

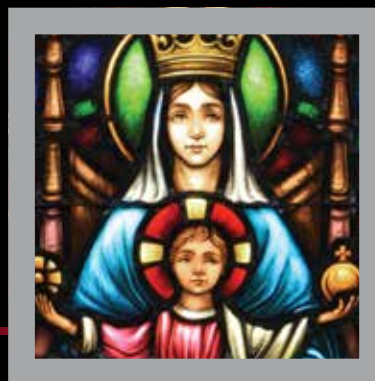
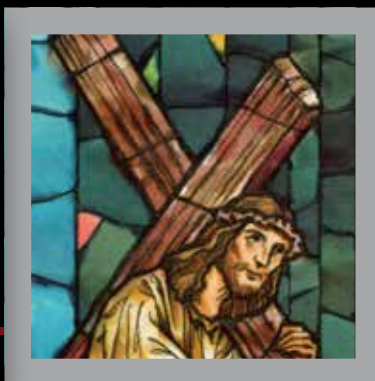
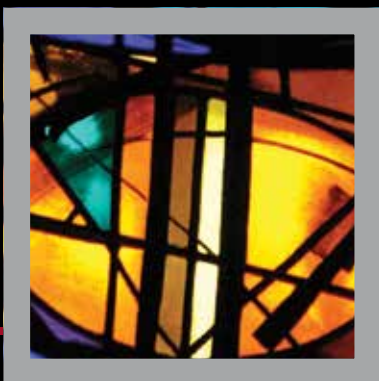
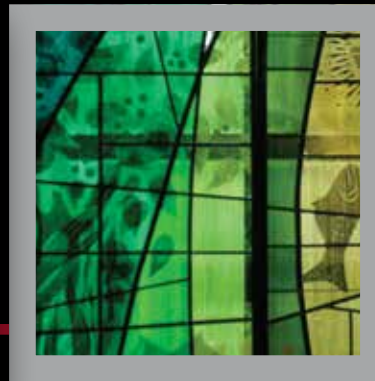
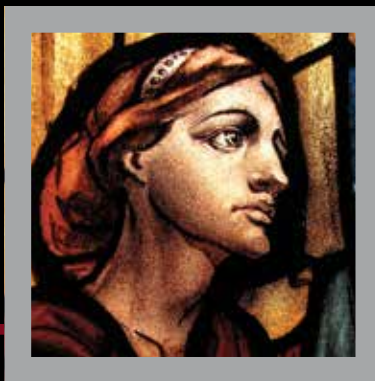
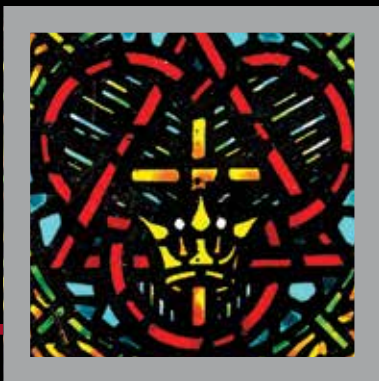


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Theme Issue:

The Aural Sacred Environment



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Photo: Mark Baechler

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BETWEEN DARKNESS AND LIGHT

EDITOR'S PAGE * MICHAEL J. CROSBIE

Louis Kahn might be best remembered for talking to bricks and asking what they wanted to be, but for the creators of sacred space

Kahn's most prescient observations are about light, light of the natural variety. "Architecture appears for the first time when the sunlight hits a wall," Kahn believed. Through his teaching and mentoring, the central importance of light in architecture for Kahn was reiterated over and over.

As the northern hemisphere is now on its journey into the darkest months of the year, I was reminded of Kahn's insight that light is not just seen, but felt. "We are born of light," he said. "The seasons are felt through light. We only know the world as it is evoked by light." For Kahn, it was an article of faith in the creation of architecture to capture natural light. He had a disdain for relying too much on what he described as "the touch of a finger to a switch," which produced a dead illumination, forgetting "the endlessly changing qualities


of natural light, in which a room is a different room every second of the day."

But natural light's presence and power, particularly in the experience of sacred spaces, is enhanced by its opposite: darkness. The two work in tandem, like graceful dancers, circling a room. Kahn spoke about how his experience of ancient Greek architecture had taught him about the alternating presence of light and no light between the columns. To capture a slice of the sun was one of architecture's greatest achievements, but even a thin sliver of light depended upon darkness for its power: "Even a room that must be dark needs at least a crack of light to know how dark it is," Kahn observed.

