

Connectivity and Healing: Some Hypotheses About the Phenomenon and How to Study It

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Most physicians are willing to admit that extraordinary improvements sometimes occur in patients' conditions, despite expectations to the contrary. Few will refuse to accept the occasional disappearance of tumors, patients who are expected to die imminently yet outlive their physicians, and other medical miracles. The dominant medical paradigm classifies these occurrences as "spontaneous remissions" since our treatments were not expected to be so successful. A non-dominant minority within academic medicine accepts the hypothesis that these events occur through a process that is called "healing" in ordinary language. Surveys of family physicians show that more than half believe faith can cure, and that divine intervention is possible in human disease.¹ These believers are not common in academic medical centers, where skepticism is the norm. Beyond the usual chaplaincy service, spirituality has largely been banished from "respectable" healthcare.

As practicing physicians, we have seen events that could also be called "spontaneous healing."² We have met cancer patients whose tumors have mysteriously regressed, allowing them to survive against impossible odds. We have encountered patients in the emergency room whom we never expected to survive, only to see them thrive years later. Those of us who have worked on the frontlines of medicine know amazing things happen that lie beyond biomedical explanation.

In this essay, I hope to propose some potential explanatory hypotheses for the amazing and the miraculous, and to suggest a method for its study. This is especially important because these phenomena do not avail themselves to randomized clinical trials, our usual method of testing treatments. I will suggest that the reason for this is that we are observing systemic transformations—events of self-reorganization that occur at far-from-equilibrium conditions, outside of the range of the ordinary events that clinical trials are designed to study.

The following case will organize our consideration of unchallenged assumptions within modern medicine that hinder our consideration of healing:

Bethany was a 36-year old woman who had success-

fully completed treatment for thyroid cancer 10 years previously, and had been pronounced cured. I met her on referral from her internist for help with stress-related symptoms. Those symptoms sounded suspiciously like seizures. An EEG confirmed this and an MRI showed a temporal lobe tumor. Within one week, she underwent surgery and a glioblastoma multiforme was removed. Most patients with this diagnosis die within 11 months of diagnosis. Bethany is still alive 8 years later. How do we explain this?

Bethany underwent the standard chemotherapy and radiation therapy. The best estimates at the time were that these treatments would prolong her life by 4%—not a very dramatic increase. Some of her friends suggested she would be better off skipping these difficult therapies. Bethany disagreed, believing that they would have extraordinary benefit for her. To his credit, her neuro-oncologist never disagreed with her optimism. In addition, she joined our weekly healing circle. We performed some extra visualization and energy healing sessions. Bethany also attended the sweat lodges and healing ceremonies of the local Native American community, along with several others of us.

In Bethany's version of her story, she reinvented her life as she surrounded herself with people who believed that she would be well. She left a stressful job that she hated; she left a relationship that was going nowhere; she created a new, sustainable life and a reason why she should live. Bethany continues to avoid pessimists. She surrounds herself with loving friends and family, believing that she needs that level of positive culture.

How do we explain Bethany's story? How unusual is it? Our "skeptical" friends avoid discussing her case since the pathology reports and laboratory findings cannot be

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challenged. Nor, however, can her continued existence be questioned. She lives and breathes. The medical model limits itself with its insistence that the cure of all states of discomfort must be linked to the precise identification of the pathological mechanism.³ Proper treatment has a mechanism of action that directly corresponds to this pathological mechanism. Bethany's "cure" cannot be directly linked to any treatment. It defies explanation on that level, as do most of the stories of miraculous healing that I have collected.

Biological and genetic hypotheses for Bethany's improvement fall flat. Bethany's outcome is so far from the mean for the population of all patients with glioblastoma that it would be merely an act of faith to claim that it was genetic or that the chemotherapy/radiation therapy somehow worked amazingly better upon her than almost all others, though this explanation is certainly possible. Nor do I like psychological or even "New Age" explanations for healing, for they are also constructed post hoc, as an effort to explain something that has already happened. To date, these explanations have not shown predictive power. For example, people who measure high on the "fighting spirit" construct do not necessarily live longer than people who measure "low" on this construct. Bethany's story is unique to her; it is idiosyncratic even. What baffles conventional medicine in its attempt to explain healing is the possibility suggested by this essay that *no one thing or combination of things healed her*. This new story says that Bethany was part of a transformative effort that involved her and others in ways that were *a priori* unpredictable.

Bethany's own explanation is completely different from that of another man I know who still works in the Department of the Interior and is a 9-year survivor of glioblastoma. The stories are so different that an argument would ensue if these two individuals were to meet—at least as long as we keep the conventional paradigm of stable causes with fixed and measurable effects. Loren's story is about removal of mercury fillings and other toxic metals, coupled with his passion to share the idea with other people with cancer that they too can live like he did. How do we scientifically study such disparate explanations for the same phenomenon? Do we need a different approach than ordinary science?

There are some fundamental assumptions within modern medicine that hinder the study of healing. We need to address and challenge these assumptions:

- Disease has a natural history, independent of the person and network of social relations in which the person is embedded. Disease has a mechanism of action that is consistent and reliable, and independent of individuality or context.
- Processes must be replicable to be believable. A given treatment should dependably work the same

in multiply-different patients and situations, as long as they all have the same diagnosis.

- Explanations for changes in clinical status are to be sought among external agents.

The alternative ideas I wish to propose read like this:

- Human disease and illness, and its progression or disappearance, is context dependent—it depends upon the network of relationships into which the particular individual is embedded, and it depends upon cultural and social factors yet to be determined. Disease is not purely biological or genetic. It does not have a natural history, but rather a biopsychosocial, historical, cultural, and geophysical history.
- *Systems* (Endnote 1) are self-healing (self-correcting), demonstrate *emergent properties* (Endnote 2), and are capable of developing unique, novel outcomes that are not relevant or applicable to any other system. Even biological treatments, with their powerful mechanisms of action, also have informational components in which they stimulate self-healing and system reorganization.
- Dramatic biological change (healing) is associated with an internal reorganization of the system of the person and systems surrounding the person. Information transfer that facilitates this reorganization may be more important than the provision of external agents.

These ideas or hypotheses set the stage for a radically different research agenda for the study of healing. This agenda looks at coherence and connectivity in asking how are we linked? How do we affect each other? A potentially radical shift is our asking these questions not just about psychology or sociology, but about biology. From this point of view, the separation of disciplines and specialties cultivated by universities, journals, and medical centers is illusory. Separations are acts of perception and not facts of nature. We exist in an indivisible whole.

The thrust of these hypotheses is to move us away from medicine as a natural science (certain heresy) and toward medicine as a systems science—one that integrates multiple perspectives and levels (explanatory pluralism) and one that draws its inspiration more from quantum physics than from classical mechanics. This new medicine can embrace the self-healing and *emergent properties* of what Prigogine calls "far from equilibrium" systems.⁴ We could describe this turn in the road as systems medicine, or even narrative medicine or quantum medicine, or we could simply say that this is what medicine needs to do, and abandon the quest of finding new and catchy names to describe what is happening.

The core of our research moves from the search for

"powerful healers" among the more alternative researchers, or for "powerful techniques," to the search for an understanding of how systems make dramatic changes of state, from one *attractor basin* (Endnote 3) to another. This concept as described by Prigogine strikes me as so crucial for our understanding of healing that it must be a pivot point. Prigogine and other systems researchers have used three-dimensional topological metaphors to describe the behavior of systems. Systems maintain equilibrium. They keep things the same. Systems transform only when they are far from equilibrium. Equilibrium states are represented as valleys, while far-from-equilibrium states are represented as mountain passes. Considerable effort is needed to cross the pass into another valley. Once the system is far from equilibrium (near the top of the pass), even minimal effort can complete the journey. This concept offers a potential explanation for the success of so-called "wacky therapies," which only work for some people sometimes and cannot be replicated.

Conventional medicine prefers to deal in the linear regions of ordinary life, in the village nestled comfortably in the valley. It's fun to look up at the mountain peaks, but not to climb them or to cross arduous passes. That's dangerous and tiring. The study of healing, however, must address life on the passes—the transitions between stable states.

