Chiropractic and Cybernetics

Dihan Wijewickrama

Submit inquiries and galley proofs to:

Dihan Wijewickrama
c/o Dept. of Complementary Medicne, Chiropractic and Osteopathy, RMIT University
Bundoora 3083
Victoria, Australia

Homeostasis (ho"me-o-sta'sis) [homeo-+ Gr.stasis standing] A tendency to stability in the normal body states (internal environment) of the organism. It is achieved by a system of control mechanisms activated by negative feedback. (Dorland's Medical Dictionary, 27 ed.).

Keating (1) has described Chiropractic as a "*strange, wonderful, terrible, crazy mixed up profession… Its literature encompasses the wholly incompatible, from religion to science and from reason and logic to irrational dogma.*"

It is my contention that the phenomenon Keating describes is far from peculiar to chiropractic and is an aspect of an epistemological crisis within science itself. The investigation of homeostasis will illustrate this issue as it is endemic to the philosophy of medical science.

The initial question which characterizes the chiropractic approach to patient care is "*What has happened to the homeostatic system, i.e what has happened to the sensory, integrative and effector coordinates upon which homeostasis depends?*" [Virgil V. Strang (2)]

The concept of homeostasis is fundamental to the key philosophy of generic medicine.

A survey of current research listed in the Medline database shows 25,343 articles referring to homeostasis in the abstract and 15,195 articles with the subject of homeostasis ('All Years' search, Medline Express)

A phrase search for *Homeostasis* and *Philosophy*, in the same time frame, showed 41 articles.

Homeostasis has a non-definitive status in medical literature. This is reflected in the language of Dorland's Medical Dictionary, wherein a 'tendency' which is something observed and of the nature of a process, differs from an established fact, which has a binary value 1 or 0 / True or False.

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The difference appears significant if we consider homeostasis within the context of history and philosophy of science, as a theoretical assumption, and then consider the fraction of biomedical research which investigates and explicates the theory compared with research which simply assumes or 'proves' homeostatic mechanisms at work in the body

It is necessary to define two terms for the purposes of discussion. Discourse refers to both a body of knowledge and a praxis. Chiropractic discourse refers to the body of knowledge of the biomedical sciences and to the praxis of Chiropractic clinical research and experience. Cosmogony is a theory/ explanation/ story of the nature of the universe, including the set of philosophical- theoretical assumptions underlying research and praxis.

Cybernetics

The concept of homeostasis is derived from the field of inquiry of cybernetics, which can be roughly translated as the act of steering. Geyer (3) describes a first and second order cybernetics. The distinction between them points squarely at the source of the epistemological crisis. First order cybernetics is mainly concerned with negative feedback loops in which the output of a closed system is compared and rectified against a preset goal. Further, mastery over the environment is an implicit goal of this approach, based on the Newtonian cosmogony in which an in-principle 'orderly' universe becomes 'knowable'/ predictable and controllable by means of continuing and cumulative efforts to discover it's basic laws of operation.

This sounds profoundly like the hermeneutic of institututionalized science.

Homeostasis is the physiologic derivation of the Newtonian-Laplacean cosmogony, dating at least as far as the seventeenth century, in which it is postulated:

(1) The universe is a machine.

(2) The operation of the universe, like the operation of a clock, follows fixed and immutable laws.

(3) The function of the universe occurs through the unfolding of linear causal chains through time, (sequential cause and effect).

If we replace the word 'universe' with 'human body', then the historico-cultural and logical derivation of medical discourse from this cosmogony becomes apparent. Another component of the cosmogony comes from the philosophy of Cartesian Dualism. Kidel and Rowe-Leete (4) describe the distinction between 'pure consciousness' (*res cogitans*) and 'pure extension' (*res extensa*) in which spirit and matter are dissociated. Reductionism, the philosophy that the living whole may be known (accumulation of scientific data) by dissection of its (dead) constituent parts, or colloquially as 'Dissect first, Ask Questions later.' is a logical derivation of the mechanistic cosmogony, in which universe and body are objectified.