I don't know if Kahn ever read Jun'ichirō Tanizaki's slender book, *In Praise of Shadows*, but I suspect he must have (Charles Moore, in his foreword to an English translation of Tanizaki's book, quotes Kahn). Tanizaki is Ying to Kahn's Yang. Writing in the 1930s, he deplores what he perceives as the West's overabundant artificial illumination, driving out cobwebs of shadow in a room, and he laments the adoption of Western emphasis on bright interiors in his native Japan. In one passage,

Tanizaki writes about how darkness in a temple allows the flickering of gold altar lamps to harmonize with the wrinkled skin of the old priest, "and how much it contributes to the solemnity of the occasion."

Tanizaki observed that the interior darkness of traditional Japanese buildings cultivated an aesthetic sensitivity "...to discover beauty in shadows, ultimately to guide shadows towards beauty's ends." Similar to the way Kahn describes the presence of light in a room as a being, Tanizaki relates how darkness envelops him in an old ceremonial teahouse: "...the darkness seemed to fall from the ceiling, lofty, intense, monolithic, the fragile light of the candle unable to pierce its thickness, turned back as from a black wall. It was a repletion, a pregnancy of tiny particles like fine ashes, each particle luminous as a rainbow. I blinked in spite of myself, as though to keep it out of my eyes."

Kahn and Tanizaki, two sides of the same coin, would consider careful measures of light and darkness as essential atmospheres in creating sacred space, and the experience of the transcendent here on earth. 

MICHAEL J. CROSBIE IS THE EDITOR-IN-CHIEF OF FAITH & FORM AND CAN BE REACHED BY EMAIL AT MCROSBIE@FAITHANDFORM.COM



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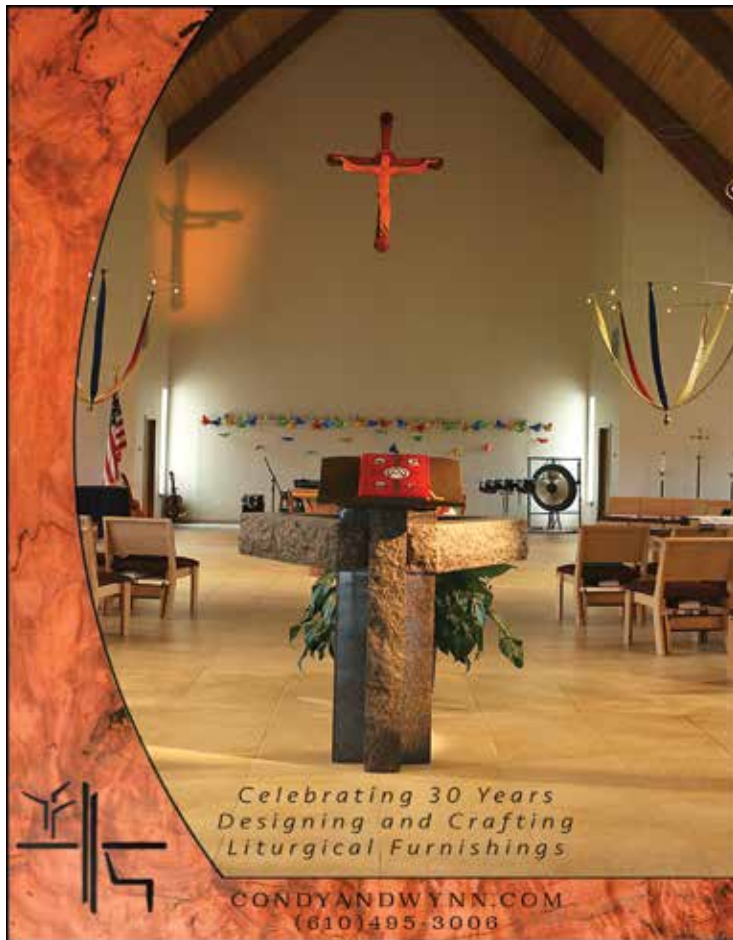
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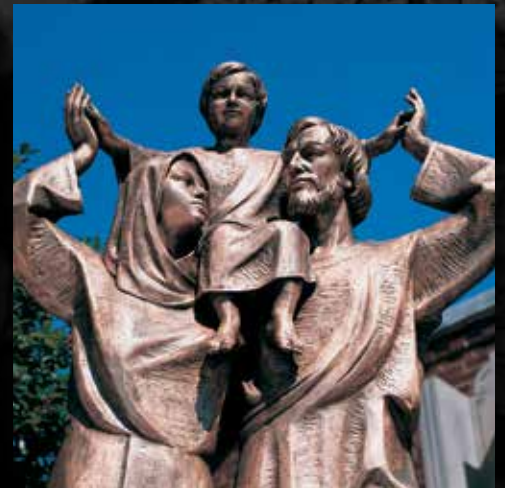
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‘We Are Sound Beings’

