

## PSYCHICAL RESEARCH AND THE OUTER LIMITS OF SCIENTIFIC INQUIRY

Glynn Custred

**ABSTRACT:** We examine here the peripheries of science where the scientific method reaches its limits, but where anomalous events suggest a wider reality that exceed, for now, our perceptive abilities.

**KEYWORDS:** Psychical research; Parapsychology; Black holes; Dark matter; Anthropology

Immanuel Kant has given us a lot to think about. One thing that is relevant when we consider the frontiers of science is his idea of the limits of knowledge. One kind of limit is the line between what we know now and what we still do not know but what, with the application of rational thought, we can eventually understand which in its most systematic form is the application of science (Kant 1934). In this way, knowledge is continuously expanding, like a settlement frontier, moving forward eventually incorporating previously unknown territory into settled country. This is the way “normal science” works; a process of puzzle solving in which investigators operate within a paradigm (a common conceptual framework) by which unknown territory is continually incorporated into a secure body of knowledge, thus extending and deepening our understanding of a field of reality (Kuhn 1970).

Kant also identifies another kind of boundary, one which he calls *die Grenze der menschlichen Vernunft*, or the outer limits of what we can know through reason (and by extension through science). We can think about things beyond that boundary: we can imagine, conjecture, speculate, hypothesize and fantasize about them, but we can never know for sure. The prime example is the question of the existence of God. You can image God in different ways, but you can never prove that God does or does not exist.

---

## NATURE'S DEEP DESIGN

In Kant's day the question of the existence of God was framed in theological terms, and before that astronomers and naturalists simply took the existence of deity for granted. Those early scientists were impressed by the orderliness and symmetry they found in nature, elegantly expressed in invariable mathematical equations; a regularity and invariance that they thought revealed an inherent design in the universe. Nobel laureate in physics Frank Wilczek addressed this issue in 2015 in an interview with the news magazine *Der Spiegel* when discussing his book *A Beautiful Question: Finding Nature's Deep Design*. In that interview Wilczek said that the only, and for him the most satisfying, speculative explanation of the orderliness of the universe is that it is the act of some "star-maker, an engineer responsible for the design of this world." The interviewer then says, "Some would call it God." Wilczek answers, "Don't forget that my heroes Galileo, Maxwell, Newton believed that with their research they could discover what God is. They were inspired by the vision that they had to study God's works. I want to discover the reality, call it what you will" (Wilczek 2015: 106).

The creation of the universe presents one instance where this question arises. Physicist Heinz Pagels puts it this way, "the nothingness 'before' the creation of the universe is the most complete void that we can imagine – no space, time or matter existed. It is the world without place, without duration or eternity, without number – it is what the mathematicians call 'the empty set'. Yet this unthinkable void converts itself into the plenum of existence, a consequence of physical laws." But "where are those laws written into the void? What 'tells' the void that it is pregnant with a possible universe?" It would seem, he says, that "even the void is subject to law, a logic that that exists prior to time and space" (Pagels 1985: 347).

Moreover, in the light of what we know about constants in the universe, and about the extreme restriction on conditions possible for life, it is a tremendous coincidence that life appeared at all. Some say that it is indeed just that, a "coincidence", the results of random processes that just happened to come together to create the right conditions for the emergence of life. Scientists, however, have been conditioned to find highly predictable order and symmetry everywhere in nature. Thus randomness on the scale necessary for the appearance of life is for many hard to believe. In that regard theoretical physicist and mathematician Freeman Dyson once wrote that "As we look out into the universe and identify the many accidents of physics and astronomy that have come together to our benefit, it seems as if the Universe must in some sense have known that we were coming" (Kaku 1994: 258). This of course opens the question of a creator, known in the

physical sciences as the anthropic principle.

The weak version of this argument is that under such conditions the very fact that life exists is an indication by itself of a creator of some kind. The strong anthropic argument is that the different constants which have perfectly aligned to create the conditions for life were somehow precisely chosen so that life was possible. This, however, is conjecture, awaiting proof or refutation. In that regard Pagels says that “unlike the principles of physics, it [this conjecture] affords no way to determine whether it is right or wrong; there is no way to test it. Unlike the principles of physics, the anthropic principle is not subject to experimental falsification – the sure sign that it is not a scientific principle. No empirical resolution of its veracity is possible, and a debate about whether it is true or not could go on forever” (Pagels 1984: 347). In other words, this question lies beyond the boundary of rational thought *jenseits der Grenze der menschlichen Vernunft*, as Kant has said, ‘on the other side of human reason’, and thus beyond the reach of scientific explanation.

