

less Turin expected this result — but then why all the complications arranging the tests?), and Gove rightly fought to keep all seven labs involved.

A book like this one, that documents actual events from beginning to end, contains numerous factoids that catch the readers' attention. For instance:

1. Did you know that Paul Dirac, Nobel laureate in physics and an adamant atheist, was a member of the Pontifical Academy of Science?
2. Gove mentions a rumor that the Shroud had been secretly carbon dated prior to the documented tests, an astonishing possibility that I don't believe (and neither does Gove).
3. The security for STURP's testing was incredibly lax. At one point during the five days in 1978 that STURP had the Shroud, fanatics ran in from the street and placed their bodies up against it!
4. Page 283 contains a mysterious and tantalizing statement implying that Umberto, last king of Italy, exiled to Portugal, had known for a long time the Shroud was a forgery. Gove doesn't know how Umberto knew this. Is it simply the 14th century confession, of which Gove is ignorant, or is there more?

By far the most important aspect of this book, and I can recommend it for inclusion in a skeptic's library on this basis, is that it lays bare the steps taken to achieve the dating of the Shroud. Putting the rhetoric aside, the book describes the details of the testing: the taking of samples from the cloth, their identification and transportation to the labs, the dating of the samples, and the handling of the results. As such it serves as ammunition for those who wish to defend reason and science against the Faithful who would discredit the dating.

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**Life at the Edge of Science** by Beverly Rubik. Pennsylvania: The Institute for Frontier Science, 1996, 185 pp., \$16.00 (p), ISBN: 0-9652401-0-X, [brubik@compuserve.com](mailto:brubik@compuserve.com), <http://www.healthy.net/frontierscience>

### *The Truth Is Out There*

An *X-Files* episode this past summer took place among an orthodox Jewish community in Brooklyn, NY. They had animated a Golem (a monster formed from soil) to revenge a death in their community. In the following week's show, we learned that investigator Scully had cancer, undoubtedly contracted during her abduction experience. (It was left inconclusive as to whether the

perpetrator had been an alien, or a mad Japanese doctor performing DNA experiments for the US government.)

The *X-Files*'s creators must be doing something right to attract 14 million viewers every week. The allure of the show was best articulated to me by one of my students:

I have never thought much about "hard" sciences, but I am intensely curious about pseudoscience. This may explain my (and America's) addiction to the *X-Files*, whose catch phrase is "The Truth Is Out There." Every week two FBI agents, Scully and Mulder, investigate strange happenings of the paranormal. Scully is a forensic scientist and MD; Mulder is a believer in higher intelligence and discounts any scientific explanation Scully offers. The result is a clash of world views, and the TV viewer is left with a mystery to ponder. The *X-Files* provides a forum for me to speculate on the truth out there, however tenuous that truth may be.

Beverly Rubik is an investigator into a world that is stranger than the *X-Files* — the world of frontier science. Instead of monsters, aliens, and conspiracy theories providing the "clash of world views," Rubik's laboratory is inhabited by subtle energy, bioelectromagnetics, low-dose bioeffects, epigenetic inheritance, and ultraweak biological light. These issues, on the edge of orthodox science, some would claim "over the edge," lead her to radical questions concerning Western scientific methodology and epistemology.

In *Life at the Edge of Science*, a clearly written and easily followed compilation of essays from the early 1990's, Rubik focuses on the territory that she has interrogated, as scientist, researcher, and advocate, most of her life. The frontier sciences represent "...whole areas of scientific inquiry that have not yet been incorporated into conventional science. These areas are ignored or even considered irrelevant by the mainstream..." (p. 26). One question a reader might ask is, if these ideas are ignored by conventional scientists, why should I pay attention to them?

Although this book contains a range of essays, the essential theme is that orthodox science and scientists approach the objects of their study with limited vision, in the form of a restrictive methodology and epistemology. Rubik repeats this critique throughout her text whenever the opportunity presents itself, "Scientists may say that they see the data with their own eyes, but in fact, they see it through their minds. They cannot bypass this central focus and filter full of biases, products of both evolution and society. It is very difficult to see scientifically beyond the context of theory or explanations" (p. 28).

As Artemus Ward said, "It ain't so much the things we don't know that get us in trouble. It's the things we do know that ain't so," and this is exactly Rubik's concern with orthodox researchers. She is concerned that scientists are so confident that they know what the object of their study is that they miss essential possibilities. The paradigmatic analytical tools they use recursively support the methodology that utilizes them. As she points out, "Scientists must continually be motivated by the *mother* of all questions: what facets of nature

remain undiscovered because what we consider to be theoretical certainties prevent the posing of new challenging questions” (p. 40)?

