



## **Chapter 2**

### **Scientific Framework for Understanding the Shift (I): Physics and Biology**

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**Preparing Ourselves for the Great Shift**

*Now, my suspicion is that the universe is not only queerer than we suppose, but queerer than we can suppose (Biologist J.B.S. Haldane, Possible Worlds, 1927).*

*The great strength of science is that it is rooted in actual experience. The great weakness of contemporary science is that it admits only certain types of experience as legitimate (Physicist David Bohm quoted in Targ and Kutra, 1998:273).*

## **Summary**

In this chapter I identify the strengths and limitations of the scientific method itself, describe the approach I have used to extend rational inquiry beyond physical reality, and examine empirical evidence and theories in physics and biology that provide intimations of what I imprecisely call the “larger reality.” A common misconception about the nature of scientific inquiry is that theories can be proved. Instead, scientific knowledge advances by a process of falsification and confirmation rather than proof. Furthermore, the Duhem-Quine (DQ) thesis proposes that multiple interpretations of the same empirical observations are possible and that the strength of a theory rests on the consistency with which multiple corollary hypotheses can be explained. At this level, experimental results that are not consistent with the theory are generally taken into account by making adjustments elsewhere in order to reestablish consistency.

Mainstream science reduces the nature of reality to that which can be physically measured or inferred by measurement and mathematics. There is a body of evidence in physics and biology that is suggestive of the existence of a larger reality, of which the physical is only a small part. Open Skeptics are people who acknowledge the possibility of a reality beyond the physical and mathematical abstractions, but do not find the evidence compelling (the materialist paradigm); Open Believers are people who accept the existence of such a larger reality, and are able to modify their understanding of that reality with new information (the transcendent paradigm). I provide examples of scientists who have made the shift from being Open Skeptic to Open Believer, and I share my personal journey from skeptic to believer.

When I accepted that my conception of reality was too limited, I used my training as a geologist to develop a rational approach to understanding this larger reality. I found the DQ thesis helpful in providing a framework for developing an alternate model of reality (a transcendent paradigm) without having to reject those aspects of

the materialist paradigm that remained consistent with my new model. When I mapped soils I knew that the lines I was drawing were abstractions that couldn't reflect the full complexity of soil patterns. Consequently, I am acutely aware that the map of the larger reality that I present here should not be confused with the territory itself. I found that I had to develop additional criteria for evaluating information that I would not have considered worthy of attention when I was a skeptic. To continue the mapping metaphor, I applied these criteria to a wide variety of information sources to develop an ever-evolving map of the territory. The confidence that I place in a particular feature of the map depends on how many different lines of evidence or different sources for a particular line of evidence are in agreement.

Having only recently “crossed the tracks” from a materialist to a transcendent paradigm, in this chapter I begin building an evidentiary case for a transcendent paradigm while remaining respectful of the materialist paradigm. I first present evidence from physics, such as dark matter, string theory, Newtonian interconnectedness and nonlocality, which suggest increasing parallels, and convergence in the materialist and transcendent paradigms. I then present evidence, primarily from the biological sciences, for intimate connections between consciousness and matter which also suggest convergence in the materialist and transcendent paradigms. Finally, I conclude the chapter by acknowledging the work of many before me who have suggested that humanity is in the midst of a profound shift in consciousness and describe some ways of understanding how the Great Shift might occur.

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## **2.1 The Nature and Expressions of Scientific Understanding**

One of my small pleasures in life is to regularly meet a friend who is a died-in-the-wool materialist and empiricist in a coffee shop and talk. By materialist, I mean that his general working hypothesis is that all phenomena that we observe and experience can be explained in terms of measurable interactions between matter and energy. I also consider myself to be an empiricist, but my own experience, as described later (Section 2.2.3) lead me to a general working hypothesis that there is a larger reality that is for the most part not amenable to study by the measurement methods that my friend relies upon. As he put it once, we are on opposite sides of a railroad track, yet we are able to talk with each other because we are both traveling in the same direction along the track. To continue with the metaphor, the track is an understanding of the scientific method that we both share in common. In the rest of this section I briefly describe an understanding of science that allows my friend and me to have stimulating conversations from opposite sides of the railroad track.

### **2.1.1 Proof versus Falsification and Confirmation.**

A common misconception about the scientific method is that a scientific theory can be proven like a theorem in geometry. Scientific understanding of the physical world advances by a process of falsification or confirmation of specific hypotheses rather than proof. The philosopher of science Karl Popper emphasized the importance of falsification (Popper, 1963), but the process can be just as well viewed as primarily one of confirmation via hypotheses, where hypothesized and actual experimental results are in agreement. Confirming a hypothesis is not the same as proof because alternative explanations are always possible.

The most useful theories lead to testable predictions, or hypotheses, that allow measurements to be made to see if the experimental results match the predictions. If the predictions are accurate the theory remains robust as a theory, if not, the theory needs to be reevaluated. Hypotheses arising from theories that have been confirmed many times by experimental results become part of the dominant scientific paradigm (Kuhn, 1962). Examples of theories that are now part of the dominant paradigm include the Big Bang theory of

the origin of the universe, Darwin's theory of evolution (as modified by neo-darwinians), and the theory of continental drift. It is important to keep in mind that there are scientific data related to all three of these theories that doesn't quite fit, but the large weight of evidence is accepted by the majority of scientists as supporting these theories.

### **2.1.2 The Duhem-Quine Thesis.**

The principle that a theory represents an organic whole that is not contingent on the results of individual testable hypotheses is often referred to as the Duhem-Quine Thesis (Duhem, 1954; Hesse, 1974; Quine, 1953). Pierre Duhem (1861-1916) was a French physicist who believed that our perceptions and theories do not necessarily reflect the real world, but are useful ways to explain and predict our experiences. W.V.O Quine (1908-2000), one of the great philosophers of the 20th century, specialized in metaphysics, epistemology and the philosophy of science. Several elements of the Duhem-Quine thesis include: (1) hypotheses are not tested in isolation, but as a body of hypotheses, (2) there typically cannot be “crucial experiments” to determine which of two competing theories is correct, (3) no single hypothesis is sufficient to explain an observation, in fact a very large number of hypotheses may be able to explain a given observation, and (4) hypotheses related to a theory that are falsified tend to be explained by inadequacy of the experimental method or adjustments may be made elsewhere in order to maintain the integrity of the theory.

Now at this point you may feel like throwing up your hands and saying: “What's the point if you can't definitely prove anything one way or another?” It gets back to Duhem's proposition that even if our perceptions and theories do not necessarily reflect the real world, they are useful ways to explain and understand our experiences. For example, the theory of evolution is more useful in many practical ways than the theory of intelligent design. Not everyone accepts the Duhem-Quine thesis, Peter Achinstein, Professor of Philosophy at Johns Hopkins University, for one, rejects it (Achinstein, 2001). I find the D-Q thesis a useful way of looking at knowledge and experience because it allows me and my materialist-empiricist friend to enjoy our weekly cup of coffee and friendly conversations across the railroad track.

In this and the next three chapters I will be gradually and cumulatively providing physical, biological, social scientific and other evidence in support of a theory that our physical world and universe are part of a larger, multidimensional reality in which individuated consciousness is ubiquitous. I invite skeptical readers to join my friend on his side of the track as we walk along it into a future which will no doubt hold surprises for all of us. Part of the adventure is wondering whether one of us will cross the track to join the other. To cross the track requires a paradigm shift, so I will say a little about what that means.

### **2.1.3 Scientific Paradigms and Paradigm Shifts.**

As I mentioned earlier in the discussion of proof and falsification, scientific theories rest on the cumulative evidence of many experiments and observations. A theory that is accepted by a large majority of scientists is often referred to as a dominant paradigm. Following the Duhem-Quine thesis dominant paradigms have an inherent conservatism. Nevertheless, throughout history there have been scientific revolutions in which the paradigm has shifted (Kuhn, 1962). The classic example is the Copernican revolution from a geocentric to a non-geocentric view of the cosmos. The geocentric view that the sun, planets and stars revolved around the Earth was sustained for centuries by increasingly complex mathematical models to account for each new anomalous observation of the movement of a celestial body. Copernicus showed that the same motions of the planets could be much more simply modeled as orbiting around the sun rather than the Earth.

Here I will usually use the term “mainstream science” to refer to the dominant paradigm that is accepted by the majority of the scientific community. I will use the term “frontier science” to refer to the work and observations of scientists and engineers that are not accepted by mainstream science (the term “alternative science” may also be used) although some of this work may appear in mainstream scientific journals (see next section). The body of modern scientific knowledge is too vast and diverse to define a single dominant paradigm, so I get a bit wary when frontier scientists talk, as they often do, of the need for a paradigm shift. That said, I present evidence later in this chapter mainly from the physical and biological sciences that scientific knowledge is in a great of state flux. I think it is fair to say that mainstream science seems poised at the cusp of multiple paradigm shifts.

### 2.1.4 Types of Scientific Publications.

Footnotes are often taken to be the mark of a scholarly publication. I find them irritating because I always feel compelled to read them, which breaks up the continuity of the main text. You will find no footnotes in this book. However, I am a stickler for documentation when text refers to information contained in other sources. I ask your indulgence for some idiosyncrasies in the way I document references. The breadth of topics covered in these volumes means that I am unable to discuss any particular topic at length. However, at the end of most chapters there is a table that provides an index to major references where additional information can be found about a topic. Because most chapters contain many book-length references, when I refer to a source that has been published in a journal I provide the full citation in the main body of the text. In this chapter and the next chapter I will be relying primarily on information from the following kinds of scientific publications:

- *Peer-reviewed mainstream scientific publications* are generally written for other scientists, most of whom accept the dominant paradigm of their particular discipline. The most rigorous sources come from peer-reviewed scientific journals. The most prestigious journals in this category are *Science* published by the American Academy of Arts and Sciences, and the British-published *Nature*. Each scientific specialty has its own journals. With cutting-edge scientific research, where a dominant paradigm has not been well-established, results that are not easily explained are often published in such journals. It is more difficult, but not impossible, for research that does not fit a well-established paradigm to be published.
- *Popular scientific publications* present information most rigorously in journals such as *Scientific American* (written by scientists themselves) and less rigorously by science journalists in magazines such as *Science News*, *New Scientist*, *National Geographic*, *Time* and in daily newspapers. Scientists cited in these sources usually have published in peer-reviewed journals, but are freer in their speculations on the implications and significance of their work.



- **Frontier science** is presented most rigorously in peer-reviewed journals such as the *Journal of Scientific Exploration*, and in peer-reviewed scientific journals that report research in the areas of ESP/Psi phenomena, subtle energies and energy medicine. *Science Frontiers* is a periodical that specializes in identifying papers in the dominant-paradigm scientific journals that challenge the dominant paradigm. Another alternative science periodical is *Nexus*. The best books on frontier science are written by scientists with excellent qualifications and are well documented using mainstream scientific journal sources. It is not uncommon for what I call the Velikovsky Effect (Section 3.1.3) to be evident in the not-so-good frontier science books, but there are also good books written by individuals who do not necessarily have mainstream scientific credentials.