Exploring the acoustic mysteries of sacred space and sacred sound

By Susan Elizabeth Hale

As the species *Homo sapiens* we have a fundamental need for the sacred. In the Paleolithic we chose the most resonant places in caves to paint animals and shaman figures. Acoustic archeologists believe that sonic rituals were performed here. I have experienced this myself singing in the original Lascaux cave and the Grotte de Niaux.

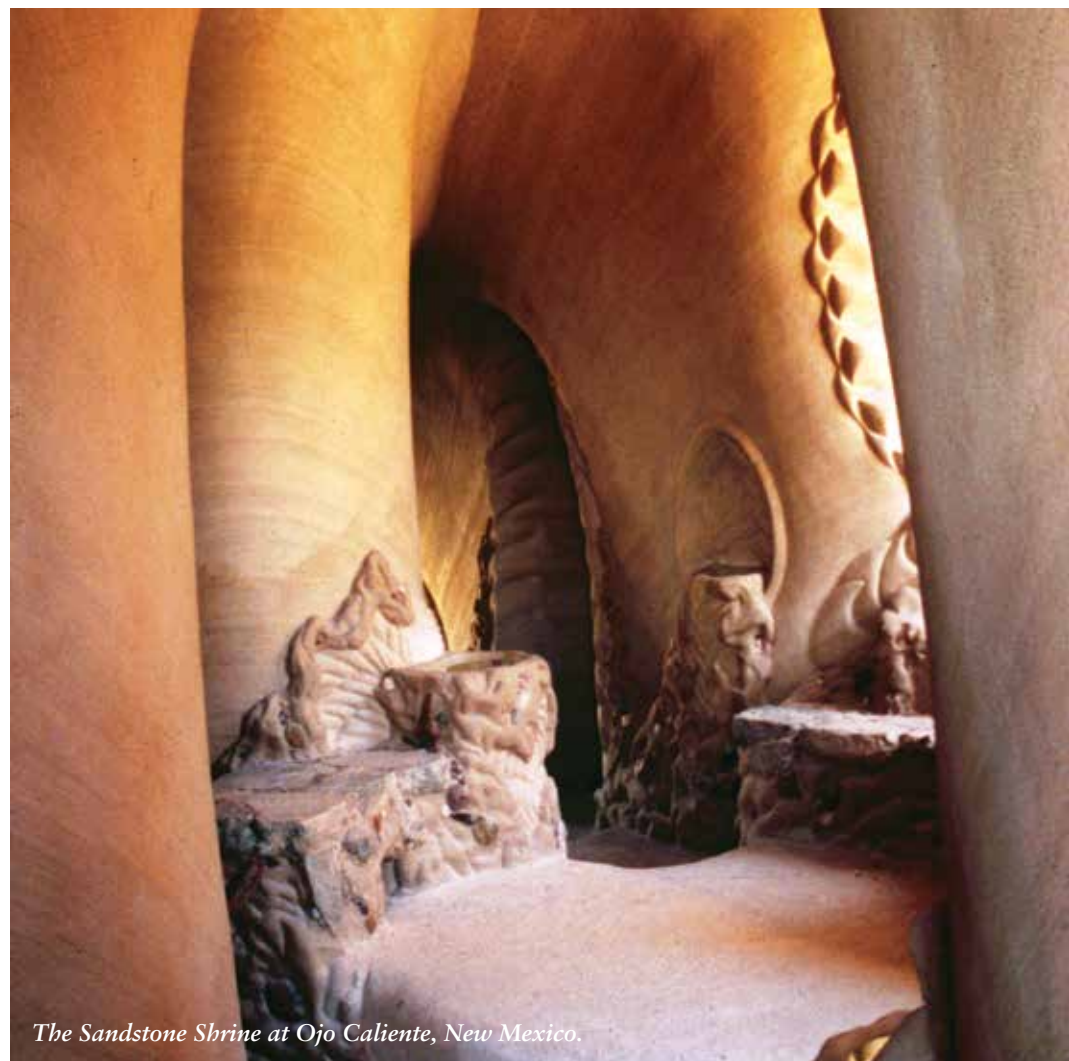
We are sound beings, highly sensitive acoustic soundboards. As resonators we have encircled the earth with painted caves, cathedrals, stupas, oracle chambers, shrines, kivas, megalithic monuments, pyramids, and other buildings to celebrate and give praise to the divine. We create these places to hear ourselves and the spirit more clearly, to create relationships with the seen and the unseen worlds within and around us.

