

Subluxation and Chaos Theory

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ABSTRACT

The philosophy of chiropractic will be examined in the light of contemporary science. The concept of the subluxation is considered in relation to advancements in physics and biology. The potential energy theory of subluxation, which is congruent with the non-linearity of the philosophy of chiropractic and with recent discoveries in contemporary science, will be proposed. Practical application of this theory will be presented through an understanding of tensegrity.

The challenge of studying the philosophy and application of chiropractic with reductionistic models will be discussed. A possible solution to this challenge will be proposed through the application of chaos theory. With chaos theory, scientists and mathematicians have been able to discover patterns in chaos called strange attractors. Strange attractors are indicators that a system is greatly susceptible to input and can be used to predict when changes in a system will occur. This paper will present a basic understanding of strange attractors and chaos theory. The possibility of utilizing advanced mathematics to find the elusive patterns of subluxations will be proposed. Studies into the nature of strange attractors in living systems have yielded information as to the stability of systems, susceptibility to input and overall ability to adapt to life. Research in this area could give rise to information about the nature of the restoration of the system toward a state of ease, patterns inherent in the subluxation, and also the effects of the subluxation and the adjustment of living systems.

Key Words: universal intelligence, subluxation, contemporary science, potential energy theory of subluxation, tensegrity, chaos theory, strange attractors, restoration, disease

INTRODUCTION

Chiropractic is described as a philosophy, science, and art of things natural. “Science tells us what it is, art tells us how it is done, and philosophy, the “why” of the other two. According to that, then philosophy must tell us about both science and art”.¹ Included in this philosophy is the concept of a universal intelligence which is omnipresent, omnipotent, and omniscience. It is infinite and perfect, is in all matter and continually gives to matter all of its qualities and characteristics.² Life is considered to be the unification of intelligence, force and matter, force being the bond between the non-material intelligence and the material matter.³ The philosophy of chiropractic goes on to describe the existence of innate intelligence, which is the “local intelligence” within each “living thing”. This intelligence builds the body and keeps it “actively organic”.⁴ All organization, adaptation, replication, healing, and coordination, is guided by this intelligence. Innate intelligence is always constructive in relation to living tissue and is always perfect and always one hundred percent. According to the philosophy of chiropractic the cause of all dis-ease in living systems is the interference of the expression of innate intelligence of the body. This interference is “always due, either directly or indirectly to subluxations in the spinal column”.⁵

The above concepts are the basic foundation of the philosophy of chiropractic, the “why” upon which the science and art of chiropractic are based. To many it appears to be self evident and requires no proof. To others it is the bane of chiropractic’s existence, a bit of chiropractic’s history that should be studied from a historical perspective but given no further time or attention. Still others have taken up the challenge to research the

concepts put forth by the philosophy of chiropractic. The researchers have sought to “tell us what it is” and thus to find support for the profession of chiropractic and possible ways to explore the evolution of the art of chiropractic. For those who seek to expand our knowledge of the science of chiropractic challenges abound. One of the major challenges is that most prevalent scientific methods and models utilized since the discovery of chiropractic have been linear and reductionistic in nature. It is my opinion that this has lead to rather linear models of the subluxation and to rather linear methods of researching the concepts of chiropractic, including the subluxation and its effects. Although I applaud the efforts and accomplishments of those in the research arena and feel that the discoveries have been useful, I also feel that contemporary science affords us the opportunity to move beyond the linear scientific models and methods of the past. The work of great minds, such as Einstein, Planck, Poincare, and Prigogine, have opened the doors of science and expanded our view of the world. Truly our world is nonlinear, vitalistic, and full of possibility and probability and contemporary science is finally evolving to a state where it can begin to grasp the wisdom and brilliance of the philosophy of chiropractic and thus seek to “tell us what it is”.

The purpose of this paper is to utilize concepts from contemporary science to bring a deeper understanding and appreciation to the philosophy of chiropractic. A model of subluxation which is both philosophically congruent and in alignment with discoveries in physics and physiology will be presented. A basic discussion of chaos theory and strange attractors will be included. Chaos theory has sparked the attention of many scientists studying complex phenomena as varied as weather patterns and turbulence to neural network models and biological evolution. Application of chaos

theory in chiropractic may further our understanding of the subluxation and its role in living systems.

THE PHILOSOPHY OF CHIROPRACTIC AND CONTEMPORARY SCIENCE

At the foundation of the philosophy of chiropractic are the major premise and the triune of life. The major premise states: “Universal intelligence is in all matter and continually gives to it all its properties and actions”.⁶ The triune of life says: “Life is a triunity having three necessary united factors; viz. intelligence, force, and matter”.⁷ These two statements suggest that there is organization in the universe and that that organization is somehow expressed in matter through force. The existence of some type of organizing intelligence in the universe seems self evident. It can be seen in the fact that the sun rises each day and sets each night. When an acorn is planted an oak tree grows. When a human female is pregnant she will deliver a human child. In the passage of seasons winter follows fall, which follows summer, which follows spring, which follows winter. The consistency of each day provides a sense of security in that there are aspects of life that are predictable. One can relax in the knowingness that there are constants that can be depended upon.

