

White Paper III

Why CAM and Orthodox Medicine Have Some Very Different Science Foundations

by:

William A. Tiller, Ph.D.

The William A. Tiller Foundation

Why CAM and Orthodox Medicine Have Some Very Different Science Foundations

by:
William A. Tiller

Introduction

Today's orthodox medicine follows the mindset and focus of today's science which has a 400 year heritage of probing the nature of Nature! A cornerstone of that heritage, since the days of Descartes, has been the now unstated assumption that, "No qualities of human consciousness can significantly influence a well-designed target experiment in physical reality". Thus, Science as we know it is a science wherein effects of human consciousness cannot be allowed as a significant variable in the study of Nature's manifold expressions. Medicine has adopted this same unstated assumption, which is perhaps a useful approximation when dealing with seemingly inanimate objects, but not when dealing with living systems and especially conscious, self-motivated humans.

It is understandable that medical practitioners today wish to adhere to this "deny human consciousness significance" in their formal "mantra" because they feel validated and secure in the thought that orthodox science is on their side. However, for well over a century, orthodox science has ignored the validity of psycho-physiologic and psycho-energetic phenomena in nature. It has chosen to conveniently "sweep this class of natural phenomena under the rug" in whatever way it can because this class of phenomena is completely inexplicable if based on current paradigms.

On the other hand, for many decades, the general public has been responding to the many examples wherein psycho-energetic phenomena, due to both unconscious and conscious energy/information processes in humans, have been harnessed to a beneficial health-enhancing procedure by courageous medical practitioners. Furthermore, the general public has been willing to pay for such treatments without social reimbursement. Over time, this human behavior has led to a medical structural offshoot called holistic medicine, integrative medicine or complementary and alternative medicine (CAM). Orthodox medicine prefers to label these as medical quackery and, at every opportunity, tries to have them disenfranchised. Because it has the complete support of orthodox science, they and their professional societies, plus outdated laws, have acquired a great deal of clout and are formidable protagonists.

Meanwhile, during the past few decades, psycho-energetic science research⁽¹⁻⁴⁾ and energy medicine research^(5,6) have made significant inroads into the deeper understanding of Nature relative to human health-related psychophysiology issues. In particular, there is now concrete evidence^(2-4, 7,8) to suggest that two unique levels of physical reality exist. One is the familiar, electric, magnetic dipole, molecular and atomic states that have been deeply and effectively studied by orthodox science and orthodox medicine. This other level of reality appears to function throughout physical space; it interpenetrates the vacuum and the electric, magnetic dipole, atomic and molecular states. In general, these two very different levels of physical reality do not interact, consequently one level of reality is invisible to the other and hence to conventional measuring instruments. I have labeled this as the uncoupled state of physical reality. However, with the proper use of human consciousness applied through human intention, one can cause these two uniquely different categories of substance to interact and this leads to what I have labeled as the coupled state of physical reality (see White Paper I)

Although White Paper I provides a more complete description of what "coupling" means, for this White Paper, it is important to illustrate, in a mathematical equation format, how "coupling" alters an experimentally measured property of a particular material. This property could be (a) the pH or electrical conductivity, σ , of an aqueous solution, (b) the air temperature in a room, or (c) a magnetic

property of a ceramic, for example. Let us call Q the material property to be investigated and call Q_M the measured magnitude of that particular property (as the experimental space is being lifted by an intention-host device from the uncoupled state to the completely coupled state of physical reality). In the zeroth order, mathematical approximation, we find that

$$Q_M(t) = Q_e + \alpha_{\text{eff}}(t)Q_m. \quad (1)$$

Here:

Q_M = total magnitude of property Q ,

Q_e = the total magnitude of the contribution from our normal, uncoupled, electric atom/molecule world,

Q_m = the magnitude of the contribution from the vacuum level, magnetic, information wave world,

α_{eff} = the coupling coefficient acting between these two uniquely different worlds and

t = time.

If α_{eff} is of negligible magnitude, then the whole of the second term on the right of Equation 1 disappears and the equation just represents the result for our orthodox (standard model) physics i.e., that for our normal, uncoupled state of physical reality! However, if the application of an intention-host device, or a very strong human biofield, is sufficient to meaningfully alter both the Q_m -contribution and the α_{eff} -contribution to Equation 1, then this can significantly change the magnitude of $Q_M(t)$ in either a positive or negative direction, depending upon the specific intention used, yielding the coupled state.

This coupled state of physical reality is a much richer and more complex system (more variables) than our normal uncoupled state of physical reality. We can describe and mathematically model this partially coupled state system via the physics of thermodynamics to be shown in the following.

In the 19th Century, thermodynamics provided a scientific basis for the “Age of Steam”. It deals with available or free energy, heat and work, pressure, volume, temperature (on the absolute scale), equilibrium states, the thermal environment and the unavailable energy or disorder in the system which is called “entropy”. Order and information might be regarded as negative entropy. Since then, it has developed considerably.

The *coupled state* has a higher thermodynamic free energy per unit volume than the *uncoupled state* (electric, magnetic dipole, atomic, molecular). Thus, if one connects a coupled state physical reality system to an uncoupled state, electric, atomic/molecular system, the coupled, duplex, system can do work of any kind on the uncoupled, electric, atomic, molecular subsystem.

This material property is particularly important because our research⁽³⁾ strongly indicates that the human acupuncture meridian/chakra system is already at the *coupled state* of physical reality. This means that humans, through their own directed and focused intention, can significantly enhance the magnitudes and qualities of the unique energies/information flowing in their meridian/chakra systems. This in turn can then enhance the electrical energies flowing in the organs and cellular structures of the electric, atomic, molecular body. This is also the source of human psycho-physiological phenomena, labeled by traditional medicine as psychosomatic phenomena.

As a brief summary of the foregoing, in preparation for the next section, we have already experimentally observed that:

- (1) Physical reality consists of two unique categories of substance in the same physical space but only one is accessible for our orthodox measurement instruments when this level of reality is in

the *uncoupled state*. This is the level of reality studied by traditional science and orthodox medicine and is the reason why many practitioners of orthodox medicine think of CAM as quackery.

- (2) The second level of physical reality is invisible to traditional physical, chemical and medical instruments when the system is in the *uncoupled state* but is accessible to these same instruments when the system is in the *coupled state*. This second level is the level of reality being largely manifested through human psycho-physiology and is the experimental domain pursued by CAM even though many CAM practitioners do not realize it.
- (3) Thirdly, these two levels can be partially coupled by either, (a) simple electrical devices which have been ‘information-entangled’ with a specific intention from some humans in a deep meditative state or, (b) bursts of subtle energies present to some degree in human bio-fields.

The bottom line here for CAM is that its practitioners can either seek validating support from item (1) above, in which case they will eventually lose their future independence to orthodox medicine, and medical evolution will take a major step backwards or, from item (2) above, which will become a newly unfolding field of serious investigation that is their future validation. The future of CAM is inextricably linked to the success of psycho-energetic science⁽⁴⁾. All CAM practitioners need to become aware of this!

Section 2 gives a brief theoretical foundation for psycho-energetic science. Any necessary mathematics is relegated to an Appendix upon which some of the earlier comments have been based. The following Section 3 deals with several real world applications to illustrate to the reader how the theory is put to practical work. The final discussion, Section 4, deals with critical points and philosophical perspectives. The Conclusion is that orthodox medicine deals largely with the *uncoupled state* of physical reality while CAM deals largely with the partially *coupled state* of physical reality.

2. A Necessary Theoretical Perspective for Understanding The Coupled State of Physical Reality

When experimental data indicates that two uniquely different categories of substance exist in the same physical space but that they can be isolated from each other or indirectly coupled to each other, it is time to change our paradigm for viewing Nature from that appropriate for viewing a single category of substance to one suitable for viewing the behavior of these two very different categories of substance. The new (but arbitrary) reference frame that I have chosen for giving a useful description of physical reality is a duplex-reference-frame consisting of two reciprocal 4-dimensional sub-spaces (spacetime or D-space and reciprocal space or R-space). One of these sub-spaces is our conventional space-time. This duplex-reference-frame is in-turn embedded in a still higher (>7) dimensional reference frame from which the “coupler”, mentioned in the previous section, is activated via the application of human consciousness. Figure 1 provides a schematic energy band diagram to illustrate these different levels applied to Nature⁽¹⁻⁸⁾.