Systems Theory

Classical logic extends from the Newtonian-Laplacean cosmogony and begins with a mental attitude '*which initially perceives the physical world as fragmented and different experiences as logically unrelated*.' (5)

In the domain of Quantum Physics, the Newtonian-Laplacean cosmogony has been confronted with disconcerting paradoxes of observer dependent phenomena described in

instances of the wave/ particle duality of electrons and photons, the Heisenberg Uncertainty Principle and others. These paradoxical phenomena have been disconcerting because the operation or wave-function of the observable object has been linked to the process of observation. That is, the act of observing or measurement of the behavior of subatomic particles has been shown to influence the behavior of the particles at what had previously been held to be a fundamental level of objectification (the subatomic). At the same time it has brought about valuable questioning of the process of objectification; the separation from context and self of the 'other.' and the process of reduction of the 'other'/ not-self into an object as part of scientific discourse.

Essentially, a basic assertion of Quantum Physics is that "*…an elementary particle is not an independently existing, unanalyzable entity. It is, in essence, a set of relationships that reach outward to other things*." (5, p.94).

David Bohm has written about the practice within contemporary scientific discourse of reducing the whole to separate parts. Quantum mechanics directs us towards a wholistic perspective where 'parts'- "*are seen to be in immediate connection in which their dynamical relationships depend, in an irreducible way, on the state of the whole system.…*
Thus one is led to a new notion of unbroken wholeness which denies the classical idea of analyzability of the world into separately and independently existent parts." (5, p.312)

Scattering matrix (S-matrix) theory incorporates the Heisenberg Uncertainty Principle which states that we may determine one but not both of a particle's momentum and position at any moment. In S-matrix theory, events rather than 'things' or 'objects' are critical. A particle, such as a neutron is described as an intermediate state in a network of interactions; a reaction channel through which energy flows in a pattern of interactions. (5, p. 266) "*The idea that objects exist apart from events is part of the epistemological net with which we snare our particular form of experience. This idea is dear to us because we have accepted it, without question, as the basis of our reality…It is the root of our inescapable sense of separateness from others and environment.*" (5, p.267)

Systems theory differs from reductionism in that instead of describing the properties of discrete objects, the interdependence and interconnectedness of phenomena is described. In the quantum logic that extends from quantum mechanics, the event rather than the discrete object is critical. The connection between events and hence the correlation between 'objects' can be described in terms of information.

According to Professor Bohm "*There is a similarity between thought and matter. All matter, including ourselves, is determined by 'information". "Information" is what determines space and time*." (5, p.323)

Humpty Dumpty and Bell's Theorem

Humpty Dumpty sat on a wall,
Humpty Dumpty had a great fall. All the King's Horses and all the King's Men couldn't put Humpty together again.

The story of Humpty Dumpty is a well known English nursery rhyme. Whether or not there is a metaphysical significance to it, let's re-read the story metaphorically, in mathematical terms this may be

expressed as a substitution of values (x)(x1), in an equation f(x).

Humpty (the whole self in context of related systems).

The fall (the process by which the whole becomes separate analyzable parts).

The King (like the Emperor in Tarot, the power of the mind, the will).

The King's Horses and Men (Scientific Discourse and Technology).

In the metaphorical reading, scientific discourse has become dominantly aligned with the King, which represents the power of the human mind/ intellect manifested in human Will and the urge to control the universe.

Zukav remarks that "*Acceptance without proof is the fundamental characteristic of western religion. Rejection without proof is the fundamental characteristic of western science. In other words, religion has become a matter of the heart and science has become a matter of the mind. This regrettable state of affairs does not reflect the fact that, physiologically, one cannot exist without the other…Mind and heart are only different aspects of us.*" (5, p.110)

In the story of Humpty Dumpty- All the King's Horses and all the King's Men (Science and Technology), couldn't put Humpty (the living interconnected person) together again. Something irrevocable has happened in the process of Reductionistic praxis, in other terms-*the data is irrecoverable*.

In terms of medical praxis, the story suggests that a wholistic perspective and praxis cannot be achieved by aggregating all the products of reductionistic discourse.