#### THE SCIENTIFIC STUDY OF ANOMOLOUS EVENTS

By the middle of the nineteenth century science had advanced so far - with the promise of much more to come - that it became part of a new materialistic and deterministic world view, a way of looking at and thinking about the world that clashed with the old world view as formulated in traditional religious terms, thus igniting what has been described as the culture wars of the Victorian Age. But there was also a third element. Reports of prophecies, oracles, visions, miracles, prophetic dreams, private revelations, premonitions, apparitions, have been found in one form or other in all the societies encountered by anthropologists, going back in the historical record to the beginning of writing, and beyond that to the origin of the species.

At the end of the nineteenth century such beliefs appeared not only as traditional folklore, but also as a new middle and upper class phenomenon known as spiritualism, a set of beliefs that was shaped in a certain way by the times. Many scientists were interested in the possibility of some other presence in the universe besides the forces and elements of the material world; some non-materialistic forces that were not formulated in traditional religious terms. Alfred Russell Wallace was one of those scientists. Wallace was a noted naturalist who had worked for years in the Amazon Basin and in the Malay Peninsula. He came up with the idea of natural selection at the same time as did Charles Darwin. For that reason Darwin put Wallace’s name, along with his own, on the first publication proposing the theory of evolution. Another investigator of the time, who thought that some other, some

‘spiritual’ reality was possible, was William James, a pioneer of modern psychology.

One part of spiritualism which received much attention was the belief that the dead and the living could communicate with one another, but only through the mediation of someone with special abilities, a medium, and under certain circumstances, the séance. Many such claims were fraudulent and were shown to be so, yet others left questions in the minds of careful observers. What better way to know for sure than to apply the methods of science, the methods of Kepler, Newton and Darwin, men who had brought enlightenment to other domains by means of the careful collection and classification of evidence, its correlation with other phenomena to see what patterns emerge, and eventually explanation within a theory suitable for the phenomena under investigation – the standard methods of the astronomer, the geologist and the field biologist.

Some who advocated this kind of research were convinced that it would show that spiritualism was nonsense. Others hoped that some proof could be produced for the veracity of such claims, especially of life after death, while others, like William James, simply wanted to know what was going on. It was in that milieu that the Society for Psychical Research (SPR) was founded in London in 1882. The organization was largely the work of group of philosophers and scientists connected with Trinity College, Cambridge, but its membership and influence spread to the United States and to the continent. The SPR also received wide popular recognition at the time in encyclopedias and other reference works. And the concluding volume of the popular *Harwith History of the World* (1909) described it as the culminating story of mankind (Gould 1968: 338).

Among the past presidents of the society were eleven scientists active in physics, chemistry and mathematics, four in the biological sciences, one physician and two physiologists, two in astronomy and ten in psychology, as well as one anthropologist Andrew Lang, all representing prominent members of prestigious universities and institutions (ten of them for example were fellows of the Royal Society and one was the head of the Royal Observatory). All of those scientists were known for their notable achievements, including three Nobel Prize winners, as well as other innovative figures such as physicist and chemist Sir William Crooke, discoverer of thallium and cathode rays and inventor of the radiometer. Other presidents of the SPR were Arthur Balfour, prime minister of Great Britain, and classicist Gilbert Murray, a well known intellectual of his time who was showered with honors from learned societies around the world, and the man who drafted the covenant of the League of Nations. Also among the illustrative vice presidents of the society was Sir J. J. Thompson, discoverer of the electron.

Psychical research was qualitative in nature much like the field sciences of botany and zoology involving the careful collection of data, systematic comparison, and in the case of psychical research eliminating the possibility of natural causes, mistaken perception, delusion and fraud. Psychical researchers produced a prodigious amount of work, collecting and analyzing an enormous body of data which were published in books and in the society's journals and in its proceedings and pamphlets. Much of what they investigated they showed was mistaken identity, delusion or fraud, but other events were anomalous in terms of our modern science-supported perception of reality, and thus labeled "paranormal phenomena", a designation which was coined at that time.