As a scientist I have spent most of my adult life working with the mainstream scientific literature, and that is what I still feel most comfortable with. Although mainstream science may give the impression to the nonscientist that it presents a largely unified, monolithic front, anyone who delves into the literature on a specific topic knows that this is not the case. Where there are conflicting viewpoints in the scientific literature, these are acknowledged and cited, and I will follow this practice.

## 2.2 Skeptics and Believers

### 2.2.1 The Skeptic-Believer Spectrum.

Chet Raymo, a professor of physics and astronomy, in his engaging book titled *Skeptics and True Believers: The Exhilarating Connection Between Science and Religion*, continually compares and contrasts two ways of looking at the world:

*The True Believer retains in adulthood an absolute faith in some forms of empirically unverifiable make-believe (such as astrology or the existence of immortal souls), whereas the Skeptic keeps a wary eye even on firmly established facts (such as atoms). Both Skeptic and True Believer use made-up maps of the world. (Raymo, 1998:14)*

I would like to suggest that rather than either/or, there is a continuum between the skeptic, whose worldview is grounded in material reality, and the believer, who accepts the existence of a larger reality. At the extreme ends of the continuum lie the Rigid Skeptic and the True Believer. The True Believer's worldview is as described above. The Rigid Skeptic, on the other hand, rejects any information that cannot be verified and replicated using scientific experiments performed by other skeptics. Since scientific experiments can only be performed in the material realm, Rigid Skeptics *a priori* reject information that is suggestive of nonmaterial realms as make-believe, fantasy, or delusion. Thus, the Rigid Skeptic gives the appearance of being open because they know that their map is not the full territory of the material realm, but they refuse to accept that the territory might extend beyond the material realm. In my view, Rigid Skeptics limit themselves unnecessarily, but I find their views to be a useful reference point (see Section A5.1 for additional discussion of “professional skeptics”).

Between the extremes of the continuum lie the Open Skeptics and the Open Believers. The Open Skeptics ground their worldview in the material realm. They use the tools of science to map a territory that seems to them most likely to include only the material realm, but they are open to the possibility that the actual territory is larger than that. Open Believers accept that the territory extends beyond the material realm. Most also recognize that our maps of the nonmaterial realm are likely to have much greater discrepancies compared to the actual territory than our maps of the material realm.

As my map of the territory has evolved I have come to recognize two major types of Open Believers, the left-brain rational believers who are most comfortable using the tools of science to expand our understanding beyond the boundaries of mainstream science, and right-brain intuitive believers who rely more on feelings and direct experience in their interactions with these realms. I know left-brain rational Open Believers who find the more extreme left-brain intuitive elements of the New Age community a bit too “woo woo” for their comfort. In Chapter 4 I outline an approach for applying rational criteria for evaluating more “woo-woo” sources of information. Used without discernment, the right-brain intuitive approach leads to the pitfall of credulity (see Section A5.2).

Both skeptics and believers may experience *cognitive dissonance*, a term developed by psychologist Leon Festinger and his colleagues at Stanford University to describe the uncomfortable feeling that develops when confronted with experiences that are “real” or information that seems to be true, but lies outside one's frame of reference (Festinger, 1962). If the feeling of dissonance becomes strong, and is not reduced in some way, the uncomfortable feeling will grow and can develop into anger, fear, or hostility. Reactions I have received from readers indicate that some of the information I am offering here can hit emotional buttons in both rational and intuitive readers. If this happens to you, I suggested in the Introduction that you try to reset your strangeness circuit breaker, and read on, paying particular attention to both the content and your emotional reaction to it. Now, relax and rest assured that there isn't anything in the rest of *this* chapter that is likely to create a feeling of strong cognitive dissonance.

Our way of thinking may also affect the way we process new information. Philosopher David Ray Griffin identifies three major types of thinkers: 1) paradigmatic thinkers, whose primary consideration when evaluating information is what they consider possible and impossible based on their worldview, 2) data-led thinkers, or empiricists, who “wear their paradigm lightly,” changing it when the data suggests it is inadequate, and 3) wishful/fearful thinkers who develop a worldview guided primarily by their hopes or fears (Griffin, 1997:25-33). In practice most of us incorporate a mixture of all three ways of thinking, with strongly data-led thinkers probably being the rarest. As Griffin says,

*In most of us, philosophical preconceptions of possibility and/or strong hopes or fears significantly color our response to whatever relevant evidence is available, often determining whether or not we will even study it (Griffin, 1997:98).*

### **2.2.2 Examples of Open Skeptics Turned Open Believers.**

An interesting aspect of the skeptic-believer spectrum is that in the scientific community it is more common for an individual to make the shift from skeptic to believer than the other way around. When there *is* a shift from being believer to skeptic, it is more usually as double-switch from skeptic to believer, back to skeptic again. The most notable example of a such a double

reversal is John Taylor, a mathematician at Kings College, London who was sufficiently impressed by experiments he conducted on the psychic abilities of Uri Geller and others, that he published a book *Superminds*, which accepted phenomena such as psychic metal bending as real (Taylor, 1976). Taylor later repudiated the views he expressed in the first book because he could find no basis for explaining the phenomenon within the framework of mainstream science (Taylor, 1980).

The examples that follow indicate that there are strong disincentives to go against the mainstream, especially for scientists in academia and medically-related professions. Making such a shift, and writing about it requires courage. Typically the shift is gradual, the cumulative effect of experiences and observations that cannot be readily fit into the mainstream scientific worldview. Here, then, are some thumbnail sketches of five scientists who have made the shift as they have described it in their own words. In Chapter 3 I will say a bit more about their actual research.

Dr. Kenneth Ring is now Professor Emeritus of Psychology at the University of Connecticut and one of the first academics to seriously study near death experiences (NDEs—see Section 3.3.1). In his book *The Omega Project: Near Death Experiences, UFO Encounters, and Mind at Large*, he describes his strong resistance to a suggestion that he expand his research to include UFO encounters:

*[M]y early sensitivities to the professional costs of stepping over the boundaries of accepted scholarly concerns never entirely eroded, and I always exercised some degree of caution whenever I was exhorted by someone to peek over the edge of my own self-defined abyss. Even to innocent undergraduates who, knowing my reputation for the exotica of psychology, would sometime approach me to sponsor their academically dubious projects, I would joke, “Look, even I have my limits, and I don't do ghosts and I don't do UFOs, so don't ask me to consider it!” As a result, much as I was interested in NDEs and their spiritual implications, I went out of my way to avoid reading about spirits, seances, UFOs, and other similarly professionally taboo topics. (Ring, 1992:9)*

Dr. Gary Schwartz is a Professor of Psychology, Medicine, Neurology, Psychiatry, and Surgery at the University of Arizona and Director of its Human Energy Systems Laboratory. He obtained his PhD in personality psychology from Harvard. Before going to the University of Arizona he became one of the youngest tenured associate professors at Yale where he was quickly promoted to Professor of Psychology and Psychiatry. In Appendix A I indicate that I do not consider academic credentials a primary criterion for reliability of a source. However, anyone familiar with academia and its tenure system will recognize Dr. Schwartz's credentials as exceptionally impressive. Schwartz conducted his initial research into the "living soul hypothesis" in secret because it was so "painfully controversial". In the introduction to his book *The Afterlife Experiments*, Dr. Schwartz states (in Section 3.3.2 I summarize his work):

*Having been there myself, I know what it's like to feel that "this simply can't be true." I know what it's like to literally see things with my own eyes in the laboratory and discount them because of prior learning, ignorance or fear. I have experienced first-hand, the feeling that "these are the kinds of data I wouldn't believe, even if they are true!" I know intense skepticism first hand (Schwartz, 2002:13).*

Brian Weiss graduated Phi Beta Kappa, magna cum laude, from Columbia University in 1966 and received his MD degree in 1970 from Yale University School of Medicine, and eventually completed residency at Yale in psychiatry. As head of the Psychopharmacology Division at the University of Miami Medical School he achieved national recognition in the field of biological psychiatry and substance abuse. When he was appointed Chief of Psychiatry at a large University-affiliated hospital he described his worldview in the following words:

*Years of disciplined study had trained my mind to think as a scientist and physician, molding me along the narrow paths of conservatism in my profession. I distrusted anything that could not be proved by traditional scientific methods. I was aware of some of the studies in parapsychology that were being conducted at major universities across the country, but they did not hold my attention. It all seemed too farfetched to me (Weiss, 1988:10).*

Nothing in his background prepared him for the experience with Catherine whose recovery of “past life” memories under hypnosis proved to be causative factors of extreme anxiety. For 18 months conventional methods of therapy had no effect. When Weiss tried past life regression her symptoms disappeared in a few short months. She also acted as a conduit for information from highly evolved “spirit entities” (see Section 3.3.5 for more discussion of psychotherapeutic past life memory recovery).

*Despite my overwhelming and wonderful experience with Catherine, I knew my naturally critical mind would continue to scrutinize every new fact, every piece of information. I would check to see if it fit into the framework being built with every session. I would examine it from every angle, with a scientist's microscope. And yet I could no longer deny that the framework was already there (Weiss, 1988:59).*

Dean Radin, PhD, is Director of the Consciousness Research Laboratory at University of Nevada Las Vegas. He has had a distinguished career doing cutting-edge parapsychological research for AT&T, Contel, Princeton's Department of Psychology, the University of Edinburgh, SRI International and the U.S. government. In his book, *The Conscious Universe: The Scientific Truth of Psychic Phenomena*, he chose to deemphasize his personal role in paranormal research (also called “psi”), but in the postscript gives a glimpse of what its like to devote one's life to this kind of research (see Section 3.4 for more on the general topic of paranormal research):

*But while I consider myself to be a fairly conventional scientist, with traditional academic degrees in traditional disciplines from ordinary universities, and I use well-established scientific methods in my research, I admit that something about psi is far from ordinary. As I write this, my lab is only one of two full-time academic psi research labs in the United States. And there are only a handful of labs like this in the entire world. Why is this? Certainly a big part of the answer is that psi threatens the very core assumptions of science, and it is not easy raising funds to challenge a powerful status quo. But perhaps there is something*

*else different about psi research, something that touches people in unusually deep ways. This “deep touch” manifests itself in ways that would probably not appeal to most scientists. For example on Monday, I’m accused of blasphemy by fundamentalists, who imagine that psi threatens their faith in revealed religious doctrine. On Tuesday, I’m accused of religious cultism by militant atheists, who imagine that psi threatens their faith in revealed scientific wisdom. On Wednesday, I am stalked by paranoid schizophrenics who insist that I get the FBI to stop controlling their thoughts. On Thursday, I submit research grants that are rejected because the referees are unaware that there is any legitimate evidence for psi...[you get the idea] (Radin, 1997:299).*