Humpty's story has surprising connectivity to contemporary scientific discourse, in the form of Bell's Theorem. Quantum physics has significant implications in the macroscopic world, and for chiropractic because of Bell's Theorem.

Bell's Theorem, in 1964, demolished the 'assumption of local causes' held by the research team of Einstein, Podolsky and Rosen (5, p.309). This principle holds that what happens in one area does not depend upon variables subject to the control of an experimenter in a distant space-like separated area. The term 'space-like' means a measure of space within which a photon takes a measurable length of time to traverse, at the speed of light. Experiments which validated Bell's Theorem supported the statistical predictions of Quantum theory, rejected the assumption of local causes and led to a perception of the fundamental significance of information at the subatomic level. A shift to a focus on information represents more than an increase in an order of magnitude of logic, it represents a shift to a meta-level of analysis.

Scientific discourse shifts from a restricted focus on parts as separate things to a self-referential perspective primarily concerned with information flow, connectivity and change.

"*If one accepts the usual ideas about how information propagates through space and time, then Bell's theorem shows that the macroscopic responses cannot be independent of far-away causes. This problem is neither resolved nor alleviated by saying that the response is determined by "pure chance". Bell's theorem proves precisely that the determination of the macroscopic response must be "non-chance", at least to the extent of allowing some sort of*

dependence of this response upon the far away cause." (5, p.313)

According to Stapp: "*The important thing about Bell's theorem is that it puts the dilemma posed by quantum phenomena clearly into the realm of macroscopic phenomena…[it] shows that our ordinary ideas about the world are somehow profoundly deficient even on the macroscopic level*." (5, p.309).

Zukav writes that physicists have 'prove,", rationally, that our rational ideas about the world in which we live are profoundly deficient.' (5) In terms of the idea of cosmogenesis presented in this paper, we may argue that it's the cosmogony/ worldview and the system of logic deriving from it which are profoundly deficient.

In the famous Copenhagen Interpretation of Quantum Mechanics, in 1927, a significant shift in the philosophy of science was recorded. Classical science attempts to picture 'reality', based on what is apparently a myth of separateness and analyzability of parts of a system. The failure of classical science, represented by the observation that the statistical predictions of quantum mechanics are always correct (5, p.306), led to the reinterpretation that the purpose of science is to provide a mathematical framework for organizing and expanding our experience. (5, p.318) This represents a huge shift in attitude from earlier in the 1900s when Lord Kelvin predicted the completion of western scientific knowledge, and the chairman of the Harvard University Physics department discouraged graduate study because so few important maters remained unsolved (5, p.315).

Geyer (3) has described how cybernetics has increasingly focussed on the analysis of interacting processes, including the observers of the processes, and how the possibility of theory transfer may prove valuable across different scientific categories. One such source of critical theory is semiology, a branch of linguistics. Barthes (6) describes the discursive content of signs, including words, images and concepts. A reductive exercise is carried out wherein a sign is split into two parts. The first part is labelled denotative and addresses the utility or function of a sign- what it serves to name. The second part is connotative and addresses the unspoken content or discursive loading of the sign. In the present discussion, the connotative loading is examined in terms of the philosophy and cosmogony which form the largely unspoken and invisible context of scientific praxis. The attempt is to locate and contextualise the sign, by bringing different aspects to light, hence the term 'unpacking'.

Homeostasis unpacked

Hudson (7) relates that Bernard labelled the internal environment of the organism with the term 'milieu interieur.' In 1928 Cannon posited the concept of homeostasis to indicate the steady state that characterized the animal organism. Bernard's work balanced Virchow's emphasis on the anatomical approach to the study of disease (7). The life processes went on within the anatomical unit of the cell. The blood provided nutrients to the cells, carried away waste products and mediated one cells effects on another. The entire scheme being mediated by the nervous system.