Conventional medicine seeks biological agents that work the same on everyone. It seeks reliability and replication. If my hypotheses are correct, healing is an individual phenomenon. Everyone does it differently. Every person finds his or her own way across the mountain pass because everyone is situated in psycho-sociocultural space in a different location. This means that we need to study how people transform, instead of seeking what cured them.

I think this will help us abandon our quest for "powerful healers," and come to understand that this is just another version of the quest for powerful drugs. The source for healing lies within the internal reorganization of the system (including the larger systems within which the person is embedded). The wizardry and power comes from changes in organization; from within rather than from without. I propose we will discover that this is more important even for conventional pharmacological therapies and for surgeries that we have ever imagined. We are addressing what determines the organism's response to intervention, not the intervention itself.

How are these things possible without biological mechanisms to explain them? As a metaphor for an answer, I wish to address the phenomenon of coherence. Coherence is a non-biological, non-local process. It involves shared information, rather than mechanical cause and effect. The concept offers some glimmers of awareness into how systems can reorganize themselves in "interven-

tional fields." It provides the first foundations for an understanding of how the intent of a community can produce biological effects, of how embeddedness in a healing environment can be associated with sudden, dramatic shifts in physiology. First, we must understand the phenomenon as it is emerging in physics and in systems science, remembering that our explanations are just simplified stories for something yet beyond our capacity for understanding.

COHERENCE AND HEALING

A process like healing is inherently difficult to understand because it lies outside the classical, mechanical, cause-and-effect paradigm. Spiritual healing cannot be traced to a linear series of events. It appears to arise almost out of nowhere from within the entity (person, family, community) that is being healed. Healing emerges, I suggest, because of coherence, a key concept that represents a correlation between behaviors of apparently unrelated events, processes, objects, or measurements. Coherence occurs when soldiers march in step across a bridge. The resonant frequencies augment each other because of the coherence of their steps, and can produce such power as to cause the bridge to collapse. This is why soldiers have, historically, broken formation and run across a bridge in a random fashion, only to reassemble and resume marching on the other side. Coherence implies connections that cannot be seen in three-dimensional physical space.

The presence of connections that are not immediately, physically apparent is surprising to the dominant culture's world view of independent, unrelated objects (or variables) and measurements. Classical physics and astronomy (until gravity was discovered) comprised the study of independent, discrete objects. Classical psychology comprises the study of independent, discrete individuals whose behavior can be understood entirely from within them. Classical economics poses a kind of market fundamentalism—that all problems will be solved by the unrestricted actions of the marketplace and that these actions are independent of the other forces at work in a society. When particles (or people) behave in a correlated fashion (*and we don't think they should*), we announce the mysterious existence of coherence, which implies connectivity through non-physical means.

Anthropologist Gregory Bateson and his colleagues at the Mental Research Institute of Palo Alto championed the idea of coherence within families—that the actions of individuals are correlated. They asserted that the behaviors, thoughts, and feelings of one member are connected to the behaviors, thoughts, and feelings of other members.⁵ Philosopher Michel Foucault⁶ presented the idea that the behaviors, thoughts, feelings, and actions of members of a society were related to society-wide con-

versations regarding knowledge and power—that what we think and do is correlated or connected to what those in power think and do. He proposed that these transactions are mediated through knowledge—the flow of information and the relations constructed to regulate the flow of information.

Most world views eventually look to physics for clues about how to examine our psychological and social worlds. The physical world is a good place to start because so many of us believe in the discrete object hypothesis within the world of matter. Practically, it works for us in everyday life. My truck is different from the wood I haul in it. I can take the wood out and burn it and the truck remains standing. Demonstrating that our simple interpretations of discrete objects and events fail within physics opens our eyes to the possibility of other discourses and explanations. The value of looking outside one's own discipline (to physics, for example) is that we find novel ideas and explanations that undoubtedly apply to us in some way, for we are all embedded in the same world, whatever level of it we happen to be studying.

What coherence in physics suggests, as we shall see in the following examples, is that objects (people) get connected. Once connected, what happens to one simultaneously influences the other, so as to preserve that connection. I will give examples from the basic particles of physics, and I suggest that people behave similarly to particles. Relationships that engender healing do so, I suggest, because coherence has developed among the participants in those relationships. The people begin to influence each other through non-physical means.

Physicists often explain coherence using the phenomenon of interference. Those of us who can remember high-school physics will recall the patterns produced when two pebbles are dropped simultaneously into different spots in the same pool of water, thereby demonstrating the properties of waves. The waves or ripples interact. We see a pattern where the waves cancel each other. Another pattern emerges where the waves augment each other. The cancellation pattern is called interference. The two waves interfere with each other. This is what Bateson called *second order interaction*. The water molecules are simply rising and falling, but in doing so they produce a pattern that can only be observed from outside or above the pool of water. The pattern arises from information imposed upon the water molecules by the propagation of energy—the wave.⁷

In high-school physics, we performed these experiments with pebbles and pools of water in preparation for learning about light. Once we had grasped the wave concept, our teacher introduced us to the original experiments of Thomas Young (early 19th century).⁸ We duplicated his findings, placing slits in cards and shining light through the two slits. When we place a screen

behind the slits, we see the same interference pattern that we saw in the pond. Young used this to convince his contemporaries that light was a wave phenomenon. He further showed that even when the light was so weak that only one photon could be emitted at a time, the wave-interference pattern remained. This could only occur if the particles of light were actually waves passing through both slits at the same time. The particle-wave duality became a central organizing principle of physics for years to come as people wondered how light could be both.

Physicists came to eventually understand that these “particle-waves” of light interfere with each other, but only if they are emitted from the same source and *even if they arrive to the earth 50,000 years apart!* (This happens when light from a distant star is bent by a black hole. Some particles of light are delayed by the curvature of space-time, while others proceed directly to us.)⁹ Interference occurs because of coherence. Connected wave-particles produce interference patterns. Disconnected ones do not. Furthermore, physicists learned that any coupling with another system destroys coherence. Coherence represents an intrinsic correlation among wave-particles that arise from the same source.

Why should we care about coherence from the standpoint of the social world? Descartes is credited with the idea that the social interactions of two minds are independent from their embeddedness in the physical world of bodies. Merleau-Ponty championed the opposite idea—that all of our perceptions (whether of direct sensation or the reading of complex physical instruments) are embedded in a world constructed through our bodies.¹⁰ While any level of discourse can be discussed in isolation, to me the gestalt produced by considering all simultaneously is much more interesting. Such considerations are relatively rare in academia. The correlations, for example, between someone's description of their state of mind and the description rendered by a positron emission tomography (PET) scan of their brain is fascinating. We inherently wonder how things are connected, almost as if we were born with an awareness of coherence.

Systems theory postulates that the operating principles of any level of discourse or explanation (*hierarchy* in systems terminology) are similar to those at any other level. If coherence exists on the level of photons, could it also exist on the level of social relationships? Are we humans inextricably interconnected? To borrow quantum physics terminology, are we hopelessly entangled in each other? Does the entanglement of people who are embedded in a natural (social and geographic) landscape form a society and a culture? Family coherence suggests that I instantaneously sense shifts in the thoughts, feelings, or behavior my brother makes, and then compensate to preserve symmetry or relatedness to him (without necessarily being conscious of this). Coherence provides an explana-

tion for the mysterious changes family members make during family therapy—for example, Gregory Bateson's description of family members passing around the identified patient role.¹¹ Family coherence means that I must change if my brother changes in order to preserve my relationship with him. It means that I am not independent from my brother. We are correlated or entangled. What he does affects me—even at great distances.

Jay Haley and Paul Watzlewick implicitly described coherence when they wrote about the mysterious ways that family members changed to keep everything the same (maintain homeostasis) within the family.^{12,13} Salvador Minuchin proposed this idea, especially in his studies of families with anorexic or psychotic members.^{14,15} Bateson explained this phenomenon using information theory or cybernetics, specifically with the thermostat metaphor.¹⁶ Families try to regulate the affective climate to keep anger levels the same, even though the anger passes through different family members, appearing first in one, then in another. Similarly, he wrote about depression being constant within a family, even though different members express it at different times. The concept of coherence from quantum physics becomes a more elegant metaphor than a thermostat. It provides more explanatory power, suggesting the power of relatedness across all levels of nature and the need to preserve symmetry.