The late John Mack, M.D. was Professor of Psychiatry at Harvard Medical School and founding director of the Program for Extraordinary Experience Research (PEER). After his first book was published reporting the results of his clinical research based on interviews with individuals who had experienced what I call SETEs—scary extra-terrestrial contact experiences (Mack, 1994), a committee of Harvard faculty was convened to investigate the quality of his research. The only “fault” the committee found was that it recommended that Mack obtain review and input from a wider range of disciplines, which led to the formation of PEER. In Mack's latest book he writes about the dilemma he faced as he began analyzing the implications of his early research (I report on his actual research in Section 3.7.1):

*I was then faced with the choice of either trying to fit these individuals' reports into a framework that fit my worldview—they were having fantasies, strange dreams, delusion, or some other distortion of reality—or of modifying my worldview to include the possibility that entities, beings, energies—something—could be reaching my clients from another realm. The first choice was compatible with my worldview but did not fit the clinical data. The second was inconsistent with my philosophical grounding, and with conventional assumptions about reality, but appeared to fit better what I was finding. It seemed to me to be more logical, and intellectually more honest,*

*to modify my cosmology than to continue trying to force my clients into molds that clearly did not suit them (Mack, 1999:5).*

### **2.2.3 My Journey from Skeptic to Believer.**

For as long as I can remember my experience of reality was rooted in the five senses. I obtain tactile pleasure from the feel of soil between my fingers, visual aesthetic pleasure from the color of soil and rocks, and the texture of landscape patterns. I experience a joy that is hard to express in combining those sensory inputs with my knowledge as an earth scientist to deduce what has probably happened in the past to shape the present physical environment and figure out harmonious rather than exploitative ways for humans to work with it. Occasional transcendent experiences during Quaker meeting for worship and while alone in nature gave me fleeting glimpses of something that seemed to lie beyond my sensory perception. However, these were too brief, infrequent and abstract in nature to give me reason or motivation to change the belief that my sensory experience of reality was primary.

Over the years I kept encountering information that suggested the existence of a spirit realm that was able to interact with the physical realm. I use the term spirit realm because the most notable characteristic of this realm is that it seems to be inhabited by disincarnate, sentient Beings. This information came from a variety of sources, a few friends who matter-of-factly described encounters with ghosts, a large body of ethnographic evidence that indigenous peoples encounter human and animal spirits as a normal part of their existence, and several independent accounts of inexplicable malfunctioning of camera equipment when trying to document sacred ceremonies involving such spirits.

Mainstream scientists readily dismiss such “spirit” and related paranormal phenomena as arising from imagination, fantasy, self-delusion, or fraud, but overall I did not find these rational explanations convincing. I could see no motivation for fraud, had my own direct experiences with fantasy and imagination, and have observed self-delusion in others (it is harder to see in oneself). None of the explanations seemed to fit the particular information I had encountered. At the same time, this other realm was outside my own experience, and my scientific frame of reference had no way to explain it. Since I couldn't explain it or dismiss it, I maintained a worldview in which my



experience and scientific understanding of physical reality was primary, but I acknowledged the possibility of a spirit realm.

In my discussion of the experimenter-expectation effect in the study of paranormal phenomena (Section 3.1.2), I describe some experiments performed by Marilyn Schlitz and Richard Weisman that gave me the first glimmering of the possibility of integrating my worldview based on material reality and whatever might lie “beyond.” In terms of the Skeptic-Believer spectrum, I would say that the experiments by Schlitz and Weisman moved me on the skeptic's side right up to the line separating the skeptic from believer. At this point I should say that everything I have described up to this point was happening more as background to my day-to-day life. The question of the existence of a spirit realm was one of mild rather than burning interest. In other words, when I remember what my life was like before my paradigm-shattering experience, I see subtle predispositions, but I can say with certainty that I was not seeking such an experience.

In November, 2002, all was right in my immediate world as far as I was concerned. Our children were grown and on their own and my wife and I were enjoying being empty nesters. I had an ideal part-time consulting arrangement with Argonne National Laboratory that paid well and gave me great freedom to pursue interesting research, while leaving much free time to work out-of-doors on our 36-acre homestead near Bloomington, Indiana. In August of that year I became aware of Machaelle Small Wright's procedures for gardening with nature spirits (see Section 3.6.3) when preparing for a lecture I gave to an organic gardening class. Whilst my left-brain rational self scoffed, I became fascinated by the procedures that she had developed that allow anyone to communicate and work with nature's nonmaterial intelligences. This led me to her book *MAP: The Co-Creative White Brotherhood Medical Assistance Program* which allows any person to obtain a team of spirit Beings that is focused on all aspects of their personal health (Wright, 1994).

As the rational part of my mind asked “why am I doing this,” I decided to give MAP (Medical Assistance Program) a try. One's MAP team, consisting of what might more accurately (from my current perspective) be described as higher dimensional Beings, is determined after lying quietly for an hour-long “scanning” session. Machaelle Small Wright reports that when she does

workshops with individuals who have MAP teams, about half have visual and/or auditory perception of their teams (perceived via high sense perception—see Section 3.6.3) and half have no clear sensory perception of their teams.

My experience during the scanning session blew my conception of reality apart. Although I had no visual or auditory perceptions of any higher dimensional Beings, my body began moving in strange ways that left no doubt in my mind that I was being worked on by something outside of myself that lay beyond my perception. Words don't seem adequate to describe what it felt like to relinquish conscious control of my body and observe it moving in complex ways and into contorted positions that I could not imagine in my wildest dreams. I can only say that I knew with a certainty that came from the core of my being that I was exerting neither conscious or subconscious control of the way my body was moving (although I quickly determined that I could reestablish control at any time). Even though I had no sensory perception of what might be causing the movements, the whole premise of MAP is that the work is done by higher dimensional Beings, so I had some frame of reference for understanding my experience.

My experience with MAP was not typical (everyone else I know with a MAP team found their scanning and subsequent sessions to be a quiet, gentle experience). What seems to be different in my case was that when I opened the scanning session I blurted out without forethought “I'm ready, take me as far and as fast as you can.” Be careful what you ask for, you might actually get it. John Mack in his studies of individuals who have had scary extra-terrestrial experiences (see Section C2.6 for my analysis of the meaning of these experiences) uses the term “ontological shock” to describe what happens when they can no longer deny that what they have undergone is in some way real (Mack, 1999:52). The ontological shock of my MAP experience began what transpersonal psychologists call a “spiritual emergency,” which I discussed in Section 1.4.1. In my case, I asked for it. I do not recommend it to the timid or faint-hearted.

Although my early experiences were completely outside my frame of reference, I decided to see where it would take me. From the outset I decided to use my training as a scientist to try to develop a rational framework for understanding what I was experiencing, described later in this chapter. The

next few months were at times exhilarating and terrifying. The first sense of direct connection with nonmaterial realms can be pretty heady stuff and early on I went through a delusional stage where I thought what was happening to me was much more powerful and significant than it actually was. From my present perspective I went through a period of severe ego-filtration, and I recognize now that without having experienced it myself, it would be harder for me to recognize it in others.

I find it intriguing that when I look back on the occasions when my experiences were most disturbing, it was my rational mind that pulled me back from the abyss. I would stop and reevaluate my perception of what had happened in light of the framework that I was slowly developing to understand what I was experiencing. What helped me through the initial tumultuous months was the knowledge that I had willingly opened myself up to these experiences, and a deep trust that the higher dimensional Beings who were guiding my process would do nothing to harm me. Many who experience the kind of awakening I am describing begin to manifest psychic abilities, but I have received only brief direct perceptions of the larger reality that lies beyond our physical senses. I have never seen a UFO, when the phone rings I am invariably wrong when I try to guess who is calling, and my premonitions never seem to pan out. I have had to rely primarily on the rational approach I developed for understanding the larger reality, and feedback and information from others who have come into my life who are able to speak from direct experience.

Aside from an amazing sense of physical health and well-being, my physical sensory perceptions are pretty much what they were before my awakening to the existence of a larger reality. My eyesight is still poor, having required corrective lenses since I was five years old, and my hearing is impaired, with one mostly deaf ear as a result of childhood ear problems. I now recognize that this is not accidental. It has been necessary for me to develop my understanding of the larger reality that lies beyond our physical world primarily through intellect rather than through direct experience. This makes it easier for me to remember what it is like to be on the skeptic's side of the spectrum between skepticism and belief.

## 2.3 A Geologist's Approach to Understanding a Larger Reality

The tools of science *can* be used to identify and study aspects of the nonmaterial realm (in the next section I try to be more precise in what I mean by this), but there are very real limitations to using only those tools. The mathematician Edward Abbot in his story *Flatland* (Abbot, 1983) illustrated the problem nicely. Flatland is a two-dimensional universe inhabited by intelligent beings. These beings have many different geometric shapes but from their perspective every being is perceived as a line. There are other beings that are lines who, when viewed head on, only appear as a point. In the story a person in our dimension tries to communicate with the flatlanders by placing his head in the plane of their universe. The flatlanders hear his voice, but are only able to perceive him as a line. He tries to describe to the flatlanders what it is like to live in three dimensions, but they don't believe him because what he describes is beyond what they can see or feel.

Earlier I spoke of paradigm shifts in the scientific worldview. In my own case, rather than a shift, it felt more like my understanding of the scientific paradigm had been shattered, with nothing immediately available with which to replace it. Rather than try to find someone else's paradigm (and many have written about a larger reality), I decided to build my own from scratch. This required that I reject no information *a priori*, no matter how strange it seemed in terms of my prior paradigm. The difficulty I faced with this approach was I encountered massive amounts of new, possibly suspect, and often contradictory information. It wasn't until I consciously applied the investigation techniques I had learned and developed as a geologist and environmental consultant that I began to develop a map of this new (to me) territory that began to make sense. In a nutshell, the method I will describe in more detail below includes:

- I use the metaphor of a map that is constantly subject to revision with new information as the overall framework for developing my understanding of the larger reality. At the same time I am careful not to confuse my map with the territory itself (Section 2.3.2).
- Following the Flatland metaphor, I accept that there are inherent limitations to relying on third-dimensional scientific methods to

understand a higher (or other) dimensional reality. Although I rely on scientific information, wherever possible, I have developed specific criteria for evaluating the reliability of sources of information that lie outside a conventional scientific framework (Section 2.3.3).

- I consider certain additional factors that may influence the reliability of information: experimenter-expectation effects (Section 3.1.2), what I call the Velikovsky effect (Section 3.1.3), and frame-of-reference and ego-filtration (Section 3.2.2 and 3.2.3).
- I use multiple lines of evidence to construct an ever-evolving map of the territory. The more independent lines of evidence that support a feature of the map, the more confidence I have in that feature, but no feature is delineated with complete certainty (Section 2.3.4).

