

From Myth to Reality: How Music Changes Matter

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The "myth" of how music works as a therapeutic enhancement to healing becomes a reality, empirically measurable in physiological parameters by applying principles of quantum physics and psychoneuroimmunology (PNI) to current research findings. A theoretical relationship is developed between the quantum properties of music, the musician, the listener, and physical indices of health. Within these dimensions, a path for understanding how music works, and for understanding the relevance of holistic physical manifestations of health and disease in response to music, is started.

DEVELOPMENT OF A QUANTUM UNDERSTANDING OF THE EFFECTS OF MUSIC ON HEALING

In my own research and practice as a nurse practitioner and clinical specialist in developmental disabilities, I have been guided by Rudolf Steiner's anthroposophical philosophy or spiritual medicine (Drohan, 1997). The practice of anthroposophy is an investigational process for the practitioner that teaches one to bridge Steiner's spiritual concepts of the human being to understanding the totality of the human organism as primary to health and disease. The foundation for practice is built upon the "scientific" base for each health-related discipline and the individual practitioner's experience of anthroposophy. It has taught me to look further into the relevance of physiological manifestations of health and disease, to unlock the apparent limitations of natural science rather than to reject it. Allopathic medical models do not "explain" how specifically music works as a therapeutic enhancement to healing, nor how other alternative therapeutics work, because allopathic medicine's reasoning is based on linear cause and effect relations. Free thinkers and compassionate practitioners of the healing arts have not been daunted by this, and have practiced intuitively by what they have felt to be true about human responses to health and disease. Florence Nightingale, credited with founding modern nursing science, to her death did not believe in the germ theory of illness, yet is famous for decreasing the number of soldier deaths from infections during the Crimean War.

Although I have done an extensive review of the literature on music and healing, it is not my purpose to share those "findings." Without a doubt, music has been shown to be a proven enhancement to psychological well-being, but I set out to find physical

manifestations of these changes as well. The majority of studies were deemed “inconclusive,” not applicable to larger populations, too small a population studied to be significant, or not statistically significant. I don’t believe that.

What I have come to believe is, if we take the best of what current scientific thinking offers us and look at it from a “near” perspective, that is, the smallest relational patterns as found in quantum physics, and simultaneously take a “far” perspective in viewing the human experience from a holistic view of how we experience the physical world, which is measurable in the psychoneuroimmunological (PNI) system, we can begin to review the abundant literature on music and healing, and conceivably other alternative therapies, to behold a path that bridges new knowledge to the natural sciences. One can then begin to see the truth of myths.

From Myth to Reality

Myths, we believe, are magical explanations for things we cannot understand. Faith is when we do not understand but believe anyway. Facts we believe are “true” explanations for things we cannot understand. We need facts in order to gain a perception of our world that we believe is a truer understanding of our existence, our “reality.” And it seems “truth” is what we come to believe as an interpretation of those “facts.” Similarly, no one really knows why quantum physical laws work the way they do. Wolf (1991), a theoretical physicist, states “Quantum physics forces you to cross the line between truth and myth. Its very nature deals with an invisible world, and consequently all we physicists can do is invent myths we call models to explain how the invisible world behaves. Out of the behavior of invisible matter and energy comes the behavior of visible matter and energy” (p.147).

According to the Cabala, the ancient book of Jewish mysticism, the universe was constructed from the vibrational sound pattern of three Hebrew letters, *aleph*, *mem*, and *sheen*, in an interplay of spirit, matter, and consciousness. Consciousness, instantaneous and beyond time was created by these vibrational patterns. Sound had two different functions: One was the formation of ordinary words and the other the formation of sacred sounds. When these sounds were produced, a resonance of some kind would put the speaker in “tune” with the universe and be able to change matter. (Wolf, 1991).

I try consciously to hear my own music when I work with people and try to hear their music as a means of guiding my diagnostic and healing skills. I sense more than hear this music—these vibrational energy patterns—either actively through therapeutic touch, or passively, as by *centering* (Bright, 1995). I believe it is the unique vibrational energy pattern that is created that is diagnostic and may be healing. It is for this reason that I recognize the healing potential music has. In one of the classes I teach about pathophysiology in The Music for Healing and Transition Program, I describe different diseases, but more important, I describe what persons feel like from my experiences, what their energy patterns are like, what I perceive their experience to be as a result of the physiology of the illness. I lend direction to the musician to develop specific musical interventions for them to create what I call “restorative patterns.” It is a process we develop together—recognizing and devising—but it is the individual musician who makes his own choice of music for the occasion. I believe it is the unique relational vibrational pattern created between the music, the musician, and the listener, that is responsible for material changes in health states.

