

# Foundation for Mind Being Research: THE CELLULAR COMMUNICATION PROCESS AND ALTERNATIVE MODES OF HEALING

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## ABSTRACT:

This paper presents a hypothesis to explain the process for long distance healing. The hypothesis is based upon an integration of many areas of scientific research. Most scientists do not accept the possibility that there could be an input to the atom from an aspect of reality beyond ordinary 3D space and time. We focus upon non-local inputs and their effects upon the shape of the molecules in our bodies. The idea of non-locality was shocking to physicists, because for hundred of years scientists have said that if anything moved it was because something else acted on it. Non-locality suggests that distant systems can be connected in a totally new way -- a way in which distance no longer seems to matter. Recent physics experiments strongly support the existence of the phenomena.

We believe that the soul represents a non-local aspect of reality that retains patterns beyond ordinary 3D space and time -- a person's archetypal blueprint or, as psychology has termed it, one's higher self. Our model suggests that for the human body, non-local effects, which initially appear at the sub-atomic level, will be detectable as changes in the molecular structure of cells. Such changes will alter the body's cellular communication process and therefore can affect both behavior and body healing. The human body can be considered a community of cells -- about 100 trillion, with 200 different types, that need to live in harmony. To accomplish this feat there must be a very effective cellular communication process. When noise, interference and misinformation enter into the cellular communication process the human body suffers. The non-local input provides the guidance for maintaining the intercellular communication process essential for human growth and a healthy body. Thus, the human mind, with its ability to operate beyond the physical, permits humans to influence physical processes and hence, the healing process of a body -- one's own or others. What this all implies is that thoughts and emotions via their non-local effects can change the shape of molecules in the human body. This in turn changes the vibrations of the body.

For a person to become truly connected to the non-local aspects of reality they have to "tune" their bodies to receive the intuitive non-local information. This involves a process of moving first to a state of entrainment for the signals from our heart, brain and breathing and then to an internal coherence state. One can achieve the internal coherence state through unconditional love. It is then that the non-local soul and the physical ego become like one. We conclude the paper with a look at how the process between a spiritual healer and a healee works.

**KEYWORDS:** Archetype, cell, communication, connectiveness, consciousness, emotions, healer, intention, love, metaphysics, mind, non-local, physics, quantum, reality, soul, spiritual, subtle energy, symbol, thoughts.

## INTRODUCTION

You may ask: Why have you chosen to focus your attention upon communication between cells? In our previous papers we have described our belief that there exists an aspect of reality beyond 3 dimensional space and time -- what has been called pre-space (Gough & Shacklett, 1993a, 1995). This pre-space is the ground from which space-time arises (Wheeler, 1967). We also consider this pre-space the "home" of mind and spirit and the origin for non-local phenomena.

Let's define what we mean by non-local phenomena. When we talk about a local connection we refer to cause and effect in space-time. We know the cause, we know the effect, and we can trace the mechanism of the signal. However, when we talk about a non-local connection, cause and effect are linked outside of space-time. We can know the cause, we can know the effect, but we have no discernible mechanism or signal in space-time. Therefore, we postulate that the signal "traveled" through non-space-time, i.e., pre-space.

We believe that for the human body, non-local effects, which initially appear at the sub-atomic level, will be detectable as changes in the molecular structure of cells. Such changes will alter the body's cellular communication process and therefore can affect both behavior and body healing (Kordon, 1993).

## THE CELL

The cell is the unit of life -- the simplest form of life. Cells exist in a vast range of varieties, coming in many sizes and shapes, and performing many functions (Glazer, 1998). Each cell has subcellular structures known as organelles (Carroll, 1989). Dynamic interactions occur between the organelles in a manner similar to the interactions between the organs of the human body.

The tree in Figure 1 is a simplified representation of how the wide diversity of living systems has evolved. A select set of atoms combined to become inorganic molecules, and then further combined to become the molecules of life -- the amino acids, proteins, DNA, etc. These eventually formed cells, the smallest unit of life. Single-cell organisms in time became multi-cell organisms that appeared as the branches of the tree. Mammals, including humans, fish, birds, etc. are but one major branch; insects, worms, spiders, etc. are another; and ferns, moss, and flowering plants, etc. are still another (Hagene & Lenay, 1987).

The evolution of the cell and later multicellular organisms occurred over a long period of historical time. It was about 4.5 billion years ago that our earth was formed. About 3.5 billion years ago the first cells appeared -- what we call life. These first cells had no nucleus and are known as prokaryote cells. Bacteria are examples of this type of cell. About 1.5 billion years ago the first cells with a nucleus appeared and are known as eukaryote cells. The cells of our body are eukaryote cells, for example the liver cells, the neurons, etc. It was about a half billion years ago that the first multi-cellular organisms appeared on earth. Yet, it was only in the last few million years that human beings appeared (Glazer, 1998).

What evidence do we have today that cells can join together, form cellular communities, communicate and share their awareness and thereby become more adept at survival? An amoeba named *Dictyostelium*, a single cell organism that feeds upon bacteria, provides an interesting example of how individual cells can cooperate. When these amoeba are under stress due to food shortage, about 100,000 individual cells form a mound about the size of a grain of sand. The mound then begins to act as if it were an organism and develops into a crawling slug like form (Gilbert, 1994).

The slug now goes through another change -- the back end catches up with the tip, and the slug turns into a blob. The blob then grows into a slender stalk carrying spores. Fifteen percent of the cells die as their sacrifice to form the cellulose stalk; the remainder live on as dormant spores, i.e., reproductive cells capable of giving rise to new cells after an interval of dormancy. If a worm, a bird, or the rain takes them to a bacteria-rich area the spores split open and free the individual amoeba to start life anew. Science is finding that these cooperating amoeba are far more closely linked to cellular communication in humans than anyone had imagined. "In case after case, the proteins found working together in *Dictyostelium* are the same as the ones doing the same tasks in multicellular organisms -- and only multicellular organisms" (Zimmer, 1998, p.90).

Now that we know that individual cells can communicate and act with a purpose; let's explore cells in a human being. Each human has about 100 trillion cells. Yet each cell has about 100 trillion atoms. So the inner complexity of both the human and the cell are in one sense comparable. The physiological systems within the human and the cell are also comparable. The cell has a boundary layer or skin, a nervous system, a digestive system, an excretory system, a respiratory system, and a reproductive system (Lipton, 1993, p.7). There is information processing going on within the cell and even individual biological clocks ticking away (Travis, 1998).

