without using all the choices mathematically allowed.

2. The structure supplied by the hierarchy, which includes the dimension structure of space-time, has provided the concepts in terms of which the transfer of information is mediated. There is no other conceptual framework provided by aspect. However the metrical relationships are yet to be described through the very measurement process which we are now setting up. There is thus a complete separation of dimensionality and metric.

We see ourselves as providing an understanding of electromagnetism itself, since the observational concomitant of each stage in the measurement is the discovery that a 3D structure is needed to represent the 'field' responsible for the acceleration of the test particle. As we normally say, the particle is accelerated at right-angles both to its motion and to the applied field -that being the definition of the e.m. field. Having seen this, we do the jump into purely mechanical picture with the measurement step now incorporated into the measurement sequence. This principle takes us back to the period after the publication of Weyl's gauge theory of electromagnetism when it slowly became apparent that the attempt to incorporate the e.m. effect into a relativity type extended geometry - could never succeed. We have had carefully to consider why it could never succeed, since the motivation of Weyl - his finding it ultimately unsatisfactory that mechanics and electromagnetism admitted two kinds of stuff in the world - retains its force and provides a push in our direction.

The connection of the macroscopic physics with quantization is also strong. At the limit of each measurement sequence we reach a point at which no complexity other than the combinatorial structure can be presented; there is no room any more for any spatial configuration, and this is quantization itself. Appropriately the coupling constant which defines the relationship between the quantized units is the measure of the coupling of the electromagnetic field specifically -namely $1/\alpha$. This limit to the observation sequence is the point at which we depend on having a combinatorial account of spin, and it was here

that the 'aspect' generalization of the hierarchy began (see ANPA 1998 Joint paper, CWK and TB). I think it is clear that we have here in principle the whole account of how the quantized electromagnetic quantities grade over into classical or 'continuum' ones, though it would be desirable to go into more detail. It should also be quite easy to fit in CPT and other basic quantum principles of that sort given that they no longer trail with them all sorts of implausible geometrical allusions.

Now the way is open to describe the very general area of the paranormal. It arises when we relax condition 1. above, which requires a monolinear or sequential time. We still see things in spatio-temporal terms but the rigidity of the metrical conditions has disappeared. This is our picture of the independence of paranormal phenomena in respect of position in space and time. It allows, indeed insists, that they be presented in space and time to our awareness rather in the Kantian manner. The next question that is bound to be to asked is how we do order paranormal experiences at all, even given that we shall expect them to be fragmented. I have nothing to say at this moment except that it is notoriously difficult anyway in the practical experience of most of us, though it is, in the opinion of many who have this experience, the most characteristic thing about the paranormal.

A COUPLE OF ODD REMARKS:

1. Mobile centre of consciousness. This term is often used, and it seems inevitable that we have some such expression: consider distant viewing, precognition, map-dowsing, out-of-the-body-experiences, and so on. It may be that the apparatus we need for these experiences will fit other paranormal phenomena equally well, though these others do not force the issue and so have been thought of in apparently less strange ways.

2. Of course we think of 'us' as physical bodies with the old ghost in the machine, but after all we can imagine all sorts of things which we would say were not really happening. How far these imaginary experiences differ from a.o.b's is quite a complicated question. ■

SUPERNATURAL AND SUPERNORMAL

Viv Pope

I do not believe in the real existence of anything that might be classified as either paranormal or supernatural. Whatever there is, in the nature of things is, by definition, natural and, if we accept nature for what it is, normal.

I do, however, believe that there are things which may be classified as infra-natural. Such things are, for instance, not only the mythical creations of the people of yore but also of the theories bequeathed to us by people like Newton, Faraday and Einstein, to name but a few, whose ideas become stranger and stranger in retrospect, as history advances. In this long view, what 'paranormal' means is - like fashion - a thing of the moment. For example, the invisible 'fields' and associated 'forces' of Newton and Faraday were once accepted, 'natural'; and now, in the light of more recent scientific developments, these things are infra-natural. The theories of our most illustrious progenitors wither and fall, as dead branches on the fast-growing tree of conceptual evolution.

But not only do theories die in that way. Sometimes even whole species of theories (what we call paradigms) may have their day and become extinct. The atomistic reductionism of Democritus, for instance, which has lasted for nigh on three thousand years, now seems threatened with extinction with the rise of a new holism in which the new 'atoms', called quanta, are the terminals of reduction rather than sources of construction in the way that metres are the reason for there being millimetres, not the other way around.

In this way, one might anticipate that the 'mechanistic' straitjacket which Democritus and Descartes placed on physical explanations of causality and which - in a belief system akin to religion, were once thought capable of explaining everything - might be removed so that Aristotle's wider and more empirical account of causality may be once more considered. Modern naturalists know that no purely mechanist or constructivist account of natural processes is even feasible nowadays. As more and more evidence becomes available, in areas of physics as well as zoology, that nature is holistic rather than atomistic, so these mechanistic theories begin to sink, like alchemy, into the Marianas Trench of history.

Given that nature is holistic, then the fact that things may influence one another 'telepathically' cannot be ruled out as dogmatically as was customary in classical science; nor, by the same token, can 'clairvoyance'. Indeed instantaneous (or non-local) influences of both kinds, on the part of elementary bits of matter, are more and more seriously being considered by physicists and, needless to say, biologists and zoologists.

So far as the Epiphany connection with ANPA is concerned, it is pertinent to point out that the word 'holy' in religion has the same root as 'holistic' and that 'deism' is different from 'theism'. All natural religions are theistic - that is to say, their deities are those it makes sense to worship and pray to. Only physics is deistic - its incipient deity being, as it were, 'a machine' or else a 'machine-designer' which it makes no sense to make supplication to and which only a mathematician or a philosophical Fred Dibnah (the well-known TV mechanophile) could possibly worship.

In short, then, I do not believe that religion in the theistic sense is either supernatural or supernormal. To me, religion in some form or another, (at the very least, that of plain optimism) is as natural and normal as breathing. Even plants are 'religious' on that least formal basis of seeking to prevail against that ultimate 'force of darkness', entropy. What are neither natural nor normal to me, therefore, are deism and atheism, which could never exist but for the follies of intellectuality.■

COMMENT ON THE PARANORMAL

by Louis H. Kauffman

It is thought that there might be ways of communication that go beyond the ordinary channels, ways of knowing that go beyond the usual forms of information and signalling, and ways of physicality that go beyond the ordinary laws.

These ways are termed paranormal and extrasensory. In considering such possibilities it is important to examine very carefully what is called ordinary. For that in itself is quite extraordinary.

A la William James, I will my arm to lift from the table. This evening it lifts. The "ordinary" explanation tells us about feedback and nerve impulse. It is a theory founded in practical facts such as the fact that an arm lifts in correlation with a thought and an intention. But absorbing this theory and seeing it for what it is - a theory, I can see no complete causal connection between my thought/intention and the lifting of my arm. There is a convenient cooccurrence, yes. These is the possibility of repetition of this experience, yes. But I cannot explain to you HOW the arm is lifted or how the thought gives rise to that elevation. It might as well be done by telekinesis.

ALL human experiences have this surprising and miraculous character! The paranormal is quite normal. But we are quite insatiable. As soon as a

phenomenon, no matter how miraculous, becomes repeatable we want more and we want new miracles. They are there. I can prove it.

You see the habitual is the direct analog of a formal system in mathematics. What is habitual is what can be formalized. And we know that a sufficiently rich and consistent formal system is necessarily incomplete.

There are theorems in the system that cannot be proved inside the system. They can be verified from the outside. Just so with habit. To the extent that behaviours and physics become habitual and predictable they are susceptible to formalization. When they are seen to be sufficiently formalized and consistent, then Gödel's theorem will intervene and produce a miracle. This is the paranormal in human guise.

Need we look for ghosts? I say not. But there are all sorts of phenomena at the boundaries of our present understanding and I believe that it is important to look very carefully at these. And if you want to investigate lucid dreaming or remote viewing, more power to you. These are the places where today's chaos will become tomorrow's science.

I believe that science is best advanced when persons find certain phenomena strange and fascinating and devote their precious time to the adventure of finding how these matters work. It is the adventure that matters, not the line between sensory and extrasensory.■

My Take on the Paranormal

Keith Bowden

I started my career as an Electronic Engineer, then a Control Engineer, then spent twenty years as an academic in a University Computer Centre. I am now a Research Fellow in the Theoretical Physics Research Unit at Birkbeck College, interested in Quantum Computation and the Nature of Information, amongst other things. Having, initially, a traditional materialist engineering philosophy my outlook on life was shattered by a number of experiences of altered states of consciousness in the seventies; I moved very much away from my roots towards a kind of idealist (all is mind) position. The effects of these experiences were heightened by my studies of the information based engineering ontologies of Kron, Jessel and others and by a growing interest in and experience of various paranormal phenomena (dowsing, remote viewing, dream phenomena and the like). I found I could reproduce these (particularly dowsing) at will, but that when I became too involved I could not control the effects. This I found scary,

which led to a more cautious respect. I am told by my parents that I was successfully taught by a dowser at the age of eight, but I do not remember this.

I am now more interested in developing models of the world which take account of these phenomena, than in experimenting with them (although I still practice lucid dreaming on occasion); there are no doubts in my mind of their existence. For some time I have been playing with a simple cosmology that resembles the Combinatorial Hierarchy and may lead to extensions of it. I think of our activity as (including) the process of asking questions of the world; the actual experimental set-up being a more important part of the process than is normally emphasised (at least in the Menshevic version) of the CH philosophy. I would like to model the construction of the question. One asks a question and receives a reply - a bit (string maybe) - in return.

Now it is interesting that there are different categories of bits that can come in depending on the kind of question one asks. We live in two expanding Universes - the theoretical and the empirical - the latter always larger than the former. There are replies to certain kinds of questions, e.g. does the antiproton fall up?, are there gravity waves?, which immediately change our theoretical world. They are asked specifically because there are fundamental gaps in the model. *Answers to these kinds of questions fundamentally and permanently change the world itself,* although there are interesting questions that can be asked about the initial repeatability of such results. We can talk about *fundamental* bits. There are others which are far more "purely *empirical*", e.g. does Mike Manthey want to go to dinner tonight? And yet others which are *Platonic.* Dan Kurth was talking with me the other evening about (Turing) computation as experiment. What is the ten billionth digit of pi? Again the bits that come in when we answer a Gedankenexperiment are purely Platonic; we ask them of quite a different world! My proposal is to classify sorts of bits by their properties and look at the implications these might have on extensions to the Combinatorial Hierarchy.