### **2.3.1 What Do I Mean by Larger Reality?**

I have loosely used terms like spirit and nonmaterial realm and larger reality in contrast to physical reality. Our physical reality includes matter, which we can see, and energy, of which we have some perception, such as the visible portion of the electromagnetic spectrum, acoustic energy in frequencies audible to the human ear, and tactile sensing of thermal energy in the form of heat. Most energy lies beyond our normal range of sensory perception, and technically could be considered nonmaterial or nonphysical. However, my working definition of physical reality includes all forms of energy for which instruments are available to detect the portions of any energy spectrum that we cannot perceive directly. I use the terms “material,” “third dimension,” and “3D-linear time” as synonyms for physical. I use the term “materialist,” as I did referring to my friend at the beginning of the chapter, not in a pejorative sense, but simply to identify someone who finds it adequate to explain all observation and experience as intrinsic to, or emergent from, the material world. The dominant paradigm of mainstream science is materialist.

I use the terms “reality,” “realm(s),” “world,” “territory,” and “All That Is (and Does)” more or less interchangeably, although context may suggest subtle distinctions. I have chosen not to define these terms precisely because they include both the known (or at least what we think we know) and the

unknown. When I speak of a larger reality, I include physical reality and everything else that lies beyond normal human sensory perception. I use many terms for the larger reality interchangeably: nonmaterial, nonphysical, multi-dimensional, and transcendent. I do *not* to use the term “metaphysical.” It is a perfectly good word, but it used with very different meanings by philosophers and theologians on the one hand, and the New Age community on the other hand. The metaphysics section of a New Age bookstore consists of books that most philosophers and theologians wouldn't touch with a ten foot pole, so I find it simpler to avoid the word.

### **2.3.2 The Map is Not the Territory.**

Alfred Korzybski coined the adage “the map isn't the territory” as a caution to not confuse the mental constructs we use to describe reality, with reality itself (Korzybski, 1958). Both the Open Skeptic and the Open Believer understand that their maps are made-up, although I suspect that we all forget this at times. Either may use the methods of science (or in the case of believers, direct experience or other sources of information) to modify the map. The True Believer and the Rigid Skeptic, on the other hand has the conviction that his or her map *is* the territory, leaving little space for changes in response to new information that doesn't fit the map. In the case of the Rigid Skeptic the territory is defined by the materialist scientific paradigm, so changes in the map can occur as long as it fits within that paradigm. Information that doesn't fit the paradigm is rejected as impossible.

Anyone who has done actual mapping in the physical world and tried to match the edges of their map with someone else's map knows the truth of Korzybski's metaphor. I will give you two examples from my own experience. In the early 1970s during travels in Europe and Africa I collected geologic maps. The most fascinating map I obtained was of a remote area of the Nubian Desert in Sudan, different areas of which had been mapped by two different geologists. There were no discernible correlations between the maps created by the two geologists. The person who compiled the map from the two sources simply left a blank area on the map to delineate the boundary between the areas mapped by the two geologists. This is an extreme example. In the mid 1970s I mapped soils in southern Indiana and part of the training included being sure when I went to a new air-photo base map to make the soil boundaries match from one sheet to another. When I was the one

doing the mapping this was easy enough, but when I came to the County line where an already published map was available I was required to match the published boundary, whether or not it fit with my own mapping. One of the reasons I stopped working on the soil survey was that I found it too stressful to be constantly making decisions as to where to put boundaries that appeared to precisely delineate on soil type from another, but were really only an approximation.

After my physically-based paradigm was shattered, I began with a metaphoric blank sheet of paper marked *terra incognita*. It felt most comfortable beginning my mapping using information based in physical reality. However, since I had no formal paradigm for interpreting the information, I found myself analyzing and integrating it differently. The exception to this is that whenever information was presented as scientific, I expected it to conform to the norms of scientific investigation methods, and evaluated it using the standards of mainstream science. There is a large amount of information about the larger reality that makes no claims to be scientific in the sense that I have just described. For this type of information I developed an approach that focuses on evaluating the reliability of a *source* of information.

### **2.3.3 Criteria for Evaluating the Reliability of a Source of Information.**

I developed specific criteria for evaluating sources of information in order to streamline the process of exploring the unmapped (by me) larger reality. If I judged a particular source, typically a person, to be reliable, I was more confident that specific information coming from that source may be useful in my evolving map of the territory. In Appendix A I describe in more detail the specific criteria I developed, and provide several detailed examples of how I use these criteria. Here I will simply list them. The seven primary criteria are:

- Controlled experimental evidence
- Authenticity and integrity
- Humility
- Direct empirical observation
- Not derived from other sources

- Consistency with other reliable sources
- Internal consistency

The seven secondary criteria are:

- Openness to change
- Respect for other views
- Respected by other reliable sources
- Sense of humor
- Academic credentials
- Anecdotal evidence
- None of the above

The none-of-the-above criterion was a bit of a surprise to me, but I have identified a few sources that fall in this category that I have found to include useful and interesting information. I have not, however, relied on these sources for the information presented in these volumes.

#### **2.3.4 An Ever-Evolving Map Using Multiple Lines of Evidence.**

By definition, it is very difficult to prove the existence of nonmaterial realms using instruments and experimental methods based in the material world. The problem is somewhat similar to characterizing subsurface geology and ground water systems. First of all, we can't see the subsurface directly, so we depend on a variety of indirect geophysical methods (seismic, electromagnetic, gravity) and selected direct observation by geologic cores and soil and ground water samples for chemical analysis. There is too much heterogeneity to map in detail the exact features of the subsurface, so we develop a preliminary conceptual model based on available information that describes the essential features of the system. We then use multiple, complementary techniques to test the conceptual model. If measurements don't fit the conceptual model, then it is revised. The more separate lines of evidence that support a feature of the conceptual model, the greater the confidence that can be placed that it is an accurate representation of the subsurface.

In the late 1990's I chaired a task group of the American Society of Testing and Materials that developed ASTM Standard D6235 (*Practice for Expedited*



*Site Characterization of Ground Water and Vadose Zone Contamination at Hazardous Waste Contaminated Sites*) which uses an approach similar to that described above. Another key element of the process was the use of highly experienced professionals in the areas of geology, hydrology and chemistry to use expert judgment in selecting the techniques and locations of observations to characterize the subsurface. The counterpart to these individuals in my efforts to characterize nonmaterial realms are the reliable sources as defined by the criteria I have described in the previous section.

Once I accepted the existence of nonmaterial realms I began the process of developing and refining an ever-evolving conceptual model (map) of those realms. I initially relied on three major lines of evidence in developing this map: (1) scientific evidence from physics and biology (this chapter), (2) social scientific evidence generated within the general framework of mainstream science (Chapter 3), and (3) direct observations by reliable human sources with high sense perception (also covered in Chapter 3).

In Chapter 4 I present a rational framework for evaluating a fourth line of evidence: direct communication from nonmaterial realms. There is another major source of information about nonmaterial realms that I have not used here: teachings of the great spiritual traditions (Hinduism, Buddhism, Taoism, Judaism, Christianity, and Islam to name a few). I have avoided these sources not because I consider them invalid, but because skeptics will not give much weight to this evidence. For believers, the experience and teaching of these great spiritual traditions can be very valuable in expanding one's understanding of nonmaterial realms. Ultimately, the Great Shift in human consciousness will be a spiritual shift, but in the rest of this chapter and the ones that follow I will build the case for this way of viewing the shift incrementally.

### **2.3.5 Honor the Blind Men (and Women).**

There are certain characteristics of nonmaterial realms upon which there is wide agreement by many sources, and I summarize those which seem most relevant to the Great Shift in Chapter 3. There are also many specifics upon which there is not widespread agreement. This situation reminds me of the story of the six blind men who were asked to describe an elephant. Each felt a different part of the elephant: a flexible trunk, hard tusks, floppy ears, barrel-

like legs, bristly tail, leathery flanks, and disagreed on the nature of the animal they perceived by touch. When specifics described by a source that I have judged reliable do not agree, I accept them as particulars that may be useful from the source's perspective, but are not necessarily of value to everyone.

Report of differing perceptions of the human energy field (HEF) is a good example of this (see Section 3.5). There is widespread agreement on the location of seven major energy centers in the HEF, often called chakras. Many other features of the HEF may be described somewhat differently using different terms, but can be correlated as different perceptions of fundamental aspects of the HEF. At the same time different practitioners, or formalized techniques for working with the HEF can have distinctive elements that are particular to the person or method. For example, Brennan (1988), a reliable source using my criteria (see Section A4.1) uses five major character structures (schizoid, oral, psychopathic, masochistic and rigid) and aura and chakra patterns associated with these character structures as a diagnostic tool. Eden (1998), another source that I find reliable, sees the HEF as influenced by a more pervasive energy system of five rhythms related to the seasons (spring, summer, solstice/equinox, autumn, and winter). There is much in both Brennan's and Eden's work that I have found extremely valuable in developing my understanding of the HEF aspect of nonmaterial realms, but somehow neither the character structure classification nor the five rhythms that affect the HEF struck me as useful.

When I say honor the blind men and women, I mean that I accept information for which I do not find independent corroboration as long as I do not see evidence of ego-filtration or other distortions using my criteria. I accept it as valid and useful for the person who has presented the information. If I don't personally find it useful, it remains valid, and I assume that others (maybe many, maybe just a few) will also find it useful. Those who choose to participate in the Great Shift have many paths available. So when I say honor the blind men and women, I am also suggesting that we honor each other. For in truth, whatever path we are on, we who inhabit the material world are like the blind humans and the elephant when it comes to understanding the nonmaterial realms.

## **2.4 Parallels, Convergence and Strangeness in the Physical and Transcendent**

I see an irony in the fact that our experience of physical reality is dominated by gravity, the weakest of the major physical forces in the Universe. Our life experience is so solidly Newtonian that it is hard for the non-physicist to know what to make of the strangeness of relativity theory, quantum mechanics and string theory. Physicists, on the other hand fall into a spectrum that ranges from those who take a purely materialist approach to those feel comfortable following possible interpretations and implications of the phenomena and equations to mystical realms.

As a down-to-earth geologist I make no pretensions to have any deep understanding of non-Newtonian physics. Many Open Believers embrace the more mystical interpretations of quantum mechanics as confirmation of a larger nonmaterial reality. I find the evidence from physics to be more suggestive than definitive, and in my own understanding think more in terms of parallels, analogies and convergence than demonstration and confirmation. In the conversations across the railroad track with my materialist friend, he has assured me that the mainstream scientific materialist paradigm remains on solid ground as far as he is concerned. The significance of convergences and parallels in physical and transcendent perspectives is that it takes only a slight shift in perspective to jump from one side of the track to the other. Furthermore, a small, but not trivial, number of physicists have made the jump, and the number in the mystical minority continues to grow.