Thus, the human body can be considered a community of cells -- some 70 to 100 trillion, with 200 different types, that need to live in harmony. To accomplish this feat there must be a very effective

cellular communication process. When noise, interference and misinformation enter into the cellular communication process the human body suffers.

#### NON-LOCAL EFFECTS

There are at least two networks of connection possible between two (or more) parts of the whole -- of the unity of which we and each of our cells are a part. The first is a local connection. We send a letter via the pony express -- there is cause and effect. This has been the focus of most physics -- all local connections occur slower than or at the speed of light. The second is a non-local connection. It is somewhat analogous to when we tune in to a radio station for the news. The radio message is already "there" but we must access it by our efforts to tune the system. Quantum physics predicted non-local connections, and experiments have now confirmed those predictions. All non-local connections occur faster than the speed of light -- some say instantaneously.

A local connection is better for detailed, one-to-one communication. Whereas a non-local connection is more effective for communicating to the many. In the case of healing, it is communicating to the many cells that have to cooperate. Non-local connections are permanent "wiring" and the automatic programming of the physical world is functioning through this connection. We can also consciously activate or tune in to experience this connection, using intention as a trigger and the power of emotion as a carrier of information.

Like all living systems, our body receives informational/energy inputs from the environment -- from local connections. There are the chemical inputs in the form of the things we eat and drink, smell, and breathe. There is increasing recognition of both the positive and negative effects of foods, herbs, medicines, and airborne particles upon our bodies. More controversial are the effects of both electromagnetic fields and sound waves upon our bodies. Epidemiological studies from many countries indicate a link between electromagnetic fields (EMFs) which accompany electric power delivery and cancers of the blood, brain and breast, especially in children (Maxey, 1991). Recent research studies show that EMFs of 60 hertz and a strength of 1 gauss "trigger a cascade of enzyme-driven cell-signaling events" (Raloff, 1998a). Yet, "Many questions remain about what types of fields and features of exposure -- such as timing -- underlie any risks." (Raloff, 1998b).

The use of music and sound, and light and color in healing practices has a long history (Hastings, et.al. editors, 1980). Although there remain doubters that such alternative healing techniques can have positive effects, one need only note the effect that various types of wave phenomena have on non-human living systems. For example, color can be used to enhance the commercial growth of agricultural plants. In one application, red mulch was very effective in helping tomatoes mature earlier and set bigger fruit (Raloff, 1997). The responses of plants to colors like red and blue light involve a cascade of receptors and other proteins that translate the light signal into a growth response (Christie, et.al., 1998). A similar process most likely occurs in humans.

Most people recognize that our bodies are open systems and that the input in the form of matter or waves can produce either increased coherence or disruptive effects upon the entire body or selective elements of our physical system. This paper, however, will focus upon an input to the human body that is usually not discussed in science literature -- the application of the non-local connections. Figure 2 illustrates this non-local input to living systems, i.e., to these cooperative organizations of living cells. Non-locality implies that a physical system, once separated, retains a "connectiveness." It was predicted by quantum theory and now is strongly validated by experimental results. All future theories on the nature of the real world must address non-locality.

Even today most people think in terms of what science would call local reality. Local reality means that effects that are strong within a given region of space weaken outside that region, so that it makes sense to divide the world into separate, self-contained systems that interact by forces and signals that fall off rapidly with distance. Thus, the idea of non-locality was shocking, because for hundred of years scientists have said that if anything moved it was because something else acted on it. Non-locality suggests that distant systems can be connected in a totally new way -- a way in which distance no longer seems to matter (Shacklett & Gough, 1991).

We believe that non-locality at the quantum level underlies all phenomena and that everyday reality is filled with innumerable non-local influences. We have suggested that non-local linkages to an aspect of reality beyond the physical world of form are what guide the coherence and dynamic assembly of the parts into a self-organizing system. The non-local input provides the guidance for maintaining the intercellular communication process essential for human growth and a healthy body. Thus, the human mind, with its ability to operate beyond the physical, permits humans to influence physical processes and hence, the healing process of a body -- one's own or others. This is the reason that the management of our thoughts and emotions is so important (Gough & Shacklett, 1995).

The question then becomes: How can our space-time world of experience, which is dominated by four forces propagating at the finite speed of light, be coupled to a non-local reality in which connections are immediate and unmediated? Dr. Robert Shacklett and I have proposed a model, as have others such as Drs. David Bohm and Basil Hiley (Shacklett & Gough, 1991; Bohm, 1980; Bohm & Hiley, 1993). These models suggest that non-local effects manifest in three dimensional space and time as waves/fields. These have been described in various terms: for example, Bohm's pilot waves (Bohm, 1980), Sheldrake's morphogenetic fields (Sheldrake, 1981), or as non-local or consciousness fields.

Our model has used a variation upon the twistor space concepts of Dr. Roger Penrose (Ward & Wells, 1990) and suggests that the change is introduced at the Planck length (10-33 cm). The result is a propagation of change into the physical world that results in a shift from a randomness/incoherence to

a greater order/coherence. Most scientists agree that matter floats on an essentially infinite sea of random energy. Another way of saying this is that orderliness floats to the top of a sea of chaos.

In previous papers we have discussed the process of moving from a state of entrainment of signals from our heart, brain and breathing to achieving an internal coherence state in our bodies (Gough & Shacklett, 1995). As one achieves the internal coherence state through unconditional love (agape), the non-local soul and the physical ego become like one because the constraints in the feedback flow between the non-physical and physical have been removed. We have become truly connected to the non-local aspects of reality; we have "tuned" our bodies to receive non-local information. When one compares the data from ECG recordings of the heart associated with different feeling states, one finds that the internal coherence state is uniquely identified by its harmonic spectrum or overtones. In a sense we are in tune with the music of the whole. There is a harmonious chord that is struck -- the term we use for this chord is love. It is the optimum feeling state for the human to relate to the total environment -- to tune to the whole, to the non-local aspects of reality. This is why in religious teachings God often corresponds to love (Gough & Shacklett, 1995).