One problem in this line of research is the reliability of evidence, for researchers are limited to testimony of an anecdotal nature that is hard to verify. This is the same kind of difficulty historians and folklorists encounter when attempting to recover historical fact from oral traditions, and that jurors deal with in evaluating eye-witness testimony; quite different from the evidence gathered by a botanist in the jungle, or by chemists in the laboratory.

Researchers, however, were able to classify those anomalous events that showed a high probability of validity. They also established correspondences between anomalous phenomena and other events; for example, a moment of crisis and the sudden appearance of a loved who was far away at the time. Yet such phenomena are sporadic, not invariably occurring under the same conditions everywhere and at all times. This is different from the mechanistic regularities which can be observed, manipulated in the laboratory and described with the method of the prototypical sciences (physics and chemistry) with their high rate of predictability, or even in the field sciences of botany, zoology and geology. Psychical research, therefore, could do no more than produce anomalous cases which could not be accounted for by normal science.

In the 1930s psychical research moved into the laboratory, adopting the behaviorist model which was dominate in psychology at the time, with its emphasis on controlled experiments and quantification. With this move from the field to the laboratory came a name change, from psychical research to parapsychology. The center for this new field of study was Duke University, and the most prominent among the researchers were J. B. and Louisa Rhine, yet such research was also carried on elsewhere around the world. The goal of those researchers was to prove the existence of what they called Extra Sensory Perception (ESP) or more broadly psi-phenomena which they divided into four categories; clairvoyance, telepathy, precognition and psychokinesics along with the study of apparitions, near death and

mystical experiences.

Much of this work involved card guessing, in which correct guesses which exceeded chance were considered an indication of the reality of the phenomenon. Researchers also experimented to see if mental influence could be a factor in the fall of dice. After working out statistical and methodological problems, and after responding to stringent criticism, a large body of quantified data was produced. The researchers, however, came up with mixed results. Some guesses did indeed exceed chance, but the experiments were not repeatable and thus there was no predictability. Moreover a high rate of success by a subject in the beginning diminishes and disappears over time. This is known as the decline effect.

Another problem in evaluating quantitative evidence produced in the laboratory is, on the one hand the highly personal and sporadic nature of the experiences, and on the other hand the highly artificial nature of laboratory experiments which might interfere with the processes under investigation. Moreover subjects for those experiments were for the most part student volunteers, not a sample that is representative of the population as a whole. One attempt was made to match subjects with certain personality traits in hopes of finding those subjects most sensitive to the kind of thing under investigation. Researchers thus sought subjects according to their belief in psi as well as those with prior experiences with the phenomenon; those with artistic and creative temperaments; and those who practiced some kind of mental discipline such as meditation.

Another line of inquiry was pursued known as the Ganzfeld experiments (from the German, meaning "entire field"), in which ordinary sensory input is reduced, so that psi conductive states might be enhanced. That method was refined over time and later employed automated computer systems to select and display targets, a method that overcomes some of the short comings of prior methods. In the 1990s such experiments showed statistically significant results, but the old problem of repeatability and predictability persisted, and without those features - both of which are defining characteristics of the 'hard' sciences to which parapsychology appealed - there was no 'science'. Thus parapsychology became viewed by many science-insiders as a pseudoscience.

Physicist and mathematician John Taylor came to the study of the paranormal in an effort to account for supposed paranormal events in terms of physics. His conclusions were that none of the phenomena described were possible under normal conditions and that those cases he examined could be explained by natural means or as a result of credulity, fantasy, sensory cues and fraud (Taylor 1980). Yet others who have examined the methods, the data and the results of parapsychology have come

away thinking that there is essentially nothing wrong with the methods and procedures, and that the proven faults and lapses of parapsychology are the same as those of other sciences. The only problem is that the phenomena do not fit into what we think of as science.

In that regard Ray Hyman, a distinguished critic of parapsychology, says of one investigator in that field (physicist Helmut Schmidt who had worked for the Boeing Laboratories in Seattle) that “by almost any standard Schmidt’s work is the most challenging ever to confront critics such as myself. His approach makes many of the early criticism of parapsychological research obsolete. I am convinced that he was sincere, honest and dedicated to being as scientific as possible... the most sophisticated parapsychologist that I have encountered. If there are flaws in his work, they are the more common and obvious ones” (Haynes 1987).