One of my favorite examples of self-regulation and the need to preserve symmetry comes from the Gaia Hypothesis.¹⁷ This hypothesis arises from evidence such as the narrow temperature range maintained on the surface of the earth since life began, compared with the temperature range experienced in the universe. Even the great ice ages were small blips in an otherwise even life of constant temperature. Lovelock calculates the probability of this occurring by chance to be a ridiculously infinitesimal number, concluding that the earth is self-regulating, and therefore worthy of the ascription of consciousness. Nadeau discovered a similar phenomenon at the macroscopic level of the whole universe.¹⁸ Currently accepted theory holds that the universe originated in a vast explosion of pre-space, creating a fireball of staggering heat and density. In the first few milliseconds, it synthesized all the matter that now populates space-time. Particle-antiparticle pairs collided with and annihilated each other, resulting in the survival of about one billionth of the originally created particles, which is the matter content of the universe we now observe.

After about 200,000 years, according to this theory, these particles decoupled themselves and formed the galaxies, solar systems, and stars we now recognize. Studies of the cosmic background radiation reveal clues to this process. There are cosmological parameters that define the rate of expansion or contraction of the universe. An infinitesimal increase in one of these parameters

leads to the universe expanding forever, while an equally small decrease leads to the universe collapsing back in upon itself. The actual value of this parameter is mysteriously maintained at exactly the critical value, rendering the universe flat—neither expanding limitlessly, nor contracting back upon itself. Nadeau calculated that the probability of this parameter remaining where it is by chance, so that the universe neither expands forever nor collapses, is less than 10 to the minus 100th power, another ridiculously small number. This gives support to what Ervin Laszlo calls the "God Hypothesis"¹⁹—that the universe is self-regulating and therefore worthy of the ascription of consciousness (Bateson argued that all self-regulating systems were entitled to be called conscious, though the subjective experience of consciousness within self-regulating systems might vary dramatically²⁰).

Why do we care about all this? Because concepts such as these shatter our ideas about independence and objectivity. If everything is so connected, how can anything be independent? How can there be an objective place from which one can study healing, since healing emerges through this relatedness, this coherence? The existence of coherence forces the destruction of our conventional concepts of the individual—especially the autonomous, freely choosing, rational man of the Enlightenment; the romantic ideal, the rugged individualist of North America. Such people only pretend (to themselves and to others) that they are isolated from the rest of us.

The demonstration of coherence in physics and its slowly evolving demonstration in social life (eg, studies of distant healing, the power of prayer, psychic phenomena, telepathy, mediumship, spiritual healing, energy healing, etc) inspires us to deconstruct our concept of the individual and the self. If I'm hopelessly entangled with a whole bunch of other people, then who am I? I'm certainly not an autonomous being who rationally chooses what I do, especially when family-systems studies demonstrate that I will change without even realizing it in order to maintain symmetry within the family, or, as Bateson puts it, to "regulate the affective climate." It means we can never be certain where we stop and others begin, which is exactly the situation in physics today where matter is seen as a wave of energy with varying densities and structures spreading outward in a probability distribution. I'm hopelessly unable to decide what is self and what is non-self. I'm relatively unable to know with certainty why I do anything, though my creative mind can generate any number of fantastic post-hoc explanations (past lives, penis envy, fear of castration, sibling rivalry, hormonal imperatives, and on and on). Coherence inspires me to realize that my concepts are largely products of my fear of uncertainty, my wish to know, and to recognize that I know for sure what's going on, when I don't.

Now let's review some of the physics experiments

that Laszlo cites to demonstrate coherence (and therefore connectivity, which he rightly acknowledges, as would any post-structuralist, as a hypothesis rather than a fact. He follows Karl Popper, in recognizing that facts do not exist, in the classical sense of the term²¹). There are only observations, all of which are inseparable from the characteristics of the measuring device and situation (another insight of quantum physics—that measurements do not exist apart from measuring systems; that there are no absolute reference points from which to measure anything—the basis for Einstein's theory of relativity). We will see shortly, that even the human intent to make a measurement, *whether it is made or not*, changes the outcome of an experiment in physics. Here are the experiments and experimenters:

- John Wheeler: Photons are emitted one at a time and made to travel from an emitting gun to a detector that clicks when it arrives. A half-silvered mirror is inserted along the path of the photon. The silvered half refracts light, while the transparent half passes light. This splits the beam, giving rise to the possibility that half of the photons pass through the mirror and half are deflected. A counter, placed at right angles to the beam hitting the mirror, confirms this possibility. The two counters now register an equal number of photons. However, when a second mirror is placed in the path of the undeflected photons, one of the counters ceases to click. One of the targets gets all the photons now. The other is silent. All photons arrive at the same destination. The presence of the second mirror disrupts coherence, completely changing the outcome of the experiment.²²
- Mordechai Heiblum, Eyal Buks, and colleagues at the Weizmann Institute in Israel: A "which-path" detector is attached to the emitting source for Young's slit-lamp experiment. This detector allows us to know with certainty which path a specific photon has taken when it travels to the target. When the detector is turned on for both possible paths, interference disappears. When we know both paths of two photons, coherence stops and interference no longer occurs.²³
- Leonard Mandel: Two beams of laser light are generated and allowed to interfere. The typical interference pattern results. When detectors are attached that allow the path of the light to be determined, interference disappears. Amazingly, *interference disappears whether or not the detectors are turned on! Merely connecting them is sufficient*. The very possibility of "which-path" detection destroys the wave nature (or superposed) state of the photons.²⁴
- Durr's experiments at the University of Konstanz: Puzzling interference patterns are produced by the

diffraction of a beam of cold atoms by standing waves of light. When no attempt is made to detect which path the atoms are taking, the interferometer detects high-contrast patterns. When information is encoded within the atoms as to which path they take, interference vanishes. The path the atoms take does not actually have to be measured. It is enough that it *can* be measured. *The instrument does not need to be used; it is enough to label the atoms so that it can be used!*²⁵

- Experiments regarding the Einstein-Podolsky-Rosen effect by Alain Aspect²⁶⁻³¹: In 1935, Einstein, Podolsky, and Rosen proposed that Heisenberg's uncertainty principle could be beat.³² Heisenberg argued that knowing everything about one aspect of a particle meant knowing nothing about its other aspects. Einstein proposed taking two particles that are connected (electrons with opposite spins, for instance), separating them at a great distance and by barriers that no known electromagnetic energy can cross, and then measuring different aspects of both of them completely. Spin is measured by reversing it and then observing the effect. When the experiment was done, quite opposite to Einstein's predictions, the "partner" particle whose spin was not reversed, somehow "knew" instantly that the other particle's spin had been reversed and then reversed its own spin accordingly to maintain complementarity. Before the experiment, particle A was spinning "up" and particle B was spinning "down." After the experiment, particle A was spinning "down" and particle "B" was spinning up. Amazingly, this effect was found with a distance of 41 kilometers between the two particles and occurring instantly, as in very much faster than the speed of light—with no lag at all. The second particle "knew" what was going on with the first particle. The measurement on the first particle actually produced a new state on the second particle. Quanta that were once connected can be thousands of years apart in space, and light years apart in time, and still behave as though connected!

The human implications of all these studies are that changes in any of us affect all of those to whom we are related, and vice versa. We cannot escape being affected by those with whom we are coherent, even if we pretend to be unaffected. The studies, on how even the intent to measure changes the results of an experiment, can be related to the human level by suggesting that we cannot avoid being affected by other people.

The human correlation of the Einstein-Podolsky-Rosen Effect arises when we speculate that people who are connected to one another (through love, hate, birth, or conception in the case of twins) receive faster-than-light (non-local) information about what is happening to the

other person, and that we respond to that information whether we are conscious about it or not. We may dream the other person's dream, choose our clothing in the morning in relation to what the other person chooses, and make modifications to our attitudes and beliefs, in accordance with what changes our connected other(s) make. Healing may transpire through such connectivity among people who strongly believe in healing and practice healing, and also through membership in a community that is committed to its belief in healing and its practice.

Regarding Durr's experiments, the human equivalent could perhaps be the way that simply declaring an intention may change everything, whether or not any action ever needed to be taken to concretize the intention. For example, merely declaring an intention to be well may start the healing process. This would be like declaring an intention to take a measurement. Or, the healer's declaring an intention to do his or her best to help someone may be sufficient to start the healing process, without the healer even needing to do anything.