In the internal coherence state the heart rate remains essentially constant and the power spectrum density under these conditions is close to zero. Such a near-zero heart rate variability in untrained individuals, when it persists for a length of time, indicates a pathological condition that often precedes death. However, in trained individuals it represents an indication of exceptional self-management -- a state that can be entered into and returned from (Tiller, et. al., 1996).

As individuals enter into entrained and internal coherence states could they affect others around them and, since we are accessing a non-local aspect of reality, could effects be detected at other distant locations? We do not have complete scientific answers to this question. However, there are indications in experiments using random number generators that intention, thoughts, and emotions produce a "field consciousness" that can alter physical randomness (Radin, 1997, pp.157-174). For example, if we flip a coin a very large number of times, we would expect to observe an approximately equal numbers of heads and tails. This is an indication of physical randomness. If instead we obtain a significant excess of heads over tails, we seek a cause for the variation from randomness.

Over 50 experiments using random number generators have recently been carried out to explore field consciousness effects. Experiments have shown that environments that foster a relatively intense subjective coherence or resonance among the participants show the largest deviations from the mean of random chance expectations. Whereas those measurements generated in more pragmatic assemblies of people like a typical business meeting or conference show no change in randomness. Figure 3

represent data taken using random number generators at a workshop of Holotropic breathwork and at a Shoshone shaman healing ceremony. Both examples indicate the shift from randomness to a more coherent situation (Radin, 1997, Nelson, et.al., 1998).

Recent experiments have studied changes in physical randomness when as many as a billion people all focus on the same event. Global television broadcasts when the world's attention is captivated by the same event provide the opportunities to explore such changes in field consciousness. Examples include broadcasts of the Academy Awards, sporting events like the Olympics, the funeral of Princess Diana, and the announcement of the O.J. Simpson verdict. These studies use a number of random number generators located at various sites around the world. The outcomes strongly suggest that the interconnectedness of non-local phenomena operates "in the large," and can be objectively detected (Radin, 1998).

We are treating randomness as a limiting case of order -- hence strict determinism and chance (i.e., randomness) represent processes that are at opposite ends of the general spectrum of order (Bohm & Peat, 1987). We have just presented evidence that our intentions, thoughts, and emotions can produce non-local effects -- a change that results in a shift from randomness to greater coherence or vice versa. How do such non-local inputs produce a change in the cellular structure of a human being?

We have discussed our model for this process in previous papers and, therefore, will only summarize it here (Gough & Shacklett, 1993a, 1995). Non-local changes originating in pre-space appear in that aspect of reality that we call 3D space and time at the Planck length -- this is where form or information is first created. We envision a shift in the randomness/coherence spectrum of the quantum vacuum.

We have modeled this coupling from pre-space by using twistor theory, for which the twistor is the intermediary for affecting particles. This shift, we predict, will manifest in physical matter at the atomic level as a change in spin state. A change in spin state is the minimum that we can do to put information into a system, since the spin is the most basic state that you can change in the physical. The result appears as a modification of the vector potential as described by electromagnetic field theory. Variations in the electromagnetic field can be observed at the molecular level as a change in quantum state. Such a change in the quantum state results in a movement of charge which produces an alteration in the shape of the molecules. Such shape changes correspond to a modification of the spectrum of electromagnetic radiation being produced by that molecule, i.e. it modifies the set of vibration frequencies of the molecule (its spectrum).

This latter point, the correspondence between shape and spectrum and vice versa, is an exciting new field of mathematical research known as drum theory. **Science agrees that everything in the universe is vibrating. Objects that vibrate, be they drumheads or atoms, have characteristic vibration frequencies -- they each are putting out a different tune.** From a knowledge of these vibration frequencies information can be gleaned about the vibrating object. For example chemical elements in stellar atmospheres were identified by their characteristic spectral "fingerprints." In principle, there appears to be no fundamental problem standing in the way of determining the characteristic vibrations of a "drumhead" no matter what its shape. However, it has been shown that two drumheads of different shape can have the same vibration frequencies. This is a field of research in which the detective work of deciphering what geometric information a spectrum holds has barely begun (Gordon & Webb, 1996; Peterson, 1998).

What this all implies is that thoughts and emotions via their non-local effects can change the shape of molecules in the human body. This in turn changes the vibrations of the body. When someone says, "He has bad vibes or I feel his spiritual presence," they may indeed be detecting at a very subtle level the vibrations of the molecules in the other person's physical system. This would correspond to the use of our cellular communication system as a vibration spectrum detector. When a healer scans someone's body for problems, could they be detecting areas where the vibrations (molecules) are out of coherence with the whole system?

A wave by nature is spread out -- waves must be moving somewhere, or they would not be waves. Whereas a definite atomic property is its position -- as well as its shape or form. One of the key questions that has been debated in quantum physics concerns the relationship between the particle and wave aspects of a quantum entity's behavior. Dr. Niels Bohr described these as complementary properties.

Complementarity can be looked at in the same way that the head and tail of a coin are complementary. If you place a coin flat on the table, it will have either the head uppermost or the tail uppermost, but not both at the same time. Both still exist, even though the observer can only perceive one of them. Complementarity, or wave-particle duality, is related to the wholeness of the system. Some physicists believe it is the most fundamental dynamic in our conscious constructions of reality (Kafatos & Nadeau, 1990). Recent research has shown that "individual quantum-mechanical entities need have no well-defined state: they may instead be involved in collective, correlated ('entangled') states with other entities, where only the entire superposition carries information" (Knight, 1998, Durr, et.al, 1998).

When we start dealing in masses much bigger than those of atoms, the quantum effects discussed above are so small that their influence can be ignored -- except for the fact that everything larger than atoms is itself made up of atoms. Thus, most scientists don't expect wave-particle duality to show up for



a brick, or a house, or a person, because the quantum effects become insignificant for large masses (Gribbin, 1995; Haroche, 1998). **However, the real issue is that most scientists do not accept the possibility that there could be an input to the atom from an aspect of reality or pre-space beyond 3D space and time. In this paper we are focusing upon this non-local input and its effects upon the shape or form of the molecules in our bodies.**

Those molecular changes that are the result of non-local connections are eventually converted by the body into understandable signals. You perceive these signals as "seeing," "hearing," "feeling," etc. because they are going through the same process of interpretation in the brain as our ordinary senses. Examples are inner voice experiences of persons who are not classified as pathological by modern psychology (Heery, 1988), and the visual perceptions of those doing remote viewing research and experiments (Targ & Kutra, 1998).