Dirac⁽⁹⁾ was the first to ask where electrons and other very small bits of physical matter came from. He used a diagram somewhat like that in Figure 1 but no substructure was discriminated in the physical vacuum, nor was the term “spirit” used to label some unknown embedding domain as I have done in Figure 1. The external energy source was postulated to be a cosmic ray (a very high energy electromagnetic photon). This interacted with postulated negative energy states in the physical vacuum to create and eject a particle with positive energy such as an electron leaving behind a “hole” in the vacuum state. This hole was calculated to have a positive energy, a positive mass and a positive charge and formed when an electron was created. Within a decade, this “hole” was experimentally discovered and labeled the “positron”, the very first bit of antimatter. Today, physicists have discovered an

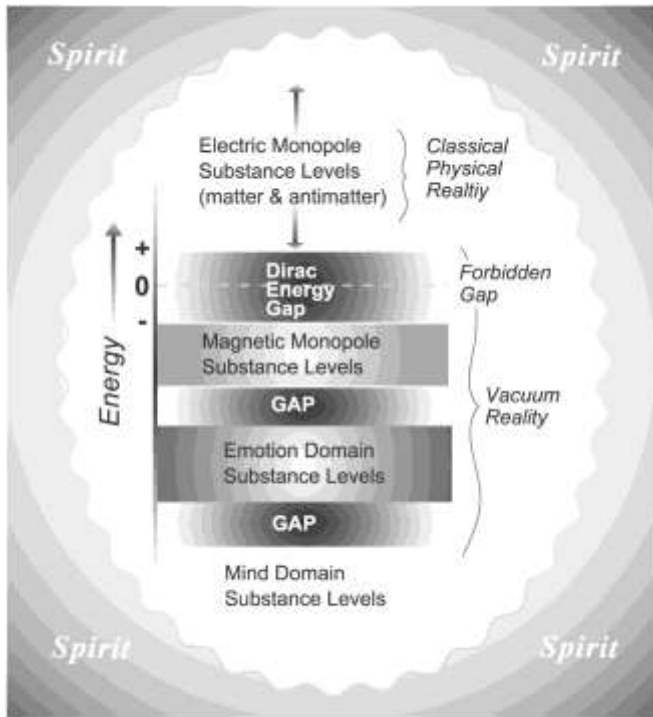


Figure 1. An energy level diagram embracing both classical physical and “unseen” vacuum levels of substance.

antimatter counterpart for every positive energy particle which has been discovered over the past 70 years. Dirac calculated the formation energy for this electron/positron pair. He was about 99.9% correct in his prediction of the experimental value even though he neglected one important factor⁽¹⁾. It is Dirac's theoretical procedure and his assumptions that justify his use of the above diagram and perhaps my extension of it (for more, see White Papers VI and VII).

3. Coupled State Applications

3.1. Where Does Homeopathy Fit Into the Picture?

A recent paper, published in JACM⁽¹²⁾, recorded a roundtable debate between proponents of homeopathy and its opponents from allopathy with no clear resolution of the issue. I believe that this “butting of heads” occurred because there is no overarching general theoretical construct that includes both perspectives. This had not been formulated until recently^(12,13). In this section, my purpose is to clearly reveal this general theoretical construct through the use of thermodynamics.

Utilizing my duplex space model as discussed in White Paper I, the Gibbs thermodynamic free energy per unit volume¹ G of a material in the partially coupled state of physical reality can (according to Equation 1 in the Introduction with the undefined quantity Q replaced by G) be generally expressed as an expansion about some standard state value G_0 in terms of the thermodynamic intensive variables to obtain the mathematical result given in Appendix I. $G - G_0$ is the sum of two main groupings of contributions from different thermodynamic intensive variables and ξ is defined as the general representation of all these different thermodynamic intensive variables which include: $P =$ pressure, $T =$

¹ A system at constant temperature and pressure will reach equilibrium at a minimum of its components' [Gibbs free energy](#) $G = E + PV - TS$ if the system's properties are determined both by the temperature T and by the pressure P , and at a maximum of their [entropy](#) S (E is the internal energy and V is the volume).

temperature, C = concentration of a particular species, \underline{E} = electric field, \underline{H} = magnetic field and \underline{g} = gravitational field.

Expressed in this way, one can immediately distinguish in D-space the electric, magnetic dipole, atomic, molecular and allopathic contributions from the R-space magnetic information wave and homeopathic contributions. Thus, in terms of thermodynamics, the homeopathic contributions are real and distinguishable from the allopathic contributions provided (a) α_{eff} is non-zero in magnitude and (b) ξ_j is much smaller than $\alpha_{\text{eff}} \frac{\partial G}{\partial(1/\xi_j)}$.

For all humans, their acupuncture meridian/chakra system is already at the partially coupled state of physical reality⁽³⁾ so the local α_{eff} is always greater than zero. Thus, if the mathematical variations of the slope $\frac{\partial G}{\partial(1/\xi_j)}$ are less than quadratic in ξ_j at very small ξ_j , there will always be a large thermodynamic free energy to provide a driving force for change under the homeopathic regime.

Homeopathic physicians need to understand that their remedies are not functioning at the traditional electric, magnetic dipole, atomic, molecular level of the body but, rather, at the magnetic information wave level within the physical vacuum which interpenetrates all the atoms and molecules of the human body.

In addition, it is important to understand that the overall picture is somewhat more complex than might be anticipated from the equations of Appendix I. This is because of the strength of a particular individual's value of α_{eff} due to their acupuncture meridian/chakra-related biofield. This leads to a type of human-generated “placebo” effect that is always present to some small degree.

Moving on to homeopathic potencies, the succussion/dilution-with-intention aspect of homeopathy has ‘boggled’ the mind of traditional chemists and allopathic medicine practitioners for well over a century. From their traditional thought processes concerning ideal thermodynamic solutions, they naturally ask the question, “How can there possibly be a chemical reactivity effect when the average aqueous solution concentration, C_i of the treatment molecule, i , has been reduced to less than one molecule per 100cc of solution by the sequential succussion/dilution process?”

In response, one needs to realize that all processes in nature that we know of are driven by spatial or temporal differences in thermodynamic free energy functions, $G-G_0$ (see Appendix I). To simplify things a little, let us restrict our remarks to just the $\partial G / \partial C_i = \mu_i$ = the chemical potential contribution to G for the i^{th} -species. In terms of all the thermodynamic intensive variables mentioned above, μ_i is completely specified by Equation I-5b of Appendix I.

Now, a very important definition for the chemical activity is given by

$$a_i = \gamma_i C_i \quad (2a)$$

so that

$$\ln a_i^* = \ln \gamma_i^* + \ln C_i \quad (2b)$$

Here, γ_i is called the thermodynamic activity coefficient for the i^{th} -species and γ_i^* is the modified thermodynamic activity coefficient (see Appendix I, Equation I-5d).

For ideal chemical solutions, experience has shown that, as C_i is taken towards very high dilutions, γ_i goes to unity so, both terms on the right hand side of Equation I - 3b become very small in magnitude and a_i becomes insignificant. This would completely support the position of traditional chemists and allopathic medical practitioners if, a sequentially diluted and succussed with intention solution were an ideal thermodynamic solution – but it is not, it has been diluted with intention! In order to show this effect, we return to Equations I – 3a and 5d of Appendix I.

In equation 2a, the C_i – term deals with the very local perturbation effect of the solute molecule on the immediate host water molecules while the γ_i - effect relates to the sum of all the macroscopic environmental effects stored in the water solvent associated with all the processing details that act on the therapy molecule i .

For example, the effects of AC or DC electric and magnetic fields on Equation I – 5d result in general energy storage as does the ΔP term due to the pressure pulse associated with succussion. This pressure pulse creates cavitation and nano-bubbles of air in the host water which, in turn, create highly entangled, inhomogeneous, localized, electric and magnetic fields which provide both macrostructure patterns and excess energy in the bulk water. Furthermore, an $\alpha_{\text{eff}} Q_{\text{mi}}$ – term of Equation 1 should be included in equation I – 5b to account for the coupled state of physical reality providing specific information from the coupled vacuum level of physical reality. Thus, even while the $\ln C_i$ - term in equation 2b is shrinking to zero, the $\ln \gamma_i^*$ - term is increasing towards very large values. This is definitely not the behavior of a thermodynamically ideal solution! This result is totally consistent with the experimentally observed behavior of solutions reported by Elia and Niccoli⁽¹⁴⁾ and by Roy et al.⁽¹⁵⁾.

