SCIENCE and PARANORMAL PHENOMENA * †

H. Pierre Noyes

Stanford Linear Accelerator Center

Stanford University, Stanford, CA 94309

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.

Contribution to the discussion of science and the paranormal
sponsored by the Epiphany Philosophers as an annex to the
20th annual international meeting of the

ALTERNATIVE NATURAL PHILOSOPHY ASSOCIATION

Wesley House, Cambridge, England, September 7-8, 1998

To be published by ANPA, May 1999, as

“Paranormal Aspects: Appendix to the Proceedings of ANPA 20”

Available from ANPA, c/o Dr. K. Bowden, Theoretical Physics Research Unit

Birkbeck College, Mallet St. London WC1E 7HX

*Work supported by Department of Energy contract DE-AC03-76SF00515.

†Conference Proceedings for ANPA 20 will be available from ANPA c/o Prof.C.W.Kilmister, Red Tiles Cottage, High Street, Barcombe, Lewes, BN8 5DH, United Kingdom.

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 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 skeptical, 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 neighborhood 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 behavior 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 behavioral 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 behavioral 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

[‡]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.

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 behavior. 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 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

[§]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?

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 skeptics 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 too 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 the 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 skeptical 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 kilometers, 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 favor 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.

References

- [1] W.A.Bonner, “Terrestrial and Extraterrestrial Sources of Molecular Homochirality”, *Origins of Life and Evolution of the Biosphere*, **21**, 407-420 (1992).
- [2] T.W.Deacon, *The Symbolic Species: the co-evolution of language and the brain*, Norton, New York, 1997.
- [3] T.Etter and H.P.Noyes, “Process, System, Causality and Quantum Mechanics: A Psychoanalysis of Animal Faith (submitted to *Physics. Essays*). <http://xxx.lanl.gov> Then search for: quant-ph9808011.

- [4] P.Galison, *Image and Logic: a material culture of microphysics*, University of Chicago Press, 1997.
- [5] H.P.Noyes, “A Scientific Retrodiction of Our Past”, SLAC-PUB-1380, January 1974.
- [6] H.P.Noyes, “The Eternal Triangle Effect”, in *Non-Verbal Communication Today: Current Research*, M.R.Key, ed., Moulton, New York, 1982, pp 279-284; see also SLAC-PUB-2264, February 1979.
- [7] H.P.Noyes, “Program Universe and Recent Cosmological Observations”, to be published in *Proc. ANPA 20*.
- [8] E.Rubenstein, W,A,Bonner, H.P.Noyes and G.S.Brown, *Nature* **306**, 118 (1983).