Gongs And The Biophysical Mechanisms That Induce Altered States

To Satisfy Requirements of a

Masters Thesis in Integral Health

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Table of Contents

Abstract

As a practitioner of Vibrational Medicine for over 15 years I've observed countless amazing transformations from exposure to my 80" gong. I've witnessed a large percentage of people create an internal state that might be described as an Exceptional Human Experience (Tassel-Matamua, 2018). There are books filled with anecdotal evidence, but no formal, rigorous study has been done with subjects in the presence a large gong, until now. I have undertaken a 1 year research project to measure salivary biomarkers for stress and immunity and correlate that with self reported states of depression, anxiety, stress, and pain. The complete research proposal is described in Appendix D and the approved Institutional Review Board (IRB) in Appendix E.

This research is designed to answer specific questions on the measurable effects of gong therapy. The more difficult question to answer is: "What are the mechanisms by which the gong induces altered states?"

I have identified 9 potential mechanisms of action, chakra resonance, hearing, right brain activation, tactile stimulation, cellular mechanotransduction, acupuncture meridian stimulation, cellular memory modulation, magnetosonic modulation, and resonance with baryonic acoustic oscillations.

Introduction

Gongs are believed to have come into existence in the bronze age about 5,000 years ago (Benton, 2013). There is a story told in the gong community, "Buddha decreed every gong in the kingdom should have the characters *Tai Loi* (happiness arrives) painted on them." This is unlikely to be true since Buddha was from India and it is dubious that he would suggest Chinese characters; plus, the symbols used on modern gongs are characters which were not in use until

1,900 years after the death of Buddha (Nur, 2015). Nonetheless, it has endured as a subcultural myth, and speaks to the powerful nature of the gong and the emotional states it can produce.

Ten years ago I stood in front of an 80 inch German gong for ten minutes. When I stepped away I thought I was going to cry, and I had absolutely no idea why. I knew there was something incredibly important here, an unspoken mystery that deserved to see the light of day.

Life exists within a sea of vibrations (Muehsem & Ventura, 2014) and the gong was like an ocean of sound that enveloped me and shifted my state of being in an unexpected way. At the time, I'd been in practice for over five years doing private multi-modal vibrational therapy sessions and group meditations, yet nothing had prepared me for the intensity of the experience nor to imagine the path of discovery it would lead me down.

I've read every gong related book and searched all the journal articles for anything to describe the nature of the experience. Although there is a great deal of research on Music Therapy (Conrad, 2010) when it comes to gongs, there are anecdotal reports, and subjective tendencies (Pesek & Batina, 2016), but no actual study of this specific phenomenon.

I have had my own 80 inch gong hanging in a custom designed building (Appendix C) for over 5 years and I've listened to clients share their own amazing experiences. These range from the mundane ("feeling relaxed") to the sublime ("being out in space," "an overwhelming feeling of love like holding their newborn child," "going back to the Big Bang," "being in the world of dinosaurs," or "dissolving, being sucked into a vortex and transported to another dimension").

Qualitative Inquiry & Research Design states, "The reality of an object is only perceived within the meaning of the experience of the individual" (Creswell & Poth 2013). The intense emotional and visionary experiences that have been reported require a complete rejection of all

presuppositions on the nature of the gong, its mechanism of action, and its capability to produce transformative change. Perhaps the only useful presupposition is from Don Conreaux, the Grand Gongmaster, who said, "The entire universe is a giant gong. The universe contains every frequency, and the gong contains every frequency, therefore the universe is a gong." (personal communication, October 29, 2014).

Literature Review

A search of literature yielded few direct results. There is a great deal of information on music and how it has been used historically in medicine (Conrad, 2010) (Goldman, 1988) but very little on the gong experience. Nothing in the Music Therapy literature addresses large German gongs.

A study in Slovenia (Pesek & Batina, 2016) surveyed participant's experience in sound meditations using gongs, bowls, and other instruments and summarized that they experienced relaxation, reduced stress, and inner well-being to varying degrees, but it didn't specify the types nor sizes of gongs, nor discuss the subjective quality of their experiences. A study on the effect of Tibetan bowls (Goldsby 2016) also used Tibetan bowls and Chinese gongs and noted that the very first initial exposure to sound meditations frequently had a more pronounced effect than on those who had prior experience.

Gongs have been measured to exhibit highly non-linear vibrations and chaotic behavior (Chaigne 2005). There is a profound distinction between the German made instruments which are nickel silver alloy (NS12, 88% copper and 12% nickel), and the Asian instruments made from bronze alloy of approximately 80% copper and 20% tin. There are approximately 50 of these large Paiste gongs in existence (mine is #30) and no formal study of their therapeutic value has ever been done.

With no formal documentation of the differences available, I'm left to describe the distinction based upon my experience as a professional musician and sound designer. Every gong is different. German gongs are more consistent yet each is still unique. Chinese gongs are less consistent with perhaps 1 in 100 exhibiting a truly superlative sound. When comparing gongs of comparable sizes, the Chinese Chau gongs sound dull, heavy, thick, limited, chaotic, and more "tin-ny," In contrast, the sound emanating from the German gongs is rich, open, full, coherent, focused, harmonic, and pure. The cost of the German gongs is approximately triple the amount of the Chinese gongs of comparable size, and they tend to be the preferred choice of professionals for producing the greatest therapeutic effect.

There is a great deal of research on music and evidence of its beneficial effects for a multitude of conditions (Stanczyk, 2011)(Standley, 2002)(Whipple, 2004). Music had a measurable effect on increased seed germination compared with noise and a control group (Creath, 2004). The Johns Hopkins Center for Music & Medicine was founded in 2015, has 80 faculty members, and offers treatments to help patients with Parkinson's disease and dementia. (Johns Hopkins website).

The first chapter of *The Oxford Handbook of Medical Ethnomusicology,* (Koen, Barz, & Brummel-Smith, 2011) Confluence of Consciousness in Music, Medicine, and Culture, describes:

> "The burgeoning area of medical ethnomusicology, a new field of integrative research and applied practice that explores holistically the roles of music and sound phenomena and related praxes in any cultural and clinical context of health and healing. This is viewed as being intimately related to and intertwined with the biological, psychological, social, emotional, and spiritual domains of life, all of which frame our experiences, beliefs, and understandings of health and healing, illness and disease, and life and death."

The study of music and its effects is an extremely broad category. Whilst there is a growing popularity of gongs baths and sound meditations (Kalaichandran, 2019), there has been scant research done on gong therapy. What follows is a description of potential biophysical mechanisms of action which may induce the altered states caused by exposure to the direct vibrations of a large gong.