### **2.4.1 The Unseen as the Basis for What We See: Dark Matter and Strings.**

I find it very suggestive that in order to explain what we observe in physical reality physicists have to construct models that include a larger unseen reality that is beyond the detection limits or currently available scientific instruments. For example, string theory, a hot topic in theoretical physics, posits numerous dimensions beyond our three spatial dimensions to develop a unified theory of physics (the latest count is 11 dimensions). String theory hypothesizes units of energy as the fundamental building blocks of the material world that are far smaller than the smallest fundamental particles (Greene, 1999; Zwiebach, 2004). Skeptical materialists, on the other hand, view string theory as pie-in-

the-sky theorizing for which experimental confirmation is a long way off, if ever.

It also intrigues me that in order to explain the structure of the universe that we observe, it is necessary to assume that 96% of the universe consists of matter and energy that we are *not* able to see:

*[B]aryonic, ordinary matter—the stuff of stars and of people—makes up just over 4% of the energy and matter in the universe...about 30% of the stuff in the universe is dark [unobserved] matter. The remaining two-thirds, theorists believe, is a mysterious “dark energy” or “quintessence”—a large-scale antigravity-like effect that is making the universe expand ever faster. (Charles Seife, “Peering Backward to the Cosmos’s Fiery Birth,” *Science* 292:2238, June 22, 2001).*

#### **2.4.2 Newtonian Interconnectedness.**

Gravitational effects are a function of mass and distance and drop off rapidly as the distance between two interacting bodies increases. Newtonian physics concerns itself primarily with the interactions of massive planets and stars, and their influences on material objects at a human's size scale. Although gravitational effects weaken rapidly with distance ( $1/r^2$  in mathematical terms) they never drop to zero. I had never thought about the implications of this distance relationship until I heard my materialist friend wax poetically about the gravitational interconnectedness of the cosmos, with all matter, down to the smallest subatomic particles influencing and being influenced by each other. From a materialist perspective there is nothing teleological about these interactions, and in practice scientists ignore them unless they are strong enough to make a difference. My materialist friend can explain, to his own satisfaction, all observable phenomena as emerging from random processes. Yet I was moved and awed by the transcendent quality of his description of gravitational inter-connectedness.

#### **2.4.3 $c = E/m$ .**

Do you recognize the above equation? It simply rewrites Einstein's well-

known equation  $E = mc^2$  to say that light is the square root of energy divided by matter. Light, then, can be seen as the unifying phenomenon of material reality, which consists of energy and matter. Depending on the way it is observed, light can behave as a particle (matter) or as a wave (energy). Peter Russell began his adult life as an atheist. While a student at Cambridge he studied mathematics with the great physicist Stephen Hawking, and graduated with degrees in theoretical physics and experimental psychology. In his largely autobiographical book *From Science to God*, Russell points out the parallels between physics and the mystical traditions in which light is also fundamental to the experience of the transcendent unitary consciousness of the universe. In this commonality he sees a convergence of science and the spiritual path (Russell, 2003). Physicist Arthur Zajonc reaches similar conclusions in his book *Catching the Light: The Entwined History of Light and the Mind* (Zajonc, 1992).

#### **2.4.4 Nonlocality: Evidence of a Transcendent Realm?**

Perhaps the most widely cited evidence for the existence of a transcendent realm of reality is the demonstration of quantum entanglement in experiments conducted by physicists in Orsay, France in the early 1980s. The more general term *nonlocality* is often used to describe instantaneous, correlated “action at a distance” between two objects without any intervening signal to relate them. The significance of experimental evidence for quantum entanglement lies in the fact that it appears to contradict a fundamental aspect of physical reality predicted by Einstein's Theory of Relativity. This theory suggests that all connections and interactions in the material world are mediated through signals traveling through space, which can be no faster than the speed of light.

Berkeley physicist Henry Stapp concludes from the quantum entanglement experiments that “the fundamental process of Nature lies outside space-time but generates events that can be located in space-time” (Stapp, H.P. Stapp. 1977. Are Superliminal Connections Necessary? *Nuovo Cimento* 40B:191-199). Quantum physicist Amit Goswami also interprets quantum nonlocality as requiring a transcendent domain of reality outside space-time (Goswami, 1993:61). My materialist friend remains unperturbed. To call quantum entanglement “action at a distance” is misleading in his view because it implies action of a force, whereas entangled particles reflect a state of

connectedness. He sees no value in postulating a transcendent realm to explain this state of connectedness. Be that as it may, quantum entanglement makes it easier to physicists to jump across the tracks from the materialist to the transcendent side.

#### **2.4.5 The Holographic Universe.**

David Bohm (1917-1992), a highly respected quantum physicist, knew not only the great quantum physicists who originated the field but Albert Einstein as well. In several books he has presented a theory that there is an “implicate enfolded order” which exists in an unmanifested state and provides the foundation upon which all manifest reality rests (Bohm, 1980, 1981; Bohm and Hiley, 1993). Calling manifest reality “the explicate unfolded order” he states,

*parts are seen to be in immediate connection, in which their dynamical relationships depend in an irreducible way on the state of the whole system...Thus one is led to a new notion of unbroken wholeness which denies the classical idea of analyzability of the world into separately and independently existent parts (Bohm, 1981).*

*The essential features of the implicate order are, that the whole universe is in some way enfolded in everything, and that each thing is enfolded in the whole (Bohm and Hiley, 1993:382).*

Bohm's model of the universe has been likened to a hologram, which is a laser-created three-dimensional image in which every part of the image contains enough information to reconstruct the entire image. Michael Talbot's book *The Holographic Universe* (Talbot, 1991) explores Bohm's work in relatively non-technical language, and Ken Wilbur's edited volume *The Holographic Paradigm* (Wilbur, 1982) provides a scholarly, but accessible coverage of the topic.

#### **2.4.6 Quantum Mysticism: The Tao of Physics.**

Chet Raymo, whose Skeptic-True Believer dichotomy led to my Skeptic-Believer spectrum (Section 2.2.1) speaks with good-humored disparagement

of “quantum mystics” (Raymo, 1998). Just as the name “Quaker,” originally meant as a pejorative term, is accepted by members of the Society of Friends, I find the term quantum mystic a satisfactory way to differentiate physicists who take a materialist view and those comfortable with a transcendent view of their profession. Perhaps the best-known quantum mystic is Fritjof Capra, a quantum physicist whose book, *The Tao of Physics*, was first published in 1975 (Capra, 1991). Capra sees many of the truths of physics reflected in corresponding truths in the eastern spiritual traditions of Buddhism, Hinduism and Taoism. For example, the essential interconnectedness of the universe revealed by quantum physics is in agreement with the spiritual teaching of the Unity of All Things. The spiritual teaching of the Unity of Opposites (yin and yang) is reflected in the property of light that allows it to behave both as a wave and as a particle. Another good book that describes the physics in language that is accessible to the nonscientist, and also shows that it doesn't take much to shift from a material to a transcendent perspective is Gary Zukov's *Dancing Wu Li Masters* (Zukov, 1979).

#### **2.4.7 Energy from a Vacuum: Perhaps There is Such a Thing as a Free Lunch.**

There are few principles that are more firmly embedded in the mainstream scientific worldview than the Laws of Thermodynamics. The First Law pertains to the conservation of energy, which in layman's terms can be summarized by the saying that there is no such thing as a free lunch, or when it comes to energy, you always have to rob Peter to pay Paul. If we were only constrained by the First Law, we could break even, but the Second Law introduces the concept of entropy. In layman's terms, the Second Law says that we can't win. Any use of energy creates a more disordered state from which it is more difficult to extract usable energy. The Third Law says that energy states are at a minimum at absolute zero (I haven't heard anyone say anything clever about this one).

The increasing evolutionary diversity and complexity of living organisms appear to run counter to the Second Law. Molecular biophysicist and biochemist Harold Morowitz, who unashamedly identifies himself as a mystic scientist, proposed a Fourth Law of Thermodynamics: intermediate systems undergoing flows of energy from sources to sinks organize themselves (Morowitz, 1987:95). From a thermodynamic perspective the self-organizing

capacity of biological organisms on Earth depends ultimately on the flow of energy from the sun. When the sun dies, life on Earth dies, and the materialist paradigm is preserved.

One of the more obscure implications of quantum mechanics is that at absolute zero ( $0^{\circ}$  Kelvin = minus  $273.15^{\circ}$  centigrade), there is a *zero point energy field*. This energy field arises because even at absolute zero the location of electrons circling an atom is defined by a probability function. Since the electron(s) are not at a state of rest, there is a zero point energy associated with the electron. This means that the vacuum in space (which is close to absolute zero (actually around  $2.7^{\circ}$  Kelvin) contains a tremendous amount of energy. According to one estimate, the zero point energy of one cubic centimeter of a vacuum state exceeds that contained in all the matter in the known universe (Dubro and LaPierre, 2002:255). It seems remarkable that a vacuum, which in physical terms represents the ultimate in physical nothingness, contains so much energy.

The idea that electrical energy could be extracted from a vacuum was first suggested by Robert Forward, a physicist with Hughes Research laboratory at Malibu, California (R. Forward. 1984. Extracting Electrical Energy From the Vacuum by Cohesion of Charged Foliated Conductors. *Physical Review B* 30:1700). The physicist Harold Puthoff has been a leading proponent of the potential for many applications of “zero point energy” (H.A. Puthoff. 1989. A Source of Vacuum Electromagnetic Zero-Point Energy, *Physical Review A* 40:9). The concept was the focus of a NASA workshop on Breakthrough Propulsion Physics in 2001 (McTaggart, 2002:217-221).

An interesting aspect of zero-point energy, according engineer Thomas Beardon, is that the Laws of Thermodynamics do not apply. In fact, Beardon proposes that one of the tests for a zero-point energy device is that calorimetric measurements (which are used to measure changes in entropy of a system) show no change in entropy (Beardon, 2002). I would classify Beardon's work as frontier science, but the theoretical underpinnings of zero-point energy are grounded in mainstream quantum physics. Time will tell whether “free” energy (prototype free energy devices described by Beardon are relatively simple and inexpensive), unconstrained by the Laws of Thermodynamics will be recognized by mainstream science.



### 2.4.8 Curiouser and Curiouser Physics.

According to the Duhem-Quine thesis many explanations are possible for the same set of observations. I offer here a sampling of increasingly far-out interpretations, models and theories which are suggestive of the existence of a larger reality beyond the measurement capabilities of mainstream science. Some of the examples below (parallel universes and negative space/time) are outside the mainstream paradigm because they violate the principle of parsimony, which suggests that the simplest or least complicated of competing explanations is the best. The fundamental assumptions in Dewey Larson's Reciprocal System of Theory, on the other hand are remarkably simple, but his approach is so different that there is little motivation for mainstream science to pay it any attention.