In an earlier paper (Gough & Shacklett, 1995) we presented our rationale for believing that "light" creates our world of pattern and form. In agreement with many other scientists, we defined the domain for "light" as the full range of the electromagnetic spectrum. In current physics theories this domain extends from the frequencies associated with phenomena at the Planck length (10<sup>-33</sup> cm.) to those corresponding to the size of the universe. In our model we assume that the entire physical world is unfolding at the speed of light out of realms beyond space-time. Everything in the physical world represents various manifestations of light. Modern physics has already found that under the right circumstances in the quantum vacuum, light and matter can switch identities (Flam, 1994). Since we wrote our paper, experiments at the Stanford Linear Accelerator have created electron-positron pairs using "real" photons from a laser beam. In effect they have broken the "Law of Matter Conservation" -- a law that says "Thou shalt not create matter from nothing" -- by converting light waves into a matter form (Tatterson, 1997).

These effects have been predicted by scientists in the past. **For example, Dr. David Bohm has stated that matter could be considered as "condensed or frozen light." (Weber, 1986, p.45 quoting Bohm).** Dr. Basil J. Hiley, a coauthor with Bohm, states that "particles themselves are merely 'ripples' on the 'sea' of underlying activity. In this outlook there are no ultimate particles out of which all other particles are formed. Rather, we will have quasi-invariant forms which can transform to each other and can be self-organized into hierarchies of larger quasi-stable isolatable systems. --- it is not so much that points exist but that they persist. They persist not in the sense that they are static, but rather that they continually transform into themselves" (Hiley, 1991). **Hence, as our model hypothesizes, light can become the manifestation of archetypal blueprints that take on and maintain physical form; and such manifestations can be affected by our thoughts and emotions, since our minds function non-locally.**

## LANGUAGES OF LIFE

**We will now address the cellular communication process in our bodies. How can a non-local input at the atomic level create behavior changes?** First we must realize that the body uses a series of different "language scripts" in its internal communication processes. Science is now trying to understand the translation codes that relate these languages (Pollack, 1994).

As an analogy, we could say that science is trying to read the Rosetta Stone of the human body. In 1799 at the threshold of the 19th century, the Rosetta Stone was discovered in Egypt. The inscription on the stone was written in three different scripts -- Greek script, a cursive form of hieroglyphic script known as demotic script, and Egyptian hieroglyphs. The breakthrough came when a remarkable man, the Englishman Thomas Young, began work on the Rosetta Stone. Young was a linguist, physician and physicist, who is still remembered for his wave theory of light. His work started the process of linking the wisdom of ancient Egypt and Western culture (Robinson, 1995). I am sure that during the 21st century which we are now entering, science will decipher the Rosetta Stone for the body's languages of life, but it will require the same interdisciplinary skills that were present in Thomas Young.

The cellular communication process starts within one or more cells and propagates throughout the system via the existing electromagnetic or chemical communication systems. The cell's surface membrane (skin) is a barrier of highly selective permeability which regulates the relationship between the cell's internal activities and its environment. In this paper, we will focus upon the intercellular communication in terms of the movement of molecular proteins. However, it should be recognized that we are also dealing with electromagnetic fields and forces. "Nature apparently uses ions, and the electric current which can be carried by them, as a kind of universal language for coordinating intercellular activities and certain relations between adjacent cells" (De Loof, 1986, p.334). For more detail, one should read Dr. Arnold De Loof's excellent review article on "The Electrical Dimension of Cells" (De Loof, 1986).

What are the three scripts that are used by the body in its communication of the language of life? Let us start first with a language that the cells use to communicate to one another. These are protein molecules that consist of chains of amino acids. They are sculptured figures more like the Egyptian hieroglyphs except that they are three dimensional shapes. These proteins carry the meaning of the DNA. These messenger molecules have been called molecules of emotion (Pert, 1997). In our bodies we have a psychosomatic communication network in which information is flowing. Messenger molecules are being released from one place and then diffusing all over the body. They carry their information to other cells that have the appropriate receptor molecules (Restak, 1994; Moyers, 1995). All these molecules are vibrating. As they change shape, the vibrational spectrum and the associated energy changes. This combination of messenger molecules and their receptors are the material manifestation of emotions in the body -- they direct the use of energy in the body.

From the above it would appear that our bodies are like a chemical pharmaceutical complex. Each cell has the ability of producing chemical messenger molecules. The protein factories within each cell are the ribosomes. Their raw materials are the twenty amino acids. They receive their orders from messenger RNA triplets which could be compared to grooved phonograph records that are then played to "hear" the instructions.

But where do the production orders originate and where does the energy to transmit the message come from? To answer these questions we must recognize that there exist within each cell molecules which are particularly good at storing complex coded information. These molecules contain our evolutionary memory. They are the DNA molecules, and there are different types of DNA within each cell. The DNA molecule that issues the production orders is the famous double helix molecule that forms the nucleus of the cell. But first let's discuss another DNA that stores the coded information necessary to power the cell. Information is what gives a system its form and structure. But energy provides the power that moves a system, connects all aspects of a system, and helps systems communicate.

This important energy DNA carrier is called the mitochondria -- another organelle or "organ" within the cell. The mitochondria are the power plants of the cell. Their DNA is circular rather than double helix shaped and comes only from the mother. It is the mitochondria that provide 90 percent of the energy for the operation of the cell and thus for the body. They have been related to problems of both chronic and degenerative illnesses as well as the aging process. Most scientists theorize that between two and three billion years ago a "marriage" took place between a single-celled organism and an oxygen-using bacterium. In the resulting symbiosis the oxygen-using bacterium not only absorbed the waste oxygen her host was producing but provided energy for the host cell as well. The oxygen users are now named mitochondria and exist in every cell that has a nucleus (eukaryotic cell) from yeast to human. (Wallace, 1997; Bova, 1998).

The DNA molecule within the nucleus of the cell contains the evolutionary history of the human species. The double helix uses four chemical bases arranged into three billion binary pairs. The binary pairs can be compared to the binary number system that modern day computers use. The binary pairs are organized into over 100,000 segments. The question now becomes: "Who" makes the decision to send a particular order to the protein factory to produce a given information molecule which then changes our body and its chemistry and behavior?