Chakra Resonance

There is a popular belief that chakras are related to musical notes with the root chakra starting at C and ascending through the chakras along the C Major scale (white notes of the piano, C D E F G A B). There is zero evidence for this and it appears to have become a cultural myth in the 1970's (Anderson, 2018).

The results of an unpublished study by PhiSonics (Anderson, 2018) indicated that the frequency for the resonance of each chakra varied by individual and there was no discernible pattern other than lower frequencies appeared to stimulate lower chakras and higher frequencies the higher chakras. Since each individual is different and the gong contains every frequency, this may point to one mechanism for change created by modulation of chakras and other components of the human biofield. This is speculative, can't be directly measured, and can only be alluded to by indirect methods and subjective reports of highly sensitive individuals.

Hearing

A recent doctoral thesis by Karambir Singh Khalsa at Sophia University studied the effects of a 50" German gong on anxiety (Khalsa, 2021). Although some changes were noted they were not highly statistically significant. The study used a recording and participants listened to it on "the best equipment they had available." No mention was made of the recording equipment, type of microphone, its placement, nor the bit size or sample rate of the recording.

The study was designed to minimize differences in the playing experience by having each subject listen to the exact same recording. Since a cranial nerve connects the eardrum to every organ in the human body, minus the spleen, externally generated sounds can have profound and direct effects on internal systems (Gerber, 1998), so this methodology might appear reasonable at first glance. It may be that the statistically minimal results were due to the idea that profound changes in state could be accomplished by listening to the sound of a gong; whether through a phone, quality speakers, cheap computer speakers, ear buds, or headphones. In my experience, the greatest therapeutic effect from the gong is from the entire body being immersed in the direct vibrations.

Dr. Tomatis, a pioneer in audiology, stated that contrary to the standard medical definition claiming ears were differentiated skin, skin is actually differentiated ear (Thompson, 2000). Gongs are felt as much as heard, and this component is lacking in a study of listening to a recording. Even if the sound was reproduced on high quality studio speakers; it is a very different experience from a 500 pound primary sound source inches from the body. The usefulness of the proposed study may be in pointing to the understanding that it is the physical vibrations interacting with the cells of the body which create meaningful and statistically measurable changes.

Right Brain Activation

Timbre is the term used to describe the harmonic content of a tone and is the most basic and quickly processed building block of music (Tervaniemi et al., 1997). The quality of timbre is based upon the regular physical overtone series present above the lowest fundamental pitch. Unlike other musical instruments, the gong is non-linear and does not follow this harmonic pattern (Benton, 2020). It also produces combination tones which are not heard but are

synthesized by the ear, therefore the perception of the sound is subjective as it produces both outer and an inner sounds (Benton, 2020).

Studies using brain imaging have determined that tonal information is processed in the right auditory cortex whereas speech tends to be processed in the left auditory cortex (Zatorre, 2001). The right side of the brain is associated with unconscious and intuitive processes while the left is relegated to the linear and logical.

The average human body makes almost 4 million new cells every second (Sender, 2021) while at the same time each of other 30 trillion cells (Sender, 2016) are coordinating hundreds of thousands of additional biophysical processes every second; and that's just the physical body, not the mental and emotional experience. Plus, only 10% of our cells contain human DNA, 90% of the cells in our body are other organisms (Hind, 2010). Humans are too complicated to understand themselves (Peterson, 2019).

Since we create the world we believe exists based upon our language (Froerer**,** 2018) shifting activity to the right side of the brain, and attenuating left brain activity, may allow for new insights and understandings that are outside of linear logic and language. Within the brain, vibration hypothetically enhances flow of cerebrospinal fluid and speeds removal of metabolic waste (Karkkainen 2006). Since the gong is non-linear it stands to reason that it may also entrain non-linear cognitive process by means of resonance. Perhaps Beethoven was correct when he said, "Music is a higher revelation than all wisdom and philosophy."

Using fMRI, scientists learned that isolated musical timbres (sounds outside of a musical context) are related to sensorimotor and paralimbic activation, and less associated with cognitive functions. (Wallmark, Z. 2018). Actual music listening is primarily associated with activity in prefrontal and reward areas (Wallmark, Z. 2018).

Humans are pattern recognition machines and the mind fis constantly looking for patterns to provide context and meaning (Watanabe, 1985). The gong defies any regular pattern, and at some point the mind gives up and lets go of the search. I've had a chronically stressed woman tell me after 10 minutes with the gong, "That was the first time in my life that I've never had any thoughts in my mind." This feeling was a tremendous relief to her.

Tactile Stimulation

Physioacoustic stimulation is a modality using speakers in a modified lounge chair to play low frequency vibrations (120 Hz or less) into a persons body at very close proximity (Karkkainen, 2006). The sound is controlled by a computer which moves the sound to various parts of the body. Physioacoustic stimulation uses sounds but is unrelated to hearing, it benefits the hearing impaired in the same way as it does people who can hear (Karkkainen, 2006). The three types of receptor cells which respond to vibration are Merkel cells, Meissners corpuscles and Pancinian corpuscles and each will habituate to stimuli at a different rate (Zimmerman, 2014). Physioacoustic therapy uses sound to create a tactile sensation which moves to different places in the body so as not to tire the receptor cells (Karkkainen, 2006).

There have been numerous studies done using Physioacoustic stimulation which demonstrated successful treatments for various types of physical and mental conditions including sleep (van Os, 2012), Parkinson's disease (Mosabbir, 2020), creativity (Norlander, 1998), pain management (Boyd-Brewer, 2004), post operative healing (Taylor, 2003), gambling addiction (Jaakko, 2003), and many others (Boyd-Brewer, 2003). The general conclusion is that people relax into a therapeutic state, stress which was held in the tissues dissipates and; "They enter into an optimal state for emotional learning because they feel totally safe. It is a state where persons can empty their head of all thoughts" (Karkkainen 2006).

According to one researcher this phenomena suggests physioacoustic stimulations may have an effect on GABA (gamma-amino butyric acid), the most common message-altering neurotransmitter in the brain (Karkkainen 2006). If threatening information is perceived, glutamate will quickly get this information to the amygdalae. If the information is non-threatening, the GABA system blocks this transport pathway.

The Nanasawa Institute in Japan holds patents for an acoustic bed used for physioacoustic stimulation. Although I was unable to access the published Japanese research, the claims made on the company website based on this research are noteworthy.