Utilizing the logic of a dualistic and reductionistic cosmogony, the human system was reduced to the anatomical unit, and by extension the life processes are reduced to intra- and extracellular functions or

physiology. The phenomenon of life is thereby reduced to a relatively closed system, wholly circumscribed within a machine domain, in which it is described and defined in terms of first order cybernetic processes.

This is an example of a primary function of discourse: to reinforce the cosmogony from which it obtains. Geyer (3, p.5) observes a kind of circular process where every success of the developing 'natural' sciences since the seventeenth century strengthened the conviction that science is engaged in the pursuit of truth, to lay bare the hidden clockwork of the universe. This pursuit of truth and order attracted new scientists to the area, and their research further reinforced the Newtonian-Laplacean cosmogony.

This observation is ironic, in that reductionistic logic seeks and stresses the importance of linear causality, often rejecting the concept of circular causality in the basket case of 'circular reasoning'- the assertion that something cannot cause itself. My cursory search of the MEDLINE database, revealed a plethora of research demonstrating homeostatic processes at work in the human system. However, the presence of 1 or many homeostatic processes within a system does not logically extend to the inference that the integrity and function of the whole system is based on homeostasis, because this would mean that the system is, in effect, closed.

Contemporary generic medicine and its historical development has been based on this assumption, this cosmogony. Much has been gained by this historical approach in terms of scientific knowledge and technology. A serious cost has been the limitation of scientific perception of the complexity and potential of living systems (the data lost when Humpty fell).

The reductionist approach, has had and continues to have serious implications for human systems, and is inextricably bound up in history, politics and culture. This field is explored in the sociology of medicine. Infamous experiments like Tuskegee (8), the debates over vaccination, and hormone replacement therapy (9), are viewed in terms of fundamental discrepancies between the intent of medicine, as evidenced in the Hippocratic oath, and it's practice, in terms of longitudinal studies across dimensions of culture and time (10). These discrepancies are very evident in studies investigating the interaction of Western biomedical science and geopolitics.

Taylor (11) says that "*The ascendancy of modern diagnostic and therapeutic medicine has all but obscured the important social and environmental factors which are the main determinants of health,illness and death in the developed and developing world*." In the context of Australia's indigenous people, Saggers and Gray (12) say that '*The Western biomedical model of health provides a conservative vehicle for Western health professionals. Biomedical ideology obscures the sociopolitical and economic origins of poverty, ill health and underdevelopment. In spite of a changed health rhetoric emphasizing prevention and participation, existing social structures and capital expenditures within the health departments of the various states and territory governments make a curative focus inevitable*."

In the territory of the personal body also, the discourse of the 'object' has serious implications: "*The five decades since Nuremberg have seen within medicine and science repeated examples of the ethical challenges of definition and selection as well as those of*

exploitation of vulnerable people. There have been recurring instances of medical science contravening the Nuremberg code and exploiting vulnerable people for medical experimentation, including patients, prisoners, visible minorities, children in institutions, women, and soldiers." (13).

Historically, the biomedical discourse has been hostile to the living system, and this is recorded in the bodies of not only humans but also countless animals subjected to 'research' (14) This hostility is perhaps most evident in the language of warfare that western scientific medicine has employed in its discourse of disease and the body. Our bodies are, of course, the terrain upon which this battle is fought. (15)

In the rereading of the Humpty Dumpty story, an alignment between Western science and the power of the will was described. "*The infusion of science and technology into medicine which began on a large scale during the Second World War, promised a more rational and effective version of an ancient caring craft. This promise has been largely unfulfilled. Most of the supposed 'rationality ' and 'effectiveness'is illusory, what we now have is a malignant proliferation of technological intervention with important adverse effects and little results in terms of improved health for the community.*" (11)

It has been philosophically convenient within biomedical discourse to say that quantum physics applies in the subatomic world and Newtonian Mechanics provides sufficient predictive accuracy to base theory and praxis in the macroscopic world. Further, and perhaps more (or less) seriously, there's been a tacit belief that in generic medicine we can continue to reduce the person to anatomical parts, biochemical interactions, physiology, psychiatrics, etc, then group all those parts together again and somehow arrive at wholistic praxis.