The human correlate of Mandel's experiment might be to argue that too much measurement or analysis or interpretation (or even the intent to analyze, measure, and interpret), especially in a structuralist or positivist fashion, may actually derail a process and prevent the spontaneous emergence of new properties arising from the coherence of parts with each other. Excess analysis and interpretation (as in measurement in physics) may un-couple coherent elements so that connectivity no longer applies. This might make coherence on the human level difficult to study in a laboratory.

How Wheeler's and Heiblum's experiments might relate on a human level is in the observation that skeptics are usually excluded from ceremonies. Anthropologists must become virtual true believers through participant research before being invited to attend. The idea would be that the skeptical measurer decouples the connections, which no longer apply. Again, the implications for research upon healing are tremendous. How can we do research when the mere attempt at measurement, or even the intent to measure, could destroy the phenomena?

What does coherence mean for us? Laszlo argues that systems behave similarly at all levels.³³ Demonstrating the existence of a phenomenon at the smallest possible and the largest possible levels suggests that it might operate at levels in-between. Abraham showed startling movies of Mexican jumping beans.³⁴ Using NASA's computer and a laser array, he rigged a measuring system to record the height jumped by each of 10,000 insects within the beans. Distinct heights were given individual colors. The movies produced showed amazing patterns with sharp geometrical demarcations that could well have been the plan for an Aztec city. The insects cohered with their neighbors and jumped to the same heights.

What this means for social interaction and social relationships is that we are much less autonomous than ever imagined. We cohere. We behave like others who originate from the same source as we do (family members). We sometimes radically change directions to maintain symmetry when others from the same source as us change. Coherence is a powerful explanatory concept in human behavior.

As a youth, I was thrilled by Hesse.³⁵ I loved the romantic ideal of the solitary hero, self-determined, answering to no one. Life has convinced me otherwise. I haven't a clue why I do much that I do. I could manufacture explanations, as many do. Numerous therapists make a living providing others with explanations (interpretations) of their behavior. But do these have truth value? As the Native Hawaiians said, the mind is only useful for making up a story (after the fact) to explain what happened, even though none of us know what really did happen. "Trust your gut," they said, "not your mind."³⁶

We participate in the forming of intricate patterns, just like the Mexican jumping beans, *without anyone actually directing us or telling us how to do it or what pattern to make*. It just happens. It is a momentous act, akin to "stopping the world" in Yaqui terms, to initiate an act that leads to pattern shift. This could correspond to Kuhn's paradigm shifts.³⁷

Coherence can explain family therapy. The presence of the "therapist" (or anyone else, for that matter—a new dog, a foreign exchange student, etc.) can initiate a change in pattern. The therapist can observe aspects of the pattern and can even comment on the pattern, but unless the family invites him or her into the inner circle, or unless a family member takes up singing the therapist's song, failure is inevitable. Change occurs when a new pattern is initiated.

Years ago, I realized that I didn't need to know what happened during "therapy." It was enough to sit with a family or a group and hold a positive intent for their highest good. I learned to trust the family's wisdom to do what was best for them, with my role being to provide a small perturbation—just a little nudge. I believe Laszlo would agree with this concept of trusting the system, and the coherence in its members, to be responsible for the change without our needing to expertly plan what the family would do. Family therapy has changed from the strategic, chess-like planning of the 1970s to the more flexible storytelling approach of the present. We learned to trust the family to know how they needed to change, instead of our so-called expertise to impose change upon them for their own good. I read Laszlo as agreeing with this; that we must trust the wisdom of systems to self-organize. In keeping with the finding that the measurement doesn't even have to be made (just hooking up the device is sufficient; it doesn't have to be turned on), I

think some therapy succeeds because of the possibility of measurement (an external observer exists).

EVIDENCE FOR COHERENCE AND CONNECTIVITY IN THE BIOLOGICAL REALM

The notion of entanglement is central to the science of connectivity. Entanglement refers to the interaction of distant states that are not capable of interacting within the tenets of classical physics and biology. Their interaction cannot be predicted by knowledge of their individual attributes, but rather arises from relationships and not from intrinsic, internal properties. Quantum biology describes a state in which individual molecular reactions occur at specific space-time points and carry out their individual functions, with the coordination of the functions ensured by quantum coherence.

Quantum biological systems are post-modern in their not allowing a precise determination of all attributes of a system. We can never know everything at once. Absolute certainty is impossible. The allowable non-classical processes (tunneling through energy barriers, interference among all possible histories preceding the present state, sensitivity to electromagnetic potentials, and entanglement) wreak havoc with our classical and deterministic assumptions about life. R.P. Bajpai writes about the remarkable capabilities that these processes bestow on living systems, including perfectly secure communication, virtually perfect information transfer, and signal detection below noise thresholds.³⁸ The emerging picture places control outside of the individual and his or her consciousness, and within a broader self-regulating system in which properties emerge without individual intent. The self-made man of the Enlightenment or the winner of the Darwinistic competition disappears.

Quantum biology challenges the dominant paradigm of scientific investigation. Evidence is accumulating to overthrow molecular determinism (the view that all life processes can be adequately explained by referring to underlying molecular interactions). Biological psychiatry as it is currently practiced is the *sine qua non* of molecular determinism, operating as if all psychological phenomena have molecular explanations and can be modified by pharmacological means. Quantum biology is also challenging the beliefs of genetic determinism—the claim that the set of genes in the genome contains a complete set of instructions for building and operating the organism. Quantum biologists are beginning to suspect that some basic developmental processes are outside of genetic control or only indirectly affected by genes. Lev Belousov suggests that genes themselves may merely be obedient servants fulfilling powerful commands from the rest of the organism³⁹—an opposite view held by the genetic-control hypothesis advocates.

Laszlo points out two impressive paradoxes that

weaken the genetic-control hypothesis. First, a simple amoeba has 200 times more DNA per cell than a human cell. The number of genes of closely related rodents can vary by a factor of two, and the house fly has five times more genes than the fruit fly.⁸ This is called the C-value paradox. The genetic-control hypothesis predicts that more complex organisms should have more genes, which is not the case. The complexity of the organism in its phenotype is not reflected in the complexity of the genome; in fact, the opposite is found. The second paradox is the gene-number hypothesis: in the organisms, more genes are always found without functions than genes with functions. The set of functional genes is far smaller than the set of all genes, another embarrassing finding for the genetic determinism hypothesis.

What should we study, if not molecular and genetically determined events? What about the relations between organs in a biological system, or the flow of information from external sources into and outside of the organism? These studies are proceeding in the biological realm as they are on the human realm (our next section).

EVIDENCE FOR COHERENCE AND CONNECTIVITY IN THE HUMAN REALM

According to Laszlo, the first controlled experiments on connectivity between humans separated in space and in time date back to J.B. Rhine's card-and-dice-guessing work at Duke University in the 1930s.⁴⁰ Experiments have become progressively more sophisticated, with no evidence emerging for a role of hidden sensory cues, machine bias, cheating by subjects, experimenter error, or incompetence in explaining the often positive results.

Russell Targ and Harold Puthoff later conducted experiments on the possibility of telepathic transmission between individuals; one acting as "sender" and the other as "receiver."⁴¹ The receiver was placed in a sealed, opaque, electrically-shielded chamber, while the sender was in another room where he or she was subjected to bright flashes of light at regular intervals. Electroencephalographs (EEG) recorded the brain-wave patterns of both. The sender exhibited the EEG pattern that usually accompanies exposure to bright flashes of light. After a brief interval, the receiver began to produce the same patterns, though not exposed to the flashes nor receiving sense-perceivable signals from the sender.

Targ and Puthoff conducted further experiments on remote viewing.⁴² In these tests, sender and receiver were separated by distances that precluded any form of sensory communication. At a site chosen at random, the sender acted as a "beacon," and the receiver attempted to see what the sender saw. To document his or her impressions, the receiver gave verbal descriptions, at times accompanied by sketches. Independent judges found that the descriptions of the sketches matched (roughly 66% of the

time) the characteristics of the site that was actually seen by the sender. (Remote-viewing experiments reported from other laboratories, involving distances from half a mile to several thousand miles, generally reported success rates of around 50%, considerably above random probability. The most successful viewers appeared to be those who were relaxed, attentive, and meditative. They reported receiving a preliminary impression as a gentle and fleeting form that gradually evolved into an integrated image. They experienced the image as a surprise, both because it was clear to their perception and because it was clearly elsewhere, in space and time, than the physical location of the experiment.)