> Research found that patients recalled subconscious memories of when they were in their mother's womb while using the bed. The first sound humans hear and feel is vibrations in the womb. The rhythmical heartbeat of a healthy and relaxed mother gives her fetus and baby a sense of security. This means the most profound memory of sound vibration in the human experience is in the primordial confines of a mother's womb.
>
> As we grow, we lose our conscious memories of the womb; however, we don't forget on a subconscious level. The research found that we feel a sense of security and relaxation when experiencing a similar condition to our fetal state.

Mechanotransduction

One theory is that sound vibrations act to clear channels of transport within the cell, facilitating the movement of energy across the cell membrane and making it easier for cells to receive nourishment (Keyhani et al., 2001)(Yount et al., 2004). This is in alignment with Dr. Tomatis's theory of sound providing nutrients for nervous system (Thompson, 2000). Mechanotransduction from low frequency sound is underestimated as an integral part of cellular signaling.

Ironically, much of the work done in understanding how the physical component of sound effects the body has been in the investigation of Vibroacoustic Disease (VAD); a whole-body pathology that develops in individuals excessively exposed to infra-sound (0-20Hz) and low

frequency noise (20-500Hz) (Alves-Pereira, 2007). Sound within this range can affect several organs and tissues, depending on the frequency of the event (Alves-Pereira, 2007). Every organ and tissue has its own acoustical properties, resonance frequency, and acoustic impedance (Alves-Pereira, 2007).

Vibroacoustic disease is characterized by the atypical growth of collagen and elastin, without an inflammatory process. It was first noticed in aircraft and heavy industry workers exposed to continuous sounds in this range. VAD has been diagnosed in aeronautical technicians (Castelo Branco, 1999a), pilots and flight attendants (Araujo et al., 2001).

Research conducted in Portugal, Russia, Japan, and China over the past 30 years has demonstrated that acoustical phenomena, whether it is perceived by the auditory system, or not, can cause organic changes in biological tissue (Alves-Pereira, 1999). Laws regulating noise in the work place only focus on requiring protection from the perceived acoustic phenomena and neglect the aspect of physical interaction under the belief that,"what you can't hear won't hurt you" (Campenella 2001). Similarly, our eyes see only a small portion of the electromagnetic spectrum, nonetheless it is understood that x-rays can be dangerous. Laws requiring only a barrier to the ears of the perceived sound are analogous to only requiring dark glasses as protection when working with x-rays (Alves-Pereira, 2007).

The conventional model of the biological cell is similar to an elastic balloon surrounding a viscous cytoplasm. This presupposes the load-bearing components are infinitesimally small in comparison to the overall size of the cell. This model has successfully explained many cellular behaviors, but fails to take into account the discrete functional contributions of the cytoskeleton network (Alves-Pereira, 2007).

In the 20th century, biochemicals and genes became the forefront of scientific interest as the field of molecular biology developed. Medicine went from a holistic view of describing the relation between form and function, to a more reductionist view describing what life is made of (Ingber, 2004b).

In the last 35 years, research at the Ingber Laboratory at Harvard Medical School has shown the 'balloon'' model of the cell to be inadequate, and has developed a cellular model based on an architecture of tensegrity. This model has successfully explained many cellular and tissue behaviors for normal metabolic activity as well as disease (Ingber, 2003) (Ingber 2004a) (Ingber 2004b). This new cellular model is fundament to understanding the effects produced by sound on living organisms because only the tensegrity model explains how mechanical signals are transduced in cells and tissues.

The primary focus of western modern medicine is on genes and chemical factors to control and explain tissue physiology and disease development (Ingber, 2003); disregarding the structural and mechanical properties of cells and tissues. However, to maintain normal cell behavior such as growth, motility, and apoptosis, cells must have the ability to sense and respond to mechanical stresses in their environment (Wang et al., 1993; Matthews et al., 2004; Alenghat et al., 2004).

The term tensegrity (tensile integrity) was coined by R. Buckminster Fuller, the 'father'' of the geodesic dome in architecture (Skelton, 2001). Tensegrity is structural form which minimizes weight by using continuous-tension and discontinuous-compression as opposed to continuous-compression. It allows an entire shape to be extremely stable as well as having the ability to change shape with very little energy expenditure (Skelton, 2001). It is the difference, between a brick-on-brick construction (continuous compression) and a stick-and-elastic

construction of a geodesic dome. The sticks are the discontinuous-compression elements while the elastics provide the continuous tension. Anchoring points, or nodes are an essential component of tensegrity structures. Mechanical forces are transduced from the nodes throughout all the compression and tensile elements. An external perturbation of a tensegrity structure results in a systematic redistribution of tensional forces through the entire structure, maintaining structural integrity.

Constituents of cellular cytoskeletons (CSK) are isomeric networks of microtubules, intermediate tubules, intermediate filaments, and actin. Forces generated within the CSK are involved in a variety of biophysical processes including: cytoplasmic organelle transportation (mitochondria and synaptic vesicles), chromosome movement during mitosis, and tension generation in the muscle cell contraction process (Ingber, 2003a). The CSK receives signaling from other cells through cell–cell junctions, and from the extra-cellular matrix through cell–matrix junctions.

The CSK microfilaments form a network of fine cables that are the continuous-tension elements (elastics) of the cellular tensegrity model. The compression elements (sticks) are formed by microtubules that are anchored to the extra-cellular matrix through transmembrane proteins called integrins, at sites called focal adhesions. Integrins differ from other cell-surface receptors because they bind with relatively low affinity, and their highest concentration is on cell surfaces.

Mechanical forces applied directly to integrin cell-surface receptors alter cell biochemical and gene expression in a stress-dependent way (Ingber, 2003)(Ingber 2004a), (Ingber 2004b) (Wang, et al., 1993)(Matthews et al., 2004)(Alenghat et al., 2004). When the same forces are applied to other types of membrane receptors, there is no such effect.

External forces applied to integrins can activate intercellular signaling pathways, such as, ion fluxes, protein tyrosine phosphorylation, and other biophysical processes (Ingber, 2003) (Ingber 2004a)(Ingber 2004b)(Wang, et al., 1993)(Matthews et al., 2004)(Alenghat et al., 2004). Integrin linkages allow for mechano-chemical transduction signaling, producing changes in cell form and function. This type of intracellular signaling is a critical regulator of cellular biochemistry, gene expression and tissue development (Ingber, 2003)(Ingber 2004a)(Ingber 2004b)(Wang, et al., 1993)(Matthews et al., 2004)(Alenghat et al., 2004). There is a large variety of mechanochemical-transducing integrin receptors molecules. Each type of integrin only binds to one extra-cellular matrix macromolecule, and this specificity modulates integrin binding activities, such as in fibroblasts, where ligands bind specifically to collagen, fibronectin and laminin. (Ingber, 2003)(Ingber 2004a)(Ingber 2004b)(Wang, et al., 1993)(Matthews et al., 2004) (Alenghat et al., 2004).