In that respect noted philosopher Anthony Flew, at that time an avowed atheist, reviewed research in parapsychology which he published in *A New Approach to Psychical Research* (1978). In 1982 he reaffirmed the opinion of his previous study when he wrote that although there were no repeatable experiments in that field of inquiry “to demonstrate the reality of any of the putative psi-phenomena”, and despite the fact that “the entire field was buried under ever-mounting piles of rubbish produced by charlatans and suckers”, still when reading accounts of psychic research “one could not with a good academic conscience dismiss the case as closed” for “too much seemingly sound work pointing to the genuineness of at least some of these phenomena had been done” and “too many tough minded, methodologically sophisticated and often formidably distinguished persons have been involved in this work” (Flew 1982:179)

Hans Eysenck, who has worked in various fields of psychology and who was firmly and explicitly grounded in science, says that parapsychology is not a pseudoscience but a real science as seen in the way it is conceived and how it is conducted. He also says that weaknesses in such research are also seen in psychology. Thus data on ESP or psi, or whatever it may be called, leave one wondering about human capacities and skills, a kind of faculty for which some evidence has been produced. In 1957 (repeated in Eysenck and Sargent 1982: 46) he wrote,

Unless there is a gigantic conspiracy involving some thirty university departments all over the world, and several hundred highly respected scientists in various fields, many of them originally skeptical to the claims of the psychical researchers, the only conclusion that the un-biased observer can come to is that there does exist a small number of people who obtain knowledge existing either in other peoples’ minds, or in the outer world, by

means yet unknown to science.

Arthur Ellison, emeritus professor of engineering at the City University of London, has also been active in studying the paranormal, bringing to carefully designed experiments the skills of an engineer. In his book *Science and the Paranormal*, he says that normal science deals with only a small strip of reality, and that the scientific world view, or what he calls a metaparadigm, is limited and “explains only a small portion of human experience” (Arthur 2002: 221). The methods of science in that metaparadigm, therefore, are not completely applicable to the explanation of paranormal phenomena.

### THE FRONTIERS OF PHYSICAL SCIENCE

We know that our senses are limited. We need look only at our oldest and closest friend in the animal kingdom, the dog, to see that although we live intimately and affectionately together in the same world, the world they can smell and hear far exceeds our own range of auditory and olfactory perception. Also bees thrive in the gardens we cultivate, yet they perceive a part of the electromagnetic spectrum different from the range of visible light to which we are sensitive. They thus see the reality of the same garden differently than we do. It was only with technical innovations that our senses have been expanded; the microscope, the telescope, sonar, radar, X-ray, radio telescopes, computer imagery, etc. revealing a range of reality we had never known before, and thus allowing us to push back those frontiers of knowledge about the universe of which we are constituted and of which we are a part.

Moreover, our cognitive abilities exceed those of even our closest primate relatives, yet that too is limited. Although humans have inherent inferential abilities, made more explicit and precise through logic and mathematics, the computers that humans have created can deal with those operations faster, more accurately and with a larger corpus of data than can the unaided mind, to the point where some worry that machines may eventually overtake us. It is not beyond reason therefore, to think that those sporadic, yet recurring anomalous events so often and so carefully studied in psychical research and parapsychology may be flashes of an even wider reality which we know nothing about.

This of course is pure inference based on minimal and insufficient evidence, producing only conjectures; but so far, that is all they have in psychical research. But conjecture is as much a part of science as is the application of acknowledged laws of nature, for every step forward begins with conjecture, then moves to the formulation of empirically testable hypothesis within a theory appropriate to the phenomenon,



which is then subject to refutation or confirmation. Such conjectures may seem strange or even off the wall to the scientific community, but if those conjectures have touched on something real, they will eventually be recognized and incorporated into the body of scientific knowledge, a process described by Thomas Kuhn in his *Structure of Scientific Revolutions*.

