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Healing Sound:
Contemporary Methods for Tibetan Singing Bowls
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Abstract

Among the many ways that music affects the human spirit, personal growth and healing are among the newest and the oldest. It was not until World War II that a modern society accepted music as a source of healing. During that era, musicians were hired to perform for injured soldiers in hospitals. This paper describes how the uses of a type of friction idiophone, popularly known as singing bowls have evolved over time. Buddhist monks have used these instruments for centuries in religious contexts. More recently, they have been adapted for recreational purposes and for music therapy. The research project will allow me to better understand the diverse applications of music in the service of healing and personal growth.

Healing Sound: Contemporary Methods for Tibetan Singing Bowls

“The large metal bowl sits heavily in my hand. I strike the rim gently with a felt-tipped beater. A humming, singing sound envelopes me. The deep, throbbing undertones gradually change into undulating overtones. I strike the bowl again, and then again and again. The more I strike, the more the room in which I am sitting is filled with sound. The sound calms me. I gradually lose an awareness of time and place. I am living in the sound and the sound is living in me”
(Jansen 1992: xi).

The compelling ring of the singing bowl is affecting more and more people in the same way. Within every individual is the ability to experience music in a manner beyond just sound. As individuals discover the overwhelming effect, one must wonder about the origin of the friction idiophone, commonly known as the Tibetan singing bowl, as well as what purpose it serves. Many times, because the singing bowl is a non-Western instrument, Americans automatically fall into a position where they feel that they must ‘believe’ in the power of the sound in order to experience the intended effect. This is akin to saying that you must believe in music in order to hear it. According to author Eva Jansen, “Sound is a physical phenomenon, and the perception of sound takes place in accordance with principles that can be explained in physical and biological terms,” (1992: xii) meaning that sound can be explained in terms of its existence as well as why and how sound affects the human body. By studying singing bowls, one can get a clear understanding of the powerful effect, both spiritual and healing, of how sound transcends into physiological and psychological well-being.

History

There are multiple theories discussing the origin and purpose of the singing bowl, but after much research and investigation, drawing from experiences of medical ethnomusicologist as well as research in special collections dating back to 1667, I have come to the conclusion that singing bowls were first created to be used in a religious setting. Over time, the purpose of the

bowl has transformed from religious to therapeutic. First, I will discuss the origins of the instrument and then discuss the evolution of the Tibetan singing bowl.

In Asia, the use of sounding instruments stems back to 2000 BC where Chinese Emperors would use 'ringing stones', usually formed from jade, which produced a beautiful ringing sound when struck (Jansen 1992: 20). It is difficult to say when bronze began being used for producing sound. Archaeological finds in Northeast Thailand suggest that bronze had been used there about two-thousand years earlier than what was known as the Bronze Age in China, circa 1600 BC. Until earlier artifacts are found, however, we must stick with 2000 BC as the beginning of the use of bronze.

By the sixth century BC, China was well advanced in the working of metal alloys and metals, creating perfectly tuned bells (Jansen 1992: 20). However, there must be previous history in order for the Chinese to have the ability to suddenly create perfectly tuned bells that weigh over one-hundred pounds, let alone bells that produce two different pure tones, depending on where they are struck (Jansen 1992: 20). There must be some previous history for China to become so advanced in this aspect. The study of the effects of sound and vibration was so advanced by the fifth century BC, that there were already instruments known as 'fountain bowls' during that time. Fountain bowls were made of bronze and created according to specific sizes and dimensions. When fountain bowls are filled with a certain amount of water, and when the two side handles are rubbed at the same time and in the same manner, the water rises up like a fountain and a humming noise is produced (Jansen 1992: 20).

The singing sound of certain metal alloys has been used in several different gongs across Asia. Around 1100 BC, the discovery of metal objects producing certain sounds was globally known, leading to the creation of small, skull-shaped bowls. Such a bowl created different tones

based on where it was struck. For example, when the ‘forehead’ near the nasal bone and the ‘temple’ area on the edge of the bowl is struck, two distinct tones are produced with an exact interval of a major third apart. The makers of the skull-shaped bowl were already aware of harmonics, and knew that the distance between the nasal and temple bone would create a major third interval (Jansen 1992: 21). These skull-shaped bowls are the earliest recorded singing bowls.