The biological explanation for some diseases based on impairment through mechanotransduction has already been successfully established (Ingber, 2003)(Ingber 2004a), (Ingber 2004b). All the cells in the body are interconnected to each other via the connective tissues (Oschman, 1984).

It is reasonable to deduce that the powerful sound waves of the gong can stimulate bio-mechanotransduction pathways. Evidence so far has shown no deleterious effects from gong exposure, unlike the causative factors behind vibroacoustic disease. This is most likely due to the high level of coherency of the sound from a gong compared with the constant and chaotic noise produced from machinery.

Water Modulation

Another potential mechanism of therapeutic action from the gong is the direct effect of vibration on water molecules. Although human bodies are 65% to 70% water by volume, they are 99% water by number of molecules (Pollack, 2013). If only 1% of the molecules of our bodies are *not* water; pursuing a careful examination of the remaining 99% may provide useful insights.

The “fourth phase of water” is the term coined by Gerald Pollack to describe how water forms into hexagonal structures and the effects these structures have on metabolic processes (Pollack, 2013). The water in every living cell is structured into clusters with hexagonal rings being the most prevalent (Pollack, 2013). It’s been found that water clusters vibrate at specific resonant frequencies, and these frequencies can help restore homeostasis to cell structures in the body through signal transduction (Bistolfi, 1990).

German biophysicist Fritz-Albert Popp, who conducted research concerning cellular communication, came to the conclusion that the body communicates with the help of cell vibrations, producing biophotons (Popp, 2003). Popp has shown that it is possible to steer biochemical processes in the cells by influencing vibration in their area (Benveniste, 1999).

The structure of water can create clusters, from which we can build "water counterpart copies" of DNA and RNA (Bulenkov, 1991). Nobel laureate Luc Montagnier, has done extensive research and published numerous papers on the effects of water, demonstrating how water has a memory that can directly influence DNA production (Montagnier, 2015) (Montagnier, 2017).

Eminent consciousness researchers, Stuart Hameroff and Sir Roger Penrose, proposed the Orch Or theory in which consciousness comes into existence via the entanglement of photons in the microtubules of neuronal brain cells and this can only take place in the medium of structured

water (Hameroff, 1998). Hammerof's work with trans-cranial ultra-sound has shown improvements in mood, which may be from the stimulation of this entanglement process (Hameroff, 2013). The belief that consciousness resides in the brain is perhaps why the Orch Or theory limits it to the CSK in the brain. If consciousness results from entangled photons in microtubules of neurons; it is equally as likely that consciousness is distributed through out the entire body and not just the neurons in the brain. If this is in fact the case, it may point to a mechanism in which direct exposure of the entire body to powerful vibration from a large gong produces profound altered states of consciousness.

Dr. Franco Bistolfi has described what he terms the Bioelectronic (or bioconductive) Connectional System (Bistolfi, 1990). The components of this system include the cell's protein cytoskeleton and extracellular proteins such as collagen fibers and keratin filaments.

Together with structured water, Bistolfi proposes that these structures "are the morphological expressions of a large and unitary cooperative system for coherent communications among cells, by means of piezoelectric interactions and photon/phonon transduction of signals, of both endogenous and exogenous origin" (Bistolfi, 1990). He has devised a "musical" model which compares the vibrations and oscillations of hydrogen bonds to the strings of a string instrument, the harp (Bistolfi, 1989). The length, number, and resonance of these "strings" (hydrogen harps) is correlated with the frequency and quality of "sound" which in this case is electromagnetic emission. This information is used to explain some essential aspects of proteins and DNA function (Bistolfi, 1989).

Structured water within the cell acts as a transducer of chemical and bioelectric energy (Haussinger 1994). The resonant frequency produced by the transduction organizes nucleic acids and proteins, providing a unified system for cell repair and replication (Haussinger 1994).

Metabolic efficiency can be enhanced by restoring tissue levels of clustered water, and this water can impart beneficial effects throughout the body via signal transduction (Lorenzen 1989).

Cymatics is the visualization of sound in water. The aesthetically pleasing designs speak to a non-verbal understanding of sound. The investigation into this has been pioneered by John Stuart Reid, an engineer who has developed and improved upon the cymascope over the last 10 years. The current state of the device allows for capturing a 3 dimensional image of sound in water (cymascope.com). When dolphin echolocation sounds were played into the cymascope the image produced was directly correlated with the shape, texture, and contrast of the objects the dolphins were imaging (Kasowitz, 2016).

A recent study at the Salk Institute implies that cognition and memory is not limited to specific neurons and neuronal patterns. Instead, it is the interference patterns of brain waves which may be a mechanism responsible for memory and cognition (Gepshtein, 2022). The gong is a source of very coherent vibrations felt in cells throughout the body. It has been proposed that all cellular communication is a language in the form of waves which can be measured by the cymascope (Ji, 2017). This cellular language, and human language, are proposed to be derived from a cosmic language, entirely based upon waves and patterns (Ji, 2017). Could this be one of the reasons people often report the sensation of "being in the cosmos" when enveloped in the sound waves of the gong? Is there an intuitive understanding of this cosmic language? Many gong players consider the sound gong to be the language of the cosmos.

The cymatic mandala-like patterns created by the gong in the water comprising 99% of our molecules are stimulating biomechanical transduction of the cell to create a cascade of cellular biophysical activity. Could it be that the cymatic stimulation of the most predominant molecule in our bodies restores intercellular tensegrity?

A systematic review and meta-analysis of energy medicine (Ross, 2019) states, “All systems in the human being, from the atomic to the molecular level, are constantly in motion-creating resonance. This resonance is important to understanding how subtle energy directs and maintains health and wellness in the human being.” The trillions of cells of the human body are each undergoing countless biophysical processes every second and this can be compared to a symphony of resonant interactions (Muehsem, & Ventura, 2014).

Mandalas were first used in therapy by Carl Jung, who found that they had a calming effect on patients while at the same time facilitating psychic integration (Henderson, 2007). Alan Watts said, “A mandala is a picture that tells a story, it is a sacred space, often a circle which reveals some inner truth about yourself and the world’ (Watts, 2000, p 6).

Could the cymatic mandala patterns created by the gong in cellular water be related to the reported feelings of calm, inner knowing, and self integration? What would it feel like if 99% of the molecules in your body were doing this?