I first heard Rubik give a lecture in 1994 at the Center for Frontier Sciences at Temple University, where she was the director. Her message, to a full audience of researchers, professors, and students, was the same as that throughout this book. Namely, science is barking up the wrong ontological tree, searching only superficial data, and missing the most interesting investigations: “The really significant questions in life about the nature of reality are those that lie beyond the scope of our present disciplines. They are deep and multidisciplinary, involving, for example, science, philosophy, and spirituality” (p. 50). This is a critical educational, as well as scientific, message. In the classroom, this book could be useful reading to get a sense for the scope of one individual’s crusade to integrate peripheral ideas into the corpus of orthodox science, or one or more of the essays could be illustrative in a course on the history of science or scientific thinking.

Rubik is especially concerned with the recurrent obstacles faced by scientists who explore the frontier. She regards these obstacles as problems with traditional funding and mainstream journal publishing, loss of professional camaradery and reputation, snags in promotion, and decreased employment opportunities (p. 32). But in the end, she is clear about the central challenge: “Perhaps the greatest obstacle that frontier scientists are unprepared for but inevitably face is political — the tendency for human systems to resist change, to resist the impact of new discoveries, especially those that challenge the status quo of the scientific establishment” (p. 7).

So, here is one answer to the question of why we should pay attention to the frontier sciences. Rubik is a revolutionary who offers us hope, and an escape from the limitations of scientific, factist meaning-making: “We are at the threshold of a new order of being. Before that, however, I anticipate at least a partial collapse of the old order. Although this would bring hardship, from a larger perspective, the breakdown of our deteriorated structures is essential to the means by which we will renew ourselves, our culture, and our planet” (p. 47).

Although this is a compelling petition, one element that is missing in *Life at the Edge of Science* is a consideration of the considerable body of scholarship that claims that frontier science is, simply, non-science. For instance, in Michael Shermer’s fast-selling new book, *Why People Believe Weird Things*, we read, “Some things, such as water dowsing, extrasensory perception, and creationism, have been tested and have failed the tests often enough that we can provisionally conclude that they are false” (p. 16). How can frontier scientists, in this case *psi* researchers, address this charge? In truth, there are a number of puzzling theoretical confrontations that frontier scientists face.

Scientists who search for subtle and inexplicable entities quickly run into a

version of the “experimenter’s regress” (Collins and Pinch pp. 97-98). If researchers are looking for something that doesn’t exist, they are good experimenters if they don’t find it, and a poor ones if they do (*e.g.*, N-Rays or the flying saucer behind the Hale-Bopp comet). However, since it is impossible to prove the non-existence of many phenomena (*e.g.*, ghosts, God, or telepathy), it is also impossible to state unequivocally whether these researchers are actually studying anything. They may be experts who know a lot about exquisitely subtle phenomena, or they may know a lot about nothing. One could absurdly say, they know a lot of nothing about nothing, since any “findings” they “discover” wouldn’t actually exist, at least in reference to the non-thing they are studying. For example, Ian Stevenson, Professor of Psychiatry and Director of the Division of Personality Studies at the University of Virginia, has been working for thirty years documenting cases of apparent reincarnation. He has published books, and articles in peer-reviewed journals, on this topic. Is his work a phenomenological (*i.e.*, reincarnation is a fact that we can study) or a sociological (*i.e.*, isn’t it intriguing that all these people believe in reincarnation) inquiry? Free energy, gravity waves, homeopathy, and most of the phenomena of frontier research can be criticized in this way.

Another question that the skeptics continually ask is, “Where is the line between the suggestively interesting and the far-out? Where is the boundary between science and non-science?” This problem of demarcation in science has not been answered to anyone’s satisfaction. But critics of Rubik’s work will surely look for methodological flaws in her analyses, and ask if the experiments she describes as subtle energies, consciousness, bioelectromagnetics, low-dose bioeffects, epigenetic inheritance, and ultraweak biological light constitute legitimate science. If these are science, then what is not science? Rubik has clearly made an impassioned plea, here and through her entire career, but the reader wonders whether she would convince skeptics like Michael Shermer, Theodore Schick, Jr. and Lewis Vaughn (*How to Think About Weird Things: Critical Thinking for a New Age*), or Thomas Gilovich (*How We Know What Isn’t So: The Fallibility of Human Reason in Everyday Life*). I don’t think so. But, this is not Rubik’s fault. It is a frustrating consequence of the conditional, orthodox science that Rubik impeaches.