One example is that of Alfred Wegner who in 1912 proposed the idea of continental drift. He based his conjecture on the shape of the continents and the fact that the same plant and animal fossils were found along the shores of widely dispersed continents. The idea was met with scorn, for there was no mechanism known that would force the continents apart. In 1953 Samuel Warren Carey proposed the theory of tectonic plates which move over time, and upon which the continents and the oceans rest, thus supporting Wegner's "crazy idea." The theory was finally accepted in the 1950s and 1960s after seafloor spreading was validated. Thus a rejected idea, a mere conjecture, became a commonplace in the geosciences.

Another example of how a conjecture (this time suggested by theory rather than evidence) is ridiculed but eventually becomes an accepted fact, is the phenomenon known as the Black Hole. Newton's theory of gravity suggested the possibility of a body of sufficient mass that it would draw in light as well as matter, rendering the body invisible. Einstein did not think much of the idea and those who seriously considered it were ridiculed. Variations of this idea arose from time to time but they were all rejected. However equations kept turning up, known as "singularities", which supported that conjecture, but were treated as aspects of the formulation and not indicative of nature.

When technology was developed which made possible detection of matter and energy beyond the range of visible light, a vastly expanded view of the universe opened up revealing forces that had been previously unknown but that were now shown to exist; a wider reality which fit the theory of Black Holes, an idea which is now a part of the accepted theory in physics and astronomy. Today Black Holes are a focus of research, and it is hoped that when their mystery is solved, physicists and astronomers will be able to unify Einstein's theories of gravitation with quantum physics, finally arriving at "the theory of everything" (Bartusiak 2015).

And then there is the case of dark matter and dark energy where scientific observations revealed anomalies in theory which in turn spawned conjectures, ideas which have not yet been crystallized into hypotheses, for scientists are still in the stage of trying to figure out what it is that they have detected - something completely unexpected, something that clearly shows that there is far more in the universe than had previously been suspected. In the 1930s Swiss astronomer Fritz Zwicky noticed

something odd about the behavior of the galaxies. He found that those galaxies within clusters move faster than others, a calculation based on the size of their gravitational fields. Dutch astronomer Jan Ort noticed the same thing for stars near the Earth. The conclusion drawn from those observations was that something, and lots of it, was generating gravity without producing or reflecting light. Zwicky called it “dark matter” and estimated that it far outweighs the matter of which we are composed and that we can see. And since energy and matter are two sides of the same coin, there must also be ‘dark energy.’ It is estimated that sixty eight percent of the universe consists of dark energy and twenty seven percent of dark matter with only five percent of the kind of matter of which we, and the planets and the stars, are made and which we can see and analyze down to the tiniest particles and waves.

This observation set off various conjectures. One was that the observed effect was caused by normal matter in the guise of things that did not show, such as perhaps orphan planets. But closer scrutiny of the cosmos’ microwave background, left over from the Big Bang, put limits on the amount of such matter. Scientists still don’t know what it is, only that dark matter is not made up of the atoms and other particles of the matter we know, and that it interacts with ordinary matter through the force of gravity, the only way we know that it even exists. Work, however, is in progress on several fronts to discover its nature, in an effort to increase our understanding of the nature of the universe, its origins and its ultimate end.

The discrepancy between the discovery of the reality of dark matter/dark energy and the theories of quantum physics has been described as the greatest disparity between observation and theory in the history of science, leading scientists to say that this is the central problem of science today and the most profound mystery of all. And indeed it is, for quantum physics has shown that empty space is not empty at all, but is rather filled with ordinary matter in the form of waves and particles coursing through the universe at fantastic speed, unseen, unsmelled, unheard and unimagined by us until science made it possible to detect and explain them, and to put them to work in a host of ways that in the middle of the twentieth century was considered science fiction, and before that magic. And now, on top of all that there is something else, dark matter/energy that we know nothing about except that it is there.

The latest example of anomalous and unpredictable occurrences in the physical universe is short spurts of radio emissions known as Fast Radio Bursts (FRB) which are temporary, lasting only a few milliseconds, and seemingly random which makes them hard to find and difficult to study. First detected in 2007 it took astronomers years to agree that those temporary and seemingly random emissions emanate from

beyond the galaxy and were not the result of some glitch in the radio telescope. Their origin is unknown. It is conjectured, however, that they may be the results of colliding stars or giant bursts from magnators, a highly magnetized type of neutron star, or that they may not be spontaneous naturally occurring phenomena, but rather artificial messages from aliens somewhere billions of light years away. Those two cases from astronomy, dark matter and dark energy and FDR are discoveries that reveal quite clearly that we are on an ever moving frontier of scientific knowledge and there is still much more to know.