A New Theory of Information Storage In Living Organisms

Quartz crystals, like structured water, are formed from hexagonal rings. Instead of H_2O they are SiO_2. In my original research experiments using a Gas Discharge Visualization device, I've shown that information could be stored and erased in quartz crystals (St. Claire, 2016). When information was stored in the crystal the light from the voltage passing through it had less area, less, power, and less entropy. It appeared the information was casting a shadow that was more organized.

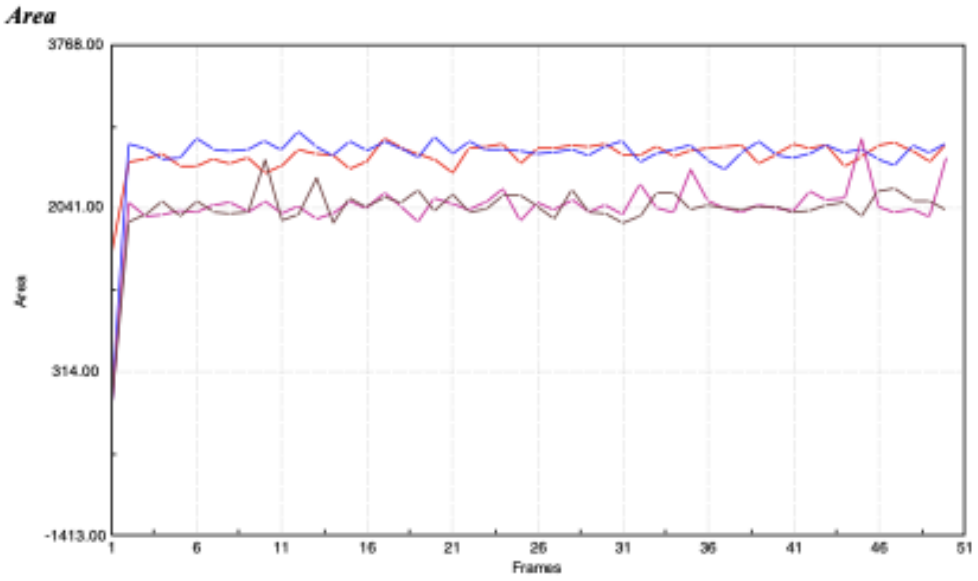
Second Harmonic Generation has been observed in quartz in which two photons with the same frequency interact within a nonlinear material, are "combined" and generate a new photon with twice the energy of the initial photons (equivalently, twice the frequency and half the wavelength), that conserves the coherence of the excitation (Wikipedia, 2021). Perhaps this property of quartz may be a part of the mechanism of information storage.

My theory is that the electrons spin around the hexagonal rings of the atomic lattice of the crystal, creating magnetic fields. These magnetic fields influenced the voltage, and subsequently the light emitted, creating the observed effect. Since ring currents are a common phenomenon that scale across all magnitudes in the universe, from the atomic (Pasquarello, 1992) to the molecular (Musher, 1965), to the planetary, (Baumjohann, 2010) to the galactic level (Lesch, 1989), I propose this to be a reasonable theory for the observed effect.

It appears that the information is stored in the crystals by the orientation of the magnetic fields occurring at the molecular level. This is analogous to how sound and video are recorded on magnetic tape. As the tape passes over a gap in the circuit the signal is conducted by the particles in the tape; completing the circuit and causing the magnetic particles to align in a pattern

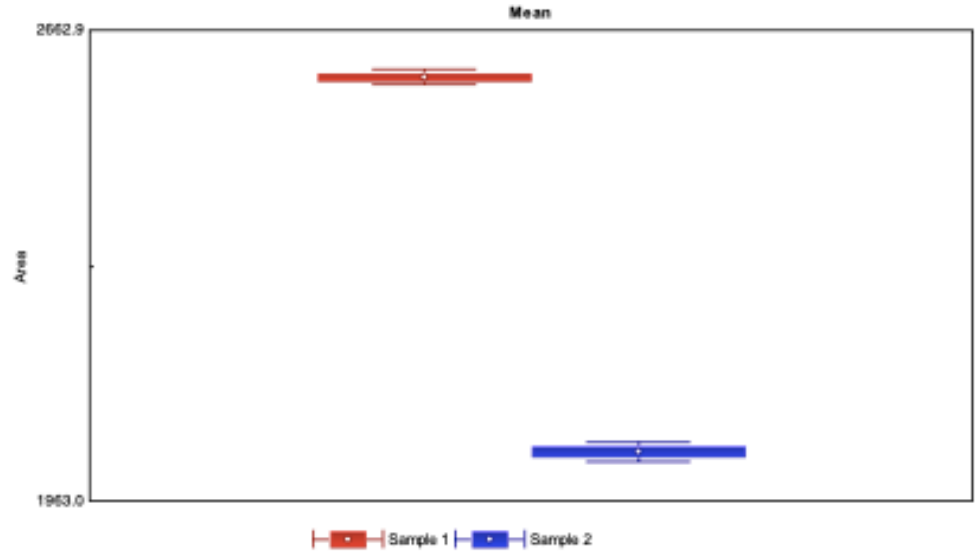
correlated with the information that was in the signal. Patterns are a means of information storage (Haramein, 2016).

These graphs show a sample of my data analysis demonstrating that efficacy of methods of storing and deleting information in quartz crystals (St. Claire, 2016).



Sample 1
...BL 1\0007.avi
...BL 1\0008.avi

Sample 2
...GA\0013.avi
...GA\0014.avi



By Student test samples are statistically dissimilar; p = 0.000274168

It is reasonable to assert that the same phenomenon is taking place in structured water. Electrons are spinning around the hexagonal rings, creating magnetic fields, and storing information in these patterns. Luc Montagnier, in his often replicated experiment, demonstrated that an electromagnetic pattern of DNA can be stored in water; and playing this electromagnetic pattern (which he refers to as "music") in water containing only nucleotides, causes DNA to organize and replicate (Montagnier, 2015).

I propose a new theory of bio-information storage and information transmission based upon the orientation of the patterns of magnetic fields in the structured water of living cells. The pattern of the orientation of the magnetic fields in the structured water (comprising 99% of the molecules in our bodies) stores information in a similar fashion as the orientation of metal particles on tape.

Does the structured water in our cells store our thoughts and feelings which then influences our DNA, thus modulating how our entire organism shows up in the world? A 100 year old wise woman once told me, "Negative thoughts are like poison to your body." Could the truth of this intuitive wisdom be related to how the water in our cells stores information and influences our DNA?