The DNA molecule is a great historical text. It's more like an encyclopedia than a novel. The DNA molecule stores the information that unites life into a common history. The cell "looks up" the information necessary to respond to input received from its external environment at its surface. However, it is our hypothesis that the cell is also responding to non-local input received directly.

The DNA text is effectively a molecular lego set in which the shape encodes information. The information is read by molecules like a "braille" text. Errors occur when items in the "encyclopedia" are out of order. For example, if information on "Washington" was mistakenly filed under "A" rather than "W", one might never find the data. The most sensitive period for human development is during times of rapid cellular growth and change -- the development of the fetus into the newborn baby and then

into a rapidly growing child. It is at these times that errors can be introduced into the information process necessary for accurate cellular communication.

A human being starts from a single egg cell. The development from that single fertilized egg cell to the many specialized cells in the body is called differentiation -- see Figure 4. The processes that organize the different cells into tissues and organs are collectively called morphogenesis. For science this amazing accomplishment has remained a mystery -- the DNA corresponds to a parts list; science has never found within DNA the instructions for construction -- the time sequence necessary for assembling the form.

Our hypothesis is that this developmental process is guided by non-local input originating from pre-space -- from an "archetypal blueprint." Good cellular communication is key for the successful "construct" of a healthy human being. However, noise and interference in this cellular communication system due to environmental input can cause severe problems. This is why pregnant mothers are warned about ingesting chemicals and avoiding electromagnetic and particle radiation. One merely has to look at the stages in the development of the prenatal brain to observe the magnificent changes in both size and complexity (Restak, 1995, pp.25-36).

After the birth of the baby, the neuron cells develop in the infant's cortex a complex web of interconnection -- see Figure 5 (Gregory, 1987). What has developed is in effect a "wiring diagram" that establishes thinking and behavior patterns that can last a lifetime.

The critical importance of providing the fetus and developing baby the environmental input most appropriate for healthy evolution of the brain has been a focus of the work of Dr. Francis Rene Van de Carr, Chief, Obstetrics and Gynecology, St. Rose Hospital, Hayward, CA. Research has shown that there exist developmental windows of time during which aspects of the nerve cell "wiring diagram" grow. These windows are periods during which there are massive changes occurring due to very rapid brain cell growth. They are periods when the creation of the brain's wiring diagram is very sensitive to sensory input.

Examples of sensory inputs include tactile patting, vibratory movement, and sounds from voice to music to simulated heart beats; but they also include non-local inputs such as loving thoughts and feelings. Such sensory inputs have been shown to increase growth rate, improve motor functions, enhance intelligence, and change the sense of self for life. The developmental window that Dr. Van de Carr considers most important has been called the "affection window" which remains open from between four months into the pregnancy until three months after birth. Lack of proper sensory inputs during this period can produce an emotionally non-reactive person -- one who does not feel compassion or connection to other humans -- one who could easily become a serial killer who processes the data of life so differently (Van de Carr, 1996).

If the initial input for the differentiation of cells in the human body is a non-local phenomena, are there special cells located somewhere in the body optimized to receive this input? **I will now speculate that a key communication channel for non-local input is in the heart.** As an engineer this is how I would design the system because the heart produces by far the strongest electromagnetic signal -- a signal that is broadcast to all the other cells of the body. "Superconducting quantum interference devices,

magnetocardiograms, and magnetoencephalograms that measure magnetic fields outside the body show that the heart generates over fifty thousand femtoteslas --- compared to less than ten femtoteslas recorded from the brain." Thus, the heart's magnetic flux density is over 5,000 times larger than that of the brain (Pearsall, 1998, p.55; Clarke, 1994). Although these are very tiny magnetic signals, they are important. **We believe the magnetic field via the magnetic vector potential serves as the EM bridge to the non-local aspects of reality, as do other scientists and even philosophers of science (Gough & Shacklett, 1995, p.26; Tiller, 1997, p.303; Bohm & Hiley, 1993, 50-54; Brown, 1994, 142-159).**

In addition, we know that between the heart and the brain there exist neurological connections plus a more recently discovered direct neurochemical and electrochemical communicational link. The heart produces a hormone known as Atrial Natriuretic Factor (ANF) that profoundly affects every major organ of the body including the brain (Pearsall, 1998, 68-69).

In all the mystical traditions the heart is recognized as the center of spiritual consciousness (Hall, 1988). For example, the Tibetan disciple Alice A. Bailey stated in 1934: "The soul, seated in the heart, is the life principle, the principle of self-determination, the central nucleus of positive energy by means of which all the atoms of the body are held in their right place and subordinated to the 'will-to-be' of the soul." (Bailey, 1980). **We believe that the soul represents a non-local aspect of reality that retains patterns or forms beyond ordinary 3D space and time -- a person's archetypal blueprint or, as psychology has termed it, one's higher self.**

Science can say very little about these statements of mystics. But there are some suggestive scientific clues that are supportive. Following egg cell fertilization there is a process of division into smaller cells that form a sphere known as a blastula. Then the process of differentiation begins. However, science doesn't know where that signal for the first cell to differentiate came from. These first differentiated cells have rhythmic electrical activity. They are sending out electromagnetic messages to the other cells. The first functional organ in the developing embryo is the heart. In fact, by four days the electrocardiogram of a chick embryo approximates that of an adult (Gilbert, 1994, pp.342-344).

Let us assume that the electromagnetic field being generated by the mother's heart is the source for the first signal to an embryo cell to start the differentiation process. Our hypothesis is that these heart cells receive the archetypal blueprint for the body and transmit via chemical and electromagnetic means the information that tells every object in the body how to do its job. In about 1% of identical twin births, one of the twins is born as an undifferentiated cell mass -- an "acardiac monster" (James, 1977). This would appear to be a case where interference with the heart-forming electromagnetic signal had caused cellular communication to break down, with the result that the required non-local input could not be received.

An even more amazing process is dedifferentiation. This is when specialized cells like blood cells go back into neo-embryonic cells and then redifferentiate into another type of cell needed by the body, like a bone or cartilage cell. For example, it is the process that occurs when a fracture heals in a frog as shown in Figure 6 (Becker, 1985). In spite of the obvious medical appeal of regeneration of limbs, etc., scientists know relatively little about the process. Continuing research still encounters mysterious barriers to

regeneration both in traditional laboratory animals and humans (Travis, 1997). The mystery behind this process has become a symbol for human transformation -- the process of dedifferentiation and redifferentiation is what occurs when a caterpillar transforms into a butterfly.