- ***Parallel Universes and Time Travel.*** The mainstream view of quantum mechanics, known as the Copenhagen Interpretation, is that the act of observing a subatomic particle causes a “collapse” of the wave function of many possible states into a single state. That's the simple interpretation. Theoretically, the act of observation could result in the creation of parallel universes each one containing the experimenter observing one of the possible states of the particle. The physics of black holes suggests the possible existence of parallel universes with each black hole a tube connecting our universe with another one. There are also features of mainstream physics that suggest the possibility of travel backward and forward in time. Physicists Fred Alan Wolf (Wolf, 1988), and Michio Kaku (Kaku, 1994) have written accessible books on these topics.
- ***Tiller-Einstein Model of Positive-Negative Space/Time.*** William Tiller, professor and former chairman of the Department of Materials Science at Stanford University, has developed a model of positive and negative space/time in which there is no limitation to the speed of light in negative space/time. The model is derived from the Einstein-Lorenz equation:  $E = mc^2/(1-v^2/c^2)$ . This equation suggests that no signal can travel faster than the speed of light because mass becomes infinite at the speed of light and any velocity faster than the speed of light results

in the square root of a negative number, which mathematicians call imaginary. Mathematician Charles Muse, however, considers imaginary numbers to be “hypernumbers” that are necessary for developing equations that describe higher dimensional phenomena. In Tiller's model at velocities greater than the speed of light there is a nonmaterial realm of negative space/time where energy is magnetoelectric and negatively entropic and substance is of a subtle magnetic character. I have not found any mainstream references for this model, but physician Richard Gerber provides a general description of what he calls the Tiller-Einstein model (Gerber, 2001:143-147, 534-538).

- ***Dewey Larson's Realms of Space/Time, Time/Space.*** Dewey Larson (1898-1990) is a little-known American engineer who developed a unified field theory called the Reciprocal System of Theory based on three dimensions of space and three dimensions of time (Larson, 1979, 1988, 1984). Our physical reality consists of the three spatial dimensions and one of the time dimensions (the present) which can be thought of as the realm of space/time. There is another (from our perspective) transcendent realm that consists of the three dimensions of time (let's call them past, present and future) and a single dimension of space which allows perception of the three dimensions of time—time/space. There is much more to Larson's theory than I can summarize here, except to say that there are enough scientists in academia who take his theory seriously that the International Society of Unified Science is devoted to the study and advancement of Larson's work ([www.rsttheory.com](http://www.rsttheory.com)).

## **2.5 The Relationship between Consciousness and Material Reality**

### **2.5.1 The Chicken-Egg Problem.**

The question as to which came first, consciousness or the material world has been wrangled over by scientists and philosophers at least since the French mathematician and philosopher Renee Descartes (1596-1650) said “I think, therefore I am.” The mainstream scientific view of consciousness is that the material world is fundamental and that human self-aware consciousness has

somehow evolved from the material world. There is actually a fairly broad spectrum of views within the scientific community with respect to this question. At one end of the spectrum there are materialists who have no doubt that consciousness can be viewed as an emergent phenomenon from matter and energy. The transcendentalists (my term, not to be equated with the American transcendentalist movement of the nineteenth century) view consciousness as fundamental. Scientific transcendentalists see the material world as created by, and subservient to, consciousness (a view also held by most spiritual traditions). To varying degrees both materialists and transcendentalists acknowledge the capacity of consciousness to affect the material world.

### **2.5.2 Ubiquitous Intelligence.**

Hair-splitters may define intelligence and consciousness as different, but I will use the terms interchangeably, with the understanding that the terms may have different meanings to a materialist and a transcendentalist. As applied to the chicken-egg problem (which came first?), the materialist would say it was the material world, the transcendentalist would say intelligence or consciousness. I think that there are substantial areas of agreement between the two viewpoints that the material world and consciousness are intimately connected. I offer some examples of this intimate connection below.

- ***The Genius Within.*** Frank Vertosick, a neurosurgeon, drawing primarily from research in the fields of microbiology, cell biology, and neurophysiology, concludes that all living things exhibit a profound intelligence (Vertosick, 2002). He finds network theory, which arose from the study of artificial intelligence in computers, to provide a satisfactory explanation for the intelligence of living things. This would seem to place him in the materialist camp, with network theory providing the mechanism by which intelligence (consciousness) arises from the material world. However, Vertosick does admit a belief in God. In his conception God is “the one point at which a network knows all that it could every possibly know, the single attractor representing perfect knowledge” (Vertosick, 2002:322-323).

- ***The Global Brain.*** Howard Bloom, an independent scientist, is anything but a mystic and would shudder at being identified with the “New Age Touch the Future Movement” (Bloom, 2000:90). Bloom's book, ***The Global Brain: the Evolution of Mass Mind from the Big Bang to the 21st Century***, marshals the evidence from research in such diverse fields as geology, biology, neuroscience, and cognitive science to make the case that since the origin of life, some 3.7 billion years ago, living organisms have functioned as a global brain. Bloom is a materialist in that he stops short of attributing any over-arching self-aware consciousness to the global brain he posits. Peter Russell, on the other hand, has no hesitation in using the term global brain to describe the shift in human consciousness that he sees happening (see Section 1.3.5 and Russell, 1983).
- ***The Age of Spiritual Machines.*** Frank Vertosick relies on network theory to explain the intelligence of living systems at all levels. Network theory is one of a number of branches of the computer-related field of artificial intelligence (AI). Ray Kurzweil's book ***The Age of Spiritual Machines*** provides an entertaining and accessible view of the theoretical and practical aspects of AI (Kurzweil, 1999). He predicts that by the year 2009 a \$1,000 computer will have the approximate computing capacity of a human brain, and that by the year 2019 machines will claim to be conscious and that these claims will be largely accepted (Kurzweil, 1999:278-280). This prediction will be a good test of the materialist view that consciousness arises from the material world.

### **2.5.3 Gaia Theory: Earth as an Organism.**

James Lovelock is a chemist and independent scientist who revolutionized environmental science when he invented the electron capture detector. This device allows the measurement of organic chemicals at very low concentrations. Lovelock then demonstrated that harmful man-made chemicals have traveled to the remotest regions of the planet. His theory that the Earth functions as a self-regulating superorganism that creates conditions that are optimum for life was equally revolutionary (Lovelock, 1979, 1988,

1991). Perhaps because he chose to refer to this phenomenon as Gaia, after the Greek goddess of the Earth, his ideas were scorned by the mainstream scientific community for more than twenty years. However, under the more sedate names of *geophysiology* and *Earth systems science*, Lovelock's theory is now widely accepted and profoundly changing our understanding of Earth and life processes. When it comes to science, Lovelock is no mystic and he makes it clear that he does not feel that Gaia theory requires that the planet has a self-aware consciousness, just as Howard Bloom does not suggest that the global brain of life on Earth functions as a self-aware consciousness. I would suggest that it does not require much of a step from the material-world-based theories of Earth as a self-regulating superorganism and all of living matter on the Earth as a global brain, to the idea that Mother Earth actually does have self-aware consciousness.

#### **2.5.4 Mind over Body.**

The dramatic advances in medicine in the twentieth century resulted from a materialist approach to understanding the human body as a machine, in which disease and dysfunction in the physical body can be fixed by modifying body chemistry through medication or by surgery. Since the 1960s a growing body of scientific evidence suggests an intimate connection between mind and body as it relates to health and healing. Here are a few examples of the emerging understanding of the ability of mind to affect physiologic functioning.

- ***Biofeedback.*** Biofeedback relies on electronically-assisted measurement of physiologic processes, such as heart rate and pressure, to create auditory or visual signals that in turn can be used by individuals to consciously modify the processes in the desired direction. The method has its origins in the work of experimental psychologist Neal Miller at Rockefeller University who demonstrated in the late 1960s the capacity of animals and humans to self-regulate physiologic systems that were not previously thought to be under voluntary control. Biofeedback techniques are now widely used for the treatment of heart disease, irritable bowel syndrome, and chronic pain.
- ***The Relaxation Response.*** Harvard physician Herbert Benson popularized the idea that mantra meditation is an effective way to

ameliorate the negative physiologic responses to stress in his best-selling book *The Relaxation Response* (Benson, 1975).

- ***Tension Myotitis Syndrome.*** John Sarno is Professor of Clinical Rehabilitation Medicine at New York University School of Medicine and specializes in the treatment of chronic back and other types of pain. He came to recognize that a certain personality type, individuals who are highly conscientious, responsible, and perfectionist, are prone to back pain caused by brain-induced muscular pain which he calls tension myotitis syndrome. By teaching his patients to make a link between their emotions and their symptoms and having them tell their brain that they've got the message and it's OK for the pain to go away, Sarno achieved a 76% to 88% success rate in follow-up surveys (Sarno, 1991:87). Later Sarno identified a host of other conditions as likely candidates for treatment in this way: fibromyalgia, migraines, repetitive stress injuries, osteoarthritis, and tendinitis, to name a few (Sarno, 1998).
- ***Molecules of Emotion.*** Candace Pert, research Professor in the Department of Physiology and Biophysics at Georgetown University, is best known for her discovery of opiate receptors in the brain. Her research suggests that neuropeptides, chemical substances made and released mainly by brain cells, provide “the molecular underpinnings of what we experience as feelings, sensation, thoughts, drives, perhaps even spirit or soul” (Pert, 1997). In her book *Molecules of Emotion* she describes being asked her opinion on the long-running debate whether emotions originate in the mind or body. She answered, “Why it's both! It's not either/or; in fact, it's both and neither! It's simultaneous, a two-way street.”
- ***The Biology of Belief.*** Bruce Lipton's research as a cell biologist at Medical Schools at the University of Wisconsin and Stanford University led him to conclude that genes do not control our behavior. His studies of the molecular mechanisms by which cells process information revealed that genes are tuned on and off by influences outside the cells. Among these influences are energetic messages arising from our positive and negative thoughts. His book *The*

*Biology of Belief* presents the results his research and other research that show how our thoughts affect genetic activity and are able to actually alter our genetic code (Lipton, 2005; see, also <http://www.brucelipton.com/> ).

The whole field of “alternative” or “mind-body” medicine emphasizes the key role of conscious intention in healing, health and wholeness. The fact that the National Institute of Health established an Office of Alternative Medicine in 1992, which was elevated to become the National Center for Complementary and Alternative Medicine in 1999, is an indication that the medical profession is moving away from a primarily mechanistic view of human physiology. Of course the materialist view is able to accept the type of evidence I have cited above because the mind and body in these cases are physically connected and explainable in terms of brain functioning and chemistry. Nevertheless, from my perspective, giving more weight to the mind in the mind-body connection brings the materialist closer to the railroad track so I don't have to shout to be heard from my side of the track.

### **2.5.5 Mind over Other Matter.**

The place where the materialists start getting uncomfortable is with the evidence that consciousness is able to make observations about material reality, such as in telepathy and remote viewing, and influence the behavior of the matter (psychokinesis) without any obvious physical connection between the two. There is a large body of research documenting these and related “paranormal” effects which I summarize in the next chapter (Section 3.4). Here I will offer two specific examples.