3.2. Where Does the “Garage Inventor Effect” - Come From?

In reference 7, it was indicated that, whenever an experimental space exhibits a DC magnetic field polarity effect, the space is at the partially *coupled state* of physical reality and α_{eff} in Equation 1 is greater than zero. To illustrate the importance of such an experimental observation, let us consider what I have labeled the “Garage Inventor Effect”.

Let us suppose that there is a man, a hobbyist, who likes to go out to his garage after dinner to work on his latest invention (and his wife is tolerant of this). He has had an idea of how to create a device for electric power conversion with a conversion efficiency seemingly greater than 100% and he wants to develop a prototype device which embodies this idea.

This man works most nights in his garage for several years to create this new type of device and one evening he convinces himself that he has got it! He has finally achieved this “over unity” energy conversion device! Excited, the next evening he calls in a small group of his best friends to demonstrate his success to them and to show them how he took into account all the key technical factors relevant to the invention. This group pondered all the relevant issues and also become excited as, they too, concluded that he has achieved a great new discovery.

Collectively, they decide to start a new business to exploit this new discovery for both financial gain and to help the world solve its energy crisis. One of the group suggests that they send the device and all the measurement equipment to a testing company in the next town that performs independent testing for a fee. The group all agree that this is a good idea and carefully pack up all the equipment and drive it to the next town for independent replication.

After about a month, the testing information comes back but, to the group's great disappointment, it indicated that the device only achieves normal rather than supernormal efficiency. The group doesn't understand this because the testing company used exactly the same, meticulous measuring procedures as the inventor, other than using their own high grade measuring equipment. Even using the inventor's measurement equipment, they achieved only normal results. How can these two very different results be true; all factors were accounted for weren't they?

Actually, all the relevant factors in the replication experiment were not the same. In the garage inventor's case, his strong desire, sustained for years presumably pumped deltrons slowly into the garage space via his biofield so he slowly conditioned the garage space from the *uncoupled state* of physical reality to the partially *coupled state* of physical reality. On the other hand, one can assume

that the testing company's experimental space was at the normal, uncoupled state of physical reality because that is the world they serve and would go out of business if, unknowingly, their space was at the higher dimensional, *coupled state* of physical reality. The important point to conclude from this example is that the level of “space conditioning”, via α_{eff} in Equation 1, is a key part of the inventor's new device and it must be present with the device for it to exhibit “supernormal” behavior. In this “supernormal” state the device draws in energy from the magnetic information wave level of nature so it just “looks like” greater than 100% efficiency from the perspective of our normal, *uncoupled state* of physical reality!² This supports the hypothesis that humans have a higher than normal electromagnetic symmetry system within their bodies. This shows us something of the importance of the unacknowledged electromagnetic gauge symmetry³ in the space where events occur. This is an important experimental variable within Nature's manifested expressions.

3.3. Where Does the Placebo Effect Come From?

The experimental findings referred to in the previous two main sections of this series indicate that there can be, and is, a profound connectivity between one part of Nature and another and that any one of us can potentially influence all biological life forms around us by our biofield emissions and the information they carry, whether we consciously intend it or not. In this regard, it is useful for us to have a mental picture as to how we operate in life with respect to one another and how all the time energy/information emissions can occur from our surroundings to us, as well as from us to our surroundings.

Figure 2 provides a simple picture of the five key factors involved in this general interactive relationship^(3,4). Usually, all five components of this figure are intimately involved in the interaction even though the practitioner and client using some material device, may only acknowledge that she/he and the client are intimately involved in the process. Now, let us look at what has been labeled the placebo effect.

My interest in this phenomenon of Nature began on reading a short 1999 paper by Enserink⁽¹⁵⁾ who noted how greatly the placebo effect's magnitude in double-blind pharmacological studies had grown in the previous 15 years. He pointed out that, “when companies started testing drugs for obsessive – compulsive disorder (OCD) back in the mid-1980's, the placebo response rate in this old testing was almost zero”. Thus, the normal experimental assumption that the placebo in the experimental protocol was an inert participant was a good approximation to the truth at that time. However, as time passed, the placebo response rates began to creep upwards to a point in 1999 where they were 70% to 80% of the treatment response rates and one could reasonably conclude that some clinical trials failed because of high placebo response rates. How is this possible if the placebo behaves in the overall experiment as an inert object? Let us look into that, because according to Equation 1, if something is happening in Nature to cause α_{eff} to slowly increase with time, but in an accelerating fashion, then the connectivity between things would likewise increase in an accelerating fashion and the second term on the right of Equation 1 could be of negligible size in the mid-1980's and of a significant portion of Q_e in 2000.

² Work can be extracted from a quantum “Carnot Cycle” engine with a single heat bath via vanishing quantum coherence. Scully MO, Zubairy MS, Agarwal GS, Walther H. (2003) *Science* **299**: 862-864.

³ See Wikipedia – Gauge Theory – this relates to the effects of symmetry transformations on physics equations which can be local or global and are important in view of the “unreasonable success” of mathematics in physics. Maxwell's electromagnetic field theory has gauge symmetry.

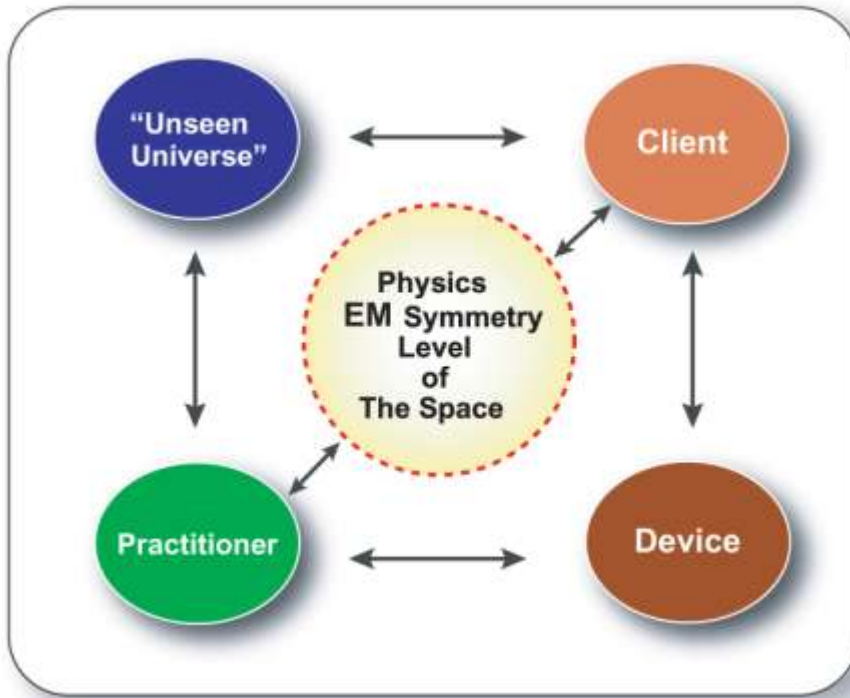


Figure 2. The simplest possible general communication system between practitioner and client in CAM.

In Appendix II, the magnetic information wave aspect of the system represented by Figure 2 has been worked out and one can readily see that a macroscopic information entanglement between all of the designated subsystems of the overall system can occur and further, that this piece of physics is the origin of the placebo effect. The relevant aspects of physics are the following:

- (1) In R-space, each subsystem must be represented as a vector with both amplitude, $R(\underline{k})$, and phase angle, $\theta(\underline{k})$, where each is a function of the position coordinate, \underline{k} , in R-space,
- (2) The entire system's vector, $R_s(\underline{k})\exp[i\theta_s(\underline{k})]$, is given by the vector sum (head to tail addition) of all the subsystem vectors converted first to common units, where $\exp =$ the exponential function and $i =$ the imaginary number $(-1)^{1/2}$ (or $i^2 = -1$).
- (3) Experimentally, one measures the system intensity I_s which is given by R_s^2 and which involves $R_s\exp(i\theta_s)$ multiplied by its complex conjugate, $R_s^*\exp(-i\theta_s)$, which eliminates the 'imaginary' part to give a mathematically 'real' quantity.
- (4) I_s is given by two groups of terms, (a) the sum of the squares of each vector amplitude and (b) the sum of pairs of different vector amplitudes multiplied by the cosine of the phase angle differences between these pairs and
- (5) the total information entanglement for the Figure 2 system is given from 4b above.