The body is always trying to heal itself. Can the powerful, penetrating vibrations of an 80 inch gong erase old information and restore the water in our cells to its natural state? When 99% of the molecules in our bodies are restored to their natural state, can the innate healing wisdom of the body be activated more effectively?

Magnetosonic Modulation

Another potential mechanism of action is through magnetosonic waves. The magnetic field from the heart extends and fluctuates around the body (Cohen, 1967). Magnetosonic waves

are common occurrences with interacting magnetic fields (Li et al 2016). The oscillating motion of a 500 pound, 80 inch nickel silver gong can create magnetic anomalies in the local environment (Haverinen, 2009). Subjecting magnetic components in an liquid (such as hemoglobin in blood) to “uniform, multidimensional, time-dependent magnetic fields, generates a variety of life-like collective dynamics, including various forms of locomotion, swarming and feeding, that are sustained by the continuous injection of energy *via* the applied field. These leaderless emergent behaviors occur autonomously” (Solis, 2014) in inorganic fluids without chemical or biophysical initiation. Such self-healing, remotely powered fluid automatons could stimulate a wide variety of cellular biophysical operations (Solis, 2014). There is evidence that when metal is being “excited," electrons become highly charged electromagnetically and form a field of plasma (Nur, 2022). Does the listener become part of this field? There are a multitude of instruments for future research into the measurement and investigation of that field.

Could the influence of the gong on the magnetosonic compression and rarefaction of the magnetic field of the heart, impact that field and modulate how the field imprints information onto the iron in the hemoglobin of red blood cells; in a similar fashion as a tape recorder, which imprints information in patterns of magnetic particles on tape? Whether or not the gong can influence magnetosonic waves in the human biofield is another area for research and investigation.

Acupuncture Meridian Resonance

It may also be possible for the magnetosonic waves to interact with the well described bioelectromagnetic signal system in the collagen fibril network, using an underlying coherent crystalline electromagnetic mechanism (Regling, 2000). The magnetic component of the heart, and its influence on physical and mental health, is understudied.

There is clear evidence that liquid crystalline water, aligned with collagen fibers in the fascia, creates a superconducting network of information transmission and this is most likely the mechanism for the acupuncture meridians (Ho 1998)(Ho 2012). Liquid crystals typically undergo rapid changes in phase transitions or orientations when exposed to electric and magnetic fields; which is why they are widely used in display screens. Crystalline structured water layers bound on the collagen fibers create proton conduction pathways, allowing rapid intercommunication throughout the body (Ho 2012). This liquid crystalline continuum liaises the body's responses to different forms of subtle energy medicine (Ho, 1998). This "body consciousness" works in tandem with the "brain consciousness" of the nervous system (Ho, 1997a). This empowers all parts of the body to readily intercommunicate, so the organism can function as a coherent whole. Studies have shown that in addition to mechanical properties, collagens have dielectric and electrical conductive properties which make them sensitive to mechanical pressure (Leikin, 1995).

Collagen has the capacity for Second Harmonic Generation, just as quartz does. This property is used in coherent optical spectroscopy/microscopy to image collagen fibers in organs such as lung, kidney, and liver as well as in connecting tissues such as tendon, skin, bones, and blood vessels (Gupta, 2018). In *Energy Medicine,* Jim Oschman proposed the idea of a living matrix that responds to touch as the basis of all forms of "subtle energy" medicine (Oschman, 2000). This liquid crystalline continuum may by the matrix he was describing.

The sound of a large gong places powerfully coherent vibrations into this liquid crystalline matrix, imparting geometrically coherent patterns and mechano-electrical flow into the super-conducting information system. Connective tissue is part of the body's larger

tensegrity system acting as the tension element; keeping the body in shape, strengthening the wall of arteries, veins, intestines and air passages, surrounding the major organs and tissues and attaching to the bones as the compression elements.

Proteins in liquid crystals have coherent motions (Searle, 1992). Protein motions cause vibrational deformations of peptide bonds, generating polarization waves along the proteins, and is accompanied by proton conduction in the structure water shell (Ho, 1998). Coherent vibrations or excitations result from metabolic pumping in dielectric systems (including organisms) when electromagnetic and electromechanical forces are interacting (Frohlich 1980). Weak signals of mechanical pressure, sound, heat, or electricity, may be amplified and propagated by a modulation of the proton currents or coherent polarizations waves (Mikhailov 1996). Any mechanical deformation of the protein bound water network will instantly result in electrical disturbances; and electrical disturbances will result in mechanical effects (Ho, 1998).

Clearly there is a connection between sound and connective tissue, interacting on multiple levels, mechanically and electrically, as well as biomechanical transduction through the cytoskeleton, as shown in vibroacoustic disease. There is reasonable evidence to conclude that the super conductions biocrystalline network of connective tissue may be related to information flow in acupuncture meridians. If statistically signifiant measurements are produced in the proposed study, then measurements of changes in acupuncture meridians based upon gong therapy would be an important and viable area for research.

A year long assessment by the U.S. Office of Technology Assessment has found, by controlled clinical trials, that only 10-20% of all procedures used in medical practice have been shown to be beneficial (US Govt. Printing Office 1978). Might the non-invasive nature of gong therapy be utilized to resonate with the innate healing wisdom of the body using a less traumatic

process with a more efficacious outcome? Rudolf Steiner said, “There will come a time when a diseased condition will not be described as it is today by physicians and psychologists, but it will be spoken of in musical terms, as one would speak of a piano that was out of tune” (Chaudhary, 2020).

Resonance Theory of Consciousness

All matter vibrates at a specific frequency through which it can both influence and be influenced by all other matter (Gaynor, 1990). Thus, everything on the planet and beyond can be considered interconnected through resonance.

The resonance theory of consciousness posits that shared resonance (synchronization) is key to the nature of consciousness (Hunt 2019). It offers a solution to the combination problem, which asks; “What is the mechanism for the combination of micro-conscious entities into macro-conscious structures? How do individual micro-conscious cells create macro-conscious people without extinguishing the micro-conscious entities?”

The greater amount of resonant interconnections, both internally and externally, mathematically demonstrates how resonant connections lead to larger scale conscious entities and how such entities may be characterized and quantified (Hunt, 2011) (Hunt, 2019).

“The higher speed of information exchange made possible by various energy pathway phase transitions in biological systems allows biological life to achieve larger-scale resonant structures than would otherwise be possible, and thus significantly larger macro-conscious entities are achieved” (Hunt, 2019).