Between 1964 and 1969, Stanley Krippner and associates carried out "dream ESP experiments" at Maimonides Hospital in New York City.⁴³ A volunteer spent the night at the laboratory. He or she would meet the sender and the experimenters on arrival, when the laboratory procedure was explained. Electrodes were attached to the volunteer's head to monitor EEG and eye movements. No further sensory contact occurred with the sender until the next morning. One of the experimenters threw dice that, in combination with a random number table, gave a number that corresponded to a sealed envelope containing an art print. The envelope was opened when the sender reached his or her private room in a distant part of the hospital. The sender then spent the night concentrating on the print. The experimenters woke the volunteers by intercom when the monitor showed the end of a period of rapid eye-movement (REM) sleep. The subject was then asked to describe any dream he or she might have had before awakening. The comments were recorded, together with the contents of an interview the next morning when the subject was asked to associate with the remembered dreams. The interview was conducted in a double-blind fashion—neither the subject nor the experimenters knew which art print had been selected the night before.

Using data taken from the first night that each volunteer spent at the dream laboratory, the series of experiments produced 62 nights of data for analysis. The data showed a significant correlation between the art print selected for a given night and the recipient's dreams on that night. The score was considerably higher on nights when there were few or no electrical storms in the area and sunspot activity was at a low ebb—that is, when the Earth's geomagnetic field was relatively undisturbed.

Jacobo Grinberg-Zylverbaum, at the National University of Mexico, studied transpersonal contact and communication in more than 50 experiments performed over 5 years.⁴⁴ Subjects were inside sound-proof and electromagnetic radiation-proof Faraday cages. He asked them to meditate together for 20 minutes. Then he placed the subjects in separate Faraday cages where one of them was stimulated and the other not. The stimuli appeared at ran-

dom intervals. The non-stimulated subject remained relaxed with eyes closed, while instructed to feel the presence of the partner without knowing anything about his or her stimulation. A series of 100 stimuli were applied—flashes of light, sounds, or short, intense (but not painful) electric shocks to the index and ring fingers of the right hand. The EEGs of both subjects were then synchronized and examined for "normal" potentials evoked in the stimulated subject and "transferred" potentials in the non-stimulated subject. Transferred potentials were not found in control situations where there was either no stimulated subject; or when a screen prevented the stimulated subject from perceiving the stimuli (such as light flashes); or when the paired subjects did not previously interact. However, in experimental situations with stimulated subjects and with interaction, the transferred potentials consistently appeared in some 25% of the cases. A particularly poignant example was furnished by a young couple who were deeply in love. Their EEG patterns remained closely synchronized throughout the experiment, testifying to their report of feeling a deep oneness. In a limited way, Grinberg-Zylverbaum could replicate his results. When a subject exhibited the transferred potentials in one experiment, he or she usually exhibited them in subsequent experiments as well.

A related experiment investigated the degree of harmonization of the left and right hemispheres of the subject's cortex.⁴⁴⁻⁴⁸ In ordinary waking consciousness, the two hemispheres exhibited uncoordinated, randomly diverging wave patterns in the EEG. When the subject entered a meditative state of consciousness, these patterns became synchronized. In deep meditation, the two hemispheres fell into a nearly identical pattern. Not only did the left and right brains of the same subject manifest identical patterns, this was also the case with the left and right brains of different subjects. Experiments with up to 12 subjects simultaneously showed an astonishing synchronization of the brain waves of the entire group.

These and other experiments provide significant evidence that identifiable and consistent electrical signals occur in the brain of one person when a second person, especially if he or she is closely related or emotionally linked, is either meditating, or provided with sensory stimulation, or attempts to communicate with the subject intentionally.⁴⁵⁻⁴⁹

Laszlo notes reports of psychotherapists that, during a session, experience memories, feelings, attitudes, and associations that are outside the usual scope of their experience and personality.⁵⁰ At the time these strange items are experienced, they are indistinguishable from the memories, feelings, and related sentiments of the therapists themselves. It is only later, upon reflection, that they come to realize that the anomalous items stem not from their own life and experience, but from those of their

patients. In the course of the therapeutic relationship, some aspect of the patient's psyche is projected into the mind of the therapist. In that location, at least for a limited time, it integrates with the therapist's own psyche and produces an awareness of some of the patient's memories, feelings, and associations.

William Braud and Marilyn Schlitz carried out trials regarding the impact of the mental imagery of senders on the physiology of receivers (the latter were distant, and unaware that such imagery was being directed to them).⁵¹ They reported that the mental images of the sender caused changes in the physiology of the distant receiver—effects comparable to those that one's own mental processes produced in one's own body. People who attempted to influence their own bodily functions were only slightly more effective than those who attempted to influence the physiology of others from a distance. The difference between remote influence and self-influence was almost insignificant: "telesomatic" influence by a distant person proved to be nearly as effective as "psychosomatic" influence by the same person.

HEALING—WHICH SELVES, WHICH WORLDS?

People of antiquity saw, and today's indigenous people see, human health and disease within the context of the world in which the person is embedded, including their cosmic context.⁵² The indigenous view is like the systems view which reacts to the classical scientific method by putting people back into the world in which they live, and seeing them as embedded and emerging in this world. (By "emerging," I mean new properties appearing that could not be predicted prior to their appearance.) Regarding the classical scientific method, Laszlo wrote that it "led to the fragmentation of our understanding of human beings. In the midst of all the complex special theories, we have gained little real insight into human nature itself."⁵²

We are interested in expanding the world in which healing is viewed beyond the views created by classical methods. In this larger view, we are concerned with the multiple, interacting and interrelated worlds within which people live. Classical medicine stops at the biological world, ignoring the social world and role of humans in interfacing and coordinating multiple worlds, including the natural world. "Interrelated worlds" means that all levels affect all other levels, which renders meaningless the concept of independent variables and the separation of disciplines from which conventional medicine views healing.

Having looked at the world in which healing occurs, we must also consider who is being healed. Laszlo argues that all systems show evidence of reactivity to elements from the external world, and respond in an effort to increase or decrease exposure to those elements.⁵³ He uses this assertion as a definition of subjectivity, arguing that humans are not unique in having this property. Laszlo

writes, "We must end by acknowledging that subjectivity is possessed by all natural systems, although the grade of subjectivity differs from level to level and species to species ... There is no unique correlation between the nervous system and the capacity for subjective sensation." In this view, the subjects (including humans) are interconnected with each other and the world. We have abandoned the notion of discrete human beings entirely enclosed by their skin.

Laszlo maintains that studies of "non-ordinary reality must also inform our understanding of the self."⁵⁴ He describes the work of Stanislav Grof with "altered" states of consciousness (ASC) induced by psychoactive drugs or breathing techniques.⁵⁵ Grof noted that ASCs embraced a large part of the human psyche; the states of normal waking consciousness being but the tip of the iceberg. Therefore, studies of non-ordinary reality are important in understanding the person who heals and the healing process. Over 100 years ago, William James noted, "Our normal waking consciousness ... is but one special type of consciousness, whilst all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness that were entirely different. We may go through life without suspecting their existence; but apply the requisite stimulus, and at a touch they are all there in all their completeness."⁵⁶

People in ancient cultures (especially those of the Orient) were, and current indigenous cultures are, more adept than contemporary modern people at entering altered states of consciousness. Today, we can find tribal people who are expert at altered states of consciousness. It is, perhaps, no accident that healing seems to be more common in remote areas with less contact with modern civilization, since people in those areas have retained skills in attaining "altered states." Additionally, they are more isolated from modern cultural views that healing is impossible without drugs or surgery. Examples of such peoples include the !Kung Bushmen of the Kalahari desert, aboriginal people of Australia, and Woodland Cree people from northern Saskatchewan. Throughout the world, indigenous peoples combine chanting, breathing, drumming, rhythmic dancing, fasting, social and sensory isolation, and even specific forms of physical pain to induce altered states. The native cultures of Africa and pre-Colombian America use them in shamanic procedures, healing ceremonies, and rites of passage. The cultures of Asia use them in various systems of yoga, Vipassana, Zen Buddhism, Tibetan Vajrayana, Taoism, and Sufism. The semitic cultures used them in Kabbalah. Only Western industrial civilization fails to hold these altered states of mind in high esteem. Western cultures tend to discount these remarkable experiences.