There are several photographs revealing temple interiors featuring what appears to be a singing bowl. However, the bowls are not being used as instruments. Instead, the round, metal bowls are used for eating. Singing bowls can serve several purposes, including offertory dishes, eating bowls, and sound. There are many opinions as to who made the singing bowls. However, all evidence points to shamanistic tradition (Muller-Ebeling et al 2002).

Shaman Tradition

Travelling metal smiths produced singing bowls that date back to the shamanistic tradition. The metal alloys used to create the bowls were made in such a way that it is impossible to recreate an authentic singing bowl using modern techniques. There is another theory that the monks actually produced the bowls themselves. The issue lies in the fact that no one has ever seen a bowl made in the original fashion, either by the monks or the travelling metal smiths (Jansen 1992: 23). Today, singing bowls are still produced, but are cast and the old metal alloys are not used. According to the shaman tradition, the bowls are made from seven metals; one metal per planet: gold (the Sun), silver (the Moon), mercury (Mercury), copper (Venus), iron (Mars), tin (Jupiter), and lead (Saturn) (Shresthra 2009: 12). The fusion of all seven metals together created the wondrous sound of the singing bowl, including an individual sound for each bowl and harmonics.

Singing bowls have not been made in the old way since the last forty years. There are several reasons for this. First, singing bowls could have been used as sacrificial dishes, which were commonly found in Tibetan monasteries. The singing bowls were used as sacrificial dishes because a gift offered in a sacrificial dish “must also be harmonious in every respect” (Jansen 1992: 25). Even though the bowls were never rung, it was important to know that the pure sound could work in harmony with the sacrificed offering.

On the other hand, singing bowls could have also been used as mere eating dishes. According to Jansen, “it is possible that the alloys of the bowls supplied homeopathic potencies of essential minerals in the diet” (1992: 25). Following this logic, a woman who just gave birth would eat from these bowls for an entire month. Yet, if these bowls were actually created by travelling metal smiths or by the shamans themselves, and they were secretly used in monasteries, there must be reasons for individuals to keep quiet about their shaman uses of the bowls; it is no wonder that many times when asked about these singing bowls, everyone answers with ‘I don’t know’ or simply describes them as mere eating bowls.

An interesting point which continues the mystery of the singing bowls lies in the fact that they are not mentioned in manuscripts or books documenting voyages to China (Kircher 1667,1673; Pinkerton 1811). Buddhism is the major religious tradition in the Himalayas where these bowls are found. Oddly enough, singing bowls are not used in ‘official’ Buddhist rituals (Jansen 1992: 25). In addition, it is not unnatural for the individuals to deny owning singing bowls because this automatically ties them to shamanistic rituals. Nevertheless, many people own singing bowls in the Himalayas and secretly use them in their rituals. A common reason given for people owning these bowls is that they are simply dishes used for display in the

household¹. It may be of that these bowls are not used in official Buddhist rituals because they simply do not want to be categorized as participating in a shaman practice.

Thus, there can be several reasons as to why singing bowls are not created in the original technique for the past forty years. If the bowls were actually produced to serve the purpose of an eating dish, then they would have been replaced by China and other materials that are easier to clean than metal. If the bowls were originally produced for the purpose of sacrificial dishes, then they are not produced the same today due to the Chinese invasion of Tibet. With the destruction of many monasteries in Tibet, the demand for sacrificial dishes has come to a halt. Therefore, I have come to the conclusion that singing bowls were indeed created for the sole purpose of usage in shamanistic rituals.