There is, in fact, a mountain of evidence to support frontier science. Among many other studies, replicable confirmation for remote viewing (Bem and Honorton), the effects of consciousness on physical systems (Radin and Nelson), and psychic phenomena (Radin) have been acknowledged, discussed at conferences, and published in peer-reviewed journals. In her chapter, “Volitional Effects of Healers on a Bacterial System,” Rubik presents her own original research, and the reader is taken on a fantastic ride. Presenting quantitative evidence for the positive influence of “laying on of hands” on bacterial colonies inhibited with varying amounts of toxic substances, the reader is confronted by data that must leave them questioning the basic assumptions of the Western biomedical model. Since these papers are a part of the scientific liter-

ature, one would imagine that the research findings they describe are presently integrated into the catalog of perspectives that scientists refer to and reference when designing experiments, and examining hypotheses. This is far from true. These provocative results, which contradict fundamental scientific assumptions, are expelled beyond the margins of science. They are not even called controversial science, but categorized as pseudoscience. When inexplicable experimental results from the frontier cannot be refuted, they are simply ignored.

There is one area where the skeptical authors and Rubik would agree. Rubik states a clear challenge for all scientists on the frontier, and it is identical to one that is echoed throughout the skeptical literature:

From an historical perspective, the accretion of anomalies or numbers of anomalous observations in themselves are not enough to produce a paradigm shift. Further effort is required. Conceptual work towards new theories and a paradigm that would reconcile them are critical to their recognition by the scientific community. No one other than the proponents of the anomalies will accomplish this. It remains for us, the frontier scientists, to design the theories, elaborate the new paradigm, and show how they explain our anomalies. (p. 35)

She is correct. The anomalies among the frontier sciences are so consistent and abundant that they constitute compelling evidence. But, compelling evidence for what? This is the deep theoretical issue that must be addressed. She is particularly critical with parapsychologists, and admits that this is the reason she left this branch of research:

*Psi* researchers have focused on measurability, quantifiability, reproducibility, replicability, stability, and consistency with the picture of conventional science, all characteristic of the masculine archetype of outward manifestations and the “hard” or physical science approach. None of these deal adequately with the subtlety of the phenomena or its inner dimensions which are features of a feminine archetype. (p. 65)

Rubik is challenging frontier researchers to acknowledge the abundance of their data, move beyond conventional methodology, and create a radically new theoretical frame.

If the book suffers anywhere, it shows the usual shortcoming of anthologies of previously published papers written by the same author. Rubik likes to use certain examples to illustrate her points, and if you miss them the first time around, you’ll catch them the second (or, the third). One wishes that the time had been taken to eliminate some of the redundancy. There is also at least one printing error, which will be apparent to anyone who carefully reads citations and bibliographies. The essay, “The Feminine Archetype,” has the incorrect set of references attached. These are minor flaws.

At one point, in a call for more holistic approaches to science and the study of nature, Rubik spoke about how the skills of traditional naturalists are practi-

cally unknown on university campuses. However, as she says, "Life may now be seen as more dynamically responsive to subtle external influences, more interconnected, and more interdependent, much more so than was considered possible under the old dominant scientific paradigm" (p. 19).

Her claim reminded me of my friend Seth. He is a birder, but this description doesn't actually do him justice. He knows birds. He knows them in a way that to the untrained eye is uncanny. To watch him glance at a tiny black speck whizzing past high in the sky, and declare its denomination with complete confidence, is startling. That he can accomplish this throughout North America, and that this talent includes identification by song as well, appears magical. A walk with him through the woods is a series of amazing revelations and visions. He recently told me about a bird count he participated in to which he had invited a birding friend. He claimed to me that his friend was "Far better than I am." I thought, what is infinity squared?

Late in the day, Seth and his friend were walking along the trail looking for new species to finish their count. Seth was trying to keep up with his friend's depth of identification. As Seth explained it to me, "He was two or three levels beyond the obvious."

"Beyond the obvious?" I asked.

"Yeah." Seth said, "When you've already identified over a hundred species during the day, your chances of discovering new ones diminish considerably. So you're trying to look and hear deeper into the woods. There are the birds in your immediate surroundings that you can see and hear. Then there are the ones you can just barely distinguish behind them. My friend was finding the species that were buried beyond that. I wanted to believe that I could distinguish what he was hearing, but in actuality I couldn't."

*Life at the Edge of Science* is the account of a scientist who has spent a lifetime looking for possibilities "beyond the obvious," and encouraging other researchers to do the same. One can't help but be impressed by the placement of these essays: seminal papers in journals, research reports, conference presentations, and keynote addresses. Clearly, Rubik has found many respectable forums for her unconventional message. Although orthodox science hasn't been looking in the right places, or even framing its questions in the proper way, a critical change in focus could allow researchers to converge on these perplexing problems in science and human understanding. According to Rubik, the most profound ideas are waiting for our discovery. Indeed, The Truth Is Out There.

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### Acknowledgement

I would like to thank Marjorie Farrell for commenting on an earlier draft.

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