We can also think of Manthey bits (these are the ones that come in when we see the two coins at the same time), void bits (after Spencer-Brown), qubits, and of course Amson trits, although these don't depend in quite the same way on the type of question we ask. In particular we can think of the properties of paranormal bits (Arleta Griffor has called these *parabits*). In any model of the construction of the question, these bits are far more elusive. They appear to have a fundamentally different relationship with space and time than any of their siblings. They appear in the interface between the two expanding empirical and theoretical worlds. Sometimes what we think of as paranormal may be "scientifically" validated and the phenomena move from the boundary into the core of our theoretical world. Other phenomena perhaps continually elude us; they are neither excluded from the empirical boundary, nor included into the theoretical core, they seem to move away as we try to grasp them. Perhaps we grasp them in the wrong way. Anyway this is my current take on the paranormal. I hope these ideas may contribute to elucidating the problem.■

COULD THE PROCESSES OF QUANTUM HOLOGRAPHY SERVE AS A POSSIBLE EXPLANATION THE PHENOMENON CURRENTLY CATEGORIZED AS PARANORMAL ?

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ABSTRACT

The basis of a model quantum holographic cosmology is presented, in which quantum teleportation can be hypothesized as possible mechanism for the phenomenon of "re-incarnation", and the related phenomena of "divine revelation"/ "near death experiences", etc. conveying evolutionary advantage to the human organism through its mental faculties, in an exactly analogous manner to those inferred to have taken place, and to take place in relation to neural faculties. The premise is that the overwhelming body of known human experience in relation to these phenomena substantiates them and the paranormal more generally as valid experimental evidence needing scientific explanation such that a model with mathematical underpinnings providing such an explanation, will in the course of time exist. The subject matter of this paper, and the language used, and the presentation concerns the context of the meeting, which was organized by the Alternative Natural Philosophy Association to consider the paranormal and report back conclusions to the body known as the Epiphany Philosophers. It is to be considered together with the scientific paper, just presented at ANPA in the context of its normal scientific deliberations, entitled "Wider Perspectives; Nature, cognition and quantum physics". Its hypothesis, via various published quantum holographic models, links physics, with chemistry, with molecular biology and specifically DNA, and thus with all biological organisms generally, but in particular with models of the human brain as a conscious system, the neuron, perception and cognition, etc.

INTRODUCTION

The label "paranormal", which, as I understand it and have experienced it, concerns phenomena such as precognition, ESP, etc., is a category of experience, that in the Western World, concerns "abnormal" occurrences, in a context, where experience has lead us to believe only other more normal experiences happen. It thus apparently differs from what in the usual scientific

understanding is the unknown, a simple lack of knowledge due to the lack of a scientific model. That is, the accepted scientific models breakdown in the case of the paranormal and hence many establishment scientists consider such occurrences outside or beyond the scientific remit. In my view however, all experience is natural phenomena, which I would expect to follow as a consequence of natural law. To quote from the introduction to his translation of the Bhagavad Gita, by Juan Mascaro, " Even as the rational mind can see that all matter is energy, the spirit can see that all energy is love, and everything in creation can be a mathematical equation for the mind and a song of love for the soul". That is, what is thought to be irrational behaviour arises because either the observer or the observed is making an error of category. I hypothesize therefore that natural law is rational, and would in principle explain how such errors of category occur.

This happens partially, in my view, because the Universe is evolving, self organizing system, which always continues to evolve faster than the boundary of scientific explanation. Even so I expect that a unified theory of everything, will soon be the agreed position in establishment science, because a natural consequence of the laws such a theory embodies, will be that the perception of order where none was previously perceived by intelligent scientific enquiry, can at best approximate to the existence of order, where none previously existed as produced by the self organised evolution.

As I stated earlier in the ANPA conference, my position is that of an experimental philosopher applying the accepted scientific criterion, that with respect to a scientific theory/model, that it only has validity provided, it is substantiated in a particular domain by the scientific data collected experimentally. My thesis about the universality of quantum holography is therefore similar to that of the Combinatorial Hierarchists that should the model, I advance, be contradicted by the facts, then it is wrong, or in need of modification or extension. My position is also that any future theoretical structure, must, on the whole, incorporate within it what is already known validated scientific knowledge.

However I also adhere to the position now increasingly being substantiated, that whereas, for example, the largely accepted view among computer scientists has been that the computer is the role model for the brain, that in fact the brain is the role model for the computer, and that the human brain/mind has now reached the stage of evolutionary development, where it has the capabilities to able to formulate a Theory of Everything of the type I have outlined above, that will in the course of time, become the common scientific and human consensus. Further my thesis is that the principles of quantum theory are sufficient basis for such a Theory of Everything. However as I shall demonstrate in the addendum to this paper entitled "The Jigsaw , the Elephant and the Lighthouse" (which outlines the cosmology), the generally accepted understanding of what follows from these principles, is incomplete. I realize that the mainstream physics establishment will take this as very remiss, but it will have to accept

that, in particular, computer scientists, philosophers, theoretical biologists, chemists, etc. are needed to expand the necessary understanding of the universe of discourse that quantum theory provides.

An example is the existence of unitary duals - groups and representations - which the quantum tenets say exist, and which quantum holography shows provide a full geometric quantization. From quantum holography it becomes clear that quantum teleportation could be an important mechanism with reference to biological systems. This is not because it allows instantaneous transfer of information from A to B, since this is only possible, because quantum information and classical information are inseparable, so that the whole process of a teleportation is ultimately governed by the speed with which the classical information has to be sent, but because it allows twice as much information to be sent as by classical information transfer alone. A possibility offering a clear evolutionary advantage ! However if biological organisms and in particular, human organisms, are quantum whole, then because humans can share a common ancestor, it is conceivable, that if the death of one human being coincides sufficiently closely with the conception of another, that the state of mind of the dying being, be teleported to replace the null state of mind of the one being conceived. For the process of teleportation does not require the whereabouts of one be known to the other at the time the teleportation takes place! This possibility would convey the accumulated knowledge and experience, on to the new being with very obvious benefits to the survival of the new being, although in general such a being would not be consciously aware that this had happened. Similarly, near death experiences, would in principle, allow beings access to the universal unconscious or complete historical record, which in this quantum holographic cosmology can be inferred to exist, since such a record is essential to the cosmology's further evolution. I would therefore maintain that evidence in support of some such mechanism is that which is generally held in Tibet, and particular concerns their methodology for selecting new High Lamas when one dies. Note I do not say such a mechanism necessarily operates as a general rule, but only in particular circumstances. Equally however, it might not simply operate with people, for Sheldrake has reported cases where the offspring of mice who were the control group, apparently acquired learnt abilities acquired by mice who were quite separate from the control group in relation to circumstances to which the control group were not exposed. That is, apparently all offspring not simply the offspring of the non control group acquired these abilities ! ■

TOWARD A SCIENTIFIC ACCOUNT OF THE PARANORMAL

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ABSTRACT

I sketch how a possible theoretical framework for paranormal phenomena arises from my work with the isomorphism between homology and cohomology, its computational interpretation, and the Combinatorial Hierarchy, and take as my primary example the phenomenon of auras.

INTRODUCTION

For those who have experienced them, the reality of paranormal phenomena - here defined to be phenomena whose explanation seems to fall well outside of the conventional scientific framework - is beyond question. Those lacking such experience are in the difficult position of either accepting the denials of the scientific establishment - and risking missing the next wave of the exegesis of our world - or accepting some very strange things on the basis of testimony alone, and risking later categorization as a fool.

The following attempts, in a very abbreviated way, to explain the bridge that I - as a practising scientist - have built to reconcile my scientific faith with my paranormal experiences. In this way, perhaps both groups of people can find succour and reconciliation. Although my primary experience is with the phenomenon of auras, I believe that the framework I offer is sufficiently broad and solid that other phenomena can be accommodated as well.

THE PHENOMENON OF AURA

According to esoteric tradition, every human being possesses five bodies: the material, the etheric, the astral, the mental, and the spiritual; the latter four are referred to as "subtle" bodies, and are listed in increasing order of remove from the material body. An individual's degree of "higher consciousness" is to a rough extent proportional to the extent to which they can perceive subtle bodies, but this measure is indeed very rough. For example, there exist rare individuals who perceive the etheric and/or astral bodies naturally who are otherwise not particularly endowed with higher qualities (eg. wisdom or spiritual insight).

Although this perception applies equally to perceiving both one's own and another's subtle bodies, in the following I will tacitly assume that we are discussing the perception of another's subtle bodies, unless otherwise indicated.

Etheric. Most people can, with a little instruction, learn to perceive the grossest indications of another's etheric body. Healing (and, I conjecture, treatment with magnets) focuses on the etheric body, which is generally associated with the nervous system(s). A normal person's etheric body resembles the Michelin man - a rounded outline extending roughly 3-8 inches (15-30 cm) in all directions from the skin, although it also includes the entire interior as well. It is perceived to have various colors, where by colors I mean transmission ("crystal") colors, that is, not subtractive ("paint") colors. Adepts will generally perceive a given person's etheric colors, form, and flow consonantly. Restrictions in form and flow, and darkness or opaqueness are indicators of real or potential ill health. The etheric body is associated with the second (*hara*) chakra, located (so to speak) on the spine directly below the navel, and is the seat of polar distinctions such as life/death, fight/flee, mine/yours (territoriality), and male/female (sexuality).

Astral. The astral body is associated with the solar plexus chakra, and is the seat of the lower feelings (hereinafter referred to as emotions): happiness, anger, jealousy, satisfaction, and the like. Its perception has a decidedly spatial character - one feels both near to and distant from the observed simultaneously. The astral aura surrounds an individual as an ellipsoid that extends generously and smoothly around the etheric body. The "dreamtime" of the Australian Aborigines seems to me to be primarily an astral description of the world. Besides coloration and flow, a perception of another's astral body is of a generally symbolic character, from (say) visualizations of lightning bolts and geometric patterns to symbols similar to those experienced in dreams. C.W. Leadbeater's "Man Visible and Invisible" [1] is an excellent, if somewhat idiosyncratic, source containing many carefully executed color plates of astral auras. Adepts need not "see" the same thing when they perceive a given individual simultaneously, although - presuming equal, high consciousness - they will agree overall on the ultimate semantic interpretation of the whole. As noted in the first paragraph of this section, someone may be able to perceive an individual's astral aura clearly, without however understanding what to make of it: "I see a white witch above your right shoulder, but I don't know what it means", whereas an enlightened individual will rarely have any doubts - the insight comes with the territory.