Now, let us consider a typical clinical trial involving the subsystems (i) doctors, D, (ii) treatment, T, (iii) placebo, P, and (iv) subjects, s. For such a system event written in the Equation 1 format using the suffices of these subsystems, the placebo-effect magnitude will be given by

$$Q_{MP} = Q_{eP} + \alpha_{eff} \int_k \left[R_p^2 + 2 \left\{ \begin{array}{l} R_p R_D \cos(\theta_p - \theta_D) + \\ R_p R_T \cos(\theta_p - \theta_T) + \\ R_p \bar{R}_s \cos(\theta_p - \bar{\theta}_s) \end{array} \right\} \right] d\underline{k}. \quad (3)$$

Thus, although $Q_{ep} \approx 0$ because the placebo is essentially inert at the electric, magnetic dipole, atomic, molecular level; Q_{MP} is definitely not zero provided that the system is functioning at the partially coupled state of physical reality where $|\alpha_{eff}|$ is greater than zero. Since the overall event involves humans and their biofields, the system – event is definitely at the coupled state of physical reality.

Small details relating to the D-space separations between the doctors and the subjects can be readily handled in the mathematics since the vehicle of interaction occurs via R-space not D-space. This will become more clear with the next example.

3.4 Where Does Long Range, Room Temperature, Information Entanglement Between Macroscopic-sized Spaces, Objects or Humans Come From?

The first important point to recognize in this example is that electric, magnetic dipole, atomic, molecular substance directly interacts with, and communicates with, its own kind via a space-time subspace. Conversely, its conjugate, magnetic information wave substance directly interacts with, and communicates with, its own kind via a reciprocal subspace that has frequency domain coordinates. These two very different kinds of substance cannot directly interact with each other because both have mass and, while the positive mass portion is constrained by relativity theory to move at velocities less than c , the negative mass portion is constrained in space time by Q_m plus relativity theory to move at velocities greater than c . In the uncoupled state of physical reality, each of these two, unique domains of substance exhibits a $U(1)$ electromagnetic gauge symmetry state, ($U_e(1)$ and $U_m(1)$). For one of these domains of substance to interact and communicate with the other, even indirectly, requires the presence of a coupler medium which I have heretofore named deltron, which can be activated from the domain of emotion (see Figure 1) and lies beyond relativity theory constraints.

In gauge reaction form, this coupling process is thought to occur in two major steps, (1) a reaction between deltrons and vacuum information waves, w , to create “rope-like” information waves with magnetic charge type properties plus stoichiometries of $w_j \delta_k$ ratios followed by (2) reactions between $U_e(1)$ materials and $U_{w_j \delta_k}(1)$ materials to form $SU(2)$ state materials. This overall reaction is illustrated qualitatively in Equations 4

$$U_e(1) U_w(1) + C_\delta \Leftrightarrow U_e(1) U_{w_j \delta_k}(1) + C'_\delta \quad ; C'_\delta < C_\delta \quad (4a)$$

$$\Leftrightarrow U_e(1) U_m(1) C'_\delta \quad (4b)$$

$$\Leftrightarrow SU(2) \quad (4c)$$

Here, C_δ is the starting deltron concentration and $SU(2)$ is the electromagnetic gauge symmetry condition of the coupled state of physical reality.

Let us now use Figure 3 as a convenient metaphor for describing how both coupling between these two domains occurs and what is required for information entanglement to occur between the D-space locations A and B. We begin in the totally uncoupled state of physical reality (the left side of equation 4a with $C_\delta=0$) with almost identical pH-measuring and recording equipment at D-space sites A and B located thousands of miles apart. There was also tacit agreement between the human

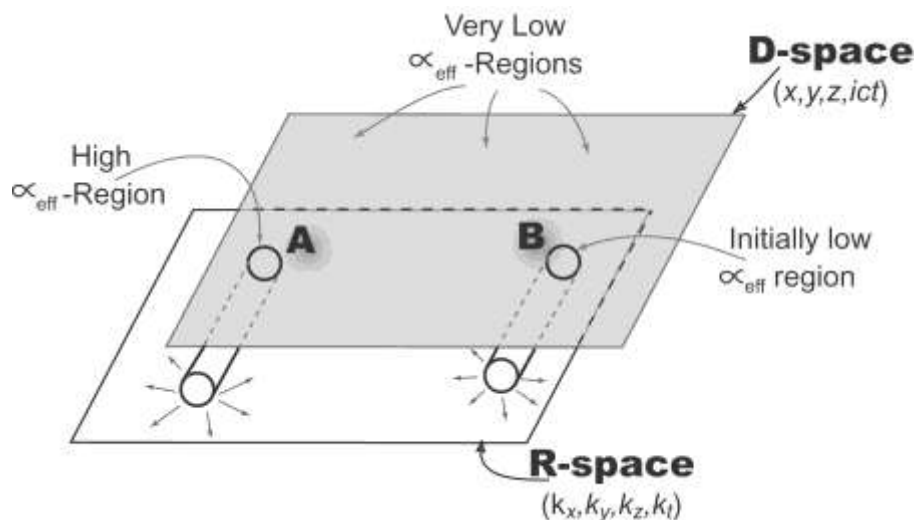


Figure 3 A schematic illustration of D-space and R-space as a construct.

operators at sites A and B to cooperate in a joint experiment. The dynamic process of change begins by placing a $\Delta\text{pH} = +1$ unit IIED at only site A, plugging it into an electrical power source and switching it on. The electrically active IIED (intention imprinted electrical device) is, in turn, thought to act as a source of deltrons by intention-activation of the emotion domain of that space. This increases C_δ in equations 4 and begins to drive the reaction to the right. This eventually generates small D-space patches of SU(2) material via a typical nucleation and growth process. What this means is that the deltrons from A allow the equilibrium magnetic information wave spectral distribution to develop in R-space at A. Since R-space is a frequency domain, this means that this pattern is available to every location in spacetime and, in particular, available to the B-site in D-space. However, at B, the D-space equilibrium counterpart to the new R-space magnetic information wave spectral distribution is not present. Although the D-space pH-equipment is present, it is not conforming to the R-space pattern generated by A and so leakage of deltrons from R-space to D-space at B occurs to provide this local equilibrium. That, in turn, requires transfer adjustments of deltrons, etc., from D-space to R-space at A and from R-space to D-space at B until B is displaying similar pH-behavior as A; i.e., $\Delta\text{pH} = +1$ units.

An adjunct procedure for understanding this process is to recognize all key subsystems involved in this overall system event, as in the previous section for the placebo effect and how the placebo term is paired with all other subsystem terms. Since D-space site B has been tacitly acknowledged as a part of the overall experiment, it needs to be listed as a subsystem of the overall event and, since all the pH-measuring equipment is also present at B, only $\Delta\text{pH}(t)$ type of information and an IIED are absent at B to exactly replicate what is at A. The $\Delta\text{pH}(t)$ -information can be readily transferred via R-space (not via D-space) as indicated above but cannot materialize an IIED at B. Thus, the $\Delta\text{pH}(t)$ patterns at A and B are unlikely to be exactly replicated. This suggests that, in future work, placing a UED (an unimprinted intention-host device) at B might produce more exact non-local information entanglement between A and B sites regarding $\Delta\text{pH}(t)$ results.

4.5. How do Electrodermal Diagnostic Devices Work So Well for Some Practitioners?

Human skin consists largely of two main layers, an outer and thinner layer, the epidermis, plus an inner, thicker layer, the dermis. The epidermis consists of stratified, squamous, epithelial tissue which, on the inside, connects to the dermis of fibrous connective tissue via a basal membrane and to the air surface via a thin layer of flattened dead cells called the stratum corneum that have converted to the water repellent protein keratin that continually flakes off. New cells are produced adjacent to the

basal membrane at the rate old keratinized cells are lost from the stratum corneum.

Any cellular membrane contains fixed charge sites which may be predominantly positively or negatively charged depending upon the pH of the tissue fluid relative to the isoelectric point (IEP) of the cells (the IEP is the solution pH needed to electrically neutralize the charge state of the surface). For the case of the solution pH being more acidic than the IEP, H^+ will absorb on the membrane surface and it will become electropositively charged. In this case, it will be selectively permeable to anions only. For the opposite case, where the pH is more alkaline than the isoelectric point, the membrane becomes electronegatively charged and is permeable to cations but not anions. The isoelectric point of a membrane depends upon the degree and type of proteins and carbohydrates embedded in the cell surface. Skin is generally electronegatively charged and is thus permeable to cations. A plot of surface potential, ϕ_s , often called the ZETA potential, as a function of fluid pH relative to the surface isoelectric point is given in figure 4.