The philosophical “why” of the apparent organization of the universe can be answered via the major premise. The task of understanding “what it is” is in the hands of science. The challenge of researching universal intelligence is that it is nowhere and everywhere. It is ever present and yet is non-material and so has no substance or form. Essentially it is everything and nothing at the same time. We see the effects of the

existence of an organizing intelligence but physically it is nowhere. How can it be studied when it cannot be found?

This is a question many scientists are asking. This “hole in our understanding of the universe” is being felt by many.

“There is a hole in the universe. It is not like a hole in a wall where a mouse slips through, solid and crisp and leading from somewhere to someplace. It is rather like a hole in the heart, an amorphous and edgeless void. It is a heartfelt absence, a blank space where something is missing, a large and obvious blind spot in our understanding of the universe.

The missing something, strange to say, is a grasp of nothing itself. Understanding nothing matters, because nothing is that all important background upon which everything happens....

For centuries, scientists, mathematicians, and philosophers have tried to track nothing down, give it a name, put a box around it. They’ve dressed it up with all kinds of decorative effects, like daisy decals old folks in Florida stick on their sliding glass doors, the better to see the invisible, to avoid bumping their heads. But nothing continues to fool them. Wherever they go, they bump up against it.

Today, nothing is back with a vengeance, at the forefront of everything. It is the font of all creation....”⁸

K.C. Cole

The interesting and somewhat challenging thing about the study of nothing is that each time the answer is approached and there seems to be something there, then it is no longer nothing and the search begins again. To date nothing has not been found, but the search continues. We do not yet know what this infinite potentiality of the blank canvas and of universal intelligence is but there is strong evidence that it exists. As physicist Lawrence Krauss says, “There is unquestionable evidence that the formation of everything we see is governed by that which we now cannot”.⁹

And so, the search for the “intelligence” in chiropractic goes on and we will have to patiently await the answer of “what it is” from science. The expression of “intelligence” in the world is understood, according to the philosophy of chiropractic, in the following terms. “Without intelligence, matter could not exist. Without matter, intelligence could not be expressed. Then there is a bond between intelligence and matter that cannot be dispensed with..... The bond is called force”.¹⁰ Essentially, force is thought to be the unifying factor between intelligence and matter.

Interestingly, although this is a statement from the philosophy of chiropractic, it greatly resembles a statement made by Max Planck, the man considered to be the father of quantum physics. Upon accepting the Noble Prize he made the following statement: “As a man who has devoted his whole life to the most clear-headed science, to the study of matter, I can tell you as the result of my research about the atoms this much: ‘There is no matter as such!’ All matter originates and exists only by virtue of a force which brings the particles of an atom to vibration and holds this most minute solar system of the atom together.... We must assume behind this force the existence of a conscious and intelligent Mind. This Mind is the matrix of all matter”.¹¹ One would think he was a chiropractor describing some of the concepts of the philosophy of chiropractic, but he is not. He is a scientist studying the nature of matter.

With the discoveries of Einstein’s theories of general and special relativity and Planck’s quantum theory the view of the world changed. The concept of a 100 percent predictable, solid reality was replaced with concepts of energy, probability, and possibility. Contemporary science tells us that matter and energy are interchangeable. In his book *The Analysis of Matter*, Bertrand Russell said, “what we perceive as various

qualities of matter are actually differences in periodicity.”¹² The Heisenberg uncertainty principle states that the location and velocity of the constituents of nature cannot be precisely known with total precision. All that can be hoped for is a probability of where the particle might be. Field theory considers matter to be “the star-like intersections of myriad raying lines of force that spread out from these centers to weave their way through the universe”.¹³ In string theory “patterns of vibration of a string appear as a particle whose mass and force charges are determined by the string’s oscillatory pattern”.¹⁴ Regardless of the theory, force is the link between matter and the thing that organizes it, whatever that organizing force might be.

The science of today lends great support in understanding the connection between intelligence, force, and matter. Undoubtedly as contemporary scientists forge ahead, they will, with ever increasing detail, be able to bring even greater understanding to the philosophy of chiropractic.

THE POTENTIAL ENERGY THEORY OF SUBLUXATION

As seen in the previous section, application of contemporary science, to the major premise and the triune of life, sheds new light and offers a different perspective to those concepts. Another concept of the philosophy of chiropractic, subject to change in the light of contemporary science, is that of the subluxation. The subluxation is the entity which interferes with the expression of the innate intelligence of living systems. Traditionally in chiropractic, the subluxation is defined strictly in terms of the spine and nerve system. Defining the subluxation in such terms and limiting the scope of

chiropractic to the spine and nerve system, made perfect sense, based upon the science available at the time of the discovery and development of chiropractic. Yet, one is inclined to wonder if it still makes sense today. Would the subluxation be defined in the same way had chiropractic been discovered in the 21st century, when our understanding of the universe and of human physiology are so very different. Approximately a century ago, quantum theory and relativity were only recently introduced and so not commonly known or understood. Also at that time in history little was known of the biochemistry and the electromagnetic field of living systems. Today however, the concepts of quantum theory and the theories of general and special relativity are more widely known and applied and increasing information is being discovered as to the role of the biochemistry and the electromagnetic field in the communication, coordination, adaptation and healing processes of living systems.