- *Alpha Redux.* Dr. Larry Farwell, a neuroscientist, and his father George Farwell, a physicist, teamed up to study the interaction of consciousness and matter at the sub-atomic level. In this research 23 test subjects were asked to try to consciously influence the timing of the detection of alpha particles emitted by a plutonium source. The odds that the observed distribution of alpha particle measurements could have happened in the absence of any conscious influence had a probability of about two in 10,000, a highly statistically significant result (Farwell, L.A. and G.W. Farwell. 1995. Quantum-Mechanical

Processes and Consciousness. *Bulletin of the American Physical Society* 40(2):956-957).

- ***Messages in Water***. Masaru Emoto, a doctor of alternative medicine in Japan, inspired by the statement “no two snow crystals are exactly the same,” began studying and photographing the frozen water crystals. What makes his research unusual (and unacceptable to mainstream scientific journals) is that he has experimented with the “response” of water to positive and negative influences. The simplest form of his experimental work is to direct a positive thought, such as “I love you” and a negative thought, such as “you fool!” towards separate vials of water. He then freezes and photographs the resulting crystals. Words cannot adequately convey the impact of viewing the differences between the beautiful crystals that form from positive thoughts, classical music, pristine, unpolluted water and the ugly smears that result from negative thoughts, heavy metal music, and polluted water. If this interests you, check his books out for yourself (Emoto, 1999, 2001, 2004).

Typical criticisms of evidence for mind-matter interaction at a distance by mainstream science include fraud, delusion, and artifacts of inadequate experimental design (see Section 3.1). I chose that alpha particle experiment to describe because it has appeared in a mainstream scientific journal and cannot be readily dismissed (although my materialist friend mentioned earlier pointed out to me that this particular journal is not peer-reviewed). In the next chapter I present more evidence in support of psychokinesis (Section 3.4.3), and in Section 3.4.8 I identify some possible scientific explanations for mind-over-matter action-at-a-distance phenomena.

### **2.5.6 The Holographic Brain.**

In the previous section I described Bohm's holographic view of the universe, which is quite different from the Newtonian view that the universe functions like a mechanical device that can be understood in terms of its component parts. Although it currently lies outside the mainstream scientific view of the brain, there is good evidence that the mammalian brain functions holographically.



- Neurophysiologist Karl Pribram began investigating memory in the 1940s while trying to understand the functioning of the brain. By the 1960s he had developed a “holonomic” theory of the brain, that memory was distributed throughout the brain, and that each part of the brain contained all its memories (Pribram, 1971, 1991). This runs counter to a materialist interpretation of memory which would require it to be related to the brain's structure.
- Paul Pietsch, Professor of Anatomy at the Indiana University School of Optometry, prefers the term “hologramic” to avoid possible confusion with the technical sense in which holography is used in laser imaging. He began his research into memory with a materialist (he calls it structuralist) bias arising from his own theories arising from experiments with tissue and organ regeneration. When he encountered Pribram's hologramic theory of memory in the mid 1960s “its implications were at odds with virtually everything else I believed” (Pietsch, 1981:3). As described in his book *Shufflebrain*, Pietsch set out to falsify the hologramic model by surgically mixing up the brains of salamander larvae in every way he could imagine, in an effort to scramble the meaning of the information their brains stored. He is now a believer in the hologramic nature of the brain (Pietsch, 1981: Chapter 5).

### **2.5.7 Life's Improbability as an Indicator of Cosmic Intelligence.**

The late Sir Fred Hoyle, a well-known astronomer, and his colleague Chandra Wickramasinghe Professor of Applied Mathematics and Astronomy at University College, Cardiff in their book *Cosmic Life Force* present calculations showing that the chance of obtaining the necessary enzymes and other fundamental molecules for life by random processes are astronomically low. They conclude:

*The alternative to assembly of life by random, mindless processes is assembly through the intervention of some type of cosmic intelligence...It would not need too great a measure of extrapolation, or too great a license of imagination, to say that a*

*cosmic intelligence that emerged naturally in the Universe may have designed and worked out all the logical consequences of our own living system. It is human arrogance and human arrogance alone that denies this logical possibility (Hoyle and Wickramasinghe, 1988:139).*

Eric Chaisson, a research physicist at MIT who also teaches Astrophysics at Harvard and Wellesly Colleges, used a similar approach by calculating the probability of the fifty-one amino acids linking in the specific order along a molecular chain to form the simplest protein, insulin. Randomly assembling the required number of amino acids at the rate of trillions upon trillions of times per second for the entire history of the Universe would not achieve *by chance* the correct composition of the protein (Chaisson, 1989). Hoyle and Wickramasinghe are materialists in that they suggest that a cosmic intelligence “emerged naturally” from the Universe and Chaisson also sees life as an emergent phenomenon of the original Big Bang. From my perspective it’s a simple step across the tracks to take the improbability of life as an indication that the material world and life emerged from a prior cosmic intelligence.

### **2.5.8 Scientists Who Suggest a Cosmic and Microcosmic Interconnection between Consciousness and Matter.**

- Sir Arthur Eddington (1882-1944), astronomer and physicist: “The idea of a universal Mind or Logos would be, I think, a fairly plausible inference from the present state of scientific theory; at least it is in harmony with it” (Quoted in Wilbur, 1984:204).
- Pierre Teilhard de Chardin (1881-1955), a Jesuit paleontologist, posited that “essentially, all energy is psychic in nature” and serves to both link all matter from the smallest particle and provide an evolutionary impulse toward “complexification” (Teilhard de Chardin, 1961:64-65). He called the field of human consciousness on Earth the “noosphere”, and saw the increase in human population as intensifying this field until it results in a profound spiritual shift.
- Erwin Schrödinger (1887-1961) the Nobel laureate physicist whose

wave equations are fundamental to quantum physics, wrote toward the end of his life, “Consciousness is that by which this world first becomes manifest, but which indeed, we can quite calmly say, it first become present; that the world *consists* of the elements of consciousness” (Schrödinger, 1964:40). Elsewhere he wrote, “Mind by its very nature is a *singular tantrum*. I should say: the overall number of minds is just one” (Schrödinger, 1969:145)

- Sir James Hopwood Jeans (1877-1946), British mathematician, astronomer and physicist: “[W]hen we pass beyond space and time [our consciousness] may perhaps form ingredients of a single continuous stream of life...and we may all be members of one body” (Jeans, 1981:204).
- Alfred North Whitehead (1861-1947), theoretical physicist and mathematician, considered the organism as fundamental to nature (Whitehead, 1933:134-135), and developed a view of reality called panentheism in which all matter is imbued with consciousness.
- Physicist David Bohm (1917-1992): “Everything material is also mental and everything mental is also material...The separation of the two—matter and spirit—is an abstraction. The ground is also one” (From interview in Weber, 1990:101,151).
- Physicist Freeman Dyson: “Matter in quantum mechanics is not an inert substance but an active agent, constantly making choices between alternative possibilities...It appears that mind, as manifested by the capacity to make choices, is to some extent inherent in every electron” (Dyson, 1988; cited by Laszlo, 2004:148).
- Quantum physicist Nick Herbert suggests that consciousness abounds in the universe and that mainstream science has seriously underestimated its significance, just as early physicists drastically underestimated the size of the universe (Herbert, 1986, 1993).
- Amit Goswami, Professor of Physics at the Institute of Theoretical Sciences at the University of Oregon, has proposed a Science within

Consciousness Theory (SWC), in which consciousness is recognized as a fundamental causal factor in the universe, not confined to the brain, the body, or the present time (Goswami, 1993).

- David J. Chalmers, a mathematician and cognitive scientist from the University of California, Santa Cruz also views consciousness to be fundamental in the Universe (Chalmers, 1996; David J. Chalmers, 1995, “The Puzzle of Consciousness,” *Scientific American* 273(6):80-86).
- Mathematician C.J.S. Clarke discussing the phenomenon of nonlocality in quantum physics (Section 2.4.4) has proposed that “it is necessary to place mind first as the key aspect of the universe” (C.J.S. Clarke, 1995, “The Nonlocality of Mind,” *Journal of Consciousness Studies* 2(3):231-240).

Other examples of scientists presenting similar views include Peter Russell (see Sections 2.4.3 and 2.5.2), engineer Robert Jahn (Jahn and Dunne, 1987), physicist Arthur Zajonc (Zajonc, 1992), theoretical physicists Henry Stapp (1993), physicist Fred Alan Wolf (1984, 1994), neuroscientist Larry Farwell (Farwell, 1999), engineer William Tiller (Tiller et al., 2001), systems theorist Ervin Laszlo (Laszlo, 1993, 1995, 2004, Laszlo and Abraham, 2003). The individuals cited in this section represent the full spectrum from pure materialists to unabashed transcendents. For my part, after making my own shift from skeptic to believer, I was pleasantly surprised by the number of scientists I have found on my side of the railroad track.

## **2.6 Premonitions of a Shift in Human Consciousness**

I will conclude this chapter by returning to my theme of a shift in human consciousness. In Chapter 1 I identified a variety of social and political signs of human betterment, positive cultural change and individual awakening of consciousness. I would like to reiterate here the astonishing statistic that about *eighty-five* percent of the books with the word “consciousness” in the title published between 1800 and 1990 were published after 1970 (Radin, 1997:265). In keeping with that statistic, most of the rich and diverse literature on changes that are occurring in *human* consciousness have been

published since 1970. I also find it significant that the Institute of Noetic Sciences, founded in 1973 to support research and education on human consciousness, changed the name of its journal *Noetic Sciences Review* to *Shift: at the Frontier of Consciousness* in December 2003.

### 2.6.1 Diverse Perspectives.

I wish to acknowledge the many authors and scholars before me who have provided guideposts for expanding our awareness and understanding of the profound changes that humanity and planet Earth are experiencing. Rather than try to summarize their specific contributions, I would like to give a flavor of their work by the language they have used to characterize their observations.

- Yale Law Professor Charles Reich saw the social ferment of the 1960's as coalescing into a cluster of values that he called “consciousness III” (Reich, 1970). This seems to be a foreshadowing the values associated Paul Ray's Transmodern worldview (see Section 1.3.1).
- Independent scholar Joseph Chilton Pearce was another who early recognized the significance this emerging worldview, and wrote *The Crack in the Cosmic Egg* (Pearce, 1971), and, more recently, *The Biology of Transcendence* (Pearce, 2002).
- George Leonard, who as Senior Editor of *Look* magazine documented the rise of the human potential movement, called the “inevitable changes in humankind” *The Transformation* (Leonard, 1972). Almost ten years later Marilyn Ferguson, publisher of *Mind/Brain Bulletin*, wrote *The Aquarian Conspiracy: Personal and Social Transformation in the 1980s* (Ferguson, 1980). At about the same time physicist Fritjof Capra (see also Section 2.4.6) wrote of a “rising culture” in his book *The Turning Point* (Capra, 1981). More recently David Korten called it *The Great Turning* (Korten, 2006).
- I have already mentioned Peter Russell's book *The Global Brain* (Russell, 1983—see Section 2.5.2) which he sees leading to a “revolutionary leap to planetary consciousness.” Barbara Marx

Hubbard in her book *Conscious Evolution* sees humanity poised for a “quantum jump” in consciousness (Hubbard, 1998), and Willis Harman, co-founder of the Institute of Noetic Sciences, called his book *Global Mind Change* (Harman, 1988). A book written for the Millennium Project was titled *Global Consciousness Change: Indicators of an Emerging Paradigm* (Elgin and LeDrew, 1997). Author Thom Hartmann subtitles his book *The Last Hours of Ancient Sunlight*, “waking up to personal and global transformation” (Hartmann, 1999).