As an undergraduate Chiropractic student it is evident that Chiropractic education is relatively fixed in a reductionistic domain, and that while there is a philosophical recognition of wholistic or 'Wellness' principles, there is a lack of theoretical modelling to enable researchers and educators to base discourse on. These principles often get relegated into the category of 'untestable assumptions' and removed to a marginalized category of 'philosophy' in an increasingly technocentric worldview.

The critique of the homeostatic model begins to show us that it is our scientific discourse, praxis and technology which are insufficient to explain chiropractic principles rather than errors in the principles.

An epistemological crisis of science was identified at the beginning of the paper, to which Keating's observations of chiropractic literature were related. The nature of this relationship can be better understood when we unpack chiropractic discourse from its cosmogony. Consider the following example from the Internet resource of the Chiro-Web, patient education material:

"*The body has an inherent ability to heal itself, assuming it is working normally under the control of a perfectly functioning nervous system. The brain and nervous system are the master control organ of the body. Every function of the body depends on this master control system. The subluxation grossly interferes with homeostasis: body's state of health. Health means that you have optimum potential to resist being sick.*" (16).

Denotation	**Connotation**
(i) control system	body as machine
(ii) master control	mechanical model
(iii) homeostasis = health	normative equilibrium
(iv) health = resist being sick	reduction

Unpacking the language we get: "control system(s)' (body-as-machine'master control'(hierarchical model based on idea of linear causal chains homeostasis= body's state of health(tending towards a normative equilibrium'Health'='resist being sick (Reductionist equation)

It is my contention that one of the main reasons Chiropractic discourse is 'mixed up' is because it's attempting to contain a cosmogenic shift. The discrepancy occurs between Chiropractic's wholistic principle that is consistent with Quantum logic, and reductionistic Biomedical discourse operating from Newtonian logic.

Such a discrepancy represents 'illogic' because the discourse is not self-consistent. Furthermore it may not be resolved in a real sense by resorting to the use of other terminology (changing the language), e.g multifactorial disease causality (the theory of choice when monocausal analysis fails), preventative medicine (the praxis of choice when curative medicine fails).

This illogic may be represented in the interaction between Practitioner and Patient, in which it is asserted, in effect: 'I am going to analyze and adjust you as a whole person, in order to do that it will be necessary to hack you up into separate parts.'

Second Order Cybernetics

Homeostasis, as defined by first order cybernetics, is a system of regulation in closed systems, achieved by negative feedback. Consequently, in a perspective on the human system, defined by first order cybernetic principles and the 'body as machine' perspective, the purpose of the system is defined in terms of maintenance of equilibrium and reaction to external influences. This is Cannon's 'steady state'.

One basic problem with this is that living systems are not closed systems.

Living systems display a spectrum of functions across multiple dimensions, including:

(a) self-will. Living systems are self steering and unpredictable.

(b) autopoiesis. Living systems produce themselves and reproduce in interrelation to their environmental niche.

(c) self-organization. Living systems display negentropy- a tendency towards increasing order and complexity.

Second-order cybernetics represents a solution to the Von-Neumann bottleneck of sequential/ linear causal analysis when faced with the living interconnected system. It is my contention that second order cybernetics can be profitably used to bridge quantum mechanics to contemporary chiropractic praxis, in the same way that first order cybernetics has bridged the Newtonian-Laplacean cosmogony to generic medicine. Second-order cybernetics deals with living systems, rather than with developing control systems for inanimate technological devices (3, p.6). Living systems are represented quite differently in this cosmogony. They are described as systems that are far-from-equilibrium. Such systems are characterized by processes which amplify deviation rather than maintain a normative equilibrium. An open system may contain closed systems/ processes within it, just as

in mathematics a set can contain subsets with different characteristics.

In first order cybernetics, negative feedback loops were studied and the object was to steer systems by keeping them on a specified course, i.e to let them fluctuate within defined parameters around an equilibrium (3).

The biological basis of second-order cybernetics points to the superordinate (in the nature of relation of a set to a subset) significance of positive feedback loops in living systems. These processes cause change rather than stability. Hence living systems are described in terms of morphogenesis.