Could the resonant entrainment of the individual by the gong account for the feeling of the dissolution of the self and feeling of oneness, or being out in space? Could the gong be a tool

to take our individual micro-conscious being into a state of oneness with the macro-cosmic consciousness?

Empty space has the practically infinite luminous energy of 10^{94} grams/cm^3 (Wheeler, 1962). For perspective on the size of that number, it's estimated that there are only10^{80} atoms in the visible universe. An energy density this enormous must be exceptionally (perhaps infinitely) coherent. This points to the understanding that our bodies are arising from an extremely coherent field. Living organisms are uniquely geometrically designed at the molecular level as bio-crystalline transducers tapping into this (zero-point) energy field (Comings, 2006). Transductive bio-coupling at the quantum level may be source of the life force energy. "Mass and matter is nothing but a specific class of dynamic modification of this pervasive medium we call space" (Comings, 2006). With a hyper-coherent energy density of 10^{94} gm/cm^3, is space the ultimate maco-conscious entity? Could this be one of the reasons the vibrations from the gong cause so many reports of "being out in space and one with all that is?"

Discussion

Is it possible that as resonant vibratory beings, humans can have their countless biophysical fluctuations entrained by broad spectrum coherent vibrations from an 80 inch gong? Can a large multi-frequency sound source have the ability to reset some of the resonant functions of the human system, create a more coherent state of health and well-being, and reconnect people to the innate healing wisdom of their body? Can this produce a measurable effect on stress, upper respiratory tract immunity, anxiety, and meaningful states of consciousness?

Doctors in various specialties have been referring their patients to me for complementary therapy to achieve specific results. The stories I've heard are truly amazing and categorizing the spectrum of experiences into a composite model will be useful in guiding therapist, physicians,

and other health care professionals on how to fully utilize the functions of this therapeutic modality. Perhaps one day there may be a room like this in every major metropolitan area around the world. If highly statistically meaningful results are obtained, this study will be a valuable tool in furthering that goal.

Having a replicable experiment with as few variables as possible was a crucial part of this study. Playing the gong is a developing art form in which the subject's experience can be profoundly affected by the sounds and sequences created by the performer. I am a highly trained master musician, performing professionally for over 50 years. Even with over 10 years experience playing gongs; it took several months and hundreds of hours of practice to competently play the 80 inch gong. In the years since then, I have continued to discover new sounds and the associated transformations they precipitate.

Because of the immersive nature of the experience, the clarity and sensitivity of the player is a primary consideration since there is evidence that intention can be a variable when considering outcomes (Schwartz 2021). In this study great efforts were taken to minimize this variable, nonetheless it remains an essential quality of the experience. Therefore, the focus of the operator when playing the gong will be to concentrate specifically and exclusively on the sound production. Using dual near-infrared spectroscopy it has been shown that inter-brain synchronization between performer and audience is strongest based upon the skill level of the performer (Hou, et al. 2020)(Tschacher, 2021). It may be instructive to discover if the performer experiences any changes in relation to the participant.

Presently I only know three other owners of 80 inch gongs and if one generalization can be made, it is that each has a deep sense of peace in their heart, this author included. Although three is a small sample size, it may signify one of the primary functions of the gong; denoting its

usefulness for relieving human suffering and creating a more harmonious world. Appendix B is a questionnaire being sent to every 80” gong owner I am able to locate; in an effort to increase the sample size and deepen the understanding of the usefulness of this therapeutic tool.

Conclusion

Until now there have only been anecdotal reports and amazing stories of transformations taking place from being enveloped in the sound of a gong. This study intends to collect the themes presented from the qualitative observations of participants in order to share a sense of the nature of the experience. Quantitatively it is designed to measure key biomarkers to demonstrate the basis for the physical, psychological, and spiritual transformations created by the gong.

Meditation is often prescribed for a wide variety of conditions as it has been shown to reduce stress and anxiety as measured by cortisol levels (Koncz, 2020) and to strengthen the immune system as measured by IgA (Vandana, 2013)(Chaigne, 2005).

Many people have difficulty implementing meditation as a therapeutic modality as it requires unfamiliar subjective mental action. Neophytes are advised: have no thoughts, focus on your breath, allow your thoughts to flow away, repeat a mantra, hold a certain posture, don’t fall asleep, focus your eyes up to the third eye, all while not having any thoughts. Regardless of the form of meditation, it requires doing, as well as focused attention. With the gong, a similar rejuvenating meditative state can be achieved without any action required. You don’t have to do anything, the gong does it to you.

The German philosopher J. G. Fichte (1762-1814) asserted, “Aesthetic experiences might not straightforwardly make us wiser or better people, but the unplowed fields of our minds are nevertheless opened up; and if we one day decide to take possession of them, we find half the resistance removed and half the work done.” (Mäcklin 2022)

Gongs are a category of percussive instruments referred to as non-linear percussion instruments. Nonlinearity is an essential part of the production of the sound. Experiments performed on these instruments has shown the features of this nonlinear behavior as energy exchanges between modes, through nonlinear coupling and chaos (Rossing, 2000) (Fletcher, 1999)(Fletcher, 1985)(Legge, 1989).

This can be described in mathematical detail in a set of nonlinear coupled differential equations governing the dynamics of the oscillator equations, wherein the coefficients are directly connected to the geometry and elastic properties of the vibrating object (Chaigne, Touzé, & Thomas 2005).

These exact same properties are the description of what governs Baryonic Acoustic Oscillations; the sound waves which propagated as the first atoms formed 380,000 years after the Big Bang (Seo & Eisenstien 2007). The sound waves are revealed as patterns in the acoustic oscillations in the irregularities of the cosmic microwave background radiation (Seo & Eisenstien 2007).

Could this be one more reason why the gong impacts us as such a primal level?
Was the sound of matter and light letting go of each other the same as the sound of a gong; which causes us to let go of our thoughts and return to the feeling of the true nature of our being in the cosmos? Perhaps the Grand Gongmaster was correct and the Universe is a gong. In which case, we are the resonant fractal harmonic reverberations of the holosonic baryonic acoustic oscillations.