- A number of authors have written of the human species being poised for a major evolutionary step. Theodore Roszak called us the “unfinished animal” standing at the edge of a frontier in the evolution of human consciousness (Roszak, 1975). Yatri sees us in the midst of a “mysterious birth of a new species” (Yatri, 1988). Author James Redfield and his coauthors write of the “emerging human being” (Redfield et al., 2002).
- There are also books that speak in more personal and spiritual terms: “elegant empowerment” Dubro and Lapierre (2002), “ever-transcending spirit” (Sato, 2003), the “adventure of consciousness” (Satprem, 1984), and the “emerging spiritual worldview” (Trevelyan, 1984).

Table 2-1 provides a more complete listing of books related to the evolution of human consciousness and changes that have been occurring in the last fifty years or so.

### **2.6.2 Characteristics of Individual Consciousness.**

The previous section focused more on collective aspects of human consciousness. There is a huge literature on the characteristics and capacities of individual consciousness. Table 2-1 provides a sampling of this literature, focusing on human capacities for “altered” and “higher consciousness.” I have relied on this literature in Chapter 6 in my discussion of the possible human (Section 6.3.1) and post-shift interpersonal relationships (Section 6.3.2).

### 2.6.3 Ways a Shift Might Happen.

I would like to conclude this chapter by discussing some analogies arising from the material world that may provide insight into how a shift in human consciousness might occur.

- ***A Quantum Leap.*** Electrons associated with the nucleus of an atom exist in well-defined energetic states. A quantum leap occurs when an electron shifts from one state to another. There is no in between state, so when a shift occurs it happens instantaneously. A shift from a higher state to a lower one releases energy; the reverse direction requires the addition of energy. A quantum shift in human consciousness implies (1) a very rapid shift, and (2) an outside input of energy (higher state) or release of energy (lower state).
- ***A Cusp Catastrophe.*** Catastrophe theory was developed in the mid-1960s by the French mathematician René Thom. It uses the mathematical field of topology to understand systems that experience sudden discontinuities or abrupt changes of state. Of the seven “elementary” catastrophes arising from the theory, the cusp catastrophe might serve as a model for a rapid change in human consciousness. The classic example used to illustrate this type of catastrophe is dog dealing with the fight or flight instinct when interacting with a human. As the human approaches the tension between the two responses increases until suddenly the dog either attacks or retreats. Applying this model to a shift in human consciousness would, as with a quantum leap, suggest (1) a very rapid shift, and (2) an outside stimulus, preferably one that functioned in way to encourage the shift to go in a positive direction.
- ***Critical Mass.*** During the decay of a radioactive isotope energetic particles (alpha and beta) or gamma rays are emitted with generally localized effects (although interactions with cell tissue can be damaging). However, when a radioisotope such as uranium-235, is concentrated into a “critical mass” a chain-reaction begins to convert some of the matter into energy. When uncontrolled, as with an atomic

bomb, the chain-reaction leads to a tremendous release of destructive energy. When controlled, as in a nuclear reactor, the heat can be put to positive uses, such as for generating electricity. A human consciousness shift arising from reaching a critical mass also implies a very rapid shift. It would also seem to require a larger intelligence to ensure that the shift doesn't run out of control and become destructive.

- ***Punctuated Equilibrium.*** A model of species evolution called punctuated equilibrium was proposed by paleontologists Niles Eldredge and Stephen Jay Gould in the 1970s to explain the fact that in the fossil record species die out and new ones appear with little evidence of intermediate “missing links” (Eldredge and Gould, 1972). In punctuated equilibrium a species remains relatively stable in form, typically for about 10 million years, and then in response to environmental changes undergoes very rapid change into a new species. Although such a change might actually take thousands of years, this is a small enough amount of time in the geologic record that the changes are not recorded in the fossil record. If we apply this idea to a shift in human consciousness, rapid changes could occur within a human lifetime scale, rather than an abrupt change. It also suggests that the change would be in response to external adverse environmental conditions.

I have focused on material world (or mathematical) analogies how a shift in consciousness might occur that suggest abrupt or rapid change. I believe that we are in the midst of a rapid change in human consciousness, and will provide evidence for this in later chapters. However, I am making no predictions as to how rapid. I think the punctuated equilibrium model fits best what has been happening in the last fifty years and I think it is entirely possible that in my lifetime I will see humanity reach the plateau of a new equilibrium level. My sense is that movement toward that new level is accelerating, and I don't discount that possibility that at some point in the not-to-distant future humanity will experience some shifts that might seem analogous to a quantum shift, cusp catastrophe or chain-reaction from reaching a critical mass. An interesting aspect of all three of the sudden shift analogies is that they require some outside agent (input of energy, stimulus in the direction of the desired outcome, control of the rate of the chain reaction)



to encourage a shift in the “right” direction. One reason I am so optimistic about the future is that I have come to accept that there are many different types of outside influences in the larger reality that are helping us move in the right direction. I will describe these influences in more detail in later chapters.

**Table 2-1 Index to Major References for Chapter 2** (not all are cited in the text)

Topic	References
2.4.1 String Theory	Greene (1999), Halpern (2004), Zwiebach (2004)
2.4.5 Holographic Universe	Bohm (1980, 1981), Bohm and Hiley (1993), Bohm and Peat (2000), Talbot (1991), Wilbur (1982)
2.4.6 Quantum Mysticism	Capra (1991), Krishnamurti and Bohm (1985), Herbert (1985, 1993), LeShan (1966), Matt (1996), Talbot (1993), Weber (1990), Wilbur (1984), Wolf (1984, 1988), Zukav (1979); <i>Quantum Strangeness for Nonscientists</i> : Lindley (1996-nonmystic), Pagels (1982-nonmystic), Wolf (1981-mystic)
2.4.8 Curiouser Physics	<i>Parallel Universes/Time Travel</i> : Halpern (2004), Kaku (1994), Wolf (1988), Dubro and Lapierre (2002), <i>Larson's Reciprocal System Theory</i> : Larson (1979, 1984, 1988)
Other Physics Sources	<i>Materialists</i> : Barrow and Tipler (1986-anthropic principle), Chaisson (1989), Hawking (1988), Tipler (1994); <i>In-Betweens</i> : Chew (1968), Davies (1984a&b, 1992), Dyson (1988), Heisenberg (1958, 1971), Shapley (1958)
2.5.1 Chicken-Egg Problem (Consciousness and Brain)	<i>Transcendent Interpretations</i> : Bhajan and Khalsa (1998), Chalmers (1996), Grof (1998), Hawkins (1995), Herbert (1993), James (1902), Mishlove (1993), Morse and Perry (2000), Pearce (2002), Satinover (2002), Skolimowski (1994); <i>Materialist Interpretations</i> : Alper (2000), Dennett (1991), Flanagan (1992), Gazzaniga (1988), Penfield (1975), Penrose (1989, 1994), Searle (1992)
2.5.2 Ubiquitous Intelligence	Bloom (2003-global brain), Brown (1980), Russell (2003), Vertosick (2002); <i>Artificial Intelligence</i> : Kurzweil (1999), Stock (1993)
2.5.3 Gaia Theory	Lovelock (1979, 1988, 1991)

**Table 2-1 (cont.)**

Topic	References
2.5.4 Mind over Body	Benson (1975), Lipton (2005), Pert (1999), Rubik (1992, 1995); see also references in Table 3-1 (Section 3.4.5)
2.5.5 Mind over Other Matter	Emoto (1999, 2001, 2004), Farwell (1999), Tiller (1997), Tiller et al. (2001); see also references in Table 3-1 (Section 3.4.3)
2.5.6 Holographic Brain	Pietsch (1981), Pribram (1971, 1991), Talbot (1991), Wilbur (1982)
2.5.7 Cosmic Intelligence	Hoyle (1983), Hoyle and Wickramasinghe (1988)
2.5.8 Scientists Who Suggest a Cosmic and Microcosmic Interconnection between Consciousness and Matter	Chalmers (1996), Dyson (1988), Jeans (1981), Goswami (1993), Herbert (1986, 1993), Jahn and Dunne (1987), Laszlo (1993, 1995, 2004), Laszlo and Abraham (2003) McTaggart (2002), Schrödinger (1964, 1967, 1969), Stapp (1993), Teilhard de Chardin (1961, 1964), Weber (1990), Wilbur (1984), Wolf (1994), Whitehead (1933)
2.6.1 Diverse Perspectives on a Shift in Human Consciousness	<b>Recent Speculations:</b> Capra (1981), Dubro and Lapierre (2002), Elgin (1993), Elgin and LeDrew (1997), Ferguson (1980), Harman (1988), Hartmann (1999), Hubbard (1998), Leonard (1972), Pearce (1971, 1991), Ray and Anderson (2000), Redfield et al. (2002), Reich (1970), Roszak (1975), Russell (1983), Sato (2003), Satprem (1984), Trevelyan (1984), Yatri (1988); <b>Stages in Evolution of Human Consciousness:</b> <i>Gebser Model:</i> Gebser (1986), Feuerstein (1987), Kramer (1992); <i>Bicameral Mind:</i> Jaynes (1997); <i>Heard's Five Ages:</i> Heard (1963); <i>Systems Theory:</i> Jantsch (1975), Jantsch and Waddington (1976); <i>Wilbur's Ladder Model:</i> Wilbur (1986, 1996); <i>Teilhard de Chardin's Noosphere:</i> Teilhard de Chardin (1961, 1964)

**Table 2-1 (cont.)**

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Topic	References
2.6.2 Characteristics of Individual Consciousness	<b><i>Psychology of Individual Human Consciousness</i></b> : Grof (1976, 1985, 1988, 1992, 1998), Ornstein (1972); <b><i>Altered States</i></b> : Evans (1989), Hutchison (1986), Huxley (1963), Kenyon (2001), Masters and Houston (1966), Wilbur (1993); <b><i>Higher Consciousness</i></b> : Bucke (1901), Murphy (1992), Price (1981); <b><i>Synchronicity</i></b> : Combs and Holland (1990), Koestler (1972), Mansfield (1995), Peat (1987, 1991)

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