One thing those examples show is the resistance within the community of normal science to some conjectures about anomalies in the paradigm, innovations that if verified would lead to a paradigm shift. Such resistance is also seen in terms of psychical research, for if those anomalies which this line of inquiry investigates can be properly validated, it would mean not just a paradigm shift, but perhaps even a change in the metaparadigm of scientific thinking, something many do not even want to think about.

For example, Hans Eysenck and Carl Sargent report that after the presentation of a paper on Ganzfeld ESP research, one of the presenter's colleagues said "The results you presented would convince me of anything else, but this: I just cannot believe it and I don't know why." And Dr. Bernard Dixon, editor of *New Scientist*, someone broadly skeptical of psychic research, tells about a lecture on psychokinesics at the Royal Institute, when one scientist leapt to his feet and shouted, "It's all nonsense! Nonsense! Heard it all before! Nonsense!" His purple face made it look as if he were on the verge of a heart attack (Eysenck and Sargent 1982: 183). As physicist Niels Bohr used to say, "No paradox, no progress", yet as seen in these and countless other examples, the paradox presented by psychical research is rejected out of hand, the kind of *a priori* judgments, says Eysenck, that have no place in science.

Another fact revealed by our examples of dark matter and Black Holes is that there is a lot more about the universe than we know and a lot more to find out. In fact scientists talk of other dimensions which they suspect exist, but about which we, at present, know nothing of, although the search continues. In this respect the anomalies that psychical researchers explore may be indications of a wider reality we know nothing about, as we knew nothing about dark matter and dark energy until more exact measurements about the speed of galaxies made new information available. This means that psychical research, stalled at the evidence-validating and conjectural stage, may one day move beyond the limit of what we know now to give us a broader, scientific understanding of the universe we live in. So far, however,

there is nothing in sight – no new technology and no new insights and testable theories – which might make that break through possible.

### THE PSYCHOLOGICAL DIMENSION

One thing about such events, however, that we do know for sure, is that people experience them, sometimes in a vivid and startling manner, and that those unusual and unexpected events are often highly significant to the experiencer, even life changing, especially in the case of near death experience. Thus regardless of the possible external cause, the reality for the experience is an interesting area of investigation today as it was for William James in his day. That field, however, has been neglected, “fallen between the cracks of contemporary mainstream psychology”; but is now finding greater interest. This is seen for example in a collection of essays titled *Varieties of Anomalous Experiences: Examining the Scientific Evidence*, edited by Etzel Cardeña, Steven Jay Lynn and Stanley Krippner and published 2000 by the American Psychological Association (Cardeña, et. al. 2000).

The subject of those essays is the psychological aspect of paranormal experiences with minimal attention to their possible external cause, viewing them together with such phenomena as absorption, fantasy and proneness to hypnosis, as well as with those temporal lobe abnormalities which can also give rise to experiences classified as anomalous. The objective of the authors is to review the literature with the aim of addressing topics relevant to clinical practice and to the evaluation of such experiences in the lives of their clients.

One line of research in that direction is the work of David Hufford, professor emeritus of psychology at Pennsylvania State University, who has studied a motif in oral tradition which is grounded in the reality of lucid dreaming, and its relationship to sleep paralysis. He has also examined mystical states which deeply affect those who have experienced them (Hufford 1982, 1988). What we see here is the conjunction of two lines of research on the frontier of science; on the one hand that of understanding consciousness (of which we know very little) and on the other, psychic research; where a common overlap may eventually lead to mutual enlightenment.

### LIMITS OF KNOWLEDGE AND ANTHROPOLOGICAL RESEARCH

When viewed in terms of its origin, its participants and its close adherence to methods we must conclude that psychic research, both its qualitative and quantitative approaches, are indeed science, naturally responding in the way science always responds to questions asked about the nature of the universe we live in. Yet

this is a line of scientific endeavor that has either run up against temporary limits of knowledge, or which may have reached the outer limit of what we can know through science, *die Grenze der menschlichen Vernunft*, beyond which we can only imagine, conjecture, speculate, hypothesize and fantasize, but which we can never know for sure. It is on that frontier where science meets and intertwines with philosophy (from which science has emerged), and where it abuts on myth and religion; for all of those ways of knowing ask the same questions, each seeking answers in different ways, questions about where we came from, what is our nature, how do we fit into the broader scheme of things, where are we going and how will it all end: genesis, chronicles, apocalypse. It is on that frontier where we also see the encounter with anthropology.