Mental. The mental aura is associated with the pineal chakra and forms a sphere with its base at the heart-level and its top about 4 inches above the head. Its patterning tends from the chaotic to highly symmetrical subdivisions, depending on the level of development of the individual in question. The circular halos depicted in Christian iconography - particularly those of the Eastern tradition - are often quite accurate, but much more structure is found than I have ever seen depicted. [The halos depicted above the backs of the heads of Christian saints are

indicative, I have been told by one who knows, of mental aura development via western, Christian methods.] The ellipsoidal form, often in white, encompassing such depictions is more often indicative of the extended etheric aura of a master than an astral depiction, which if it were depicted, would reveal a preponderance of clean geometric forms, in that such a person's emotionality have been entirely cleansed. I have never met anyone who could perceive a mental aura who had not followed some meditative practice for a considerable length of time. This level of consciousness yields the ability to read thoughts, a "siddhi" that appears of itself (as do the others, respectively) at this stage of development.

Spiritual. The spiritual aura, being the "highest" aura, is not restricted to the locus of the physical body, as are the others. Hence a perception of a spiritual aura will transcend that individual's space-time locus, revealing eg. their past lives and progressive karma. Regarding the former, Urgen Tulku told a student (I have the story second - but not third! - hand) who asked if he (the student) should believe in reincarnation: "It is best to keep an open mind. But if you *will* believe one or the other possibility, assume that it's true, since (smiling wryly) that's the way it really is". The ability to perceive a spiritual aura requires that one has reached and transcended the heart level - the realm of the higher emotions: joy, awe, love, etc. The spiritual aura is associated with the throat chakra. It is depicted by Leadbeater [1] as a series of radiant rings (actually, spheres) of ever increasing diameter, eventually dwarfing the physical individual.

Summary. Every human possesses these auras, and while some few individuals can perceive the lowest two (etheric and astral) without any training, their perception, and especially their semantic content, is a progressive function of disciplined spiritually-oriented practice over many years. Each particular type of aura is similar in form and content across individuals, and enlightened adepts' perceptions of a given individual's auras will be generally consonant, though perhaps complementary with some overlap.

Consolidation and Interpretation. Here I list various conclusions drawn from the above (and other material) that serve to further a scientific analysis of the phenomenon of auras.

1. All esoteric traditions agree that there is a decided hierarchical structure.

2. Auras are perceived as patterns of light.

3. Anybody can (in principle) perceive auras, given training (and many reincarnations!). But...

4. One cannot perceive an aura while in the grip of ego-consciousness - one must be in the Now. [My definition of ego: the ego is to the Self as the hand is to the body.] This explains why most people - in that they are continually

immersed in ego-consciousness when they are not asleep - are unable to perceive auras. A revealing exception is sexual orgasm, and the state of mind thereupto: one can literally experience a 'physical' merging with one's partner (etheric) and even true - though evanescent - love (transcendence to the heart level); but such experiences require namely that one has relinquished ego-consciousness.

5. In that the ability to perceive auras deeply means accessing information about another individual that is not "materially" available, this implies that consciousness (viewed, ultimately, as pure perception) is non-local. In other words, the boundary of one's consciousness is not restricted to one's skin, but can extend to include another individual.

6. This extension of consciousness is in fact symmetric and mutual, even though one of the parties may be unaware of this fact. Ie. if parts A and B constitute the whole AB, then both A and B are, equally, parts of AB.

7. Even though the perception of an aura is a visual perception par excellence ("third eye"), esoteric traditions agree that the sense of hearing is the deepest, organizing entity of perceptive consciousness. In that hearing is wave-based, this implies that "higher" consciousness has, at least, a wave-like character. I note that the wave state is inherently non-local.

8. This "wave-state" requirement in turn implies that the entire consciousness must be free to oscillate in any required mode to perceive an aura. And conversely, the inability to so oscillate will impair said ability proportionately. Revealingly, every esoteric tradition, however different their practices (read "exercises") - from kneeling with palm-to-palm hands to circulating etheric streams to Sufi whirling to staring at candle flames to Zen koans - focuses precisely on freeing up various portions of the various bodies.

I should perhaps note in closing that *belief* is appropriate only insofar as it furthers insight, otherwise it is a straitjacket. A *truth* can always be subsumed by a larger truth, which not so much denies the subsumed truth as reduces it to a special case. The larger truth does not relativize the lesser one - it simply exceeds it. To take an example from physics, the time-energy uncertainty relation does not violate the "truth" of energy conservation, but rather simply exceeds the Newtonian version, rendering it irrelevant except under (for quantum mechanics) very special conditions.

A Scientific Model

Collapsing a long discussion of what constitutes a "scientific model", one certainly requires that such a model be stable mathematically. This requirement implies namely that the model in question possesses a large degree of

objectivity, in that the primary property of a mathematical description is that "what it says" in no way depends on the beliefs of the person manipulating said mathematical model to see what it implies. The subjective aspect enters when one begins to interpret the "meaning" of the mathematical symbols and expressions, and reasonable people can disagree here. But given that both parties accept the naked mathematics, both will agree on which deductions are legal and which are not.

The present proceedings of the 1998 ANPA meeting contains, if a little tersely, a complete exposition of this author's mathematical model in a physico-logical rendition in the article "A Combinatorial Bit Bang Leading to Quaternions" [2]. I will here only crib those aspects that are relevant to describing the aura phenomenon. Readers desiring mathematical details are referred to this article and its references.

A second requirement that must be placed on the present endeavour is that well-established scientific principles and phenomena must be included in any expansion of the model to new phenomena. For example, although one (unfortunately often) reads journalistic accounts to the effect that Einstein's relativity theory contradicts Newton's, this is in fact untrue: Newton's theory is a special case of Einstein's, in that it reduces to classical Newtonian theory at low velocities. [This is another example of the truth-subsumption mentioned earlier.]

Hence it is a requirement that the model I present be consistent with quantum mechanics and relativity theory. It is my belief that this is so, since (1) its mathematical structure contains all the basic relations and symmetries necessary to existing theory, and (2) I have been able to show how local 3-d space, spin, and quark structure appear, cf. the above-mentioned article. This is not to say that one can perform most of the calculations that working physicists require, since it lacks much of the necessary superstructure; but the necessary "guts" appear to be solidly present.

A pleasing aspect of this model, in stark contrast to contemporary classical quantum mechanics, is that it is a *mechanical* model. That is, it reveals who is doing what to whom at any and every stage of a process of change. This obtains because the model emanates from a computational point of view, and hence it is an information-mechanical (vs. material-mechanical) model. It is a purely *distributed* model, and I note in passing that Penrose's conclusion regarding the inadequacy of computation to model quantum mechanics is, quite simply, incorrect (with which judgement virtually all computer scientists concur).

A third requirement that I have placed on my model is that it can tell a coherent story of the ascent from the microscopic to the mesoscopic to the macroscopic. Classical QM can tell the story - more or less - of how, given "simplest" particles like photons, neutrinos, quarks, gluons, and electrons, one can construct protons, neutrons, mesons, and thence atoms (well - hydrogen for

sure, helium and lithium go pretty well, and then a well-founded leap of faith to all atoms). The same tools explain the structure of the periodic table of the elements and chemical bonding.

So at this point, one can say that 20th century physics can tell a coherent story of the ascent from the microscopic to the lower mesoscopic. But at this point the story begins to break down, since phenomena such as heat and entropy appear, but in fact cannot be rigorously grounded in the theory that, so to speak, produced them. The protein-folding that is critical to DNA replication is, from this point of view, a complete mystery. It is simply a matter of scientific - or more to the point, reductionistic - faith that the contemporary scientific canon can "explain" an elbow joint or an eyeball. Hari Seldon's psycho-history lies agreeably well into the future!

The key word in the preceding paragraph is *reductionism*, the thesis that higher level phenomena can be "reduced" to lower-level ones. There are three forms of reductionism. The first, *strong* reductionism, requires that any composite phenomenon be "deconstuctable" entirely into the pieces provided by the underlying model: our consciousness is "nothing but proton-electron interactions in 3+1 dimensions, everything else is epiphenomenal". This is the position taken, tacitly or expressly, by most scientists who deny the very possibility of paranormal phenomena.

The second form of reductionism, *weak* reductionism, allows new phenomena to *emerge* as properties of a whole, while insisting that such emergent phenomena be grounded in the properties of the level (model) below. The third, and loosest, possibility, allows that emergent phenomena can be totally "new" and need not necessarily be groundable at all in the level below. I think that this third possibility is unscientific, yea anti-scientific: if "anything can happen", the explanatory and pre-dictive (vs. post-dictive) power that we, very reasonably, require of the scientific endeavour simply evaporates.

I believe very strongly that the second possibility, weak reductionism, is the only acceptable one, both for scientific endeavour in general, and for allowing for the possibility of paranormal phenomena. The same scientists that favour strong reductionism scorn this, asking for some posited emergent phenomenon, and then showing that same is precisely not emergent. But they are purblind, for two reasons: (1) they do not understand that a phenomenon such as conservation (of some quantity) is in fact, exactly, a property of a whole that is not contained in any of its parts. They either ask the wrong question, or answer the wrong question. And (2), they do not recognize that the hierarchical operation that is involved is not the function composition of their mathematics (which confounds the hierarchical operations that are actually in play) and, significantly, function composition is strongly reductionistic. In effect, when they are asked the question of emergence, which is on playing field A, they unconsciously, unknowingly, or obtusely, switch the question to playing field B (function composition), and answer the question there. [Computer scientists like

Marvin Minsky (cf. Lisp, which is pure function composition, and his conceptual foundation) do this unabashedly by tacitly invoking "subroutine call" hierarchy. I always ask fellow computer scientists "How can one understand 'deadlock' as anything but an emergent phenomenon?".]