According to Hultkrantz, world-renowned expert on Native American ritual traditions, “The central idea of shamanism is to establish means of contact with the supernatural world by the ecstatic experiences of a professional and inspired intermediary, the shaman” (Muller-Ebeling et al 2002: 4). A central role of shamanistic technique includes altering the state of mind in order to experience a different consciousness (Price 2001: 187). Among chemical stimulants, controlled breathing and fasting, is the use of sound to induce altered states of consciousness (Price 2001: 187). The power of sound, especially found in percussive instruments, is so strong that it may single-handedly create an alternative state of mind. Depending on the rhythm and pitch frequency, sound can create a transcendental experience. For example, the sound of the singing bowl was used to put the shamans into a meditative state (Price 2001: 217). Once the shamans were induced to a meditative state, they were able to receive hidden information (Price 2001: 217). Singing bowls really came into play when an individual became suddenly mute.

¹ However, I would like to make it clear that I am not at all trying to make Buddhism and Shamanism synonymous. I am just focusing on the similar uses of the singing bowls between both traditions.

The shaman would be able to communicate directly to the mute individual through the voice of the singing bowl and its resonating overtones. The shamans were able to visualize the disturbance of the muted individual's spirit through the singing bowl. Not only did the singing bowl allow the shamans to assess the spirits of others, but it also allowed them to permeate communication boundaries to the heavens and the underworld. In addition, the sound of the singing bowls worked as purification to the shamans.

When played in the presence of an individual in a trance or substance-induced state, the sound of the singing bowl can alter that individual's state of consciousness, leading one to experience cosmic states of mind, otherwise unattainable in a conscious state. Robert Desjarlais, author of Body and Emotion: The Aesthetics of Illness and Healing in the Nepal Himalayas (1992) participated in a musically induced shaman ritual. Desjarlais reported, "Music resonated within me, building to a crescendo, charging my body and the room with impacted meaning. Waves of tremors coursed through my limbs. Sparks flew, colors expanded, the room came alive with voices, fire, laughter, darkness" (1992: 5). It is the overtones produced by the singing bowls that allow for such a powerful effect on the conscious. The vibrating overtones resonate within the individual, causing the individual's consciousness and sound to vibrate together (Price 2001: 218).

From East to West

Regardless of the way the Himalayan people used singing bowls, one thing is certain. Western people are definitely affected in a special way by the ring of the bowl. This brings us to ask: What differentiates our Western musical tradition from the sound of the singing bowls? The difference lies in harmonics. Far less attention is paid to harmonics in the Western music tradition in comparison to the East. For example, when a string is vibrated, a basic tone is

produced in addition to a whole scale of resonating harmonics. These resonating harmonics include all the whole tones as well as semitones which continue to decrease in interval. Bells, gongs, cymbals, and singing bowls produce harmonics well beyond the number produced by Western instruments (Jansen 1992: 37). When it comes to understanding harmonics, Westerners use a system based on octaves. For example, with two successive C's the frequency of the higher note will be exactly twice that of the lower note. This logic applies to all the other notes and semitones of D, E, F, G, A and B.

A perfect fifth sounds the most harmonious to Westerners. There are two kinds of fifths, a perfect fifth which has an interval of three whole notes and one semitone, and a diminished fifth which is composed of two whole tones and two semitones. Western musicians follow a system called 'the circle of fifths' which is a cycle of twelve fifths. Within the circle, there are eight C's, meaning that the circle is composed of seven octaves. If one is to calculate the frequency of the 'circle of fifths', one will calculate a frequency of 128 Hz (measure of frequency in cycles per second) when measuring the seven ascending octaves, and a frequency of 129.75 Hz when measuring the twelve ascending circle of fifths. The difference in the calculation of frequency is 1.75 Hz, proving that the circle of fifths is in fact not, created entirely out of perfect intervals. What accounts for the difference when measuring frequency in the circle of fifths, is that there is a difference of 1.5 Hz in frequency between the highest note and the lowest note in a fifth interval (Jansen 1992: 37). In order to make up for the issue of perfect intervals, instruments were artificially tuned (known as even temperament) in order to achieve perfect intervals (Jansen 1992: 37). Jansen describes the outcome perfectly when she states, "rational thinking has placed restraint on sound" (1992: 37).

Eastern instruments such as gongs, symbols, and singing bowls do not have this issue of artificial barriers. Because the natural vibration of the intervals in the singing bowls between the harmonies can be clearly heard, a very distinct, different sound is produced. These different sounds affect Westerners differently than the artificially shortened intervals and vibrations in the well-tempered (even tempered) octave.