There are numerous biological examples of morphogenesis- the phenomena of learning and corresponding change in the patterning of neural networks, the continuous remodelling of bone, adaptive change in the immune system, the changes in skeletal muscle with exercise, the phenomena of growth and evolution. Second-order cybernetics is concerned with modelling change and evolution in biological systems. Further, it provides a language with which we can conceptualise and describe these systems as they deviate from mechanistic processes. Prusinkiewicz et al (17) describe the phenomenon of emergence, where a system as a whole acquires complex properties through the interaction in space-time of its component molecules. In biological systems complex forms and patterns develop and their emergence is referred to as morphogenesis.

Living systems are massively interconnected (18), within themselves and within the larger systems they participate in. The transfer of information is the description that quantum physicists have given to this interconnection as it has been observed in subatomic experiments. This interconnection is vital to the integrity of the system and points towards a redefinition of 'health' in the living system.

According to Brook, (19) "*In any system, organisation is constructed from information and negentropy (the structural ordering of matter). Put another way information brings harmony and negentropy brings order to a system.*

Information and negentropy entering your nervous system are flows that help to organise your consciousness."

A quantum type shift is being recorded in which scientific discourse relinquishes its fascination with control, causality and reductionism and begins to address the interconnectedness of things. The great search of Western Science for the fundamental bits of the universe and to reveal the essential causes of things appears to represent a mirage. Yet in biomedical discourse we are still locked in pursuit of the 'cause' of things, from the extremely self-limiting cosmogony of Reductionism.

It is at this point, that we may begin to reconstruct the connection between **Chiropractic and Cybernetics**.

The cosmogenic shift in scientific discourse, which this paper hinges upon, is a difficult thing to defy in the long term, but easier to ignore in the short-term/ single generation thinking of individual actors.

The beginnings of this terrain have been mapped by quantum physicists. It's a terrain that encompasses more than the purely 'theoretical', but also the political, the economic, the psychological and more. This is because our actions in the world- (our praxis), are embed-

ded in an invisible cosmogony, and the categories we like to impose on our praxis are fictions.

Heisenberg has written"*I believe that the difficulties at this point can hardly be overes - timated. Once one has experi - enced the desperation with which clever and conciliatory men of science react to the demand for a change in the thought pattern, one can only be amazed that such revolutions in science have actually been possible at all.*" (5, p.211)

The model of health deriving from the mechanistic cosmogony is polarized and two dimensional. Health is defined in terms of its opposite- disease. This opposition is inevitable because the cosmogony from which this system of thinking obtains is primarily a process of objectification producing binary oppositions beginning with the separation of Self from Other and extending in logic to Health and Disease, Good and Evil, Law and Crime…

Health appears two dimensional because it is represented as an arbitrary level of normalcy (a homeostatic equilibrium); a goal always to be approached/ deviated from, and, insidiously, never to be attained. Illness, the opposite, appears devalued as something to be avoided and 'cured' or 'prevented'.

In this sense the intent of preventative medicine is not far removed from curative medicine, because both forms of medicine operate from the same logical basis.

Chiropractic's idea of the restoration of homeostatic equilibrium as the gateway to health, promotes a reductionistic concept of health. From the first-order cybernetic model of health depicting maintenance on equilibrium in a closed system, we can develop a second-order cybernetic model of health, which depicts increasing levels of integration, organization and complexity in the interconnectedness of living system and environment. The spectrum of function of biological systems is multidimensional, and thus the arbitrary binary opposition of values on a fixed scale of Health and Illness appears less relevant, because we're interacting with a system that is evolving in complexity, along multiple axes or dimensions. An analogy would be between the fuel gauge on a car and the binary view of health and disease. The system is observed to fluctuate along a linear scale.