We know that fingertips cleanly sheared off by accident in children eleven years old or younger "invariably regrow perfectly in about three months" (Becker, 1985, p.156). **When spiritual or shamanic healing occurs we suspect that the cellular communication message and the required energy have been imparted to the body so that dedifferentiation occurs and the body can restore its archetypal pattern.** Recall that after seven years all the cells in the human body have replaced themselves -- yet we are the same person -- the ability to maintain the archetypal blueprint remains.

#### DNA CHANGES AND BEHAVIOR

Alzheimer's research is providing a model for how brain research is likely to develop in the future. The findings suggest an important principle described by Dr. Restak: "A continuum exists from the molecular to the behavioral: the memory loss, disorientation, and other disabling features of Alzheimer's. Or one can begin at the other end of the continuum and work inward to inner domains of the nerve cell: experience influencing brain systems, which influence circuits, which influence synaptic relationships, which influence ion channels, which influence neurotransmitters, which influence second-messenger systems, which, finally, influence genes to change structure and function." (Restak, 1995, p.134).

**This paper has focused upon the possibility that non-local input can cause the DNA molecule to change structure and function and thus affect behavior. Healers can cause the shape and hence frequency spectrum of DNA to change. This initiates a process that is like tuning a chemical transceiver. The shape of a molecule is the easiest aspect to change. Figure 7 shows three ways of showing the structure of a protein molecule. Non-local input can change the charge on the atoms that make up the molecule which changes the angles that they bind to their neighbors as shown in Figure 7b. The result is a change in the molecules shape as shown in Figure 7c which changes the message being sent by the cell (Rose, 1998, p.40).**

**Mutations are changes in the sequence of the four chemical bases in the DNA of a gene. Such mutations represent a change in the information within DNA -- the meaning encoded within the DNA. These changes, which can occur at any time, are often harmful and our cells have many ways of preventing them. The question remains whether healers can facilitate positive changes by altering the sequence of the DNA bases. There is some preliminary evidence in support of this possibility (Rein & McCraty, 1992).**

Humans can now mechanically insert items and instructions into the DNA encyclopedia of parts. Modern science has now embarked upon this path. The actual insertion and/or removal of entries by healers, however, is much less likely but theoretically possible. The entire sequence of human DNA -- the human genome -- evolved over thousands of millions of years. Yet, "A quarter century of genetic studies has consistently found that for any given region of the genome, humans and chimpanzees share at least 98.5% of their DNA. This means that a very small portion of human DNA is responsible for the traits that make us human." Researches are now poised on the verge of a brave new world where they will be able

to identify and tinker with the DNA that makes us human. We will face new ethical dilemmas. (Gibbons, 1998)

As a child in New Jersey I loved to watch and play at night with the glowing "fireflies" as they flashed their photoluminescence light. Thus, when I saw a photograph of a green glowing iridescent mouse, it left an indelible impression upon my mind (Harlow, 1997). The Japanese scientists had graphically illustrated to me how a mammal could be altered by inserting a new entry into its DNA encyclopedia that they had obtained from a fish. By adding or deleting parts and altering instructions humans now have the power to change the evolution of a living physical creature, and perpetuating those changes through many generations.

Gene-altered mice are by far the animal of choice among the small zoo of creatures scientists now use to study the genetic basis of disease. For example, at Duke University, some 30,000 mice are housed in its Transgenic Mouse Facility because their altered genes harbor fundamental secrets that they believe can help save millions of human lives (Meredith, D., 1998). Many scientists are concerned that we do not fully understand the meaning of the "words" in the languages of life and their interrelationship to the whole message being written by Nature.

Mistakes can be made. Neuroscientists are already looking for evidence that some neurologic and psychiatric diseases result from chemical toxins in our everyday environment due to gene alterations. One neurologist writes about a problem that has already occurred: "Even chemicals that we eat, both natural and synthetic, can exert devastating effects on the adult brain. Foods like the drought-resistant grain pea can induce a disease marked by gradual paralysis and eventual death. The active ingredient in the pea is thought to be an excitatory amino acid that, after ingestion, attacks certain parts of the brain." (Restak, 1995, p.120)

#### SUPPORTING RESEARCH

Intriguing research supports our contentions regarding the informational memory content and the non-local interconnectedness of cells.

First, in recent decades there have been a rash of physics experiments designed to test whether nature really does exhibit the "implausible" non-locality. This repetition and extension of the physics experiments on non-locality have continued to support the existence of the phenomena as an integral part of physical reality. The distance over which non-local effects have been observed has been increased by about three orders of magnitude. A recent experiment has demonstrated non-local quantum correlations over a distance of almost seven miles (10.9 km) (Tittel, et.al., 1998). In theory, there is no limit to the distance over which non-local effects can occur.

Second, the medical profession is becoming increasingly aware that the cellular structure of transplanted organs carry with them a memory content to a degree never before considered possible. This research has been discussed in a number of books and articles. After surgery, food and music likes and dislikes sometimes change dramatically, and recipients occasionally even use words they never

spoke before. For example, one recipient used the word "copacetic" which was key to the donor in his intimate relationship with his wife (Pearsall, 1998, p.76).

Two specific examples: A thirty-five year old female heart transplant recipient had a sudden greatly expanded interest in sex, and her whole approach to sexual activities changed. It was only later that she and her husband learned that she had received the heart of a twenty-four year old prostitute (Pearsall, 1998, p.89). An eight year old girl received the heart of a murdered ten year old. After the transplant, the girl started screaming at night about dreams of the man who had murdered her donor. The police using the description of time, place, clothes, etc. from the little girl found the murderer and convicted him. (Pearsall, 1998, pp.7-8).

Third, if the organs of our body have a cellular memory, is there research evidence that our thoughts can influence individual cells? Drs. Elmer and Alyce Green of the Menninger Foundation used the research of John Basmajian (Basmajian, 1962, 1963) to support their observations during biofeedback studies of voluntary control of single nerve cells. Basmajian described a muscular firing pattern called "single motor unit firing" which appeared when a person reduced the tension in a muscle to levels far below what had previously been thought possible through visual and auditory feedback or through meditation alone.