Therapeutic and Recreational Purposes

Today, the purpose of the singing bowl has been transformed into a therapeutic use. We can only imagine what the original travelling gold smiths or shamans would think of this idea. While holistic healing has become ever so popular, it is still not possible for us to use the shamanistic approach of ‘making no distinction’ between the body and the spirit. The shamanistic approach was not based on intellect or empirically confirmed ideas. Rather, the approach was intuitive and embedded within the experience itself. Because our culture has become so accustomed to analytical thinking it is difficult to use the singing bowls in the traditional way. We can, however, learn about the old tradition and continue on our own path of inner discovery and experience.

Tranquility of the mind correlates with health (Brummel-Smith 2008: 311). Thousands of studies provide evidence (e.g., Anderson 1987; Murphy and Donavon 1997) of the benefits of acquiring a still mind. Positive effects created from meditative states include an increase of pain tolerance, immunity, muscle relaxation, and awareness (Brummel-Smith 2008: 311). It has been observed that during meditative states “heart rate, blood pressure, respiratory rate, epinephrine, cortisol, and cholesterol” are decreased (idem). In addition, there is a high correlation between meditative states and brain waves manipulated by electroencephalograms (EEGs) (idem). Clinical evidence reports that during a meditative state, “reproducible decreases in anxiety,

depression, addictive cravings, and substance abuse” have been recorded. Diseases have even been documented as benefiting from meditative states, including “hypertension, asthma, tension and migraine headaches, seizures, ulcers, allergies, premenstrual syndrome, and attention deficit hyperactivity disorder” (idem). More specifically, singing bowls have been observed that may leave one speechless. Additional effects include “synesthesia, spiritual visions or a sense of visitation by divine forces, loss of a felt sense of being bound by linear time, expanding beyond the physical body, and transcendence of ego” (ibid: 312).

One theory explaining the effect of musical vibration on the human body is synchronization. Theorists such as Dr. Larry Dossey, Rupert Sheldrake, Harold Saxton Burr, and Eva Jansen have all taken different approaches to explain this phenomenon. Jansen describes synchronization by taking a look at the effect vibration has on water. Water is affected by vibration as mentioned earlier in fountain bowls and the human body is more than eighty percent water (Jansen 1992: 39). It is not surprising to learn that the vibrations of the singing bowl have physiological effects on our bodies. The vibrations of the singing bowls cause a light internal massage to all of our cells. The same results are conducted by physiotherapists with ultra-sonic sound waves (Jansen 1992: 39). Synchronization comes into play when the vibrations of the singing bowls transform the normal vibrations and wavelengths of the human body to match their own. Meaning, a healthy organ vibrates at his own rhythms and frequency, while an unhealthy organ’s natural rhythm is disturbed. Singing bowls “recreate the original harmonic frequency, and stimulate the body to rediscover its own harmonic frequency, by making it vibrate to the frequency of the bowl so that when it is synchronized, it can vibrate independently” (Jansen 1992: 39).

Another theory involves brain patterns recorded on EEGs correlating with brain waves created by singing bowls. During the 1960s, biophysicist Erwin Neher experimented and compared correlating brain waves altered by EEGs and brain patterns created in a meditative state (Neher 1961). While beta waves are produced in a normal state of the brain, alpha waves are produced in the brain during a state of meditation and relaxation. Theta waves are present in 'half sleep' and delta waves are produced only during deep sleep. Waves produced during a meditative state created by singing bowls are found to be exactly like those of alpha waves. According to Neher's study, "The vibrating resonance of Tibetan bowls has been correlated with the generation of an alpha brain-wave state, while ting-shang, small cymbal-like bells used by Tibetan meditators, have been described as producing the consciousness-altering theta state" (Brummel-Smith 2008: 317). In addition, it has been shown that generally when one is induced in a meditative state, the production of alpha waves increases (Hardt 1994; Travis 2001). This demonstrates the physiological as well as psychological effects that the singing bowl has on the human body. Therapists have discovered the relaxation that the sounds of the bowls induce and are now using them in a clinical context.