What makes a place sacred? A sacred space is a natural or created place to enhance spiritual experience and to perform ritual acts of worship. It is a *temenos*, an enclosure to enter into a relationship with a greater reality. Entering into sacred space one crosses a threshold and moves from *chronos*, human time and space, into *kairos*, eternal time.

There are places on the earth, often where ley lines and underground water streams converge, that emanate powerful vibrations that alter our sense of ordinary reality and put us in contact with the numinous, with mythic reality and greater mysteries that cannot be named. Early people from all over the world revered such places as mountains, caves, rocks, or groves of trees. Later, sacred structures were built on these spots, aligned with stars and constellations, to protect, contain, and amplify the energy.

RESONANT SACRED SPACES

Sacred spaces are inherently musical. They are places where we go to attune and



The Sandstone Shrine at Ojo Caliente, New Mexico.

be tuned, to be in harmony, to resonate with holy realms. Early humans sought out natural places for their acoustic properties. They found resonant caves, echo canyons and other places where sound reverberated in mysterious ways. Later, one might say that “music” was literally built into temples and churches in the form of sacred geometry. They became more than visual masterpieces but acoustic masterpieces as well. From the Taj Mahal, to the Great Pyramid of Giza, to soaring Gothic cathedrals: these places sing!

While we can’t really know if acoustics were used intentionally in the design of sacred sites, I believe knowledge of resonance was passed down from the oral cultures of the Paleolithic, to the Neolithic, right straight to the door of Chartres. From voice to voice, ear to ear, heart to heart, this understanding was passed from generation to generation, like an ancient game of telephone. Connecting through the songlines of the earth, I believe these vocal people *noticed* when something vibrated and built to enhance these effects. Singing in caves and canyons they heard echoes and later built sacred architecture to enshrine the air, housing the spirits of sound. I believe early shamans

were sound technicians that knew how to manipulate sound and space to create portals into other dimensions.

Different religions created buildings that most suited their message. Cavernous stone cathedrals with their incredible reverberation were perfect for Gregorian chant. In Protestant religions, which emphasize speech over music, small chapels with elevated pulpits were built so the minister’s sermon could be heard. The cloth hangings, silk paintings, and wooden ceilings in Tibetan temples “...restrict reverberation and produce a high clear sound.”¹ This is ideal for the sounds of horns, drums, and cymbals, which punctuate the chanting of Buddhist monks. Pueblo kivas in New Mexico, built of adobe bricks, create a womb-like space in the earth that enhances the experience of intimacy.

SACRED SOUND QUALITIES

Why is sound considered sacred? To answer this question we must look at different qualities of sound.

Sound is primary in forming consciousness. Igor Reznikoff, a specialist in early music, antiquity, and the resonance of sacred sites, believes that deep consciousness is

THE AUTHOR OF *SACRED SPACE SACRED SOUND: THE ACOUSTIC MYSTERIES OF HOLY PLACES* (QUEST BOOKS, THEOSOPHICAL PUBLISHING HOUSE, WHEATON, ILLINOIS AND CHENNAI, INDIA, 2007), SUSAN ELIZABETH HALE IS AN INTERNATIONALLY RENOWNED MUSIC THERAPIST AND SOUND HEALER AS WELL AS CREATOR OF THE ANNUAL GLOBAL EVENT EARTH DAY - SING FOR THE TREES (SONGKEEPER.NET).

mostly structured through sound.² Sound is always there, imprinting and inspiring us. Sound matters.