So, returning to the thread of the requirements I have placed on my model, it must not only be a hierarchical model, it must be hierarchical in such a way that it allows emergent phenomena. And it is indeed a weakly reductionistic model. Being an explicitly hierarchical model is what endows it with the ability, at least in principle, to tell a coherent story of the build-up of structure from the microscopic to the macroscopic: coherent because hierarchical ascent per se is front-and-center, and rigorously so. In contrast, the concept of hierarchical ascent is, usually, entirely subterranean in contemporary physical theory, popping out in discussions of spin domains in one form, of "the arrow of time" in another, and "scale independence" in yet a third - all different and unrelated!

A further property of the present model's hierarchical structure is that it includes the Combinatorial Hierarchy (CH) of Bastin, Kilmister, and Parker-Rhodes. This means not only (as one would expect) that level 2 is built out of the elements of level 1, but as well that level three is built out of (not just) the elements of level 2, but also level 1. So at any given level, the elements of all the underlying levels are present and available. [In this connection, it is important to realize that my hierarchical construction includes both conjunction and action, whereas the traditional version of the CH treats only the former. This occurs because I build out of +1 and -1, instead of the 1 and 0 of the CH; Kilmister's later CHA (CH with Aspect) takes this possibility up, and I hope and expect that this development will both converge on and illuminate my version. My "The CH Recapitulated" in the ANPA 93 proceedings goes through this.] The import of this kind of "inclusive" hierarchical construction is that a phenomenon like the receipt of a single photon by a retinal neurone is easily and naturally expressible without needing to explicitly go through the detailed ascension from atoms up to neurotransmitters. Thus, one can entirely correctly say that the retinal neurone is in *direct* contact with the universe, and avoid the false conclusion that the mental processes are "clearly and entirely epiphenomenal".

An important implication of this last conclusion is that the boundary of an individual's consciousness is the universe itself. From a strongly reductionistic point of view, everything is just such photon interactions. [I note that in physical theory, it is photons that determine the connectivity - the very topological structure - of the universe.] So one can ask of the strong reductionist "What exactly has determined that the boundary lies (say) at the skin??"! Seen this way, there is no criterion except the relatively arbitrary one that "Well, that's where the skin is." This is clearly a circular argument.

Another way to look at this boundary-of-consciousness business is to realize that, using computational terminology, the emergence-allowing hierarchical

computation that the model uses to describe anything is entirely and utterly distributed: there is no "top node" that is giving the orders to its underlings (read: calling *sub*routines). Rather, every entity (including the entities of which it is hierarchically composed) derives its actions and semantics from all the others! This is, quite literally, the Pearls of Indira and, I believe, the insight behind Leibniz' monads. In this view, when one requests a hierarchical descent/decomposition by asking "What is C made out of?" and gets the answer "B's", and then asks "What are B's made out of?" and gets the answer "A's", and then asks "What are A's made out of?", the answer isn't "Well, I guess I'll have to think of something simpler than A's" (which is what a strong reductionist must answer) but rather, "The semantics of A's are determined by everything that lies beyond the boundary of the A-B-C entity you started with!" So, again, the exact point where the boundary between a given entity and the rest of the universe is found is arbitrary. The distinction is not "down vs. up" as the strong reductionist would have it, but rather "inside vs. outside". What's "inside" and what's "outside" is determined by the original question, and that question is arbitrary!

The point of this entire reductionism-hierarchy-boundary development is to establish the critical conclusion that the compass of an individual consciousness - its boundary - is *not* determined by the "external" universe, but *rather* by the entity (= that same consciousness) that asks the question "Where is my boundary?" Once an individual's consciousness has absorbed ("grokked") the fact that its boundary is arbitrary, it can expand to include another individual, creating a composite "non-local" entity. The ability to grok this fact is congruent with being able to oscillate with sufficient generality to express it, which in turn is congruent with the information contained within the therewith expanded boundary, which in turn yields the information we call an aura. At this point, then, I believe that I have redeemed the promissory note issued at the beginning of this paper.

The phenomena of the paranormal are closely associated with spirituality and ultimate origins. I have therefore had, if not the requirement, then the desideratum for the model that it be able to tell some sort of creation story. My article [2] describes this in detail, but since this does not figure in the present discussion, this aspect of the model will not be discussed further.

The Efficacy of Consciousness

It is perhaps appropriate at this point to inquire "If this model can model anything, as you claim, how does it model consciousness itself?" Recall the criteria that have been imposed: consciousness must be non-local, have a self-determined arbitrary boundary, possess a wave-like character, and occur in the Now. The model (cf. [3]) is based, fundamentally, on the time-wise indistinguishability of co-occurring events, and thence pairs of such co-occurrences are co-excluded to produce the inside-outside relation (cf. Lou

Kauffman's work). Algebraically, co-occurrences are spin 1 objects, which is the fundamental criterion for having a wave-like character (whereas co-exclusions have spin 1/2, which is the particle-like criterion). Co-occurrences, precisely because the elements of the co-occurrence occur by definition neither before nor after each other, have a timeless character - within a co-occurrence there *is* no "time". For this reason, I have for many years associated "co-occurrence" with "consciousness". Tononi and Edelman, in their article "Consciousness and Complexity" in a recent issue of Science [3], conclude on the basis of dynamic brain scans that consciousness should be equated to the evolving set of co-occurring neural events. That the esoteric (in both senses) point of view being espoused here should arrive at the same conclusion as the strongly reductionistic mind-set of Science's population of neurophysiologists is quite satisfying! [While I obviously agree with Tononi & Edelman's conclusion, I believe that they ignore several important distinctions that are well known esoterically, eg. the distinction between "thoughts" and "consciousness". One wonders what they would see if they scanned a person in deep meditation. I predict that the more profound the state, the more of the brain the co-occurrence will encompass, and progressively less neural activity will be seen.]

Taking then the equation of consciousness to co-occurrence, two conclusions can be drawn, both deriving from the mathematical form of the model.

The first, deriving from its strong hierarchical character, what I call "level independence of phenomena". Since every level of the hierarchy is, mathematically, a boundary, and every hierarchical transition "upwards" is performed in the same way, any phenomenon attributed to the level-transition mechanism itself (= co-exclusion) will recur at each and every level. Put less formally and more baldly, since it is exactly the level-transition mechanism itself that ultimately produces the quantum-mechanical properties of the lowest levels, these properties will also obtain at any higher level, even macroscopic ones. I posit therefore that an individual's aura is usefully equitable to the wave-function $\Psi(X)$ of the subtle body in question, which wave function enjoys all the properties of a quantum mechanical ditto: non-local in time and space, superposed, probabilistic (if one chooses to ask that sort of question), etc. This accords very nicely with the fact that what one sees in an aura is not so much a current state as a set of tendencies and possibilities. [Whence follows the frustrating practice of masters always seeming so irritatingly vague when answering questions, even though you know they are seeing more deeply into you than you do yourself!] The fact that $\Psi(X) + \Psi(Y) = \Psi(X+Y)$ accords with the earlier conclusion about the expanding of one consciousness to include another to produce a whole with the same character, etc.

The second conclusion that can be drawn from combining the consciousness = co-occurrence conclusion with the formal structure of the model addresses the issue of the "efficacy of consciousness" (or, as more commonly but incorrectly put, "the efficacy of thought", since thought is namely *not* the same as consciousness, since once can experience consciousness in the absence of any

thought, whence comes the view that consciousness ultimately is perception). This is philosopher language for talking about such things as telekinesis: how can mere thoughts affect anything residing outside of one's skin?

To this question, I note that the formal structure of the hierarchy resembles (in its simplest form) a ladder, where the right-hand side is the ascending sensory stream (increasingly abstracted co-occurrences), the left-hand side the descending stream of (increasingly detailed) "actions", and the rungs represent successive levels, whence the sensory co-occurrences at a given level have exact [isomorphic] counterparts representing actions. [The right side is cohomology, the left homology, and the isomorphism that of homology - cohomology. Although this set-up greatly resembles that of supersymmety theory, I do not know if this appearance holds.] Given the level-independence of phenomena, eg. non-locality of co-occurrence, and the isomorphism to corresponding action, we have a model that says that is it possible for "thought" to be efficacious.

Closing Comments

I have attempted to describe how the hierarchical model I have developed can accommodate contemporary physical theory while simultaneously providing a framework that allows for paranormal phenomena. I have argued this case primarily for the aura phenomenon, but pointed as well how telekinesis might be viewed, as well as (indirectly) something like precognition and past lives via the space-time non-locality of level-independent wave functions. The central pillar of the construction is the mathematical properties of co-occurring (and therewith time-wise indistinguishable) events. These properties include Now-ness, non-locality, and wave behaviour. I believe that the abstract foundations of the model's structure are solid, and therefore that all, or at least most, of the conjectures I have offered are well-founded.

This does not mean that other theories or models are herewith excluded. Rather, given another well-founded model, investigating their consequences and isomorphisms will, in the event they are congruent, vindicate both. And, as well, lend credibility to the reality of paranormal phenomena to those who have not, as yet, experienced them. For removing mental resistance is a necessary, though not sufficient, condition for such experiences.

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PSI, INFLUENCE AND LINK THEORY

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1. TIME AND CAUSALITY

Trying to create a science of parapsychology with our present primitive understanding of causality is like trying to do long-distance navigation with a map of the flat Earth; in each case one encounters the problem of *non-locality*. To ask what "causes" clairvoyance or telepathy or precognition is like asking how people can instantly sail from the East edge of the Earth to the West edge of the Earth. The problem isn't just wrong assumptions or wrong theories; it's worse than that. Pauli once remarked of a colleague's presentation: "That's not right, that's not even wrong!" I'm afraid his remark fits most of what science has to say about psi. We are like a tribe so primitive that it has no word for roundness. For such a tribe, the question of whether the Earth is flat or round cannot even be asked. Is the Earth flat or is it <blank>?

Is psi causal or is it <blank>? That's a non-question for the scientific community today. Link theory aims to fill in the <blank>.

Causality is closely related to the arrow of time. There is a parallel between our problem with time's arrow and the ancients' problem with up and down. For the pre-scientific mind, up and down are intrinsic to space itself, which is why the round Earth had such a hard time gaining credence, despite the overwhelming evidence in its favor. The practical needs of long distance navigation finally triumphed over instinctive prejudice, but up-and-down still remained a mystery until Newton realized that the arrow here is not a *property* of space at all, but rather a *relationship* between massive bodies. There is an analogous solution to the problem of time's arrow, which is that it is really not a property of time (or of space-time) at all, but rather a relationship between "bodies" of *information*. Link theory gives the conceptual framework in which this relational solution can be stated mathematically. As with Newton's gravity, the strong directional arrow of time characterizes the situation of small informational "bodies" in the neighborhood of a much larger informational "body". Such "bodies" are actually *events*. When these events are more nearly equal in size, the situation becomes more complex, and the simple arrow of time gives way to a multi-event relationship, just as the arrow of up and down among the satellites of Jupiter gives way to a multi-body relationship.