When we enter an altered state, our connections to each other and to our environment become more obvious.

At these times, we tend to describe a loosening and melting of the typical body boundaries. We may experience merging with another person in a state of unity and oneness. We may report virtually complete identification involving body image, physical sensations, emotional reactions, attitudes, thought processes, memories, facial expression, typical gestures and mannerisms, postures, movements, and even voice inflections.

Group identification and group consciousness is a further extension of altered states. People become aware of being part of an entire group that shares some racial, cultural, national, ideological, political, or professional characteristics. The depth, scope, and intensity of this experience can reach extraordinary proportions. People may experience the suffering of soldiers who have died on the battlefield, the anguish of mothers who have lost children, or the love, tenderness, and dedication of saints who tend to the sick and the suffering.

Identification with animals (including body image, specific physiological sensations, instinctual drives, unique perceptions of the environment, and corresponding emotional reactions) can be authentic and convincing.

Identification with plants and botanical processes include complex experiences of becoming a tree, a wild prairie rose, seaweed, an orchid, bacteria living within the human gut, or a palm tree on the shore. People even report becoming conscious of the totality of life on this planet.

In the "experience of inanimate matter and inorganic processes," people can identify with the Pacific Ocean, a forest fire in the Catalina Mountains, or the mountain itself. They can also identify with the forces of nature, as presented in volcanic eruptions, tsunamis, earthquakes, and other forces. People can identify with the micro-world, experiencing the dynamic structure of molecules and atoms, inter-atomic bonds, electromagnetic forces, and subatomic particles.

In "planetary consciousness" the subject's consciousness expands to the Earth's geological substance and biosphere, with all its life forms. The Earth as a whole appears to be one complex organism, oriented toward its own evolution, integration, and self-actualization.⁵⁷

In "extraterrestrial experiences," people experience other celestial bodies and astronomical processes, traveling to the moon, sun, planets, stars, and galaxies. They experience explosions of supernovas, contraction of stars, quasars and pulsars, and even passage through black holes. At the widest (and comparatively rare) form of this experience—"identification with the entire physical universe"—the person has the feeling that his or her consciousness encompasses the entire cosmos. All its processes are experienced as part of the organism and psyche of the all-encompassing universe-system.

"Out of body" experiences are also important to our understanding of the worlds and subjectivities of healing.

Similar phenomena of clairvoyance, clairaudience (hearing the future), and telepathy are important:

Time-displacement experiences range from "embryonal and fetal experiences," where the subject recalls his or her intrauterine experiences as a fetus, through "ancestral experiences" (involving identification with one's biological ancestors), "racial and collective experiences" (where those involved are not one's direct ancestors but members of the same race), or sometimes the entire human species..., all the way to "past incarnation experiences." The essential characteristic of the latter is a convinced sense of remembering something that had already happened to oneself. Subjects maintain their sense of individuality and personal identity, but experience themselves in another form, at another place and time, and in another context. In these reincarnation-type experiences, the birth of the individual appears as a point of transformation, where the enduring record of multiple lifetimes enters the bio-psychological life of the individual.^{39,51,53}

The perceptions, and their cognitive interpretations that emerge during altered states of consciousness, can provide instant and direct extrasensory access to otherwise unavailable information about our surroundings—local, global, or cosmic. The reports of these emerging perceptions introduce the possibility that divisions and boundaries in the universe are illusory and arbitrary. In some philosophies, only a cosmic consciousness is postulated as what actually exists. In the Gaia Hypothesis, for example, God is considered to be the largest possible consciousness; what emerges when everything is considered as the largest possible entity, and we imagine this entity to be conscious. Native Americans sometimes talk about each of us being a small speck in the body of the Creator. Buddhists sometimes refer to a universal consciousness, or the Universe (everything, largest possible system) being conscious itself.

In reflecting on this concept, it strikes me that we could conceive of ourselves as elements of the body of God or Creator in the same way that a red blood cell might comprehend itself as a member of our body. Of course, the elements of scale are, even still, so much more massive for us (in relation to everything) than our red blood cell in relation to one of us, but the concept is still suitable for meditating on the theme of being a part of a larger whole—being embedded, or contained. Jung also provides a psychology permissive of non-locality and the expansion of awareness outside of the physical realms of the human body.⁵⁸ He provided support for the idea that the "world and brain—cosmos and consciousness—are interconnected by a continuous information-conserving and transmitting field"⁵⁹.

EMBEDDEDNESS OF CONSCIOUSNESS AND EXPERIENCE

The quantum concept of embeddedness resembles Goffman's concept of the frame. Goffman wrote:

Activity framed in a particular way—especially collectively organized social activity—is often marked off from the ongoing flow of surrounding events by a special set of boundary markers or brackets of a conventionalized kind. These occur before and after the activity in time and may be circumscriptive in space; in brief, there are temporal and spatial brackets. These markers, like the wooden frame of a picture, are presumably neither part of the content of activity proper nor part of the world outside the activity but rather both inside and outside.... One may speak, then, of opening and closing temporal brackets and bounding spatial brackets. The standard example is the set of devices that has come to be employed in Western dramaturgy: at the beginning, the lights dim, the bell rings, and the curtain rises; at the other end, the curtain falls and the lights go on.^{60(p252)}

Goffman's frame represents a kind of fluidic boundary between the system contained and the containing system. One "frame" for an individual is the family. A "frame" for a family is the extended kinship system in traditional societies, or a looser network of friendship circles in modern, Western societies. But unlike earlier versions of systems theory applied to the human condition, quantum physics has destroyed the neat metaphor of boxes within boxes, each larger box nicely containing the smaller box. Quantum physics reveals an absence of clear boundaries between "boxes" or frames, with multiple intersections and a breakdown of the classical notion of hierarchy. We are all contaminating each others' frames. We are embedded within each others' systems in ways we cannot even guess. The human drama exists within the biogeographical frame, referring to nature and the specific geographical region in which our particular human drama of interest unfolds.

Laszlo, for example, could not see individuals as meaning-makers apart from the social milieus or systems in which they "construct" meaning. Goffman wrote that we bring our interpretations to any social circumstance, and, with them, our sense of what our part should be in that circumstance. Goffman said, "A teammate is someone whose dramaturgical co-operation one is dependent upon in fostering a given definition of the situation...."^{61(p81)} Laszlo, likewise, would say that our interpretation of a social circumstance is forged by our participation or embeddedness in that social system. The system itself emerges through the coherence of individuals who belong to that system. The system maintains itself through the connectivities of individuals who are

embedded within it and who forge it. Embeddedness is more complete than being "framed."

Healing is difficult to understand because of this embeddedness. If we are all interlaced with each other and have something to say about each others' conditions (including health and disease), then we are all responsible for sudden shifts in health and disease, though in what way is often a guess. The nice linear cause-and-effect relationships so desired by modern medicine and biology rapidly break down in the bog of healing. We have to abandon our quest for simple explanations and certainty when we embrace embeddedness.

The term "framing" arises from the theatre and from art, while "embeddedness" arises from physics. Hence, we can create an equivalency between the metaphor of the theatre and the metaphor of physics—the essence of systemic understanding that common processes underlie operations within systems. Goffman saw framing as a constitutive act that people accomplish through their interaction. He saw attunement in understanding and purpose as coordinating social interaction. Laszlo complements this by grounding this attunement in the concept of coherence and embeddedness, and showing how this is a characteristic of all systems, not just human systems. Goffman saw attunement as coming from participants meeting "system requirements" (demonstrating that they were capable of participating within the frame). Laszlo makes the individual less primary in that process. The system imposes its requirements or constraints upon its members who naturally adjust to comply. Attunement and coherence both result from and create shared membership.