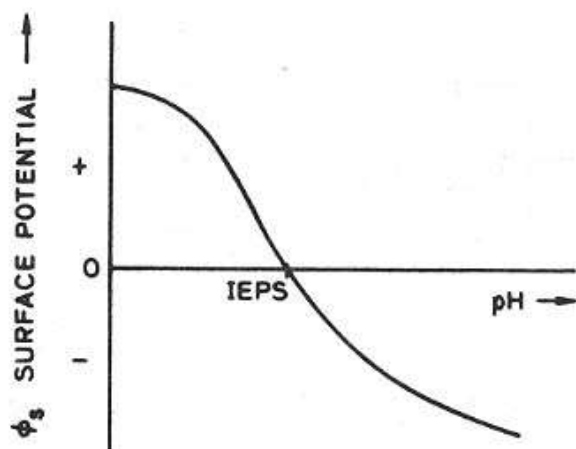


Figure 4. Schematic plot of surface electrical potential (zeta potential) as a function of fluid pH relative to the surface isoelectric point (IEPS).

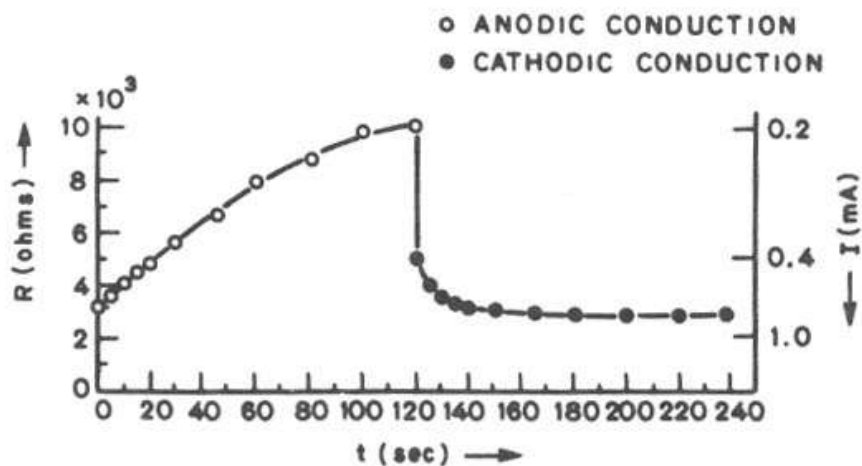


Figure 5. Time dependence of the electrical resistance at 2V (7 cm^2 of skin moistened for 20 minutes with saturated KCl solution).

When a steady electric current is moved outwards through the skin (cathodal current), the DC resistance of the stratum corneum falls as illustrated in figure 5. The opposite occurs when electric current moves inward through the skin (anodal current). In both cases, the time-constant, τ_1 , is ~ 10 -50 seconds and the resistance changes by a factor of ~ 5 . The reason for this behavior for a cation permeable membrane, is illustrated in Figure 6.

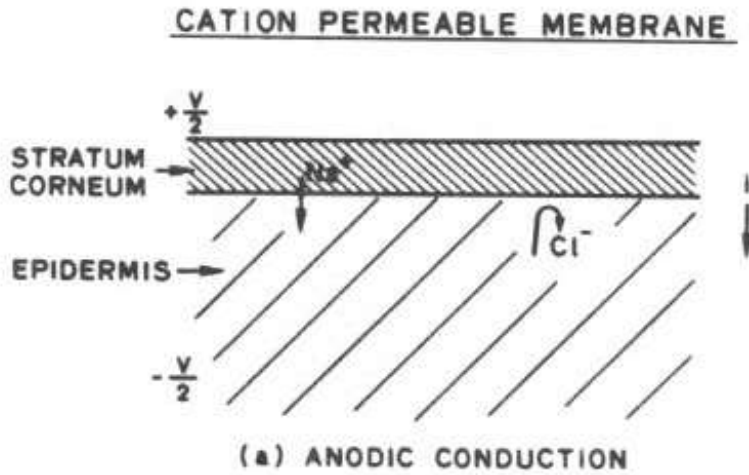
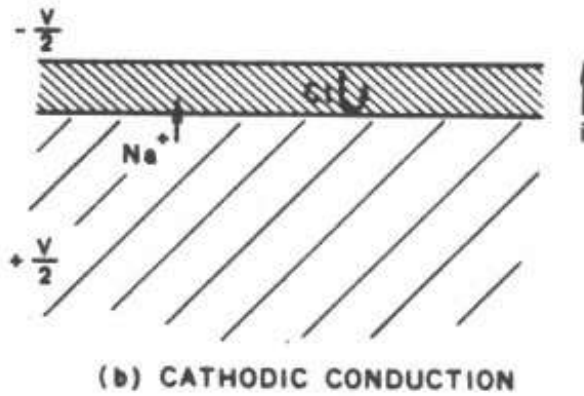


Figure 6. Illustration of permselectivity of membrane effect on ionic transport for anodic and cathodic conduction.



In this case, the simplest frequency-independent electrical equivalent circuit for skin measurements is given in Figure 7.

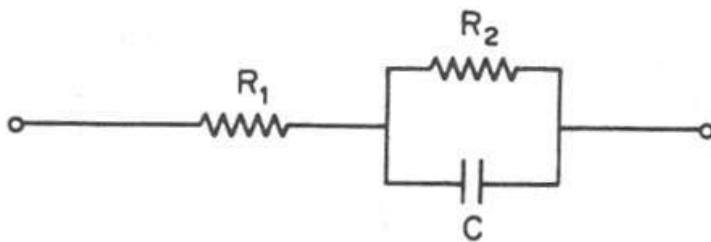


Figure 7. Simplest frequency-independent electrical equivalent circuit used for skin measurements.

However, via the use of AC Conductance techniques⁽¹⁷⁾, both a high frequency and a low frequency diffusional admittance type of electrical equivalent circuit was observed as illustrated in Figure 8⁽¹⁸⁾.

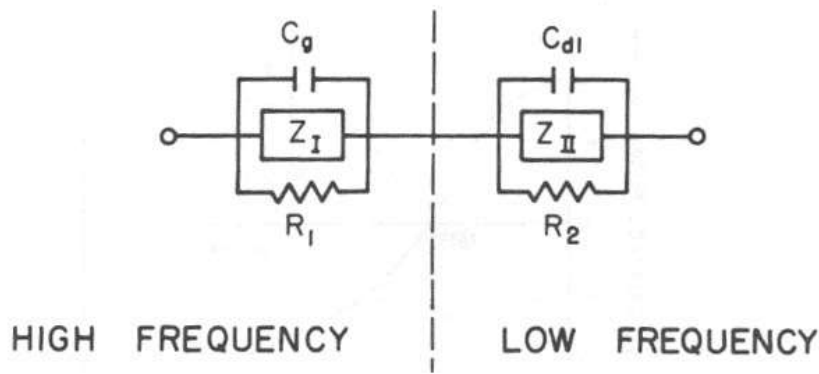


Figure 8. Electrical equivalent circuit generated from skin measurements using AC conductance techniques and complex plane analysis.

Probing still further, Motoyama discriminated (1) a short time-constant charge polarization process occurring at the basal membrane interface between the dermis and epidermis with $\tau_2 \sim 50$ microseconds (μsec) and total interface voltage change of ~ 1 volt. In addition, (2) his experimental work reveals the presence of an electrical energy generator in the dermal connective tissues⁽¹⁹⁾. Since his research was intimately related to the electrical responses associated with energy/information flows in acupuncture meridians, it connects directly to the $\alpha_{\text{eff}}Q_m$ term in Equation 1⁽²²⁾. Connecting this basal membrane, τ_2 time-constant process with the epidermis/stratum corneum, τ_1 , time-constant process of figure 5, one obtains figure 9 as the best approximation to a constant impedance parameters electrical equivalent circuit for the skin.