Different religions throughout the world consider sound as a spiritual force. The Bible says, "In the beginning was the word. And the word was with God and the word *was* God."³ Creation myths all over the world repeat this same basic truth. For people of the Laguna Pueblo in New Mexico Spider Woman shapes the world through humming and singing. In Egypt the world was created when the singing sun sang its cry of light. These stories are deeply woven into our human matrix.

The Latin word for spirit is *spiritus*, or in Greek, *pneuma*, the same word for air. In Hebrew *ruach* means both the wind and the spirit. The Persian mystic poet Kabir says that God is "...the breath inside the breath."⁴

We hear sounds through the ear, home of our earliest sense, which develops in utero. The inner ear is complete at four and a half months, 135 days after conception. The ear starts first at the surface of the skin as a small gill-like slit. Gradually it burrows, spirals inward, deep down in the petrous portion of the temporal bone. According to Dr. Albert Soesman, author of *Our Twelve Senses: Wellsprings of the Soul*, this is the hardest bone in the body. Humans are the only mammals where the inner ear is protected so carefully. This fetal ear is comparable to a fully functioning adult ear. We are sound beings. Our senses develop out of the matrix of the ear. Touch, taste, smell, and sight all have their foundations in the ear, which "...precedes the nervous system."⁵ In evolutionary terms hearing is at least 300 million years old.

Sound shapes the air as vowels. Pythagoras believed that vowels embodied the creative principle and that the voice is the primal instrument. It is the only instrument that can produce vowels. Vowel sounds are universal, common to every language. They are the emotional content of speech. The high "Ee" of excitement, the groaning "Oh" of pain, the "Ah" of love are all instinctually understood by every culture. Spiritual traditions refine the vowels and elongate them vocally. Latin Mass,

Gregorian chant, Hindu mantras, and the Muslim call to prayer are all vowel rich.

Vowels are also the spiritual content of speech. In ancient Egyptian and Hebrew languages vowels were sacred and not notated with writing. To read these languages one must participate vocally. When the vowels are intoned words become alive. Words are magic.

"Ah," the shape of the mouth on exhalation, is cleansing, like water washing over the body. "Ah" vibrates the heart and is the sound of praise and wonder. Allah! Alleluia! "Ee" lifts up into the head, clearing and stimulating the region of the third eye. "Ou" descends into the interior vibrating the lower portions of the body. "Oh" explores the deep cavern of the body's core. "Oh" as in *Om* sounds the void and fills emptiness. Perhaps vowels inspired forms in sacred architecture: *I* for columns, *A* for arches, *O* for domes.

When vowels are intoned in sacred places they take wings as overtones, magical bell-like tones that float above the fundamental note. Gregorian chant is the earliest example of Western harmony where singers move in parallel fifths above the melody line. The fifth is the first naturally occurring harmonic and has a characteristic open sound that generates a feeling of power and strength. The monks initially sang in unison. Musician Kay Gardner believes that the harmony of the fifth was added when "...the singers, chanting in highly resonant stone cathedrals and monasteries, were hearing the fifth naturally occurring as a harmonic above a single melody line... soon they began singing what they heard."⁶

SOUND AND SACRED CONSCIOUSNESS


Sound alters consciousness. One of the primary ways sound and music influence consciousness is through entrainment, a process where weaker rhythms lock in phase with more dominant rhythms. When we hear a bass drum in a parade our feet automatically tap along. When an infant hears its mother's lullabies it is lulled into sleep. Heart beat, respiration, and brain wave rhythms can all be influenced by sound and music through the

process of entrainment.

Our brain state is a composite of brain wave patterns. These patterns are measured in different frequency ranges. Beta brain waves (13-30 cycles per second) are predominant when we are alert, awake, and rational, engaged with the outside world. The slower rhythms of Alpha brain waves (8-13 cycles per second) are generated when we are relaxed. Even slower Theta waves (4-7 cycles per second) show up when we are in a trance state where visual images are seen on the screen of our minds. This is a state of deep meditation, the threshold between the conscious and the unconscious. When we listen to the slow sounds of chanted drones we can reach Alpha and Theta brain waves, matching their rhythms. In deep sleep, or profound states of meditation, Delta brain waves (0.5-4 cycles per second) are predominant.

Sounding together creates community through a shared aural space. From congregational hymn singing, to chanting in a ceremonial kiva, to the Dances of Universal Peace, people are brought together into harmony. When words are added as in hymns and mantras sacred stories travel more deeply into our consciousness through repetition and entrainment.