Given the hegemony of the Newtonian-Laplacean cosmogony on our cultural consciousness, it is easy to ascribe values of good (full tank, health) and bad (empty tank, illness) to the scale. It is said that in feudal times, illness was thought to have been caused by demons. In current biomedical discourse we appear to have demonized disease, and in many ways made it more real than the person (e.g the 'Germ ' theory of disease, the idea of separate and linear disease causality). In a morphogenetic model of health, e.g a spiral form- the system never occupies the same point twice. Furthermore the model removes two critical biomedical derivations necessitated by classical logic. Firstly, the function of a living system is plainly more than its steady-state/ equilibrium. Therefore dysfunction/ disease is more than disturbance of equilibrium. If the 'steady-state' assumption is not sufficient to explain health and illness then we may dissolve the prevalent binary association:
Health (function)≠ Good
Disease (dysfunction)≠ Bad

Secondly, we can then question, by implication, why we need to search for the 'cause' of disease. The search-and-destroy mission to locate, identify and

eliminate or 'prevent' a disease-causing 'entity' is predicated on this seemingly innocuous binary association. However this evaluation of health and illness is neither innocuous, innocent, nor silent, even though it is usually presented as part of the unspoken/ invisible biomedical discourse.

The quest for the cause of disease is predicated on the idea of tracing the sequential causal chains of the body read as a machine. Because the body and the universe are systems that are far-from-equilibrium, they cannot be contained within the rules of classical logic and are more consistently described by a quantum logic, based on measurement (experience) (5, p.319). Integrated interconnected open systems are irreducible (resistant) to sequential causal analysis. In the field of Artificial Intelligence this problem has been described in the analysis of emergent phenomena in neural networks as the 'Von Neumann bottleneck' (3, p.9).

In a reinterpretation/ re-reading of biomedical science using quantum logic, we re-read the body in terms of information flow instead of hacking it into separate parts. From this logic we derive Health and Illness as a measurement of how a system is processing its environment. A morphogenetic definition of health and illness is merged with the definition of the human system itself. In other words, health and disease are not qualities nor quantities of the system, but rather represent a fundamental process which is not separate nor reducible. Bell's Theorem tells us that we can't understand the system by reducing it to parts. Such a discourse is not consistent with contemporary scientific knowledge. The characteristics of living systems describe functioning of the systems across multiple dimensions (see above).

In our observation and interaction with such complex evolving systems, we may define the health of the system as a measure of the integrity of the system in terms of information flow and connectivity.

Correspondingly, disease represents the emergent phenomenon or crisis through which the system evolves to higher orders of complexity, in inter-relation to its environment. This evolution of the 'self' is apparent in terms of the neurological aspects of learning and experience and the adaptation of the immune system (neuropsychobiology).

Greenwood and Nunn (20) describe a transformation model which resolves the separation of health and illness in an emergent model of human development and experience.

The morphogenetic model represents a complementary discourse of the human system, to the metaphysics of quantum mechanics. The model records a shift in focus from where these elements are seen as objects/ things to be analysed to the maximum degree (in search of ultimate causality) to a wholistic perspective which views these processes in terms of how they contribute to the evolution of the system.

A morphogenetic model allows medical praxis to develop beyond the present dilemma of objectifying and reifying illness, at the expense of devaluing and obscuring the person's context and experience.

From the treatment of sickness induced from a homeostatic model of the human system, the morphogenetic model permits the recognition that the human system is complex and evolving, characterized by emergent processes, while maintaining highly limited and system relative homeostatic processes. The idea of value is not excised

from medical praxis, pain is still pain, suffering is still suffering, the world is still in need of healing. The question is- what is our aim as health practitioners? If health and disease are ultimately not things, but rather processes, then what is doing the processing? How do we define, analyse and evaluate the system? The morphogenetic model suggests that we as Healers perform a function like midwives, helping a system in a crisis of emergence, to give birth to itself, at a higher order of complexity.

The morphogenetic model represents a theoretical basis, grounded in the 'hard science' of Quantum mechanics, for wholistic medical praxis. Greenwood and Nunn (20) assert that medicine (as a discourse) is a reflection of the cultural consciousness in which it is embedded. If we consider this as chiropractors, then we need to locate and understand our praxis within the cosmogony from which it derives.

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