Goffman also describes what Laszlo calls systemic evolution—when systems find themselves far from equilibrium conditions, and transform. This is what we commonly call healing. Goffman says, "There are other arrangements to draw on.... In these circumstances, the whole framework of conversational constraints—both system and ritual—can become something to honor, to invert, or to disregard, depending on the mood that strikes. On these occasions, it's not merely that the lid can't be closed; but that there is no box."^{62(p73,74)} In Laszlo's terms, the system reaches such a far-from-equilibrium condition that it reorganizes itself. It transforms, reinvents itself, heals. It basically reconstitutes itself.

New properties emerge from this transformation. Laszlo's perspective on evolution, similar to what I am proposing about healing, is that leaps happen suddenly—not through Darwin's progressive process of natural selection,⁶³ but abruptly, dramatically, in a hurry. This is consistent with current findings of evolutionary biology. To some of us, it seems parsimonious and aesthetic when evolutionary biology meshes with Goffman's sociology. When disparate roads converge, we feel that we are really heading somewhere. Others believe that it is appropriate

and desirable to keep levels of explanation separate. Explanations (stories) can work on one level without reference to any other level. Be that as it may, there are those of us who are integrators. We want to find stories that work on several levels. We seek stories that explain the correlations among levels of explanation. Explanatory pluralism does not mean that we must eschew multi-level explanations, but rather that no one level of discourse is inherently superior to another.

HEALING AND CULTURE

We are stuck with being part of a culture and must work within it. Stepping outside of any culture is not possible. Laszlo writes:

It seems that the self-monitoring capacities of the human nervous system, coupled with its sensitivity to the environment, emancipated us from the confines of sensory reality and placed us within a world we ourselves created. There is no evidence to support the claim that an evolved culture has biological survival value, nor for the different claim, that once biological survival is assured, the inevitable next step is culture. To hold that human culture is a goal inscribed on the banners of biological evolution is without foundation.⁶⁴

While having a culture cannot be escaped, the forms and structures that the many cultures of the world take is not given. It does not arise from essential forms or archetypes that drive us to create from our psyches. It is our arbitrary creation. Laszlo continues:

Once we started to use reason in some things, we became stuck with our rationality. And when we evolved the capacity to substitute imaginative satisfactions for real ones, we also became saddled with the capacity to feel, envisage, and to believe. It became as impossible to return to the state of nature as it was for Adam and Eve to return to Paradise—a myth which expresses this insight in metaphorical terms....The means became the ends: the self-maintaining biological species was transformed into a cultural species sensitive to knowledge, beauty, faith, and morality....Our evolutionary history determined that we become a cultural creature, but did not determine what kind of culture we would have. Hence, our problem today is not whether to have a culture; it is what kind of culture to have.

There is one set of factors which exercises determining influence, for it is this set which influences the growth, persistence, or decay of any particular kind of technology, law, and communication. This is the set of values prevalent in a society. Cultures are, in the final analysis, value-guided systems....Cultures satisfy not bodily

needs, but value needs. Values define cultural man's need for rationality, meaningfulness in emotional experience, richness of imagination, and depth of faith. All cultures respond to such suprabiological values. But in what form they happen to do so depends upon the specific kinds of values people happen to have.⁶⁵

Laszlo uses the concept of values to tie the behavior of cultural systems to other systems. All systems pursue values. Even Bateson's thermostat pursues the value of keeping the temperature constant. The universe pursues the value of maintaining the cosmological parameters in a narrow, constant range. The earth pursues the value of temperature regulation and climate control. Human systems pursue self-created values. In *You Can Change the World*, Laszlo writes about the nearly lethal values that our current cultural systems are pursuing: the value of unlimited industrial and economic growth as necessary; the value of unlimited consumption, the fundamentalist worship of market forces without constraint or regulation; the value of pursuing wealth and its increase at all cost; the value of pursuing "peace" through military means, etc.⁶⁶ Laszlo's understanding of the way that individuals get caught into the pursuit of these values mirrors Foucault's description of how people become constituents of power-knowledge systems or Goffman's description of the experience of membership in a frame. We do what we're supposed to. How else can we explain ordinary people committing the atrocities of the Native American genocide in North America, the massive and tortuous executions of the Spanish Inquisition, the killing fields of the Khmer Rouge, and the current suicide bombings. Goffman would say that we fulfill our roles with some measure of individual variation.

Becoming aware of our roles, and the values that we assist the larger systems to pursue, can facilitate the healing process. In becoming aware of those roles, we can rebel and change our participation. This change can lead to an internal reorganization and even transformation, in our relational self and, therefore, our physiology. This is the path to healing.

HEALING AND TRUTH

Alfred North Whitehead wrote:

The universe is vast. Nothing is more curious than the self-satisfied dogmatism with which mankind at each period of its history cherishes the delusion of the finality of its existing modes of knowledge. Skeptics and believers are all alike. At this moment, scientists and skeptics are the leading dogmatists. Advance in detail is admitted: fundamental novelty is barred. This dogmatic common sense is the death of philosophical adventure. The Universe is vast.⁶⁷

William James (quoted in Roy⁶⁸) wrote:

If there is anything that human history demonstrates, it is the extreme slowness with which the academic and critical mind acknowledges facts to exist [that] present themselves as wild facts, with no staff or pigeon-hole, or as facts [that] threaten to break up the accepted system.

Lao-tze wrote, "A good scientist had freed himself of concepts and keeps his mind open to what is,"⁶⁹ while Aristotle wrote, "Nor again must we in all matters demand an explanation of the reason why things are what they are; in some cases, it is enough if the fact that they are so is satisfactorily established."⁷⁰

We cannot know the ultimate truth about healing, or perhaps there is no ultimate truth to know. Healing is diverse and context-dependent. We are limited to observations from particular measurement systems that generate explanatory hypotheses (stories) to refute or confirm with further observations or tests of hypotheses. Both Popper and Godel argued persuasively that nothing can ever be proven.⁷¹ Foucault wrote about how constructed ideas come to achieve "truth" status, with these "truths" then acting to set standards of "normalization" and to influence how people shape their lives.⁶

IS HEALING POST-STRUCTURAL?

Post-structuralism is marked by the rejection of totalizing, essentialist, foundationalist concepts. A *totalizing* concept puts all phenomena under one explanatory concept (for example, genetic determinism or molecular determinism). An *essentialist* concept posits a reality that exists independent of, beneath or beyond, our culture, biology, and other constraints. Essentialists, for instance, believe that there is such a thing as human nature and that a single truth exists that can be discovered. A *foundationalist* concept suggests that there are stable systems of meaning that describe a world of fact that is isomorphic with human thought.

Medicine, of course, is currently modern and structural in its belief in totalizing concepts, essentialism, and foundationalism. These beliefs prevent an adequate study of healing. The totalizing concept of medicine is that all of health and disease is ultimately explained by genetics. Its essentialism is biological—that a basic biology exists independent or beneath culture, our lives, and all of our other constraints. Its foundationalism is expressed in its belief that there is one way to heal, and that multiple, different pathways vitiate the phenomenon.

As I have previously said, healing is not reducible to genetics. It is not based upon a biology that is independent from spirituality, culture, family, and other effects. There appear to be multiple ways to heal, most of them idiosyncratic to the entity being healed. The multiple

ways are better presented by telling stories than by listing facts, as our indigenous healers always knew.

I suggest we challenge medicine's assumption that the biological reality is independent of the human experience. Natural systems share certain goals—that the system should continue, even re-create itself or make copies of itself; that the system needs to maintain its anti-entropic, far-from-equilibrium position; that the system interacts with its milieu to change the milieu to improve its energy distribution functions. Human systems perform these operations. How they perform them—the particulars—or what we call "culture" is an arbitrary creation, a construction arising from existing conditions of which there could be infinite variations. These various constructions all have biological consequences and implications, which is what requires an individualizing of biological science to really consider healing.

While the quantum-wave equation and the unified-field theory (string theory) could be contained within that equation, our life experiences take place within particularized decompositions of the wave equation into individual realities, which are not determinate. Only the whole is determinate and at a level beyond our comprehension (quantum-wave equations can be solved for only the simplest cases). Quantum physics describes a reality so vast as to contain everything and to be beyond description, except mathematically. Quantum physics is anti-foundationalist. Stability is a joke. Heisenberg (with his uncertainty principle) taught us that the only certainty is uncertainty. Einstein's relativity theory taught us the impossibility of finding an absolute reference point from which to make measurements. These are the considerations relevant to the study of healing.