In the words of the Green's: "In Basmajian's research each pulse of the single-motor-unit firing was heard on a loudspeaker as a thump, and he soon noticed that with auditory feedback a person could learn to control the thumping pattern. For instance, if it was desired to hear thump-thump followed by thump-thump-thump, quite often it would happen. People found that they could manufacture doublets, triplets, and drum rolls at will. The important point of the research was the fact that single cells were being controlled by volition. This fact is remarkably significant. From a medical point of view, the ability to develop conscious control of a single nerve cell has theoretical consequences that extend through all biofeedback research, whether in the domain of voluntary muscles or the autonomic nervous system or the central nervous system." (Green, 1989).

Fourth, is there evidence that cells perceive, record and act upon one's thoughts, intentions and emotions via a non-local process? Cleve Backster has been doing research to test his basic hypothesis that "our thoughts are known by single cell organisms as well as by the cells of complete organisms." (Stone, 1989, p.31) Backster is an innovator and well-known expert on the use of the polygraph (lie-detector). He developed the Backster Zone Comparison polygraph technique which continues to be used as a world standard.

In the 1960's Backster studied the physical and emotional relations between plants and man (Tompkins & Bird, 1972). More recently he has studied how individual human cells communicate and know what you are thinking, even when removed and observed at a distance away from one's body. His research has focused upon white cells obtained from scrapings of the roof of the mouth. These cells are known scientifically as in-vitro leukocytes although he has also used human spermatozoa and other human cell clusters (Backste & White, 1985; Stone, 1989, pp.66-67).



His research has shown that cells appear to have a "primary perception." Backster considers "primary perception" more fundamental than the five basic senses which monitor the physical environment. It is equivalent to a non-local input from a universal life force which enables cells to react to thoughts, especially to thoughts with high emotion or thoughts of life or death (Stone, 1989, pp.21, 52, 59).

Hence, our thoughts or emotions can be known by our liver cells, our artery cells, our heart cells, our kidney cells, etc. This supports the research on positive self-healing effects via affirmations and visualization. Also, since the types of cells in each organ are quite specialized, one might suspect that certain types of thoughts would affect certain cells preferentially. Thus, due to their particular thought patterns one could have the cancer prone and heart attack prone persons. Alternatively, by focusing upon the heart with feelings of love and appreciation, the positive effects noted by the training and research at the Institute of HeartMath might be anticipated (Childre, 1994).

Although at close distances, experiments by others have shown that electromagnetic fields are a communication process used by cells; Backster's research has included experiments over distances of miles. Dr. Brian O'Leary, a NASA scientist-astronaut, conducted experiments with Cleve Backster both in the laboratory and over distances of 350 miles away using his own donated white blood cells. T

o Dr. O'Leary these experiments "suggest there is no reduction in signal, unlike what one might expect for electromagnetic waves familiar to the physicist. One would have expected an attenuation proportional to the inverse square of the distance, but that was clearly not the result" (O'Leary, 19??). To further eliminate the possibility of EM field effects, in March of 1998 Backster performed experiments at the California Institute for Human Research in Encinitas using a sophisticated magnetically and electrically shielded room. He obtained similar results to previous research when he recorded a philodendron plant and a bacterial culture (yogurt) inside the shielded room (Backster, 1998). Backster has concluded that neither distance nor shielding are inhibiting factors. Thus, non-local input to the cells appears a more likely cause.

There is another aspect of Backster's work that suggests a non-local input. Our model predicts a non-local continuum of intelligence that fills all space -- the wisdom of the interconnected web of the whole. Backster's research clearly indicates the importance of spontaneity and sincere intention. Both plants and human cells appear to discriminate between a thought that you do not really mean and a thought that is "for real" (Stone, 1989, pp.37&58). This can create a problem for the use of certain scientific protocols since one could be in effect telling the plants and cells ahead of time what is going to happen - - spontaneity is lost and the intention is often to deceive.

Support in basic physics research for "thought discrimination" comes from the work and experiments of Dr. L. Mandel at the University of Rochester. Mandel describes experiments in which the result (a light beam interference effect) is influenced by the possibility that the experimentalist could take actions, even if he doesn't take these actions (Mandel, 1991). Thus, these data indicate that mental acts can influence future events. This research challenges the prevalent view of physics in which events are based on what is rather than what could be. In addition, recent experimental research on quantum

mechanical complementarity has shown "that the mere existence of information about an entity's path causes its wave nature to disappear" (Weiss, 1998; Durr, et.al., 1998).

Fifth, We have assumed that the shape of molecules and hence their EM spectrum of wave emanations can be altered by non-local input. We know that the DNA molecule can have different shapes. We speculate that the different shapes that DNA can have enable the DNA to act for the human physical system as the basic transceiver of information originating from beyond space-time.

Experiments by Dr. Glen Rein have shown that individuals in a continuous state of deeply focused love who were producing a coherent ECG spectra when holding a beaker with a test tube containing DNA samples could alter the DNA shape, (in technical terms, its conformation) (Rein & McCraty, 1993, 1994). In some cases, the changes observed were well beyond those produced by maximum thermal and/or mechanical perturbation, which are also known to change the conformation of DNA. In one case there was preliminary evidence "that in addition to changing the conformation of DNA, an alteration in the physical/chemical structure of one or more of the bases in the DNA molecule occurs." (Rein & McCraty, 1992, p.3).

In an exploratory experiment, three DNA samples were held at the same time with the intention of simultaneously causing different effects in two samples, while leaving the third sample unchanged. The results "indicate that the two DNA samples which were intended to change showed increased absorption peaks to different degrees, while the third sample showed no change in absorption". This precision use of focused intention suggests a non-electromagnetic information carrier. Also, long distance studies were conducted at 0.5 miles away from the test area. Intention coupled with coherent heart energy at this long distance caused DNA shape changes and, thus, supports the possibility of non-local input at the molecular level (Rein & McCraty, 1992).

Sixth: What additional evidence is there to indicate that we live in a world of patterns and symbols that are interconnected in non-local ways that science as yet does not understand? I believe that there exist strong clues regarding this mystery in the literature on identical twins reared apart. As one would expect, this literature discusses many personal characteristics such as religious attitudes, job satisfaction, antisocial behavior and other personality similarities that require a contribution other than the environment (Farber, 1981).