QUANTUM PHYSICS ON LIGHT, MATTER, AND CONSCIOUSNESS: HOW MUSIC WORKS

Theoretical quantum physics describes the vibrational behavior of matter and light and postulates that matter could not exist without some consciousness to perceive it. The fundamental principle is that everything in the universe has an inherent probability-vibrational pattern. This pattern enables the physicist to calculate the physical structure of atoms and molecules by how they emit and absorb energy, measured in light waves, in relation to universal vibrations. Matter in quantum physics is neither dead nor solid. In Newtonian physics, time and space is measured by its linear function. Theoretical quantum physics posits that vibrations are circular, not linear, and what is produced is by a double action in a specific consciousness to perceive it. Matter is not entirely material but a product of consciousness. The application of quantum physics to the natural sciences in the last 50 years has created new wonders, including the ability to perform laser surgery.

Three basic theories of quantum physics applied to music and healing can create new extensions as well. The observer effect, nonlocality, and quantum wave manipulation can begin to describe a unique relationship between music, the musician, and the listener by describing each entity's quantum properties as evidenced in current research findings. Application of a fourth theory of least-action paths to human consciousness can then describe how their unique probability wave patterns affect holistic physical manifestations of health by measurable changes in the PNI system. It also demonstrates that by changing our way of thinking, we can extend our knowledge of our physical existence as well.

Music

The first theory, the observer effect, is based on dealing with matter in terms of all of its probability-vibrational patterns and is important for understanding what music does. The waves of vibrations of probability are nonmaterial, and because of that, they display different properties than matter. For example, when two particles of matter interact, their probability waves entangle, so no clear separation between them takes place and they remain connected. Any observation performed on one of the particles instantly, faster than light, produces an effect on the other. This is called the observer effect. Some say it is the very act of observation that collapses a probability wave to change into matter.

What is music? It is much more than I describe to you. What I can say is what music does as evidenced in applied quantum physics. It causes unique measurable physical changes by the very act of "observing" it. It produces a more active level of consciousness and a different mind-set within that consciousness than from other sounds with the exact same vibrational patterns. Ogata (1995) found that delta Electroencephalogram (EEG) waves, recorded during deep sleep consciousness, were significantly higher in subjects during sim-music (created by a sound modular which simulates the same sound-pressure vibrations of a given piece of music) than with music. As well, the music listeners reported they felt pleasantly relaxed or comfortable, while those listening to sim-music reported they felt unpleasantly weary and sleepy. The act of observing music caused material changes in the brain that were different from observing the same vibrational patterns but was "noise." This indicates that the act of observation caused an event to occur.

The Musician

In fact, a second theory of quantum physics, nonlocality (Bell, 1987), further explains this phenomenon of material changes caused by the observation of music. Nonlocality postulates that the second object assumes a characteristic as a result of the measurement of the first object that was not present before the observation. In other words, as a result of observing "B," music, changes occur to "A" simultaneously which were not present before the observation. Nonlocality describes the interconnectedness and relationship between probability waves as a result of an observation. Bell was able to do experiments that showed how to measure not only the presence of this connection, but also how to establish a precise physical limit as to when this circumstance had to take place.

It seems there is something about musicians that causes observation of music to be different for them than for nonmusicians. It seems as if there is an inherent musical intentionality. And if there is, would it not stand to reason that if the nonlocality quantum property would be different for the musician, it would therefore be different for the listener who is observing the music as well? I do not propose to postulate what this is, but these differences in responses to music are measurable. It has been demonstrated in research that musicians' EEG, hormonal skin electro-magnetic field, and states of consciousness are different in response to music than those of nonmusicians (Ramos & Corsi-Cabrera, 1989; Tervaniema, Ilvonen, Karma, Albo, & Naatanen, 1997; Vander & Ely, 1992).

Ramos and Corsai-Cabrera (1989) found that when amateur musicians were exposed to silence, music, and an infant's crying, that theta (stress) relative EEG power was significantly higher while listening to music. Beta power (intense activation of the Central Nervous System) did not change, and there were no interhemispheric changes or correlations noted. Vander and Ely (1992) found that there were differences in plasma levels of norepinephrine, endorphin, cortisol, and galvanic skin responses when music majors were exposed to music as compared to biology majors. As a control, they found there were no differences in plasma levels or galvanic skin responses between the two groups before performing the experiments. The galvanic skin responses are interesting to note because it has been said that music is processed 10% by auditory function and 90% by absorption.

It had been thought that musicality was a cognitive component that was dependent on attention-related brain functions that required a conscious analytical process. However, recent research indicates that there is an inherent neurophysiological basis of musicality. Tervaniema and associates (1997) measured auditory Event-Related potentials (ERPs) which are neurophysiological objective and replicable evaluations used to determine inherent cortical hearing threshold potentials. By exposing groups of musicians and nonmusicians to sounds while reading a book, they found that the cortical preattentive detection of changes in the stimulus patterns were statistically larger in amplitude in the music subjects. In other words, this indicates a more accurate sensory memory function in musical subjects, demonstrating prehensile cortical paths, rather than an attention-related cognitive function, that are also, different in the processing of sound between musicians and nonmusicians. The three aforementioned studies indicate that there is "something" different about the musicians, and that something may be found by applying the principle of nonlocality to research findings on musicians as subjects. These inherent differences stand to affect the observation of the listener as well as of the one who experiences live music.