Independence is an illusion in a post-structural world. Only inter-dependence exists. Essentialism posits independent or transcendent concepts. Even the equations of quantum physics are just descriptions or stories of a universe (*multiverse* in Max Tegmark's terminology⁷²) in which we are hopelessly embedded. Mathematics qualifies as a language in that regard—it has grammar and syntax. It tells a story to those who can speak the language. Quantum biologists consider these phenomena responsible for our capacity to even think. We cannot escape. Goffman emphasized the impossibility of considering human behavior and actions apart from the stage or frame upon which, or in which, they occur. Healing cannot be studied in isolation from the frame or stage in which it occurs. (I suspect this is true for all biological treatments, but we don't tend to study pharmaceuticals and their responses from this perspective).

The ultimate constraints are the cosmological parameters that determine the shape of the universe. The philosopher, Ashok Gangadean wrote that the experience of independence is an illusion of predicating thought, the

artificial division of perceiver and perceived.⁷³ If we are inextricably embedded and entangled in nature, any thought of separating us from nature is absurd. Our very lives and consciousnesses may have arisen as an *emergent property* (Endnote 2) of nature's internal dialogue.

Post-structuralism contests the view of "man" presented by enlightenment thought and idealist philosophy. The enlightenment view holds that "individuals" are sacred, separate, and intact; their minds the only true realm of meaning and value; their rights individual and inalienable; their value and nature rooted in a universal and trans-historical essence—a metaphysical being. The post-structural view holds that people are culturally and discursively structured, created in interaction as situated, symbolic beings. The common term for a person so conceived is a "subject." Each subject is embedded, meaning that we are inseparable from our context—biological, geological, sociological, and spiritual.

The explanations people give about healing are suspect. The sociologist, Goffman said:

What is presented by the individual concerning himself and his world is so much an abstraction, a self-defensive argument, a careful selection from a multitude of acts, that the best that can be done with this sort of thing is to say that it is a lay dramatist's scenario employing himself as a character and a somewhat sup-portable reading of the past.⁷⁴

People's descriptions or explanations of their own healings are similar. Fundamentally, healing or internal reorganization and transformation operates through means that are invisible to us and whose understanding is poorly attainable at best.

The pathway to healing for the individual is contingent upon the larger systems to which he or she belongs. Individuals are completely interconnected and non-local. Subjects are created through interactions of relationships, and occupy various culturally-based sites of meaning (as family members, as occupationally and economically and regionally defined, as gendered and of sexual orientation, as members of clubs or clients of psychotherapy or presidents of their Parent Teacher Organization—every site evoking a different configuration of the self, different language uses, different foci of value and energy, different social practices, and so forth). Each subject will have a different pathway to healing, depending upon these facts.

Subjects are embodied and present in the physical world, entrenched in the material practices and structures of their society—working, playing, procreating, living as parts of the material systems of society. Subjects are social in origin, taking meaning, value, and self-image from their identity groups, their activities in society, their intimate relations, and from the multiple pools of common mean-

ings, symbols, and practices they share variously with their subcultural groups and with their society as a larger unit.

Post-structuralism sees "reality" as being much more fragmented, diverse, tenuous, and culture-specific than does structuralism, with some of the following consequences:

- post-structuralism's greater attention to specific histories
- a greater emphasis on the body; the actual insertion of the human into the texture of time and history
- a greater attention to the specifics of culture, and to the arenas of discourse and cultural practice
- a greater attention to the role of language and context in our construction of reality and identity

My argument is that these different emphases are essential for the study of healing. We must attend to each specific story of healing as if there were no other. We must consider how biological change is contextual and dependent upon the actual multi-dimensional placement (time, location, culture) of a human body into a particular time and history. We must pay greater attention to the role of culture and its practices as relevant to our discourse about healing, and we must look at the constitution of identities—those who are well and those who are sick. We must ask the question, how do these differences (sickness and wellness) come about?

SOME CONCLUDING HYPOTHESES

I proposed the following hypotheses in the beginning of this essay:

- Human disease and illness and its progression or disappearance, is context dependent—it depends upon the network of relationships into which the particular individual is embedded, and it depends upon cultural and social factors yet to be determined. Disease is not purely biological or genetic.
- Systems are self-healing (self-correcting), demonstrate *emergent properties*, and are capable of developing unique, novel outcomes that are not relevant or applicable to any other system.
- Healing can result from the internal reorganization of a system. Information transfer that facilitates this reorganization may be more important than the provision of external agents.

Now we can develop those hypotheses further.

Since people are connected, embedded, and entangled, their physiological processes are influenced by systems outside of the conventional limits posed by modern biology. Healing is actually internal-systems reorganization occurring at far-from-equilibrium conditions, and is

dependent upon the historical, socio-cultural, and geological matrix into which the person is embedded. The matrix provides the conditions for internal reorganization to occur. The common observation that healing requires a community recognizes that the thoughts and beliefs of those to whom we are connected cohere with ours to produce a sustained output that influences everyone's physiology. Our cells are "in-formed," as Laszlo describes in his Connectivity Hypothesis, by fields of information created by our mutual entanglement. Biological responsiveness cannot be understood separately from this context into which we are planted.

Systems, including human systems, undergo remarkable internal reorganizations when they are far from equilibrium and as their contexts shift. Healing is our ordinary-language way of talking about these dramatic shifts. Because of the idiosyncrasy of these internal shifts, related to pre-existing organization (also called history) and to the new contexts that are being formed, formulas to predict healing are doomed to fail. Each system must be considered by its own merits. We can develop a different kind of science—a descriptive, hermeneutic methodology in which we learn how to study the process of transformation, how to recognize when conditions are ripe for transformation, and how to predict when transformation will occur, even if we cannot know what the result of that transformation will look like. We learn how to ask the right questions to discover how specific systems transform. Perhaps a science of necessary and sufficient conditions can emerge. Perhaps we can learn to recognize systems that are too close to equilibrium for sudden, dramatic reorganization to form. Perhaps we can learn how to assist systems to question prevailing assumptions and allegiances so that transformation becomes more likely.

When we shift our focus from the action of external agents to the flow and organization of all kinds of information, we arrive at a radical new science that is more quantal than mechanical. We can come to understand how small interventions for far-from-equilibrium systems provoke reorganization, while large interventions for systems close to equilibrium have no effect. We can only gain that understanding through hearing the stories of systems that change and systems that don't change, perhaps bringing them together to consider similarities and differences, to compare each other's contexts. I propose that this work will further the conventional natural systems by bringing a context to biology, and allowing us to better understand why some people respond to treatment and others do not.

Instead of ignoring the natural sciences, we contextualize them. In doing this, we find a basis for the scientific study of healing. Through our progressive broadening of context or frame, we may encounter other provocative hypotheses, including the idea that the geological region in which we are embedded conditions and

influences the shapes and forms that our thoughts (art, writing, science) take, helping to explain differences in the music, shapes, and rituals of the earth's geographic regions. How far embeddedness will go as a hypothesis remains to be determined.

Once we have come to appreciate this, we can understand why healing is not rational, why we need new science to study healing, and why one-size-does-not-fit-all to explain healing. We can look at systems of healing and how they provide information for component parts of systems to reorganize themselves, and can understand the pivotal role of dialogue (in all of its definitions) in this process. Then, I think, we will stop arguing about the efficacy of individual techniques and will abandon our obsession with the randomized, controlled trial (or even the idea that we can control anything at all). We will then adopt methods of current physics and systems engineering to study systems that are moving toward transformation so that we can learn how to influence those processes to move in the directions we prefer (health and wellness), rather than toward the directions we do not prefer (illness and disease).

Endnotes

1. *Systems*, in this context, refers to wholes that are greater than the sum of their parts.
2. *Emergent properties* are novel events or transformations appearing without explanation that cannot be anticipated or predicted from interacting systems, except to point to the role of internal reorganization of elements of the system in producing novel behavior or properties that could not have been anticipated.
3. An *attractor basin* is a "valley of energy" in which stability lies, and from which energy is required to move over the pass into another "energetic valley."

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