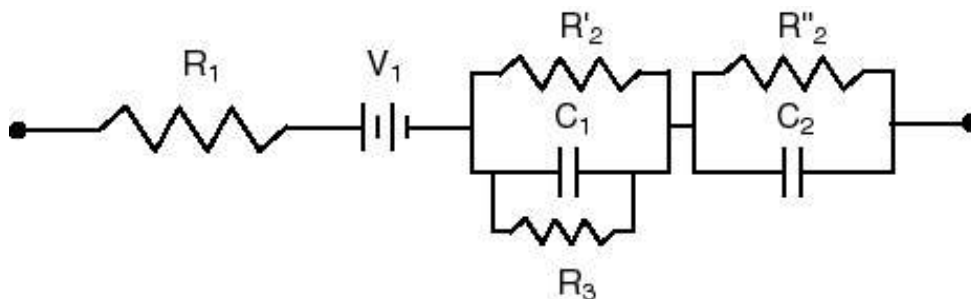


Figure 9. Electrical equivalent circuit for human skin approximated to constant impedance parameters.

In figure 9, R_1 is the resistance of the dermis, while V_1 is its electrical energy generator (DC and AC), R_2' is the resistance of the basal membrane interface region of the epidermis while C_1 is its capacitance, R_3 is the resistance that allows for current leakage through this capacitor and R_2'' is the resistance of the stratum corneum while C_2 is its local capacitance.

Since V_1 in figure 9 brings into play the coupled state of physical reality associated with the human body's acupuncture meridian system, figure 9 must be expanded to include presently known details concerning the $\alpha_{\text{eff}}Q_m$ contribution in Equation 1 as it relates to an “effective” electrical equivalent circuit of the human skin when coupling between our two unique levels of physical reality must be taken into account. Although V_1 in figure 9 is symbolically represented as a DC battery it is really an AC/DC system induced into the electrical dermis from the magnetic currents flowing in the “unseen” magnetic information wave level of physical reality. Thus, it should really be regarded as a complex impedance coupling term driven from a secondary source acting somewhat like the

“secondary” circuit of a transformer. However, in this case it is a magnetic current, i_m , that flows in the secondary circuit element while it is an electric current, i_e , that flows in the primary circuit element. This is metaphorically illustrated in figure 10 where Z_D is the effective electrical impedance of the dermis/epidermis/stratum corneum system and Z_R is the effective magnetic impedance of the magnetic information wave system.

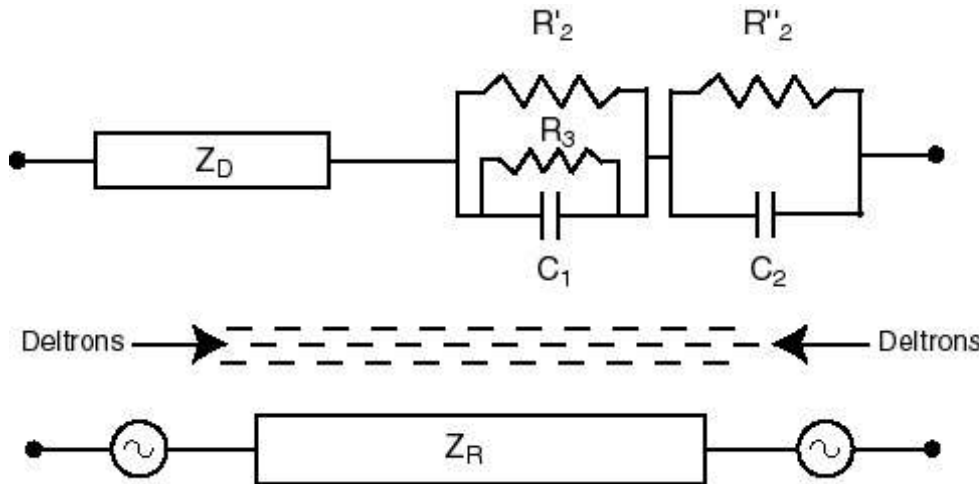


Figure 10. Proposed electrical equivalent circuit for human skin when the system is in the coupled state of physical reality. Here, Z is the impedance and the deltrons are the coupler medium.

When we apply our duplex RF to figure 10 as the device in the figure 2 system and also add a D-space test substance (neutraceutical, food substance, specific crystal, pharmaceutical, etc.) as one new contribution to the experimental system, the R-space contribution to Q_m in Equation 1 grows by (a) the square of the R-space vector amplitude for this added D-space test object plus (b) the sum of pairwise R-space vector contributions between this D-space test object and each of the other R-space subsystem vectors in the overall system. Thus, if this D-space test substance is thermodynamically beneficial for the overall coupled system, a system response will appear in the (b) contributions above. Likewise, if this new contribution is detrimental to the system, the (b) contribution above is capable of indicating that.

If the practitioner in figure 2 has a weak biofield and no other source of “space-conditioning” is present, α_{eff} in Equation 1 will be negligible and the EM gauge symmetry state of the space will be very close to the $U_e(1)$ state. The overall system will be in the uncoupled state of physical reality and any psychoenergetic usefulness of the electrodermal measurement responses will be very small.

In principle, if one goes further and represents the health of the client by the balance state of the client's twelve acupuncture meridians (which function in the client's R-space body), one can begin to recognize that a formal procedure exists to evaluate or anticipate the effect of various environmental factors on the state of health of the client's D-space organs.

4. Discussion

The main point that this author has been trying to make with this White Paper is that traditional medicine and CAM build their practices on two, very different aspects of science and they both need to understand that. I and my colleague's experimental and theoretical research of the past decade has delineated these differences: (i) there are at least two unique levels of physical substance, not just one,

occupying the same general space in our physical bodies but, normally, they are minimally interactive with each other. This leads to our normal, uncoupled state of physical reality, (ii) the human acupuncture meridian/chakra system, functioning in the coarsest level of the physical vacuum (in the space between the fundamental electric particles that make up our electric atoms and molecules), are at the coupled state of physical reality, (iii) using intention-host devices, one can macroscopically “condition” a space, the measuring equipment contained within that space and, to some degree, humans occupying that space to the coupled state wherein the two uniquely different kinds of physical substance begin to significantly interact with each other and (iv) the normal, uncoupled state of physical reality is the material medium addressed by most of orthodox medicine while the partially coupled state of physical reality is the material medium addressed by most of CAM.

The theoretical construct, invented by this author to understand the seemingly strange behavior of inorganic, organic and living materials present in the coupled state of physical reality, when human consciousness is utilized as a significant experimental variable, consists of two, reciprocal subspaces, one of which is space-time (D-space) while the other is a wave domain (R-space) with some level of a higher dimensional coupler substance activated. D-space is the home of positive mass and energy, electrically charged particles traveling at velocities slower than c while R-space is the home of negative mass and energy, magnetically charged information waves traveling at velocities greater than c . When one expresses the thermodynamic behavior of the partially coupled duplex system in equation form, as in Appendix I, one sees allopathic-like thermodynamics dominating at large values of the intensive variables, homeopathic-like thermodynamics dominating at very small values of these same intensive variables and some combination of both for intensive variable magnitudes in between.

As the amount of coupler substance shrinks towards zero, the duplex system separates into two non-interactive domains and only the allopathic-like world is cognitively accessible by humans and our traditional measuring instruments. This leads to traditional science and traditional medicine. This leads to a world where one can expect randomized-controlled medical trials to be a rational strategy for experimentation. Likewise, in this domain, we have a great many traditional measurement instruments that can reliably access the relevant physics and chemistry that dominate the key electric/magnetic dipole processes of the human body.

On the other hand, as the amount of activated coupler substance substantially increases in nature, the duplex system of electric charge and magnetic charge begin to interact with each other, long range connectedness effects begin to macroscopically appear; strong human intention effects begin to appear, human psycho-physiological and psycho-energetic effects begin to appear, non-random behavior in natural processes become a significant factor and many of these features are not accessed by our traditional measurement instruments. This is a physics and chemistry behavior quite different than that found in traditional science; it is a significant perturbation of that reality. In this world, one cannot expect (1) randomized-controlled medical trials to be a rational strategy for experimentation or (2) that evidence-based medicine, gathered by traditional science-based instruments, to access all of the relevant data-streams involved in CAM practices. Today's problem for CAM is that there appears to be only one measurement instrument available to reliably discriminate between the uncoupled and coupled states of physical reality⁽¹¹⁾.

In the application section of this White Paper, not only does one see how the activation of the homeopathic effect arises through the presence of a significant value for α_{eff} and that, to gain experimental insight into the details of homeopathy, one needs to measure the modified thermodynamic activity coefficient, γ^* , at all phases of the process.