It is known that the nerve system is not the only communication system utilized in living systems. In her book, “Molecules of Emotion”, Candace Pert shows that the neurochemistry is vital in not only communication but also memory, behavior, and emotions. The emotion felt, thought retrieved, and behavior elicited are determined by the ligand/neuropeptide receptor interaction.¹⁵ In other words the response by the organism is determined by which ligand binds with the neuropeptide receptors. This is determined by the shape of the neuropeptide receptor. The shape of the receptor is determined by the environment in which it resides, that is, the electromagnetic field. The electromagnetic field of the body is also known to be associated with healing, tissue health and disease, mind phenomena and human consciousness.¹⁶ If this information had been available during the initial discovery and development of chiropractic, would the

innate forces of the body have been considered to “operate through and over the nervous system” only?¹⁷ Or would the definition of the subluxation specifically include interference to the other communication pathways of the innate forces of the body? The potential energy theory of subluxation not only recognizes the traditional aspects of the subluxation but also expands the idea further to encompass contemporary knowledge of our bodies and the world we live in. The discovery of the quantum theory, the tensegrity matrix of the body, the growing understanding of neurochemistry, and the role the electromagnetic field plays in the function of the body, afford one the opportunity to expand the view of the subluxation bringing it into contemporary terms.

With the discovery of quantum physics, came a new vision of the universe. There was a shift away from “solid reality” to one in which energy and matter were interchangeable. There was a realization that the things considered to be solid matter are actually made up of energy, and this energy is experienced as a vibration of a certain frequency or tone. This discovery paved the way for many of the technological advancements that have been made, such as microwave ovens and the computer chip. It also changed the way many researchers viewed the body. Scientists began to see the body not only as a physical structure but also as an energetic system. In the potential energy theory of subluxation this view of the energetic quality of the body is integrated into the idea of subluxation. The subluxation is not only viewed in terms of the neurological component but also the energetic component.

In life, each moment living systems are bombarded with input. Traditionally in the philosophy of chiropractic, this input is referred to as a “universal force”.¹⁸ Universal force, being the bond or unifying factor between intelligence and matter, carries the

information of universal intelligence. Thus, each force experienced by living systems carries information. Quantum science tells us that this information is expressed as packets of energy with varying frequencies or tones. So, although the input experienced may be quite varied, one consistent aspect is that all are energetic in nature. The senses perceive the energy of the experience and then the system interprets it. In humans the energy is changed from frequencies and tones to words understood, objects recognized, and impacts felt. In the philosophy of chiropractic, this information processing and interpretation occurs via the innate intelligence of the living system. The innate intelligence is the localized intelligence in all organic matter.¹⁹ In living systems, this intelligence keeps the system actively organized through the adaptation of forces.²⁰

According to the potential energy theory of subluxation, if the forces experienced are integrated, that is, the intelligence of the body recognizes and processes the information contained in the experience, then it can utilize them to grow, learn, heal and evolve. If the experiences are not integrated, then the input is stored in the physiology and the subluxation is created. The potential energy theory of subluxation expands the understanding of how, energetically, the subluxation is a system wide phenomenon. Further more, it encompasses the concepts of learning and evolution of the system. Continuing this discussion on an energetic level, the senses perceive a particular energy, with a particular frequency or tone. The tone of the energy determines the information carried by the experience. The information processing systems of the body then interpret the tones and initiate the appropriate response and the energy of the experience is utilized in the body. This energy utilization and tone interpretation suggests that there is an integration of this energy and tone (information) into the system. To integrate is “to

coordinate or blend into a functioning whole.”²¹ When an experience is integrated, the tone of the energy is blended into and becomes part of the living organism. Quantum physics has shown that matter and energy are interchangeable. In fact Chris Quigg, a physicist at Fermilab, goes so far as to say: “The distinction between matter and force (energy) is ancient, mythological, air and water and love and strife. The separation has been useful until now. But things are telling us that it is not fundamental in the end. I think this wall between force carriers and fundamental constituents is going to fall sometime soon.”²² Matter is but an organization of varying frequencies and tones, the more complex the frequencies the more complex the matter. If this understanding is extended to living systems, they may also be considered to be a multitude of synchronized frequencies and these organized frequencies determine the geometry and structure of each living organism and of the world. In other words, humans are, energetically speaking, a musical symphony physically manifested and walking around on earth. When a living system integrates an experience of life it has simply begun to express another note in the symphony that comprises the system increasing the complexity of the music ever so slightly. The structure of a living system is determined by the music, if the music changes, the structure changes. Thus, if the complexity of the music is increased by integrating a new tone (experience), the complexity of the structure is also increased. This is what evolution is, simply the integration by living systems of frequency upon frequency over billions of years.