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Appendix A Summary of Potential Mechanisms of Action

1. **Chakra resonance** with sound - Hypothesized but never directly measured.
2. **Hearing** - Sound 20Hz-20kHz. State changes are based upon music therapy and the ability of sound and timbre to generate emotional states and the accompanying biophysical changes. A cranial nerve connect the eardrum to every organ except the spleen. Music can stimulate a resonant vagal response.
3. **Right brain activation** - Sound 20Hz-20kHz Change of psychological state based upon tonal (non-verbal) processing in the right hemisphere of the brain, separate from language & linear processing in the left hemisphere. Right brain activity is associated with intuition and non-linear consciousness. Developing this mental state leads to parasympathetic response, mental, emotional, and spiritual insights, and physical healing.
4. **Tactile stimulation** - 120Hz and lower. Physioacoustic therapy has published preliminary research using sound from speakers placed very close to the body. It is hypothesized the sound triggers touch receptor cells causing tissue relaxation and accompanied relaxation responsiveness in neurotransmitters, creating a calm body and peaceful mind.
5. **Mechanotransduction** - Sound less than 500Hz. Physical and associated psychological state changes are based upon mechanical effects of vibrations on the cellular cytoskeleton. This triggers a cascade of biophysical processes which can produce health or disease, depending on the nature of the sound.
6. **Acupuncture meridian resonance** - There is reasonable evidence to conclude that the super conductions biocrystalline network of connective tissue may be related to information flow in

acupuncture meridians. Sonic stimulation may be amplified and propagated by a modulation of the proton currents or coherent polarizations waves.

7. **Magnetosonic modulation** - 1Hz to 100,000+Hz. I propose a new theory of changes in physical and emotional states due to the modulation of the magnetic field of the heart; imprinting information on iron in the blood, and transmitting electrical information through the bioconductive crystalline network of connective tissue. Changing how we experience our heart changes physical and emotional states as well as our perception and belief of who we are.
8. **Water modulation** - Sound 0Hz-20+kHz. I propose a new theory based upon the cymatic effect of sound on water and my research demonstrating that information can be stored in the magnetic fields created by motions of electrons in a hexagonal lattice. Sound creates new patterns in the water, erasing the old information stored the cellular water and restoring it to its neutral state. This creates changes in DNA and other biophysical processes at the cellular level.
9. **Baryonic Acoustic Oscillations** - The patterns in the Cosmic Microwave Background radiation were produced when matter and light separated 400,000 years after the Big Bang. The pattern we measure is the echo of the reverberation of that sound. This cosmic primal sound is described using the same non-linear equations as the sound of the gong. We are fractal harmonic resonating patterns of that first sound and the gong may be able to resonantly reharmonize the coherencey of the primordial pattern of our being. An interesting theory to consider…

Appendix H Questionnaire for 80" Gong Owners

1. How long have you had your 80" gong?

2. What is the number on the back in the top center?

3. Where is it installed?

4. Briefly describe the nature of its use.

5. What percent of time do you play for yourself vs playing for others?

6. What is the typical positioning of others that you may play for? Standing, sitting, lying…?

7. What do you perceive are the differences in the results from different client positioning?

8. Do you charge money when playing for others? If so, how much and for what specifically?

9. Please circle which best describes you: 1) I struggle with anxiety. 2) I am at peace.

10. Please describe some of the results you've noticed from using the 80" gong.

11. Would you be interested in supporting research on the use of 80" gongs?

12. If yes, would your contribution be in the form of tax deductible donation or participating in clinical research?

13. Other Comments.

Appendix C Gong Room Description

Design

- Six foot deep concrete footings with concrete slab foundation
- 20’ x 20’ square building
- 9’ ceiling at the walls sloping up to 13’ at the peak
- Pyramid roof (22° exterior) and ceiling (11° interior).
- Ceiling acts as a parabolic reflector, directing sound in a column streaming down the center of the room directly above clients heart.
- Half inch solid copper rod penetrating 3 feet into the earth through the center of the slab (directly below the apex of the pyramid) to grounded the crystal table.
- Crystal Table directly in the center of the room.
- Ultra sensitive dimmers to control 3 sets of lights from very bright to extremely dim
- Hexagon shape of 3” lights centered around apex of the peak of the ceiling

Soundproofing

- One and half inch stucco exterior
- 2x4 framing with sound proof caulking on all joints connecting the exterior sheeting
- Recycled cotton fabric batting sound proofing material in ceiling and stud bays
- Interior covered with mass loaded vinyl for a sound barrier and airtight membrane
- Interior covered in solid aluminum fabric, creating a Faraday cage to isolate it from all ElectroMagnetic Frequencies (EMFs).
- Rubber clips mounted every 4 feet to hold 2 inch metal channels and isolate the interior walls and ceiling from the exterior structure

- 3/4’ plywood screwed to the isolated metal channels
- Green glue, a non-hardening material that converts sound energy to heat through chemistry, to reduce sound penetration of the walls and ceiling, troweled over the entire interior surface.
- 5/8” drywall
- Two walls are tapered from 4” at one end to 0” at the other providing non-parallel interior walls to prevent standing wave reflections
- Double interior and exterior doors

Instruments

- Gongs - 80” Paiste gong, 80” Paiste gong, 80” Paiste gong, 80” Paiste gong, 32” Oetken Heart gong, 28” Flower of Life wind gong, 20” hand wind gong.
- Tibetan bowls - Approximately 50 bowls ranging in size from 3” to 16” laid out in precisely measured sacred geometry.
- Crystal bowls - 22”, 20”, 18”
- Native American flutes -12 custom flutes from the oldest living trees on Earth, Bristlecone Pines.
- Harp - 44 string 200 year old J.F Browne pedal harp
- Cosmic Transducer - 140 pound custom granite stone sliced with 11 resonating lamellas on a custom designed resonator.
- Innato - A unique wind instrument that plays 3 notes simultaneously and changing fingerings creates different combinations which are all harmonious together.
- Rain sticks - Custom built 6 foot and 8 foot rain sticks.

- Ova - Two unique wind instruments which produce portamento sounds with a one octave range. C at 64 Hz and G a fifth above that.
- Chimes - Professional “monk grade” tingshas, Svaram large and small tuned chimes, 4 Koshi chimes, Treeworks bell tree.

Crystals

- Psychophotonic Triangulation Table - one of the original “John of God” tables with 8 articulating stainless steel arms with a Vogel cut crystal at the ends. A control box controls LED lights which flash behind the crystals in 30 different patters at 15 different speeds. A custom designed power distribution box has 2 knobs to adjust the power and width of the pulse. There are over 54,000 unique settings.
- Large crystals - there are 33 large crystals of various minerals, weighing between 2 to 40 pounds. One of these is typically placed between the ankles of the client and programmed for their specific needs.
- Small crystals - there are hundreds of unique crystal specimens and minerals which are programmed for the specific condition of the client and place in the bowls on and around their body. This process usually causes the client to shift into an altered state of deep relaxation or the feeling of being overwhelmed with a sense of sublime love.