The Listener

Much research has been done on the listener as a result of music, but two research study findings can be explained by the principle of quantum wave manipulation which states that an “event” is the result of circular vibrations of quantum waves by its conjugate. That is, what is produced is done so by a double action—from a given state to another state and then back to its original state instantaneously, rather than in a linear function of time and space. It is demonstrated, for example, when two waves multiply themselves, such as when a radio wave modulates a carrier frequency. This multiplication principle is also seen in the Cabala’s explanation about how consciousness comes about, and it is important in understanding that the quantum relationship between music, the musician, and the listener is the critical piece of healing.

Brownley, McMurray, and Hackney (1995) compared the effect of music on physiological and affective responses to exercise in trained and untrained runners. They found that listening to fast, upbeat music during exercise may be beneficial to untrained runners, but counterproductive for trained runners as they were too “stimulated” and found the experience unpleasant. This study tends to support the notion that just as musicality exists in preattentive levels of musicians, so might inherent qualities in states of individual health affect consciousness of the experience of music. I feel this has important implications for viewing “health” as a circular state of being, as an inclusionary process rather than a linear one. The essence of the untrained runners may have included the vibrations of upbeat music to enhance their experience, while the trained runners, already physiologically upbeat, were repelled by these vibrations.

Individual differences of the effect of music on the listener were also observed by Kabuto, Kageyama, and Nitta (1993). These researchers observed differences based on type-A or type-B personalities while comparing EEG power spectrum changes due to listening to pleasant music. When the type-A personality variable was added to the component factors, the association between the total theta changes (stress) and alpha (wakefulness) frequencies was inversely related in the left occipital region, indicating a less stressed but more alert state of consciousness as a result of relaxing music to subjects with type-A personalities. Type-B personality subjects had overall significant delta (relaxation) changes, but not in any one region of the brain, or associated with other EEG changes from listening to the same music!

While this research indicates that the act of observing music can change matter, the theory of quantum wave manipulation also can be applied to reality formation in human consciousness in response to the vibrational patterns of music, the musician, and the listener in creating new consciousness, new realities, and new states of health. These vibrational patterns that affect consciousness can change matter. It is not a function of these relationships but rather the multiplication principle that explains the uniqueness of these relationships that can affect the physical state of being

LEAST-ACTION PATHS AND HUMAN CONSCIOUSNESS

Wolf (1991) conceived of a model for human consciousness based on the quantum physics theory of least action paths in “The Eagle’s Quest; A Physicist’s Search for Truth in the Heart of the Shamanic World.” In fact, it is through his work that I have gained insight into the applicability of quantum physics to music as a therapeutic enhancement to health, and he is to be credited with my understanding of quantum

physics as well. His basic premise is that a thought is complementary to a feeling in the same manner that the position and momentum of a particle are complementary to each other. Quantum physics indicates that it is not possible to know simultaneously both the location and the momentum of a particle.

In a similar manner, Wolf says, it is not possible to hold a feeling and a thought at the same time. I think so too, and I think as well that while one cannot hold both at the same time, one can examine both, like mixing oil and water, to create a new property, a new consciousness of reality. Wolf suggests that we can change our neural pathways by changing our thinking, unlike trying to change the movement of larger particles. Movement involving large massive bodies follows the laws of classical physics and there is only one "least action" path present. What this means is that a large body will follow Newtonian physics and will fall to the ground if dropped. That is its only option. However, quantum physics, which describes the vibrational behavior of invisible matter and energy, states that many "least-action" pathways are available to these smaller particles, because all of the possible paths take the same action. It is the result of the observation that one of these paths emerges as the actual path of the object and becomes the one that takes the least action. According to Wolf, the habitual paths from which we call the unconscious mind is a misnomer. The unconscious is really very conscious and is observing all the time. I believe there is evidence to suggest that our "unconscious" is really very active. Its activity related to observing music can be measured in psychoneuroimmunologic changes and understood by applying quantum physics theory.

PSYCHONEUROIMMUNOLOGY: MEASURING MUSIC'S EFFECTS

There have been many scientific experimental results throughout the years which could not be explained by linear applications. As cited by Wolf (1991), Libet, a neurosurgeon at the University of California, San Francisco, Medical School, in 1984 used a refined electrical mapping technique to identify where in the cortex stimuli on the body surface would cause electronic firing. This firing pattern was called "neuronal adequacy." Libet found that it took a full half second after the stimulus had been applied before neuronal adequacy occurred. Further tests indicated that subjects "knew" about the stimulus in a few thousandths of a second after the stimulus had been administered. This was measured by having the subjects push a button as soon as they sensed the stimulus. In other words, the subject "knew" what was happening before the brain had time to process the data. The researchers dismissed these data, thinking the subjects were probably just mistaken.