It is said that the universe is holographic.²³ Essentially, this means that the infinity of information of the universe exists in every single atom. This is congruent with the philosophy of chiropractic which describes universal intelligence as being perfect,

infinite, and everywhere. What truly differentiates one thing from another is not whether the infinite intelligence of the universe is present in it. What differentiates it is what part of the infinite intelligence is being expressed. The philosophy of chiropractic states: “We would never know there was such a thing as intelligence, since it is abstract, unless it is shown to us by matter; that is, expressed”.²⁴ According to the potential energy theory of subluxation, the integration of each experience, by living systems, activates a previously dormant tone; that is, a portion of universal intelligence which is present but not expressed in matter and so not known and experienced in the world. This activation is much like resonance of strings on a guitar. If two guitars are placed side by side and the A-string of one of the guitars is plucked, the correlating string of the second guitar will also begin to vibrate. The second guitar, in essence, experiences the tone/force of the first guitar, integrates the information, the A-string is activated and, as a result, the guitar expresses its potential to play the note. In living systems, when the experience is integrated, the previously dormant portion of universal intelligence is activated. That bit of intelligence, now activated, expresses in the living system and a greater portion of the intelligence is “known”.

According to the potential energy theory of subluxation, if the system does not integrate the experience, then instead of the new tone becoming part of the integrated whole, it is stored in the body. The system perceives it as a foreign, dissonant tone. Contemporary science tells us that the resonance of the energy of a system determines its structure and thus its geometry, and so if the tone is changed the geometry of the structure will also change. In applying the potential energy theory of subluxation, the dissonance of the tone, of the experience which was not integrated, distorts the body’s

natural geometric structure and alignment. This distortion of the geometry of the body creates tension in the soft tissue (muscles, ligaments, tendons, meninges, messentary) and misalignment of the osseous structures, thus causing stress, in various ways, to the nerve system and interference to the communication of the intelligence of the body. This is congruent with and the existing models of the subluxation, such as the various component models, the subluxation degeneration model, the dysafferentation and neurodystrophic models, and segmental, postural, and tonal models.²⁵ It also expands the understanding of the subluxation beyond these models to include the effects of the subluxation on the neurochemistry and the electromagnetic field of the body.

Because of the energetic components of the subluxation, not only are the physical structures of the body distorted but also the neurochemistry and electromagnetic fields of the body. The neurochemical system is an important part of the communication of the body. Neuropeptide receptors and their ligands are seen as “information molecules – the basic units of a language used by cells throughout the organism to communicate across systems such as the endocrine, neurological, gastrointestinal, and even the immune system. Overall, the musical hum of the receptors as they bind to their many ligands, often in the far-flung parts of the organism, creates an integration of the structure and function that allows the organism to run smoothly, intelligently”.²⁶ The electromagnetic field (EMF) of the body has been found to have an affect on the neurochemistry by influencing the shape of the neuropeptide receptors. It has also been determined that the EMF plays a vital role in tissue health and healing, and in the functioning of the mind.²⁷ In the potential energy theory of subluxation, the tonal dissonance of the subluxation is related to an incoherence in the EMF of the body. Incoherence of the EMF is associated

with distortion of the neurochemistry, organ disfunction, emotional/mental disturbances, and in chiropractic terms, an interference with the expression of the intelligence of the body. According to the potential energy theory of subluxation, the subluxation, not only affects the spine and disrupts nerve system function but also creates an incoherence of the EMF, disruption of the neurochemistry, and distortion of the geometry of all tissues (hard and soft) of the body.

The adjustive thrust of the chiropractic adjustment is thought to release the stored energy of the unintegrated experience. This gives the system a second opportunity to integrate the energy and information. Once integrated the dissonance clears, the EMF becomes coherent and the disruption of the neurochemistry and the geometric distortion of the physical structures of the body are released. As these changes occur, the interference between all communication pathways of the body is cleared and the body is better able to adapt, heal, and function. What's more, the system has integrated the new information (frequency) into its energetic matrix, thus increasing its complexity and the complexity of the entire system. With the potential energy theory of subluxation, the chiropractic adjustment is truly about releasing the innate potential of living systems, not only by releasing the interference to the intelligence of the body but also by aiding the system in progressively expressing ever increasing aspects of that intelligence. In short, the potential energy theory of subluxation expands the idea of the effects of the chiropractic adjustment to include, the release of potential throughout the entire system, reestablishment of the vital communication of the system, and increasing expression of aspects of universal intelligence and thus evolution of living systems.

TENSEGRITY

The application of the potential energy theory of subluxation to the art of chiropractic can be best understood through the concepts of tensegrity. The term tensegrity was coined by F. Buckminster Fuller and is used to describe “a system that stabilizes itself mechanically through the distribution and balance of tensional and compressive forces within a structure”.²⁸ The building blocks of tensegrity structures are rigid struts, which can withstand both compressive and tensional forces, and tension bearing members, which can withstand only tensional forces. Use of a tensegrity design creates a structure which has a strength, stability, and flexibility which far exceed that which would be predicted by looking at the individual parts.