The garage inventor effect illustrates that an essential part of a functioning device is the electromagnetic gauge symmetry state of the surrounding space. It is also important for the reader to recognize that sustained, unconscious or conscious human intention, flavored by strong desire, can significantly raise the electromagnetic gauge symmetry state of the work space

In the placebo effect, one sees the key factor involved in the R-space contribution to Q_m ; i.e.,

the vector summation of all the identifiable subsystem R-space vectors in the overall event and then the intensity vector for the whole system. Even though no electric D-space connections exist between the various subsystems, the R-space conjugates are connected via the pairwise R-space subsystem vector amplitudes and phase angles. One also sees in the electrodermal diagnostic testing device example how the introduction of a D-space testing substance to the client, as a new subsystem for the overall system, introduces an additional series of terms to the final result that indicates either a health improvement or a health diminishment factor.

The information entanglement example illustrates the importance of two key factors of this duplex space mathematics: (1) the deltron-modulated Fourier Transform pair relationships between the D-space object and its equilibrium R-space conjugate plus vice versa and (2) the importance of R-space as a frequency domain. Although information entanglement is present in today's quantum mechanics, it is restricted to temperatures very close to absolute zero and to extremely small D-space object sizes. Here, room temperature, very large system sizes and very long range (5000-6000 miles⁽³⁾) information entanglement may somehow be related to quantum mechanics but the connection is not yet obvious.

Conclusions

Traditional medicine's mindset and working arena is the *uncoupled state* of physical reality. CAM's working area is the *coupled state* of physical reality and its mindset needs to become psycho-energetic science. Both sets of practitioners need to become aware of the fact that data gathering strategies that work well for *uncoupled state* physics do not work well for *coupled state* physics and vice versa.

References

1. W.A. Tiller, Science and Human Transformation: Subtle Energies, Intentionality and Consciousness (Pavior Publishing, Walnut Creek, California, 1997).
2. W. A. Tiller, W. E. Dibble, Jr., and M. J. Kohane, Conscious Acts of Creation: The Emergence of a New Physics (Pavior Publishing, Walnut Creek, California, 2001).
3. W. A. Tiller, W. E. Dibble, Jr., and J. G. Fandel, Some Science Adventures with Real Magic (Pavior Publishing, Walnut Creek, California, 2005).
4. W. A. Tiller, Psychoenergetic Science: A Second Copernican-Scale Revolution (Pavior Publishing, Walnut Creek, California, 2007).
5. The Journal of Subtle Energies & Energy Medicine.
6. Bridges (Quarterly Magazine) (ISSSEEM, 11005 Ralston Road, Suite 100D, Arvada, Co 80004, USA).
7. W. A. Tiller, An Introduction to Intention – Host Device Research, A 42 minute DVD, see www.tiller.org, 2008.
8. W. A. Tiller, Psychoenergetic Science: A Second Copernican-Scale Revolution, A 7 hour, 5 diskette DVD, see www.tiller.org, 2008.
9. P.A.M. Dirac, Proc. Soc. A133, 1931, 60.
10. R. M. Eisberg, Fundamentals of Modern Physics (John Wiley and Sons, Inc., New York, 1961) pp140-146.
11. W. A. Tiller and W. E. Dibble, Jr., “Toward General Experimentation and Discovery in Conditioned Laboratory and Complementary and Alternative Medicine Spaces: Part V, Data on 10 Different sites using a robust new type of subtle energy detector”, JACM 13 (1), 2007, pp 133-149.
12. W. A. Tiller, “On Chemical Medicine, Thermodynamics and Homeopathy” JACM 12 (7), 2006,

- pp. 685-693.
13. W. A. Tiller and W. E. Dibble, Jr., “Expanding the Thermodynamic Perspective for Materials in an SU(2) Electromagnetic (EM) Gauge Symmetry State Space: Part 1, A Duplex Space Model With Applications to Homeopathy”, *Materials Research Innovations*, 2007, 11 (4) pp 163-168.
 14. V. Elia and M. Niccoli, “Thermodynamics of Extremely Diluted Aqueous Solutions”, *Ann. NY. Acad. Sci.* 1999; 879: 241-248.
 15. R. Roy, W. A. Tiller, I. Bell and M. R. Hoover, “The Structure of Liquid Water: Novel Insights from Materials Research; Potential Relative to Homeopathy”. *Mater. Res Innovations* 2005; 9; 577-608.
 16. W. A. Tiller, “Human Psychophysiology, Macroscopic Information Entanglement and the Placebo Effect”, *JACM* 12 (10), 2006, pp1015-1027.
 17. W. A. Tiller, “Explanation of Electrodermal Diagnostic and Treatment Instruments: Part I, Electrical Behavior of Human Skin”, *Journal of Holistic Medicine*, 4 (2) (1982), pp105-127.
 18. W. A. Tiller, “On the Evolution and Future Development of Electrodermal Diagnostic Instruments”, in Energy Fields in Medicine, Eds. M.A. Morton & C. Dlouhy (A John E. Fetzer Foundation Publication, 1989).
 19. H. Motoyama, “Electrical Energy Generator in Dermal Connective Tissues and Equivalent Circuit of Epidermis and Dermis”, reported in the following publications: (a) *Psychophysiology* 21 (5), 1984, (b) *Journal of Holistic Medicine* 8 (1&2), 1986, (C) *Science and Medicine* 6 (4), 1998 and (d) the California Institute for Human Science, 2006.
 20. R. V. Churchill, Introduction to Complex Variables and Applications (McGraw-Hill, New York, 1948) pp 102.
 21. J. W. Gibbs, The Collected Works of J. Willard Gibbs (Yale University Press, New Haven, CT, USA, Volumes I and II, 1957).

Appendix I, Relevant Mathematics for Homeopathy

For the uncoupled state of physical reality, the U(1) EM gauge symmetry state, it is typical to expand various mathematical functions in a Taylor series expansion provided there are no mathematical singularities within the domain of interest (within D-space). However, for the case where mathematical singularities do exist in the D-space domain of interest, one must use a Laurent series expansion⁽²⁰⁾ rather than the Taylor series expansion because, with the appropriate polynomial coefficients one obtains a “singularity free” expression. Interestingly, this yields a very similar mathematical form as a Taylor series expansion to our special duplex space RF (reference frame) consisting of reciprocal three or four dimensional subspaces, one of which is spacetime. Applying this approach to the Gibb’s thermodynamic free energy function⁽²¹⁾, G , for a material in the partially coupled state of physical reality ($0 < \alpha_{\text{eff}} < 1$) as per equation 1 of the main text, one can express G as an expansion about a domain G_0 , in terms of its intensive thermodynamic variables, to obtain

$$G - G_0 = \left\{ \left(\frac{\partial G}{\partial P} \right) \partial P + \left(\frac{\partial G}{\partial T} \right) \partial T + \left(\frac{\partial G}{\partial c} \right) \partial c + \left(\frac{\partial G}{\partial \underline{E}} \right) \partial \underline{E} + \left(\frac{\partial G}{\partial \underline{H}} \right) \partial \underline{H} + \left(\frac{\partial G}{\partial \underline{g}} \right) \partial \underline{g} + L \right\} \begin{matrix} \textit{Allopathic} \\ \textit{Contributions} \end{matrix}$$

$$+\alpha_{\text{eff}} \left\{ \begin{aligned} &\left(\frac{\partial G}{\partial(1/P)} \right) \partial \left(\frac{1}{P} \right) + \left(\frac{\partial G}{\partial(1/T)} \right) \partial \left(\frac{1}{T} \right) + \left(\frac{\partial G}{\partial(1/c)} \right) \partial \left(\frac{1}{c} \right) + \\ &\left(\frac{\partial G}{\partial(1/E)} \right) \partial \left(\frac{1}{E} \right) + \left(\frac{\partial G}{\partial(1/H)} \right) \partial \left(\frac{1}{H} \right) + \left(\frac{\partial G}{\partial(1/g)} \right) \partial \left(\frac{1}{g} \right) + L \end{aligned} \right\} \quad \text{Homeopathic Contributions} \quad \text{(I-1)}$$

$$= \sum_j \left\{ \left(\frac{\partial G}{\partial \xi_j} \right)_{\text{Allopathic}} + \left(\frac{\alpha_{\text{eff}}}{\xi_j^2} \frac{\partial G}{\partial(1/\xi_j)} \right)_{\text{Homeopathic}} \right\} \partial \xi_j ; \quad \text{(I-2)}$$

$$\square\square\square\square\square \quad \xi = P, T, c, \underline{E}, \underline{H}, \underline{g}, \text{ etc.}, \text{ respectively.} \quad \text{(I-3)}$$

In equations I-1 to I-3, the variable ξ_j represents all the thermodynamic intensive variables where P=pressure, T=temperature, c=concentration, \underline{E} =electric field, \underline{H} =magnetic field and \underline{g} =gravitational field. Equations I-1 and I-2 immediately distinguish the D-space allopathic contributions from the R-space homeopathic contributions to G.