Though the breakdown of an absolute distinction between past and future is baffling to common sense, it is quite harmonious with the larger picture of the universe that has emerged from physics. After all, Newtonian dynamics is completely reversible in time, as is quantum mechanics, and Einstein's general theory of relativity has led astronomers to the discovery of domains of space-time (black holes) where time-lines are cyclic. A supposed earmark of the absolute difference between past and future is the openness of the future, in contrast to the closed-ness of the past where everything is determined once-and-for-all. But how could there be an open future in a cyclic time? A more "scientific" earmark of time's arrow is the steady increase of entropy. But how could entropy increase steadily around a closed loop?

As with up-and-down, the cognitive dissonance here between common sense and reason has to do with habits of thought that are probably hard-wired into our genes, and are thus very difficult to overcome. The most wonderful new discoveries about black holes, superstrings, space knots, complexity theory or whatnot, will not help us one iota with psi until we have overcome this cognitive dissonance by clarifying our fundamental ideas..

Like Newton's clarification of up and down, the link-theoretic clarification of past and future is only a first step. In both cases, the second step is an even greater insult to "animal faith" than the first. The second step for up and down is Einstein's amazing insight that these really belong to space after all, albeit to a new kind of crooked space that also includes time. I believe that the second step for psi will be the assimilation by link theory of Von Neumann's deep discovery that Boolean AND and OR are relative in the quantum domain. But that's another story.

2. The Arrow of Influence

So how do we use reason to do an end run around our hard-wired habits?

But first: Why should we want to?

Instincts are formed over the eons as automatic responses that make for efficient functioning in relatively stable environments. When a creature moves to a very new environment, some of these automatic responses may be completely wrong, as when a rabbit freezes in response to oncoming headlights. Thanks to science and technology, the whole human race has, so-to-speak, wandered onto a superhighway, and it looks as if it will quickly become road-kill unless it starts using its reason in heroically new ways.

Fortunately, unlike rabbits, human beings *can* reason, even though it pains them to do so. That is to say, humans can sometimes arrive at decisions and judgments by not only responding to impulses and images, but also by manipulating *symbols* in a way that reveals otherwise inconceivable options.

Ideally the two ways of functioning go together, and the most important accomplishments of reason transform our imagery as much as they transform our beliefs. For this reason, I will start out here with some traditional images of time-direction and causality, and then show how these can be "morphed" by symbolic reasoning into something better suited to our present needs.

Though philosophers like to talk about causes and effects, in our everyday experience causes and effects are but isolated incidents in a pervasive field of *influences*. Let's visualize an influence as an *arrow*. Sometimes this arrow goes from one thing to another, sometimes from one event to another. The kind of arrows that go from one event to another are more basic, since the persisting influence of a thing A on a thing B can always be regarded as a series of influences by events involving A on events involving B.

Now big events consist of smaller events, and understanding how things "work" usually means taking apart fuzzy arrows among big events into sharper arrows among smaller events. Let's visualize these smaller events as *nodes* in a graph whose lines are the arrows of influence. A node, then, represents a small region of space-time. How small depends on the context; for the particle physicist it could be an electron for a nanosecond, while for the astronomer it could be a galaxy for a million years.

What makes such a diagram useful is that it abstracts the *connectivity* of influence from the details of space, time and matter. Concerning such connectivity, there would seem to be one undeniable law: *arrow heads come after than their tails*. From this law it follows that there cannot be cycles of arrows, and this so far is the sole restriction on our diagrams.

What do we mean by influence? Influence is so much a part of everyday experience that it hardly calls for a definition. Indeed, along with other basic ideas like 'here', 'now', 'this', 'I, 'we' etc., that of influence seems to be an essential working part of the very machinery of thought. If this is true, there is no way to define it without using it; the best we can do is to understand how it relates to other concepts.

Influence is the *exercise of power*. Influence means *shaping how things happen*. To influence a situation means to *alter the range of possibilities* for events in that situation. Such an alteration can be in what is *required*, or in what is *allowed*, or in what is *prohibited*, or in what is *probable*, or in all of the above.

These alternative words for influence are all tied to the human experience of exercising power, of being in control. What, then, does it mean for a mere physical object to influence another mere physical object? For one thing, it can mean that object A is our helper, our tool, our *means*, for doing something to B that we want done. When we see that A influences B, for instance that rain influences the grass to grow, we are usually also at least peripherally aware that we ourselves could *in principle* use A as a means for exerting our own influence

on B, for instance, we could water the lawn. Even when we study the influences at work in the most remote and esoteric domains of nature, somewhere in the back of our minds there always lurks the question "How might we put all this to work for *us*?" This is not surprising, since our genes are more concerned with our practical well-being than with our abstract understanding of the universe.

The arrow of influence was described above as going from one event to another. This is not quite accurate. Consider the following conversation:

"I played tennis this morning."

"Why are you telling me this? You always play tennis in the morning."

As versus this one:

"I played tennis this morning:

"Congratulations! I see I'm having a good influence."

Comparing the two, we see that influence, properly speaking, does not act on the event of playing tennis itself but on the situation in which that event is a possibility. You can't influence events that always happen no matter what, just as you can't influence events that have already happened. For an arrow from A to be called an influence on B, the situation cannot be one that presents B as a foregone conclusion; rather, it must present B as one of several alternatives. Either I drag myself out of bed and play tennis, or I sleep for another hour. Even if I always succeed in dragging myself out of bed, the option of sleep must always be there if the good influence is to continue to qualify as such. Thus the arrow of influence does not, strictly speaking, connect an actual event A to an actual event B, but a range of possible events A to a range of possible events B. Keeping this in mind, we can still use the language of events influencing events, but with the understanding these are *variable* events.

As mentioned, there's one thing our genes would seem to be very clear about: influence always flows from past to future. We set our goals for tomorrow, not for yesterday. Arrow heads are always *later* than their tails. This, of course, is why we have so much trouble with the physicists' time loops, and of course, with precognition.

Suppose there is an arrow from event A to event B and another arrow from event B to event C. When A happens, this limits the possibilities for B, and the fact that B must be confined to this smaller range in turn limits the possibilities for C.

Physics says there are loops in time. This, according to what we have assumed, would allow for a third *backward* arrow from C to A. If an arrow is defined as something that narrows the range of what is possible, then this backwards arrow

must limit what is possible in the situation of A. But A has already happened! No further limitation on the situation of A can be imagined. Instinct simply goes tilt. Forget about it, replay the game, erase the tape, start over.

Scientists have the same genes as the rest of us, so what makes them able to talk about time loops in black holes? They do it simply by changing the subject. The "time" of Einstein's space-time is not the time we actually experience, the time in which tomorrow's events don't happen until tomorrow. The physicist's circular time is just a dimension of an imagined four-dimensional curved space. Such so-called space-time can be studied as if it were something timeless and completed. The "events" in space-time do not *happen*, they are simply *given*, like the words in a history book. In curved space-time, a circular "time-line" is no more mysterious than a circle around a cylinder in ordinary space.

All this works fine for distant galaxies, but it won't do at all when we get closer to home, as when we try to think about time loops that arise from our own precognitions. Confronted with such oddities, scientists go tilt along with everybody else. But *science isn't allowed to go tilt* – ergo the alleged phenomena are "scientifically" impossible!

As we'll now see, this freak-out by science is quite unnecessary. There is in fact a relatively easy way to avoid going tilt over the A, B, C loop, even for precognition. It does require us to give up certain of our old habits of thought, but what it puts in their place holds no mysteries, and is based on quite ordinary mathematics.

3. Link Theory

The family of words like *cause* and *influence* also includes the word *function.* A gadget is *functioning* properly when its buttons and dials *cause* the appropriate responses. To say that A *influences* B means that something about B is a *function* of something about A. Though the concept of function in pure mathematics has been attenuated into that of a bare mapping, it still retains its causal connotations in empirical science. Especially in the more worldly sciences, one tries to make sense of a complex whole by describing it as a *functional system* whose parts are *simple functions functionally composed.*

Link theory replaces functional parts by *relational parts*, and functional composition by *relational composition.*

We speak of a *determining* influence when the state of B is a function of the state of A. It's more common today for science to work with *probabilistic* influences, where the state of A determines not the actual state of B but the probabilities for the possible states of B. We can still fit such analysis into the functional mold by defining a probabilistic influence as a function that maps the set of all *probability distributions* on a state variable of A into the set of all

probability distributions on a state variable of B. This of course reduces to the deterministic case when the probabilities involved are just 0 or 1.

It is useful to represent a probabilistic influence by a so-called *transition matrix* whose column index is a state variable of A, whose row index is a state variable of B, and whose ij'th entry is the probability of i given j. Multiplying such matrices corresponds to the chaining of influences, which gives rise to the notion of a *Markov chain.* This is a more general concept than it might at first seem; it covers computers, with or without random inputs, and any process that can be realistically modeled by computers. It is hardly an exaggeration to say that the goal of most scientific enquiries is to find explanations that have the form of Markov chains. (A word of caution: The terms "Markov chain" and "Markov process" have been used in a variety of inconsistent ways, and our informal account here makes no attempt to sort these out; for a more rigorous discussion see [1]).

The "black boxes" that are chained in a Markov chain have only a single input and a single output representing the complete state variable of the system as it changes with time. We usually try to analyze functional systems into smaller functional units; for instance, we analyze a computer into its logic gates. Such units will often have more than one input, but otherwise they are described in the same way as Markov boxes, i.e., by the rule that gives their output probabilities as a function of their inputs. Connecting outputs to inputs generalizes Markov chaining, but the succession of total states in such a generalized system is still a Markov chain.