Recently the concepts of tensegrity have been applied to living systems. In the body the tensegrity structures can be seen on both the macroscopic and microscopic level. On a macroscopic level the osseous structures are the rigid struts and the muscles, ligaments, and tendons are the tension bearing members. The combination of these two components, give the body its visible form and thus its geometric expression on a macroscopic level. Microscopically, the rigid struts are made up of the micro-tubules, the extra-cellular matrix and large bundles of micro-filaments, while the tension bearing members are the micro-filaments. The study of the tensegrity of the body has given insight into body movement and force transmission, cell replication and inhibition, cell nucleus displacement, linear stiffening of tissue, self-assembly, nerve repair, protein activation, the coupling of harmonic oscillators and the exhibition of characteristic

harmonic frequencies of vibration of DNA, nuclei, cytoskeletal filaments, cells and tissues.²⁹

The nature of tensegrity is such that the structure is pre-stressed, this causes any forces introduced to the system to immediately be transmitted over the entire structure. In the model of subluxation described above, the unintegrated frequencies are experienced by the entire body through the tensegrity matrix and the entire structure of the body responds on both a macroscopic and microscopic level creating a distortion of the geometry of the body. This distortion may be palpated on the surface of the body and will express as tracks of tension in the soft tissue and misalignment of osseous structures. The changes which occur on the macroscopic level can be utilized to assess the system and determine the subluxation pattern. As the geometric structure of the body distorts, the energy is focused in different areas of the system depending on the distortion. In the potential energy theory of subluxation, the area of the system where the energy is focused the most is associated with location where the adjustive thrust would be introduced.

CHAOS THEORY AND STRANGE ATTRACTORS

For many years science has approached the study of the world and living systems with a reductionist approach. It was assumed that if enough information about the thing being studied was gathered and broken apart, that eventually the thing would be fully understood. Models could be developed and precise predictability could be achieved. This view, however, is being challenged. The science of chaos is suggesting that things are not as predictable as once thought. Scientists now believe, and have shown, that

minor changes can create major fluctuations in a system, making it impossible to completely predict the state of the system. In chiropractic the truth of this is experienced everyday in the offices of chiropractors across the globe. The chiropractic adjustment, while being a very simple input into the system, can create significant changes in the dynamics and functioning of the organism. This non-linear response of the system creates fundamental limits on the ability of the linear, reductionistic modeling to make predictions. This has posed a significant challenge to those researching the effects of the chiropractic adjustment. When the intention of the adjustment is to release the interference to the expression of the innate intelligence of the body, how can the specific resulting actions of the system be predicted? Will the innate forces release a pain, or regulate the heart beat, or change the hormone balance, or cause cancer to go into remission or choose some other action in the infinite field of possible responses?

The philosophy of chiropractic states that the adjustment releases the cause of disease. "Dis-ease is indicative of the body being minus something that should be restored, in order to make it normal; that is, in various modes of expression that body lacks ease, health, coordination, transmission, adaptation, well being, 100 % quality, soundness, sanity, etc., which must be brought to 100% or restored."³⁰ The chiropractic adjustment releases the subluxation, allowing the system to begin the process of restoration back to a state of ease. The fact that it is a process and not an event, suggests that many steps may be involved, the specifics of which may be impossible to predict. The process of restoration is a complex, dynamic behavior of the system, one that moves the system closer toward a state of ease. Linear methods of research are not sufficient to study this process. Chaos theory is the study of complex, non-linear, dynamic systems. Through its

application to complex systems it is found that within the seeming chaos there is order. And although it may not be possible to predict the specific state of the system, it is possible to predict the behavior of the system and see its inherent order. In applying it to the science of chiropractic, the exact path the body will take as it heals or the exact symptom it will express with a particular vertebral subluxation may not be known but the overall behavior toward ease or dis-ease may be better understood. In this section, a basic understanding of chaos theory will be presented. If the reader would like further information, the “Turbulent Mirror” by John Briggs and F. David Peat is a wonderful resource for a general understanding of chaos theory.³¹

To see the order within chaos, scientists use what is called a phase-space map. This map plots variables of a system in a way that allows the overall behavior of the system to be seen. The example commonly used is that of the motion of a pendulum. To create the phase-map of the pendulum, draw a two dimensional graph, with the momentum of the pendulum on one axis and the position of the pendulum on the other axis. As the pendulum swings back and forth it will change in position and momentum, with the momentum and position displacement being the highest at the top of the swing and the two components being zero at the bottom of the swing. If one were to measure the momentum and position over the course of the pendulum’s movement and plot the relationship onto the phase-space, the “behavior” of the pendulum over time would be seen. In the free swinging pendulum, due to the effects of gravity and friction, this behavior would show a tendency to lose momentum over time and to eventually stop at the central point of the pendulum swing. At this point there is zero momentum and zero position displacement from the central point. The pattern on the phase-space map would

show a spiral progressively decreasing in circumference until it reaches a point at the exact center of the map. This point is the zero point. No matter how large the momentum and position displacement of the pendulum at the beginning of the swing, it will always eventually decay to zero and the phase-space map will show the spiral winding toward the center zero point. The phase-space map reveals the behavioral tendency of a pendulum motion toward the zero point, in which the pendulum finds its resting place. In chaos theory, this point is called a point attractor because it seems to attract the motion of the pendulum toward it.