In fact, the evidence from personality studies using identical twins reared apart suggests "that powerful convergent factors must be continuously at work over the entire life span. If this were not true, the divergent factors commonly believed to be continually operative would create greater and greater divergence and drive the correlation for MZA (i.e., identical) twins towards zero." (Bouchard, 1986) The technical literature attributes these correlations to a "genetic contribution" (Lykken, et.al., 1990).

Our model suggests that the close coupling at birth for identical twins with "identical" DNA patterns leads to strong non-local influences between the two brain/body systems. This would represent an added factor to the genetic and environmental factors normally considered. It could also be the basis for the "unexplained" phenomena being observed that appear to correlate to the interconnected use of symbols and patterns (Shacklett & Gough, 1991).

For example, there is sometimes a trail of similar names inexplicably often associated with such twins. Bouchard describes two adopted infants both named by their adopted parents Jim. When they were reunited at age 39 they found that their lives were marked by a trail of similar names. "Both had dogs named Toy. Both married and divorced women named Linda and had second marriages with women named Betty. They named their sons James Allan and James Alan, respectively." In another pair of long separated twins, Bridget and Dorothy, Bouchard notes "another case of coincidence in naming children.

They named their sons Richard Andrew and Andrew Richard, respectively, and their daughters Catherine Louise and Karen Louise. (Bouchard is struck by this, as the likelihood of such a coincidence would seem to be lessened by the fact that names are a joint decision of husband and wife)" (Holden, 1980, p. 1324). Farber also reports such name similarities. In the case of Berta and Herta the twins had the same nickname of "Pussy" yet "The nicknames, it is worth adding, were in different languages since the twins lived on different continents and had not met since the age of four" (Faber, 1981).

The researchers often speak of these findings of parallels between reunited twins as "eerie," "bewitching" and "remarkable" (Horgan, 1993). They indicate to me that the shape and, hence, the spectrum of frequencies of molecules is far more subtle and detailed than modern science has ever suspected; and that such subtleties are very important in non-local interactions. These subtleties exist at the cellular level. Remember the heart recipient who was Hispanic and received the donor heart of a Caucasian who used the word "copacetic" as a code word with his wife. The heart recipient suddenly mysteriously starts using this unfamiliar symbol in a similar manner.

**In an earlier paper we wrote about the power of symbols (Gough & Shacklett, 1993b). We believe that mental thoughts function in pre-space, beyond 3D space and time. Thoughts represent non-local input that must be converted to symbols in the physical. People who devote their lives obtaining such non-local input are artists, musicians, poets, and prophets like Moses, Jesus, Mohammed, and Buddha (Gough, 1997). The more the cells of the person are in harmony with the whole, the more God-like will be the message. Unconditional love at the cellular level is the key for such harmony. We have suggested that a new and expanded scientific paradigm will be needed to encompass the possibility of this type of non-local input and the symbolic feedback process involved (Gough & Shacklett, 1996).**

## CONCLUSION

We will conclude the paper with a brief look at how the process between a spiritual healer and a healee might work. The healer's intervention starts with establishing a healing intention. There is an attunement of the healer's body to optimize the non-local connection which can be obtained by entering a feeling state of appreciation and unconditional love. The healer is now "one" with the universal wholeness (and with the healee), therefore, an appropriate intention at this point is a request for permission to heal. This is an acknowledgement on the part of the healer that he/she is not the real healer, but rather has

become a conduit to facilitate the flow of the healing information and energy from a much more encompassing non-local intelligence.

An entrainment and coherence process has been activated in the healer that will affect cellular communication in both the healer and healee. The healer is now generating an electromagnetic information field which the heart's EM field is broadcasting. Research at the Institute of HeartMath has demonstrated a transference of the electrical energy generated by one subject's heart which can be detected in the other subject's EEG (brainwaves) when they hold hands (McCraty, et.al., 1996).

Such an entrainment with the healer would facilitate the healee's coupling to the non-local input. In this paper, we hypothesize that a non-local "field" is also being generated in the healee's body that alters the DNA shape and hence the instructions to the body's cells. The indications are that, depending upon intention, the non-local effects can be very specifically targeted to areas of the body or can be broad and alter probability space by changing the consciousness "field" over broad areas.

What is the healee's reaction? The change in consciousness field may or may not be consciously detected by the healee -- it depends upon the person's sensitivity to subtle changes in their body. However, non-local information to the healee's cells is being received. If the healer is physically close, there could be an entrainment to the healer's electromagnetic field.

The first measurable physical effect of the non-local input is to alter charge at the molecular level. This changes molecular shapes which changes molecular messages. The DNA instructions for the production of proteins in the healee's body are altered. In effect, the meaning of the instructions have changed, for example DHEA instead of cortisol might be produced and the healee's body will respond differently. The overall change results in system coherence and the body's rebalancing and healing.

The change in the consciousness field can alter life events to bring about healing. An experience, which is quite similar to what occurred during a healing that a group of us did for an aeronautical engineer and college friend of mine, is described by the spiritual healer Jane Katra and Russell Targ as "The Healing of a Physicist" (Targ & Katra, 1998, pp.192-196). A characteristic of such event changes is that they are very difficult to prove scientifically. Nevertheless, data on consciousness field effects using random number generators support the premise that the physical environment can be changed by strong emotional feelings and focused conscious intent.

#### CORRESPONDENCE

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Figure 1: The Tree of Evolution

"Its roots converge toward the cell.

Its branches diverge in the direction of  
the incredible diversity of the living world."

[Reference: *The Origin of Life*,

B. Hagene & C. Lenay, NY: Barron's 1998]

Figure 2: Non-Locality

[Artwork by Robert Bourdeaux

8510 Brink Road, Gaithersburg MD 20882]

Figure 3: Field-Consciousness Effect

Figure 4: Dedifferentiation

From Specialized Cells to Neo-Embryonic Cells

[Reference: Robert O. Becker, M.D. & Gary Selden,  
The Body Electric, William Morrow & Co., NY, 1985]

Figure 5: Growth of Cells in Striate Cortex of a Human Infant

[Reference: The Oxford Companion to the Mind

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Figure 6: An Overview of Fracture Healing in Frogs

[Reference: Robert O. Becker, M.D. & Gary Selden,  
The Body Electric, William Morrow & Co., NY, 1985]

Figure 7: The Structure of Protein

(a) Primary, (b) Secondary and (c) Tertiary

[Reference: Lifelines: Biology Beyond Determinism,  
NY: Oxford University Press, 1998. p.40]