From equation I-2 with ξ_j =concentration, one immediately sees that the homeopathic response is only significantly manifested when $\xi_j^2 = \alpha_{\text{eff}} \frac{\partial G}{\partial(1/\xi_j)}$.

If, for the moment, we consider the $\alpha_{\text{eff}}=0$ case and focus on ξ being only P, T and c, one finds from well-known experimental results that

$$\left(\frac{\partial G}{\partial P} \right)_{T, c, \text{ etc.}} = V; \quad \left(\frac{\partial G}{\partial T} \right)_{P, c, \text{ etc.}} = -S; \quad \left(\frac{\partial G}{\partial c} \right)_{T, P, \text{ etc.}} = \mu \quad \text{(I-4)}$$

where V is the specific volume, S is the entropy of the system and μ is the chemical potential of a particular species. Shifting our focus now to μ in Equation (I-4) the general expression from G is

$$G = E + PV - TS = \sum_i n_i \mu_i, \quad \text{(I-5a)}$$

where

$$\mu_i = \mu_{0i} + kT \ln(a_i) + \beta_1 \Delta P + \beta_2 \underline{E}^2 + \beta_3 \underline{H}^2 + \beta_4 \underline{g} + \dots \quad \text{(I-5b)}$$

$$= \mu_{0i} + kT \ln(a_i^*) \quad \text{(I-5c)}$$

and where

$$a_i^* = a_i \left\{ \exp \left[\frac{\beta_1 \Delta P + \beta_2 \underline{E}^2 + \beta_3 \underline{H}^2 + \beta_4 \underline{g} + L}{kT} \right] \right\}. \quad \text{(I-5d)}$$

Here E=energy, n_i =number of species, i , per unit volume, $(\beta_1, \beta_2, \beta_3, \beta_4)$ are all known coefficients, μ_{0i} is the standard state chemical potential for the species i , a is the thermodynamic activity, a^* is the modified thermodynamic activity, \ln is the natural logarithm, \exp is short for the exponential function and k is Boltzmann's constant. When one takes the natural logarithm of a_i^* in equation (I-5c), equation (I-5b) is reproduced.

Appendix II, Relevant Mathematics for the Placebo Effect

Here, we use Figure 2 as the most general example of a D-space medical interactive relationship and use it as a pedagogical vehicle for generating the R-space equilibrium counterpart for such a system event.

With \underline{r} representing the D-space general spatial coordinate and \underline{k} representing the R-space general spatial wave number, the Fourier Transform pair relationship for a D-space shape of the form $f(\underline{r})$ is given by

$$F(\underline{k}) = \frac{1}{(2\pi)^{3/2}} \int_{-\infty}^{\infty} f(\underline{r}) e^{i\underline{r}\underline{k}} d\underline{r}, \quad (\text{II-1a})$$

and

$$f(\underline{r}) = \frac{1}{(2\pi)^{3/2}} \int_{-\infty}^{\infty} F(\underline{k}) e^{-i\underline{r}\underline{k}} d\underline{k}. \quad (\text{II-1b})$$

With a deltron activation function of $C_\delta(\underline{r})C_\delta'(\underline{k})$, the deltron-empowered Fourier Transform pair relationship for a D-space subsystem in the overall system is given by

$$G(\underline{k}) = F(\underline{k})C_\delta'(\underline{k}) = \frac{1}{(2\pi)^{3/2}} \int_{-\infty}^{\infty} f(\underline{r})C_\delta(\underline{r}) e^{i\underline{r}\underline{k}} d\underline{r} \quad (\text{II-2a})$$

and

$$G'(\underline{r}) = f(\underline{r})C_\delta(\underline{r}) = \frac{1}{(2\pi)^{3/2}} \int_{-\infty}^{\infty} F(\underline{k})C_\delta'(\underline{k}) e^{-i\underline{r}\underline{k}} d\underline{k}. \quad (\text{II-2b})$$

This is how an equilibrium R-space conjugate is formed for a given D-space geometrical shape, $G'(\underline{r})$, in the partially coupled state of physical reality when the deltron activation function is separable into the $C_\delta(\underline{r})C_\delta'(\underline{k})$ form.

To obtain the $\alpha_{\text{eff}}Q_m$ term in Equation 1 of the main text, we first evaluate the intensity, $I(\underline{k})$, and integrate it over all of R-space to obtain Q_m . Then, we take general expansions of $C_\delta(\underline{r})$ and $C_\delta'(\underline{k})$ and make a zeroth order approximation to obtain α_{eff} . Proceeding,

$$I(\underline{k}) = G(\underline{k})G^*(\underline{k}) \quad (\text{II-3a})$$

and

$$\alpha_{\text{eff}} Q_m = \int_{-\infty}^{\infty} I(\underline{k}) d\underline{k} . \quad (\text{II-3b})$$

Here $G^*(\underline{k})$ is the complex conjugate of the vector $G(\underline{k})$.

Turning now to Figure 2 of the main text, there is only one component to Q_e in equation 1 of the main text but 5 vector components for the R-space counterpart. Setting α_{eff} = the space gauge symmetry component, we now have Q_m being determined by the other four vector contributions defined, with subscripts P, D, C and U to represent, respectively, practitioner, device, client and unseen. Therefore, the system vector, $R_s \exp(i\theta_s)$, is given by the vector sum

$$R_S(\underline{k})e^{i\theta_S(\underline{k})} = R_P(\underline{k})e^{i\theta_P(\underline{k})} + R_D(\underline{k})e^{i\theta_D(\underline{k})} + R_C(\underline{k})e^{i\theta_C(\underline{k})} + R_U(\underline{k})e^{i\theta_U(\underline{k})} . \quad (\text{II-4})$$

The system intensity, $I_S(\underline{k})$, is given by

$$I_S(\underline{k}) = R_S(\underline{k})e^{i\theta_S(\underline{k})} R_S(\underline{k})e^{-i\theta_S(\underline{k})} = R_S^2(\underline{k}) \quad (\text{II-5a})$$

$$= [R_P^2 + R_D^2 + R_C^2 + R_U^2]$$

$$+ 2 \left\{ \begin{array}{l} R_P R_D \cos(\theta_P - \theta_D) + R_P R_C \cos(\theta_P - \theta_C) + R_P R_U \cos(\theta_P - \theta_U) + \\ R_D R_C \cos(\theta_D - \theta_C) + R_D R_U \cos(\theta_D - \theta_U) + R_C R_U \cos(\theta_C - \theta_U) \end{array} \right\} \quad (\text{II-5b})$$

In equation II-5b, the coordinate, \underline{k} , has been left out for simplicity. The important point to note here is that, in the system intensity, which is all that one can expect to measure, we have 6 pairwise terms indicating that each term is connected to each other term and each subsystem has three neighboring interactions. For example, let us let the device be replaced by a placebo so that we can represent $I_S(\underline{k})$ by

$$I_S(k) = A + 2R_D \left\{ R_P \cos(\theta_P - \theta_D) + R_C \cos(\theta_D - \theta_C) + R_U \cos(\theta_D - \theta_U) \right\} \quad (\text{II-6})$$

where A is determined by subtracting equation (II-6) from (II-5b). Thus, even if R_D has only a nominal value, the bracket that multiplies it can be very large so its activity effect in the system can be appreciable. This is how, in a typical doctor, treatment, placebo, subjects randomized clinical trial, the placebo group can never be isolated from the treatment group. Further, the magnitude of the placebo effect depends on the size of the doctor effect, the treatment effect and the subject effect.

If one is using just one subject (client) with the practitioner using a testing device on the subject and brings a sequence of food supplements X, say, into the field of the experiment, a series of new terms will enter $I_S(k)$, one for each of the other R-space subsystems in the overall system. In principle, one can use such a testing procedure to determine beneficial vs. harmful reactions of the R-space aspect of X upon the R-space aspect of the client.