The point attractor is the simplest of the attractors utilized in chaos theory. The phase-space map, of the pendulum of a clock, which has constant input to keep the pendulum in constant motion, would reveal a limit cycle attractor. The pattern of the limit cycle attractor looks like a circle. It shows a behavior of the pendulum to have a regular rate of swing. The torus attractor is donut shaped and describes the motion of two pendulums combined. With this information scientists can now look for dynamic systems in nature which have similar attractors, that is express similar behavior, and study them from a new perspective. For example, consider a predator/prey relationship. In nature there seems to be a perfect balance such that the prey is never brought to extinction and the predator never multiplies unchecked. How is it, that nature achieves this balance when the individual activities of the animals are seemingly random and independent? Insight into the predator/prey relationship may be gained by looking at the phase-space map. If the number of predators is plotted in relationship to the number of prey, over time a pattern of behavior of the system would be seen. As the predator population increases, the demand placed on the prey population would also increase.

This would result in a decrease in the number of prey available to the predator population. This decrease in food supply would ultimately reduce the predator population. A decrease in the predator population would allow the prey an opportunity to increase in number. With this increase in number, there would be an increase in the food supply for the predator and so the predator population would again increase, starting the cycle over again. On the phase map a limit cycle attractor would form. The limit cycle attractor suggests a behavior of the predator/prey eco-system. Keep in mind that the formation of an attractor on a phase-space map suggests that the “behavior” of the system is “attracted” to a particular limit. This means that, theoretically, even though additional input into the system may initially create chaos, the system ultimately will return to the original limit cycle. In looking at several predator-prey populations, this is determined to be true. If either the predator or prey are suddenly increased or decreased, the system will eventually return to the original limit cycle and exhibiting an overall behavior which is again in balance. If three animals are considered in the predator/prey relationship then the more complicated torus pattern will form.

The fixed point, limit cycle, and torus attractors are useful when looking at simple systems, but what of the more complicated systems? Will attractors form for them also? The answer is yes, but the attractors are very “strange”.

The term strange attractor is used to describe the unusually shaped attractors which form with the analysis of more complex systems. The first known strange attractor is the Lorenz attractor named for the man who discovered it, Edward Lorenz. In the 1960’s, Lorenz began to look at the seemingly unpredictable behavior of weather patterns. Through the mathematic analysis of 40 years of weather data, Lorenz

discovered an amazing order amidst the chaos of the ever changing weather, the Lorenz attractor. The Lorenz attractor represents the overall behavior of the weather system over time. Lorenz also noticed that even minute changes in the input data created enormous changes in the output. From this realization came the famous “butterfly effect” which states that if a butterfly flaps its wings in Hong Kong it can change the weather in New York. In dynamic systems small perturbations can create significant changes. This is because through the iterative process small changes will magnify over time leaving a system which is entirely different from the original system with the original conditions. Interestingly however, even though the specific values of the systems change, the attractor formed, and thus the behavior of the system, remains the same. Since Lorenz, many scientists have used chaos theory and strange attractors to study subjects as varied as population growth, the stock market, heart arrhythmias and human behavior. In the next section, possible applications to the field of chiropractic will be explored.

SUBLUXATION AND CHAOS THEORY

“In recent decades, inroads have been made into understanding the complex patterns which characterize living things. One major discovery in the mathematics of complex phenomena is that complex patterns can arise from simple causes. A number of factors seem to be required: time irreversibility, far-from-equilibrium structures, self-similarity on different scales, repeated feedback or iterations, and nonlinearity. Given these conditions simple mathematical equations can produce a wide variety of complex patterns which resemble those seen in living nature. Living things, conversely, conform to all of these conditions. Time is irreversible; all living things age and die. Life maintains itself far from equilibrium; the form is relatively stable while the material constituents are constantly being replaced, with a steady supply of energy from the environment in the form of food, air and sensory stimulation. Living things make extensive use of self-similar structures: the branchings of bronchial tubes, blood vessels, and neurons allow interpenetration and intermixing of different

substances needed for metabolism. Repeated and complex feedback is one of the most salient features of the living world, from the fact that everything eats and is eaten to the complex interactions that characterize social structures. And nonlinearity, provided by the basic dimensions of the world, is the rule: a moment of passion can produce a new being, a step off the edge of a cliff can kill a man and one incident can trigger a world war.”³²

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The above statement describes beautifully the possible power of the chiropractic adjustment. Added to the statement, after “a moment of passion can produce a new being, a step off the edge of a cliff can kill a man and one incident can trigger a world war”, could be the words, “and one chiropractic adjustment applied perfectly to the body can forever change the course of the person’s life”. To function in a nonlinear way is the nature of all living systems. This fact is what makes living systems and the application of chiropractic so difficult to research. Chaos theory provides new possibilities for areas of research for the science of chiropractic.