A third theory involves hemispheric neurological coherence, which is the balancing of activity in the right and left brain hemispheres. This balancing has been documented by both EEG monitoring as well as other forms of brain imaging (Brummel-Smith 2008: 319). Musical and meditative experiences have an astounding special effect on spatial organization within the neurological hemispheres. When examining the neurobiology involved during ritual trance (which is a common practice in shamanism), Barbara Lex, associate in psychiatry (anthropology) at Harvard Medical School, talks about the brain's ability to hold more affecting stimuli, "in effect decreasing the dominance of the analytical left hemisphere in favor of activation of the

more intuitive, spatially oriented right hemisphere” (Brummel-Smith, 2008, p.319). This spatial theory has been studied and supported by several theorists including Ornstein, D’aquili, Newberg, Splittstoesser, and Lou. D’aquili and Newberg (1999) coined the term “neurotheology” (“spiritual science”), theorizing that both left and right hemispheres of the brain become activated in order for one to reach a meditative state. According to Splittstoesser, both left and right hemispheres produce increasing alpha and theta waves during meditative states. This has been shown experimentally using EEGs. In addition, an increase of cerebral blood flow occurs in both hemispheres during meditative states. This has been shown through positron-emission tomography (PET) scans (Lous et al 1999). The neurological effect of musically induced altered states of mind and meditation continue to be studied through enhanced brain imaging devices including PET scans and functional magnetic resonance imaging (MRI) scans (Anderson 1987).

Contemporary music therapists are now utilizing the singing bowls by way of the dynamic ‘triad’: client-therapist-music (experience). The ontology of *what* promotes the healing change in the individual really shows a plausible though striking evolution in the use of the singing bowls. In the past, the purpose of the singing bowl was to perform in shamanistic rituals. The healer was the shaman who used music as a channel to ‘scan’ the patient’s spirit. Shamans used music in order to diagnose disturbed spirits in others. Today, therapists use music as the healing device and the therapist is the channel through which the music is played. Healing with Eastern instruments such as gongs, singing bowls, and overtones promotes resonance and balance to the listener (Wigram et al 2002: 149). Eastern instruments, along with their fundamentals of vibrations and broad range of overtones help a listener/patient achieve

relaxation, consciousness, and balance. Singing bowls are often used in combinations with meditation, overtone chanting, and Gregorian chant (Wigram et al 2002: 149).

As mentioned earlier, a perfect fifth is the most consonant interval to Western ears. Music therapists purposefully set up bowls that are intervallic fifths apart. Dr. Harold Grandstaff Moses, director of the Institute of Harmonic Science in Phoenix, Arizona states “We have run numerous experiments with sound frequencies, harmonics, chord progressions, tempos, color, lighting and visual imaging in order to gain insight on ways to influence emotions and feelings, while facilitating healing, reducing stress and generating a heightened state of spiritual awareness. Our research indicates that the music interval of the perfect fifth and the resulting harmonic overtones² have the ability to favorably influence the parasympathetic nervous system while modifying the listener’s state of consciousness” (Shrestha 2009: 26).

Conclusion

While the healing shaman tradition still survives today in remote areas across the globe, the ancient tradition has been revisited and reinvented in order to meet the needs and issues of people living in contemporary Western societies (Wigram et al 2002: 150). The ancient art of playing these exquisitely crafted friction idiophones has been used by healers, shaman or not, to “invite the mind and body into a tranquil state of being in which remarkable healing can occur, events that are unexplainable from a conventional biomedical perspective” (Brummel-Smith 2008: 309). Contemporary Tibetan healers choose specific tones proven to heal an illness syndrome based on clinical experimentation and observation. These ‘music interventions’ have been proven successful since the beginning of civilization. As more theorists experiment with EEGs and musically induced states of meditation, we are able to transmit knowledge acquired from experimentation and apply them to current music therapy training. With people in most

² Resonant frequencies higher than the fundamental frequency

contemporary societies constantly in motion, the comparative stillness of meditation is increasingly seen to provide an important balance. The clinically proven effectiveness of induced states of meditation, such as those associated with Tibetan singing bowls may well have a central place in this emerging practice.