Link theory covers the same ground, but does so in a mathematical language that enlarges this ground. Link theory is a so-called *covering theory* for the theory of functional systems (it's also a covering theory for quantum systems, but that's another story.) Going to the link-theoretic description of a functional system involves two steps:

1) Replace functions by *functional relations.*
2) Define probabilities by *case counts* for *hidden inputs.*

By a *functional relation* is meant a statement like y=f(x). By *linking* two statements is meant *identifying* a variable in one statement with a variable in the other. We link y=f(x) to z=g(w) when we replace w with y, giving us the two statements y=f(x) and z=g(y). Notice that, after they are linked, these two statements together tell us that z=g(f(x)). That is, the two statements that results from linking the argument variable of a functional relation with the resultant variable of an independent functional relation, when they are taken together, imply the functional relation of the composed functions. Here is our first rule:

Rule 1: Replace descriptions in the language of functional composition by equivalent descriptions in the language of linked relations.

We saw that the language of influence goes tilt when it tries to deal with cycles of influence. This fragility carries over to the more formal language of functions. What would it mean to have a cycle of functional composition? A recursion, perhaps? No – a recursion is a cycle of *types* of functions, not a cycle of *instances* of such types. Such fragility is not shared by the language of relations, though. There is nothing to stop us from linking both variables of y=f(x) with both variables of z=g(y), which would simply give us a pair of simultaneous equations.

Already we have taken an important step in dealing with the "paradoxes" of precognition. We see that whatever else we must do, we must substitute the language of relations for the language of functions.

Since probabilistic systems like Markov chains can be treated as functional systems whose variables range over probability distributions, we can apply step 1 to them too. However, the language of functional relations provides a way to deal with probabilities that avoids the need to reify and operate on distributions as a whole. This brings us to step 2. Instead of introducing transition probabilities as additional structure, as we did above with Markov chains, we shall derive them from the structure of functional relations themselves. Here is a brief account of how this works:

An *input* to a system is by definition a variable that contains no information until it is linked to something outside the system. Let's then divide inputs into two classes: those we want to control or keep track of, and those we want to ignore. An input we want to ignore should not be treated as containing any information; after all, "unknown" information is no information. Under Shannon's definition of information, this means that we should treat the values of ignored inputs are *equiprobable.* Also, we should not assume that there is any correlation among ignored inputs, which implies that their joint values are equiprobable. Such equiprobable joint values will be called the *hidden cases* of the system.

Rule 2: Given a deterministic influence with hidden inputs, treat it as a probabilistic influence whose transition probabilities are given by counting hidden cases.

Here's a simple example. Consider an AND gate with inputs x, y and output z. Hide input y. The result, by Rule 2, is a probabilistic influence of x on z having the 2x2 transition matrix 0, _, 1, _. It's easy to see how we can create any (finite) transition matrix whose probabilities are rational numbers by applying Rule 2 to a suitable deterministic influence. In itself, our second step is not at all radical, and is easily incorporated into computer science; for instance, a computer programmer doing a real-time simulation of a Markov process might well use Rule 2 to simulate random transitions, with the Rnd function assigning equiprobable random values to hidden inputs of a programmed function.

Step 2 becomes radical, however, when we combine it with step 1. When we chain probabilistic influences, we multiply their transition matrices, which is how we compose linear functions on a vector space whose points represent probability distributions. Linking does something entirely different. The functional relation of our AND gate is the statement (z = x AND y). Let's use the prefix (Hy) to mean that we are hiding y. Thus the statement (Hy)(z = x AND y) defines a *joint probability distribution* p(x,z) on the variables x and z, where the probability of a given pair of values of x and z is the number of hidden cases for that pair divided by the total number of hidden cases. When we link two copies of that relation we get a statement of the form (Hy,y')S(x,x',z) whose pair of hidden binary variables produce four hidden cases. Hiding the link variable x' gives a statement in two variables whose transition matrix is the square of the AND gate matrix described above, as the reader can easily verify. Notice that we were able to arrive at this result without thinking at all about functions on probability distributions.

Link theory and standard transition theory, despite their very different logical structures, completely agree for Markov chains. In so far as Markov chains capture the essential structure of influence, link theory does too. But where link theory comes into its own is in dealing with influence diagrams that contain *cycles*. We saw above how this works for deterministic influences, but it works just as well for probabilistic influences. *Any* influence diagram, whatever the connectivity of its arrows, has a formalization in link theory that determines probability distributions on every variable and combination of variables.

An arrow diagram of component functional relations is simply a set of simultaneous equations. When we hide certain variables, the number of solutions of the equation set becomes a function of the unhidden variables; these numbers are the hidden case counts. Dividing these counts by the total number of cases gives us our probabilities.

Scientists who disbelieve in psi usually claim that the alleged phenomena would violate well-established laws of nature, chief among which is that "causes can't go backward in time." This is hotly denied by psi partisans, of course. What both sides usually fail to recognize is that neither has the foggiest idea of what they mean by causes going backward in time. I hope the above discussion has made clear that there actually is a mathematical framework that *generalizes* the scientific conception of causality in a way that removes its necessary unidirectionality.

Does this mean that causes can go backward in time?

Does Newton's discovery of gravity means that things can fall up?

4. THE ROUND EARTH

The Earth became round in about 600 BC and remained round until about 400 AD, when it was flattened again by a strange alliance between religious fundamentalism and advanced technology. This was still before the Dark Ages, and the savants who flattened the Earth were well schooled in the works of Aristotle, Ptolemy and Aristarchus. But they were also aware of the amazing inventions of Heron of Alexandria, who not only built steam-powered toys but put on a completely mechanized puppet show, and this new technology of complex machinery provided the material for their arguments. The "new astronomy" was spelled out in a three-volume treatise by a certain Kosmos of Alexandria [2], a work containing a detailed description of the universe as a giant planetarium in the shape of Noah's Arc, with the flat Earth as its floor. An elaborate system of stage machinery, designed by God of course, pulled the heavenly bodies around in precisely those orbits described by Ptolemy et. al., thus creating the observed celestial show. This new astronomy was apparently well-received by the intellectuals of the time.

Why, after a thousand years, did the Earth become flat again? Certainly one reason was nostalgia for simpler times, but another is that the arrow of up and down was still regarded as a property of space itself. This really does make the idea of a round Earth confusing. Even Lucretius (circa 50 BC), in his account of the strikingly modern relativistic cosmology of Epicurus, is silent about the Earth's shape. This is not surprising, since the Epicurean cosmology presents things as everywhere falling. 400 AD was a time of rising social chaos and cultural confusion, so it is understandable that people wanted firm and clear ideas to hang onto, and confusions about up and down were hardly welcome.

Today most of us still think of the arrow of time as an absolute property of time itself, despite the absence of that arrow in the laws of mechanics. The situation is undoubtedly confusing. We should not be too hasty to laugh at the confused ancients, considering our own confusions about past and future, and judging by our tendency to make computer models of everything including ourselves, the ghost of Kosmos may still be with us.

In Section 1 it was remarked that link theory provides an alternative *Newtonian* theory of past and future. We are now in a position to pursue this further.

The best-known and most clear-cut physical manifestation of time's arrow is the irreversible increase of entropy mandated by the second law of thermodynamics. Today we realize that entropy is closely linked to information, and if we take entropy in a broad enough sense, the two are actually the same quantity with opposite signs. With this in mind, the idea that time's arrow is a kind of "gravity" in the vicinity of massive bodies of information no longer seems so far fetched.

As mentioned, a "body" of information in the present sense is not an object that persists through time, but is more in the nature of an event. Our first pass at a theory of "informational gravity" will maintain a clear distinction between *informational space* and *informational matter*; in this we are following Newton rather than Einstein. Let's start out by thinking of this informational space as a cellular automaton in which the cells have inputs. "Matter", then, will consist of *values assigned* to these inputs, which gives it the dimension of information. Let's ignore the unassigned variables, in the sense of "ignore" discussed in Section 2, thereby making their transition boxes probabilistic. If no variables are assigned, we'll regard the history of our automaton as *empty space-time.* The assignments in a certain region of this space time will constitute a "body." For most automata, some part of this body of assigned information will persist in empty space after the assignments, gradually fading away with the passage of time; this fading away is the second law at work.

Our automaton model is of course completely unidirectional in time. No information from the body will ever be found *before* the assignments of values to inputs, and time-cycles are inconceivable. However, the situation is very different if we use link theory to construct *relational* rather than *functional* cells for our empty space. Such a relational array can be completely symmetrical in past and future, and indeed, homogeneous in all directions. Link theory, as we saw, replaces assignment by *linking*; we "assign" the value k to a variable x by linking x to y in the functional relation y = k. Matter, then, consists of a break in the symmetry of the array produced by linking definite values into the variables of a region. The resulting "body" will "radiate" its information in all directions. The second law takes the form of an attenuation law with distance; the information from a body on an enclosing surface of empty space falls off with the distance between that surface and the radiating body.

If there is only one radiating body, the arrow of time is simply the arrow away from that body, and it is unidirectional. With several bodies, however, the situation can get much more complicated, and one often needs the mathematics of link theory to get even an intuitive idea of the what's going on. There is, however, a kind of *local* manifestation of the radiated information from several bodies that is quite analogous to the gravitational field, in that it is characterized by a simple structure which is independent of the details of the system of radiating bodies. This structure is called the *density matrix*, and it occurs at every link, being simply the hidden case-count matrix that results from *breaking* that link. Ordinary one-way time has a clear and simple local signature, which is that one of the broken ends contains no information. There is a continuum of cases between all the information being in x to all the information being in y, which takes us smoothly from forward to backward time. The case halfway between, where x and y have the *same* information, is of particular interest, since it turns out to completely characterize the basic laws of quantum mechanics, but that's a another story. [1]

What's important for our present topic is the mathematical fact that we can, using the density matrix, precisely describe the local manifestations of "backwards time", just as we can describe the rate at which bodies fall without knowing the source or sources of the gravitational field. This local analysis reveals that entropy, or more exactly, change of entropy, is the sum of two components, one oriented backward, the other forward in time. We are apparently living in a strongly polarized past-future field, where the backward component is too weak to have measurable effects on thermodynamic entropy. Even so, it could play a very significant role in steering complex informational processes via triggering events, and it makes good sense to look for the signature of such steering in the data of psi.

Our cellular model of space-time raises two questions: What, in relational terms, is a cell? and where does the local information come from? I believe that both questions are spurious. To get rid of them, though, calls for a Einsteinian correction of our Newtonian thinking. The notion of space-time as a regular array of cells must give way to the notion of space-time as a homogeneous manifestation of relational disorder which becomes smooth when it reaches a certain scale. Matter, then, is not anything added to space-time, but the manifestation of more orderly patterns of linking that "warp" the smooth large-number symmetry of empty space-time. The quantum nature of this space-time is contained in the very structure of linking itself, as mentioned above.