One possible area of exploration is in researching the restoration process after the adjustment, when the system is transitioning from a state of dis-ease to a state of ease. It is probable that during this restoration phase there will be changes in the physiology of the body. The challenge is that these changes may be quite varied and also they may express a subtlety that initially may be missed by the more gross methods of measurement. The application of chaos theory to information received from the measurement of varying parameters such as brain waves, heart rhythm and pulse strength, muscle activity, and nerve conductivity could lead to the discovery of attractor patterns associated with dis-ease and the restoration of ease. One of the promising areas of research is that of field dynamics. The electromagnetic field of the body is incredibly

dynamic by nature. Research has shown that the field of living systems sometimes responds before there is conscious awareness of a change in the environment. Field changes will also occur in living systems before the heart or brain respond with increased activity, and sometimes with stimuli too weak to activate the nerve system. The electromagnetic field of humans reflects incoherence with disease processes and coherence with health and healing. It also reflects changes in the system before the tissue has fully healed, and so may be an effective means of determining the more subtle aspects of the restoration process. The dynamic nature of the field makes it more prone to exhibiting chaotic relationships. The Hunt attractor, which was derived from analyzing human field data, only required three seconds of data to yield sufficient information for the calculations. Chaos attractors found in brain wave and heart frequency data have required several hours and even days of continuous data to yield sufficient information. This could limit the practicality of their application. The efficiency of retrieving field data increases greatly the probability of gaining useful information, such as definable patterns of diseases and of the healing process itself.³³ In chiropractic, the study and analysis of field changes before, during, and after the adjustive thrust is introduced could lead to a greater understanding of the restoration process and of the overall effects of the adjustment.

Another possible area of exploration is in researching the sublaxation pattern. In previous sections of this paper the potential energy theory of sublaxation and the concept of tensegrity were presented. At the end of the section on tensegrity it was noted that patterns of sublaxation would emerge as a result of the tonal dissonance, of the unintegrated universal forces, being reflected through the tensegrity matrix of the body.

Analysis of these patterns revealed consistent geometric correlations in the human body.³⁴ If these correlations are viewed as a system, then the relationship between each of the geometric correlates could be used as a recognizable pattern. The possibility exists that a strange attractor determines the specific geometric correlations, giving rise to the patterning of the subluxation. It is also possible that analysis of field changes associated with subluxation patterns in the geometric correlates could yield the strange attractors of specific subluxation patterns.

As a universal force acts on a living system, it will cause the geometry to temporarily distort. If system integrates the force, it will express a higher level of complexity, but the overall geometry of the system will “normalize” and the system will return to a state of ease; that is, the forces of the attractor will move the system back to its “normal” state. If the system does not integrate the force, the geometry will remain in distortion. Theoretically, if the system remains in this distorted state, the distortion will become the new normal and a new strange attractor will form and will be present until the distortion is released. According to the potential energy theory of subluxation, the chiropractic adjustment releases the universal force stored in the system which is creating a tonal dissonance, and thus, also releases the geometric and EMF distortions. When the subluxation is released, the system transacts or moves through the attractor, organizes to a higher level of complexity, and learning occurs. If the subluxation is not released, transaction does not occur and the dissonance/distortion remains. According to the work of Ilya Prigogine, complicated structures actually require more energy transactions to maintain their integrity. When energy is introduced to matter the disorganization process can be altered and matter can take on higher complexity and organization. In fact if a

system does not have this input it will express a greater disposition for catastrophe and structured mutations.³⁵ Analysis of the field data after the chiropractic adjustment may reveal changes in the strange attractor patterns associated with the subluxation releasing. This analysis may also reveal changes in the attractors that suggest a movement of the system to a higher level of organization lending support to the philosophy of chiropractic and the efficacy of the chiropractic adjustment.

Valerie Hunt has studied the effects of various hands-on approaches to healing and has noted the following. “As living systems transact through their attractors, they build a complex repertoire of vibrations, which results in a memory. I describe it as a ‘wave train’. It is like a series of different chaos patterns strung together over time to show a gestalt or reactivity quotient. We have discovered that some people’s fields show such a limited wave train of energy patterns that in a few minutes they have literally exhausted their everyday reactive capabilities. Others show untold differences over time, an open, dynamic complex field of adjustments. In other words, the nature of the wave train circumscribes the available interactive possibilities. It follows that if the human field does not transact, it loses its complexity, becomes narrow in vibrational spectrums, and thus displays a simple wave train with a diminished capacity for self organization or creative exploration.”³⁶ She goes on to say, “Of all animals, it is the human who gravitates toward stress, it taxes the organization of his field and in positive cases, leads to greater coherency and higher refinement. If one does not respond successfully to stressful stimulation, the body suffers”.³⁷ In term of the potential energy theory of subluxation and of chiropractic, a system which is locked in a subluxated state and has not integrated the experiences of life is not able to readily adapt to environmental changes

and will express an increasing state of disease. Research like that of Hunt could provide tremendous support for both process of restoration after the chiropractic adjustment and the analysis of the subluxation pattern.