In a more recent study, Watt, Verma, and Flynn (1998) reviewed 1,082 references from 1980-1996 on "Wellness" programs. They included studies on chronic disease, health promotion, health behavior, relation techniques, music therapy, laughter, anger, meditation, and behavioral medicine. Only 11 studies met their criteria for appraisal on the strength of their scientific merit. They concluded that despite the suggested benefit associated with wellness programs, the evidence was inconclusive.

How could this be? I suggest that the researchers themselves were trying to compute wellness outcomes based on illness models, trying to measure feeling outcomes by thinking standards in a linear model. This abounds in the literature. Of all studies that I reviewed that had used parasympathetic nervous system criteria to measure the general physiologic effects of music, specifically heart rate, none had "proved" it.

There were no statistically significant general physiological responses elicited as a result of music on states of illness by this method of observation

I would suggest that looking at psychoneuroimmunological (PNI) responses to music would offer the research some evidential proof, physical manifestation, of changes that music can produce on the human organism. If we still perceive the brain as the center of our universe and the heart rate alone as the measurement of its effective functioning, we deny ourselves the probabilities of human experience. One study to date has been able to demonstrate the error of taking this approach. To measure music's psychophysiological effect on heart rate, researchers Iwanaga and Tsukamoto (1997) divided heart rate variability into two components of low frequency—mainly affected by the sympathetic nervous system, and of high frequency—mainly affected by the parasympathetic nervous system. A subjective correlation noted by the subjects was measurable in spectral analysis indices of heart rate only related to high frequencies. For this reason, they conclude that the excitative-sedative psychological effects of music (both of which were variables) are measured in the parasympathetic nervous system, but not in the sympathetic nervous system to which we have been drawn to.

Every diagram I have seen of the PNI system puts the central nervous system at the top and proceeds to create an image of linear action, yet it is defined as a complicated nonlinear system of interconnections or pathways of communication between the psyche, the nervous, and the endocrine systems. I believe we experience our world in a more complicated pattern than this, but it does offer a way to measure physiologic responses to how we perceive our unseen stimuli, such as music. It is a more holistic conceptualization of the way we receive, communicate, and interpret stimuli, simultaneously.

The PNI is a physiological model which demonstrates the principles of quantum physics as applied to unconscious perception, which is the stuff we perceive our conscious selves to be. I believe it was through this system of perception that Libet's subjects were able to "know" that a stimulus occurred before the brain did. I also believe that it is the way one can understand and explain the benefits of wellness interventions. It is not necessarily that the research methodology was at fault, but that the theoretical interpretation of the data was too limited. If we look at our existence as a multifactorial instantaneous process—neither thinking nor feeling—and realize that we create this dichotomy of consciousness because of who we are and our own least-action-path-created realities, I believe we can begin to create a new consciousness for ourselves, new realms of reality, new paths of least action, and understand how to utilize music and other complementary interventions as therapeutic and measurable enhancements to health. Once our attention has been gained, we can perceive it and proceed with it in whatever way we want.

The most recent research is significant, exciting, and indicates that music has an effect on cortisol levels (McKinney, Antoni, Kumar, Tims, & McCabe, 1997), neutrophil and lymphocyte counts (Rider & Achterberg, 1989), and beta-endorphin production (McKinney, Tims, Kumar, & Kumar, 1997), all interrelated elements of the PNI system and known variables in states of health. Looking at these elementary changes can give a more holistic and reliable picture as more is learned about their reflection of one's state of health. Elbeialy, Elbarbary, and Kamel (1997) recently identified an inverse relationship between beta-endorphin levels and rheumatoid arthritic activity. My questions remain: just what is the relationship between elements of the PNI system in human responses to health and illness and how can the vibrational patterns of music affect these relationships? We just "know" so far that it can.

CONCLUSION

This paper was an attempt to begin to understand the quantum relationship between music, the musician, the listener, and measurable states of health. It has been a long journey for me and all that has been accomplished is that I "see." It is my hope that in sharing my vision, others may not only "see," but progress. This is not a conclusion but a beginning for me. I know there are others who have gained much more sight than I. From those, I hope to learn more. I know there are others who, standing at the same threshold as I, intuitively know there is something out there to connect our clinical insights to empirically understand knowledge, and I know there are those for whom the journey has just begun. To those I hope to offer guidance. But most of all, I offer thanks to those who have shared their intuitive insights with me to embrace the myths. So, I believe it is the interplay of three vibrational patterns, when in the right combination, that can change matter.

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