The mathematics required to actually construct such a radical theory of the physical world is still in a primitive stage and will take a lot of hard work. Perhaps the needs of parapsychology will motivate us to do some of it. Since the study of psi began as a search for the immaterial dimensions of the world, it would be a curious twist of fate if the fruits of that search turned out to be a unification of our two major theories of matter.

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SCIENCE AND PARANORMAL PHENOMENA*

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ABSTRACT

In order to ground my approach to the study of paranormal phenomena, I first explain my operational approach to physics, and to the "historical" sciences of cosmic, biological, human, social and political evolution. I then indicate why I believe that "paranormal phenomena" might - but need not - fit into this framework. I endorse the need for a new theoretical framework for the investigation of this field presented by Etter and Shoup at this meeting. I close with a short discussion of Ted Bastin's contention that paranormal phenomena should be ***defined*** *as contradicting physics.*

1. INTRODUCTION - NORMAL SCIENCE

There was difficulty during these discussions reaching any consensus on what was meant by "paranormal". In the end we did not try. I suspect that part of the problem was that our diverse group does not agree on what is "normal science", making a sharp, contrasting definition of "paranormal" phenomena impossible for us in the first place. I have therefore decided that, before I can explain to you how I try to think about paranormal phenomena, I must first explain how I think about ordinary science.

I am a physicist. For me, as for many others, physics is an empirical science based on quantitative measurements mutually agreed on by a community of practitioners of physics. That such a community exists, but has come into existence only since the "scientific revolution" of the seventeenth century, I take to be an established historical fact. In this sense, I take agreed upon laboratory protocol and practice to be primary and the mathematical language and other technical terms used in describing how, up to a point, agreement between members of the community is achieved to be secondary. Both evolve over time, and bring in other communities, as is well illustrated by Peter Galison's incisive examination of the objects on the laboratory floor which constitute the material culture of particle physics in this century [4].

What concerns me here is not so much particle physics per se, but how its conclusions are extended to provide a framework with which to describe the past. Since I have presented at this meeting the cosmological framework that

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comes out of Program Universe and its connection to bit-string physics [7], I will be brief. The basic assumptions are: a) the Galilean assumption that processes we observe occurring here and now will - until we have evidence to the contrary - occur a similar way under similar circumstances elsewhere in the cosmos; b) the assumption that (except under special circumstances described by the General Theory of Relativity) light travels at the limiting velocity c if unimpeded by matter; c) on a large enough scale (which has now been achieved, thanks to the Hubble Space Telescope) the universe at any epoch is homogeneous and isotropic, leading to the Friedman-Robertson-Walker metric for the macroscopic framework into which we fit our observations. Extrapolating back to 13 billion years from the present (thanks to a number of recent developments [7]) now provides a consistent description of the evolution of the cosmos within our event horizon, with a number of detailed cross-checks.

This sounds like a departure from my commitment to an operational stance about space and time. So I emphasize that this picture only refers to physical phenomena we can measure and/or observe here and now. I remain sceptical, even doubtful, as to whether these successes establish the "reality" of space and time in any deep sense. Clearly, as with "common sense" space and time, they form a useful descriptive framework, if we do not commit the error of casting it in concrete. I consider it a real triumph of the ANPA program that we can arrive at this framework from the combinatorial hierarchy construction via program universe [7] or any similar algorithm *without* postulating any *a priori* space time.

Granted this background, the older story [5] of the origin of the solar system, of biomolecular chirality and biopoesis [8, 1], and of terrestrial biological evolution falls into its appropriate niche. Recent work, which I will not bother to cite, has enormously deepened and enriched this description and (for me, at least) strengthened my conviction that no major lacunae remain. I stress that the "here and now" sciences - physics, chemistry, biology, ... - are a necessary background for understanding the historical sciences in the broad sense: cosmology, stellar and solar system evolution, terrestrial biological evolution, evolution of human intelligence and language, social evolution, political evolution. As we proceed up the chain from physics to politics, the scientific disciplines become more and more contingent on unique, local events whose prevalence in the rest of the cosmos we can currently only guess at. However, the recent discovery of many extra-solar planetary systems in our immediate neighbourhood makes it possible that, in the not too distant future, some of these guesses about exobiology may be replaced by hard fact. We may also be on the threshold of understanding the co-evolution of language and the brain in the human species if Deacon [2], among others, is to be believed.

2. WHAT ABOUT PARANORMAL PHENOMENA?

Much recent work on "paranormal phenomena" has amounted to getting large statistical samples with small deviations from "chance" which are unexplained. Much of this work has considerably higher methodological standards than most scientific work. However, for those familiar with experimental physics (and presumably in many other fields as well) this will never be convincing. We are all too familiar with unexplained effects that cannot be attributed to "chance". For us these are examples of systematic error, and if they cannot be brought under control, simply characterize a bad experiment. One has to *understand* the sources of systematic error, show that they vary in a systematic way with changes in experimental conditions, and do one's best to bring them down *below* the effects of statistical error. For this, of course, one needs a theory, not only of the phenomenon being investigated, but *also* a theory of what is (or is likely to be) interfering with the measurement. I do not see how this situation can be achieved in investigations of paranormal phenomena without much more theoretical work using a framework that allows for the testing of hypothesis *and their rejection.* In this I agree with what Etter and Shoup have already said at this meeting, and in this discussion. But I would go further and say that one needs not only a quantitative theory for the phenomena themselves, but *also* a theory for sources of systematic error in a form which can also be tested.

The impetus for research into paranormal phenomena has not come, and does not now come, from small, inexplicable effects. Judging by material presented in this discussion, and from my own contacts with scientists interested in the subject, I assert that this interest usually arises from personal experience. I have never had any "paranormal" experience. But people I respect, including some at this meeting, tell me they have. So I take the possibility that some people have this capacity seriously. I also do not get much out of listening to music. But I have plenty of evidence that many people do. In both respects I am not unusual.

I start with an incident I heard of three decades ago, which was told to me by an anthropologist [6]. In brief, while working one day in the Pacific Northwest with a shaman he had known for several months, the shaman asked suddenly if the anthropologist would like to know what the anthropologist's friend in Chicago was doing just then. Of course he said yes. Equipped with the shaman's response, the anthropologist documented it, wrote to his friend in Chicago and got a statement of what he was doing at that time. The correspondence between the shaman's report and the friend's statement was so close that the anthropologist, twenty years later, was still afraid to publish for fear it would damage his professional reputation.

I didn't know what to do with this story at the time. However a year or so later I proved that when a system with two quantum mechanical particles interacting via short range forces is augmented by a third particle with similar interactions, the behaviour of the pair changes no matter how far away the third particle is. I

called this example of the extreme non-locality of quantum mechanics the *eternal triangle effect*, and compared it analogically with the above instance and other behavioural examples. The analysis I subsequently published [6] provides a good starting point for discussing my current position. I quote:

> "It is not necessary for you to believe the story in order to ask the question, as I do, of how such a remarkable 'communication' might occur. After much rumination on the event, and after the discovery of the eternal triangle effect and its behavioural analog, I have come to a tentative model, or rather explanatory framework. Since the anthropologist and the shaman had reached a mutual level of confidence and trust, they could to a certain extent 'share each other's thoughts' - [a] phenomenon known to all of us, and not necessarily involving any paranormal phenomena[†]. Further, the anthropologist knew his distant friend well, and might by [a] similar process anticipate (unconsciously) what his friend would be doing at the time. We know of many instances when such unconscious deductions come to us in dreams - sometimes accurate and sometimes not. For the shaman to 'pick up' this knowledge or conjecture from the anthropologist need involve only the types of 'non-verbal communication' discussed in this volume, and which, though often difficult to understand, model, or demonstrate, are again familiar aspects of human behaviour. Granted only the postulate that a human mind makes many accurate deductions about present (and future) happenings from past experience - which would shock no psychoanalyst - the whole incident can be fitted into the framework of explanatory models that, separately, are often accepted.
>
> It is interesting to speculate on whether many phenomena which are called 'paranormal' might not fit into such an explanatory framework. The 'framework' does not really explain anything, of course. To account for an unexplained occurrence by saying that the human mind can make, unconsciously, very accurate deductions about what will occur ('precognition'), what another person is thinking ('telepathy'), or how an unstable system will behave (predictive 'telekinesis') is only to replace one problem with another - namely how to explain this extraordinary computational ability. But it does have the aspect of explaining a fact that is troublesome in 'paranormal research', namely that the ability is not 100% and closely tied to the emotional state of the individual[‡]. This is what we would expect, from psychoanalytic theory, of a process deeply buried in the unconscious. Coming back to the theme of this volume, such unconscious processes clearly can have an important bearing on non-verbal communication of more conventional sorts, and it is perhaps reassuring that

[†] It is relevant here that the anthropologist was one of the founders of kinesics; he once told me that given only a minute or so of the start of a filmed psychotherapeutic session, he could predict what would happen during the rest of the hour.

[‡] In the light of our discussion of systematic error above, it occurs to me that 'emotional state' of both subject and experimenter is one factor that cries out for quantitative assessment and investigation in this field - perhaps an impossible task?

the underlying physics warns us we should include them in our thinking about how such communications work.

My intention in this essay is not to say that quantum mechanics 'explains' paranormal phenomena by some such route. What I do claim is that quantum mechanics, in the simplest case where the phenomena can occur (the three particle problem with finite range interactions), *does* require both an extreme nonlocality of description when forced into an 'instantaneous' or 'static' form, and the inclusion (in principle) of *all* past events in the discussion of the current situation. I hope that this fact can provide an 'explanatory framework' within which it is easier to contemplate correlations between events so distant in space and time from each other as to make models drawn from classical physics seem inadequate or implausible."

My first criterion for the establishment of a scientific study of paranormal phenomena is that it be capable of convincing sceptics like me that meaningful experimental investigation is possible in the first place. If the investigations are statistical, it is all too easy to dismiss their results as due to unexplained systematic error. If they are anecdotal, it is all to easy to fall back, as I have done in the analysis just quoted, on some form of unexplained "unconscious" effect that falls more properly in the domain studied by psychiatrists than in a new discipline.