Even though the science of chaos theory is relatively new, the possible applications to the study of chiropractic are numerous. In addition to the possible applications in studying the restoration process and subluxation patterns, characteristics of the strange attractor patterns, such as the edge of chaos and the ridge of chaos,³⁸ may yield information as to the optimal timing of the adjustive thrust. Contemporary science has paved the way for the philosophy of chiropractic to be better understood. The task assigned to the science of chiropractic of “telling us what it is” may approach its fruition.

SUMMARY

Chiropractic has long been challenged with the task of studying non-linear concepts with the limitations of linear, reductionistic science. Contemporary science has given chiropractic a wonderful opportunity to understand our philosophy from a different perspective. When considered in the light of the current understanding of the universe, the concepts of universal and innate intelligence and the triune of life are not only scientifically congruent but are at the leading edge of science. The application of discoveries in contemporary science, such as quantum theory, field theory, and chaos theory, provide the scientists of chiropractic the opportunity to study philosophical concepts of chiropractic from a new perspective. It also provides the opportunity to consider the subluxation from a different perspective. The potential energy theory of

subluxation incorporates the idea of the interchangeability of energy and matter. It proposes that the subluxation is an experience, ultimately is energetic in nature, which is not integrated by the system resulting in a distortion of the physical structure, the biochemistry, and the electromagnetic field of the living system. The potential energy theory of subluxation is congruent with the philosophy of chiropractic, the current models of subluxation, and with contemporary science. The application of this model of subluxation can be understood through the application of the tensegrity structuring of the body.

Chaos theory is an exciting discovery in science that allows non-linear, chaotic systems to be studied. The application of this theory affords the scientists of chiropractic the opportunity to study the process of restoration which occurs with the release of the subluxation and also possible patterns created by the subluxation.

REFERENCES

1. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), xiii - xiv
2. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 236
3. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 238
4. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 258
5. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 308
6. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 236
7. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 238
8. K. C. Cole, *The Hole in the Universe*, (New York, Harcourt Inc.), 1-2
9. Lawrence Krauss, *Quintessence: The Mystery of the Missing Mass in the Universe*, (New York, Basic Books)
10. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 238
11. John Davidson, *The Secret of the Creative Vacuum*, (CW Daniel Co. Limited)
12. Robert Lawlor, *Sacred Geometry*, (Thames and Hudson), 4
13. Arthus Zajonc, *Catching the Light: The Entwined History of Light and the Mind*, (New York, Oxford University Press)
14. Brian Greene, *The Elegant Universe*, (New York, WW Norton and Co.), 15
15. Candace Pert, *Molecules of Emotion*, (New York, Scribner)
16. Valerie Hunt, *Infinite Mind*, (Malibu Press), 22

17. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 270
18. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 251
19. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 20
20. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 258-268
21. Merriam Webster Dictionary: Home and Office Edition, (Merriam-Webster Publishing), 273
22. K. C. Cole, *The Hole in the Universe*, (New York, Harcourt Inc.), 77
23. Michael Talbot, *The Holographic Universe*, (Harper Perennial)
24. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 250
25. Christopher Kent, *Models of Vertebral Subluxation: A Review*, (Journal of Vertebral Subluxation Research), Vol 1, No. 1, 11-17
26. Candace Pert, *Molecules of Emotion*, (New York, Scribner), 27
27. Valerie Hunt, *Infinite Mind*, (Malibu Press), 22
28. Donald Ingber, *The Architecture of Life*, (Scientific American), January 1998, 46-57
29. Donald Ingber, *The Architecture of Life*, (Scientific American), January 1998, 46-57
30. R. W. Stephenson, *Chiropractic Text Book*, (Iowa, Palmer School of Chiropractic), 80-81
31. John Briggs, and F. David Peat, *Turbulent Mirror*, (Harper and Row Publishing)
32. Christian Wertenbaker, *Nature's Patterns*, (Parabola Magazine), Spring 1999, 6-13
33. Valerie Hunt, *Infinite Mind*, (Malibu Press)

34. Susan M. Brown, Bio-Geometric Integration I, II, & III Course Manual for Bio-Geometric Integration Seminars

35. Ira Prigogine & T. Stengers, Order Out of Chaos: Man's New Dialogue with Nature, (New York, Bantam Books)

36. Valerie Hunt, Infinite Mind, (Malibu Press), 56

37. Valerie Hunt, Infinite Mind, (Malibu Press), 68

37. Valerie Hunt, Infinite Mind, (Malibu Press), 54