References

- Anderson, R.A. (1987). *Wellness Medicine*. Lynwood, WA: American Health Press.
- Brummel-Smith, K. (2008). "Music and the Meditative Mind: Toward a Science of the Ineffable." In *The Oxford Handbook of Medical Ethnomusicology*, edited by Benjamin D. Koen, Jacqueline Lloyd, Gregory Barz and Karen Brummel-Smith, 308-327. New York: Oxford University Press.
- d'Aquili, E., and Newberg, A.B. (1999). *The Mystical Mind: Probing the Biology of Mystical Experience*. Minneapolis: Fortress Press.
- Desjarlais, R.R. (1992). *Body and Emotion: The Aesthetics of Illness and Healing in the Nepal Himalayas*. Philadelphia, PA: University of Pennsylvania Press.
- Murphy, M., and Donavon, S. (1997). *The Physical and Psychological Effects of Meditation*. Sausalito, CA: Institute of Noetic Sciences.
- Hardt, J.V. (1994). EEG power and coherence in Zen meditation. Presented at the Society for the Study of Neuronal Regulation Conference. Retrieved March 15th, 2010, from <http://biocybernaut.com/publications/eeg-zen.html>.
- Jansen, E.R. (1992). *Singing Bowls: A Practical Handbook of Instruction and Use*. Diever, Holland: Binkey Kok Publications.
- Kircher, A. (1987, originally printed in 1667). *China illustrata : with sacred and secular monuments, various spectacles of nature and art and other memorabilia*. Bloomington, IN: Indiana University Research Institute for Inner Asian Studies.
- (1673). *Phonurgia Nova*. Campidonæ : per Rudolphum Dreherr
- Lex, B.W. (1979). The neurobiology of ritual trance. In E.d'Aquili., *The Spectrum Ritual: A Biogenetic Structural Analysis* (pp.117-151). New York: Columbia University Press.
- Lou, H.C., Grieschar, L.L., Rawlings, N.B., Richard, M., and Davidson, R.J. (2004). Long-term meditators self-induce high amplitude gamma synchrony during mental practice. *Proceedings of the National Academy of Sciences*, 101(46). 16369-16373.
- Muller-Ebeling, C, Ratsch, C., and Shahi, S.R.. (2002). *Shamanism and Tantra in the Himalayas*. Rochester, VT: Inner Traditions.
- Neher, A. (1961). Auditory driving observed with electrodes in normal subjects. *Electroencephalography and Clinical Neurophysiology*, 13, 449-451.
- Ornstein, R. (1986). *The Psychology of Consciousness*. New York: Penguin Books
- Pinkerton, J. (1811). *Travels through Tibet, to and from China: By Several Missioners*. London : Printed for Longman, Hurst, Rees, Orme, and Brown ..., and Cadell and Davies .
- Price, N. (2001). *The Archaeology of Shamanism*. New York, NY: Routledge.
- Sears, W.W. (2007). *Music: The Therapeutic Edge*. Gilsum, NH: Barcelona Publishers.
- Shrestha, S. (2009). *How to Heal with Singing Bowls: Traditional Tibetan Healing Methods*. Boulder, CO: Sentient Publications.
- Splittstoesser, W. (1983). EEG analysis during meditation: A literature review and experimental study (original title: Elektroencephalographische Untersuchung bei der Meditation: Literatur und eigene Erfahrung). Unpublished doctoral dissertation, Johannes Gutenberg University, Mainz, Germany. Abstract retrieved on January 7, 2010 from http://www.mum.edu/tm_research/tm_biblio/physio_b.html.
- Travis, F. (2001). Autonomic and EEG patterns distinguish transcending from other experiences during Transcendental Meditation practice. *International Journal of Psychophysiology*, 42(1), 1-9.
- Wigram, T., Pederson, I.N., and Bonde, L.O. (2002). *A Comprehensive Guide to Music Therapy: Theory, Clinical Practice, Research, and Training*. Philadelphia, PA: Jessica Kingsley Publishers.