I am afraid that all too many "scientists" are uncomfortable living in a world in which most of the important things in life are unexplained, and grasp at facile explanations or rejections. For me the true scientist lives with uncertainty as his constant companion, and never expects that situation to change. But that does *not* mean that new facts and methods are to be avoided; rather, they should be eagerly pursued. I look at one new possibility in the next section.

3. A New Methodology?

We have already heard from Etter and Shoup about a new approach to the study of paranormal phenomena based on new theoretical insights that have come out of Etter's work on the foundations of quantum mechanics. Since the up to date material will not be available for a while in written form, I refer you to an older paper of Tom's, which is now available on the web [3]. What Tom does is to show that the core laws of quantum mechanics (Born's probability rule that gives probabilities as the squares of "amplitudes", and the unitary evolution of the quantum state called Schroedinger's equation) are simply a piece of mathematics which has no physics in it. This allows him to formalize Markov chains (which are irreversible) with either past or future boundary conditions, and use the same framework to describe the time-reversible Schroedinger evolution. Thus classical (statistical) systems peacefully coexist with quantum systems, as they must in quantum measurement theory. Hopefully, his discussion of quantum measurement theory will make this subject less paradoxical for

some who have trouble with it. Although his approach provides a new way of looking at quantum mechanics, at this stage no new predictions are made.

What makes Etter's analysis exciting from the point of view of this paper is that in addition to quantum mechanics, the formalism allows a clean description of phenomena, such as "future causation", which appear to occur in many reports of paranormal phenomena. But this descriptive framework, being general, is not tied to Planck's constant. Thus it provides for the possibility of macroscopic acausality which, as I indicated in the last section, is analogically suggested by quantum mechanics, but without giving a clue as to how to make a systematic theory for it.

Even having a theory is useless, except as an aid to imagination, until a way is found to fit experimental results into the theoretical framework. The payoff is when experimental results thus formulated lead to a reliable technology which can join the everyday world of fact. I must confess that I am sceptical whether this can be done for paranormal phenomena, but I enthusiastically support Etter and Shoup's efforts to take this step.

4. Conclusion

I conclude by turning to Ted Bastin's proposed definition of the paranormal. He started with the proposition that paranormal phenomena show no dependence on space and time. He then coupled this to his further assumption that current physics *begins* with space and time. These two propositions in conjunction make a clash with normal science inevitable.

This need not be the case. I am not the only contemporary physicist who feels the need to *construct* space and time as part of the foundations of physics. Since I think of myself as doing "normal science", or possibly as encouraging a paradigm shift which will turn out to be acceptable by normal scientists, I cannot accept the second half of Ted's position. I quite agree with Ted that *many* scientists do start by uncritically accepting either the continuum space-time of physics or the cruder space-time of "common sense" as the given theatre in which the dramas they study take place. But I do not go along with them. In fact many people accept the fact that demonstrated macroscopic quantum phenomena such as supraluminal correlation without supraluminal signalling over distances of 20 kilometres, and the teleportation of photons (destruction at one position and recreation of the same photon at a separate space-time location) show that "space-time" is more complicated than the Maxwellian picture allows for. Similar remarks could be made about black holes and modern cosmology.

Thus, for me, it comes down to whether the best strategy for getting on with the job of obtaining a better understanding of "paranormal phenomena" is to follow a course that inevitably leads to confrontation, or to find a way to expand "normal science" so that it can include such phenomena. Obviously, from what I

have said in this paper, I currently favour the latter course. But I am ready to be convinced that this is a mistake.

I end by giving my heartfelt thanks to the Epiphany Philosophers for making possible these two days of very interesting discussion.

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♦ TEN-MINUTE STATEMENTS ♦

Some notes on the ten minute contributions follow. Some come from the authors. Most are based on notes which Clive Kilmister made at the time and which I (TB) have slightly clarified and tidied up.

Tom Etter His view is akin to Pauli's. QM's difficulties give us a clue. Link theory came from an attempt to understand precognition. Tom has a serious worry about space and time. Rather than construct x, t he analyses complex activity into simpler ones and asks about the nature of extension (e.g., its connectivity). He starts from Russell's relation arithmetic in terms of tables, with a nod to Cantor. (Using tables seems to import semantic baggage). Asks why relation numbers don't do the job: composition is by logical product, and substituting a similar table may fail to give the same relation number. Identifying the variables is the trouble.

Tom believes that his notion of separability may have relevance to understanding of the paranormal. Claims to have a notion, for relations, of congruence rather than similarity. The notion of relation is being separable:

Def. $Rxz \Leftrightarrow Lxyz \leftrightarrow [x < y \text{ and } y < z]$ (y separates x from z)

Proposal: Actual out of relation geometry comes by separability.

True "action at a distance" is essential inseparability.

Geoffrey Constable Paranormal gives us a few hints about how physics needs extending. Events are not limited to one point of space and time.

Viv Pope thinks that from the physics theory point of view, morality and religion should be classed as paranormal views of the world. They challenge the prevailing determinism of physics and bring us back to Plato and Democritus. Why Democritus? Because of the indeterminism involved in atoms in the void. Viv is very sceptical. Argues for a "commonsense view" - "an object is what it is." The Paranormal is just what we are unable to fit in, and is created by our mistaken view of a norm in physics.

Juan Alvarez de Lorenzano seeks understanding in general of "how things work". Hopes the combinatorial hierarchy would give a clue to understanding how paranormal things work. He sees the importance of investigations that cross disciplines here. Construction of relational space and time is important. (Peter Marcer's point: distinction between the unknown and the paranormal. But what IS the distinction?)

Pierre Noyes is a physicist who accepts that quantitative phenomena are not all; and so is not a reductionist. Is inclined to think that biology is already one step towards the paranormal from his point of view. Deplores the religious interpretation of the paranormal.

Mike Manthey The goal is to express (say) non-local phenomena in a framework different from conventional space and time, e.g. the phenomena in meditation. He says we need to be public about this: i.e. we need to believe scientific endeavour is (a) valid and (b) can be expanded. (He knows evidence cannot be ignored. Not that everything will turn out to be what it seems to be. He also accepts that lack of theory will continue to inhibit acceptance.)

Peter Analytis returns to Geoffrey Constable's Mc.Taggart-like reference to sinking of the Titanic. They both take the Titanic as an analogy. It was not an event at a point of time or space because it is still with us now and here - helped by film and video - so events are not localized in a sense which they see as relevant to paranormal.

Keith Bowden got started by failure to understand the teaching of QM; since then he has had many paranormal experiences. Is unhappy at the science emphasis. "He has been corrupted by our emphasis on CH", which made him concentrate on its structure and neglect the wider picture. There are many levels at which questions can be asked.

Eddie Grey How does the world of the mind work? Early card guessing was weak because it was so boring. Who would want to transmit such info? Emotional content of phenomena is essential.

Kamala Balarama wants to bring concepts from conventional wisdom into contact with science concepts: she calls into question the nature of "centres"! which we invent. (c.f.space!) Also patterns.

Lou Kauffman "Big question mark": in any model, an observer can't see everything because the observer arises from a Spencer-Brown division. So there will always be the unknown. But how can we have a theory of it? Note too, Gödel incompleteness in mathematics. The Cretan paradox shows that some truths about the world are performative. (Process). Also, as with the paranormal, solutions of a problem by intuition shows one is in contact with much knowledge not known consciously.

Lynn-Claire Dennis comes from the position of having had to figure out what "normal" was. Says that what limits our understanding is our beliefs which are anchored in the past.

Ted Bastin points out that all the ANPA contributors have in common an interest in computer based or combinatorial attitudes to the physical world and to theoretical physics. This orientation makes the passage to thought about the paranormal comparatively natural since the starting point has to be on the connection of patterns or structures rather than taking space and time continua as the unquestioned forms of experience. It will be interesting to see, as I [Clive? Ted? Ed.] predict, whether a much greater sophistication and greater spread of knowledge about the paranormal is manifest at our meeting than we should expect of a body of conventional scientists.

The usual subdivisions of paranormal studies: telepathy, precognition, psychokinesis, clairvoyance, and so on, seem obvious ways to divide up the subject until one realises that they do receive this uncritical acceptance because of the automatic reliance on the spatial and temporal modes. In fact this sort of division is very blurred and it often seems, for example, that physical contiguity and temporal simultaneity are second-order criteria, and even that it may give a clearer insight to treat them as actually irrelevant.

The openness which he expects to find at ANPA to other analyses of experience should allow us to concentrate on more characteristic aspects of the paranormal: he mentions particularly their extreme specificity or individual singularity.

Clive Kilmister I believe that the most useful contribution that ANPA can make in the paranormal field is a theoretical one. It can address in a direct way the prevailing lack of open-mindedness of the scientific community. This community demands objective quantitative results, yet it refuses to be swayed by more and more careful and controlled experiments. This obduracy results, at least partly, from the (correct) understanding that a scientific fact has meaning only as a part of a theory, and there is no theory here.

My own point of view is that we should concentrate on those events which appear to call into question the spatial and temporal connections of the Newtonian paradigm. This is not because they are necessarily the most important but because we have some hope of establishing a clear philosophy of Newtonian space and time. This will arise by way of the theoretical construction of space and time from a process philosophy which augments Whitehead's notions by setting them in the context of the combinatorial hierarchy. That project has already advanced sufficiently to give a new philosophical explanation of Kant's problem of how all our spatial experience has a three-fold character. But at present the Newtonian network of spatial relations has not been clearly exhibited. A continuation of the work and a careful criticism of it should then show how the Newtonian paradigm results from specific and arbitrary restrictions at some point. By removing these restrictions we shall be able to understand a more general kind of spatio-temporal connectivity and this would form the basis for the required theory.

Michael Horner Civilisation has made progress in understanding nature. As a Westerner I am aware of the importance of the original Greek work which can be summarised as investigating closed systems near to equilibrium aided by linear mathematics. For 2500 years we have taken the easy route and studied this very simple set of cases. It is time to move on to a wider scope.

It is now clear from the pollution of the oceans and the air that human activity is systematically interfacing with the planet. I believe the root reason for these pollutions is we are still assuming our simple Greek systems and outside of the system we assume the oceans and so on are infinite sinks. We must revise these assumptions and limitations.

I have two proposals. Firstly, introduce the notion of information into the picture. Secondly introduce modelling, (computer based modelling) as a third mode into science along with experiment and theory. If we do this the likely results will be that we can examine more complex systems, there will be links from physics to biology and sociology, and eventually some parapsychological events will be inside the new scope.