From the earliest days of the discipline anthropologists have explored how people in different cultures answer those recurring questions within their own meaning systems. We see it in the work of Edward Tylor, Sir James Frazer, Lucien Levy-Bruhl and others, using second hand data from travellers, missionaries and colonial administrators, and within the theoretical framework of unilinear evolution. This line of research gave us valuable information and some of the terms we use today, but the theoretical formulation fell short. This line of research was continued, based this time on first hand ethnographic data within different theoretical frameworks as seen in the work of Bronislaw Malinowski, E. E. Evans Pritchard and others, all of which are scientific enterprises in that they involve careful collecting, systematization and comparison of data and evaluation within a clearly stated theory.

Some attention has also been given to the cross-cultural study of psychical phenomena, as defined by psychical researchers (apparition phenomena, precognition, etc.) and as revealed in the oral traditions and the belief systems of other cultures. Yet this line of inquiry has not advanced very far, perhaps because psychical research has been relegated to the periphery of science and even considered by some as unscientific, despite the fact that it is an attempt in the best scientific tradition to probe a strange fringe of human experience, which, taken together with those other ways of knowing on that outer boundary of rational understanding, is itself an appropriate topic for anthropological inquiry.

Professor emeritus  
Department of Anthropology  
California State University, East Bay  
148 Los Cerros Avenue  
Walnut Creek, CA 94598

(925) 934-3969  
glynncustred@sbcglobal.net

## REFERENCES

- Bartusiak, Marcia. 2015. *Black Hole: How an Idea Abandoned by Newtonians, Hated by Einstein and Gambled on by Hawking Became Loved*, Yale University Press.
- Cardeña, Etzel, Steven Jay Lynn and Stanley Krippner. 2000. *Varieties of Anomalous Experiences: Examining the Scientific Evidence*. Washington, D.C.: American Psychological Association.
- Ellison, Arthur. 2002. *Science and the Paranormal*. Edinburgh: Florian Press.
- Eysenek Hans and Carl Sargent. 1982. *Explaining the Unexplainable: Mysteries of the Paranormal*. London: Weidenfeld and Nicholson.
- Flew, Antony. 1982. 'Parapsychology : Science or Pseudoscience?', in, Patrick Grim (ed), *Philosophy of Science and the Occult*, New York, State University of New York Press.
- Gould, A. 1968. *The Founders of Psychical Research*. New York: Shocken Books.
- Haynes, René . 1987. *The Society for Psychical Research 1882-1982*. London, McDonald & Co.
- Kaku, Michio. 1994. *Hyperspace: a Scientific Odyssey through Parallel Universes, Time Warps and the Tenth Dimension*. New York: Random House.
- Kant, Immanuel . 1934. *The Critique of Pre Reason*, New York, D. P. Dutton and Co.
- Kuhn, Manfred. 2012. "Von der Grenze der Vernunft der Reinen Vernunft", in, Lyre, Holgar and Oliver Schliemann (eds). *Kants Prolegomena: ein Kooperativer Kommentar*, Frankfurt am Main, Kostermann Rote Reihe.
- Kuhn, Thomas. 1970. *The Structure of Scientific Revolutions*, Chicago, the University of Chicago Press.
- Pagels, Heinz. 1985. *Perfect Symmetry: the Search for the Beginning of Time*. New York: Bantam Books.
- Hufford, David. 1982. *The Terror that Comes in the Night: an Experienced Based Study of Supernatural Assault*. Philadelphia: University of Pennsylvania Press.
- Hufford, David. 1985. "Introduction" to, Genevieve Foster, *The World was Flooded*

with Light: A Mystical Experience Remembered. Pittsburg: University of Pittsburg Press.

Taylor, John. 1980. Science and the Supernatural. New York: E. P. Dutton.

Wilczek, Frank . 2015. Interview, "Die Welt ist ein Kunstwerk" Der Spiegel. 33.