Intention is central to our role in creating the sacred. A circus tent becomes a revival church with the joyful noise of a gospel choir. Dances at Southwestern Pueblos transform a dusty courtyard into a giant prayer. What matters is that we become part of the dance, that we bring our attention, intention, ecstasy, despair, and receptivity to a greater reality, that we blow our prayers onto cornmeal and scatter it over the food we pick, that we make our own joyful noise whether at Chaco Canyon or in our own backyard.

As we continue to struggle with racism and religious persecution it is important to remember our common roots and the universal need for harmony. It is hoped that these tools of sacred space and sacred sound can help us evolve from *Homo sapiens*, thinking man, to the more enlightened consciousness of *Homo luminous*.⁷ 

NOTES

1. Tim Wilson, "Chant" in Don Campbell, editor, *Music: Physician for Times to Come* (Wheaton, IL: Quest Books, 1991) p.12.
2. Igor Reznikoff, lecture at Voices of Heaven and Earth Conference, Findhorn, Scotland, 1996.
3. John 1:1.
4. Kabir in Robert Bly, editor, *The Soul is*

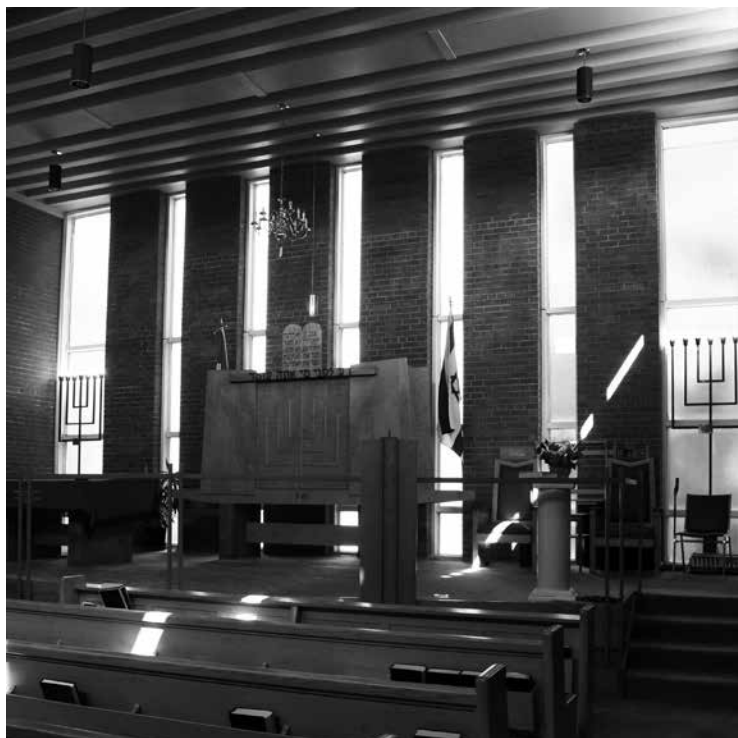
Here For Its Own Joy (Hopewell, NJ: The Ecco Press, 1999) p. 88.

5. Bradford Weeks, M.D., "The Physician, the Ear and Sacred Music," in Don Campbell, editor, *Music: Physician for Times to Come* (Wheaton, IL: Theosophical Publishing House, Quest Books, 1991) p. 45.
6. Kay Gardner, *Sounding the Inner*

Landscape: Music as Medicine, (Stonington, ME: Caduceus Publications, 1990) p. 109.

7. Alberto Villoldo quoted in Vincent Bridges and Jay Weidner, *The Mysteries of the Great Cross of Hendaye: Alchemy and the End of Time* (Rochester, VT: Destiny Books, 2003) p. 392.

The Voice of Abraham's House



Shaar Hashomayim Synagogue, Sudbury, Ontario.



Fielding Memorial Chapel of St. Mark, Sudbury, Ontario.

“And Lord said to Abram, ‘Go forth from your native land and from your father’s house to the land I will show you. I will make of you a great nation, And I will bless you; I will make your name great, and you shall be a blessing. I will bless those who bless you, and curse him that curses you; and all the families of the earth shall bless themselves by you.’”

Genesis 12:1-3¹

“At that time Jesus came from Nazareth in Galilee and was baptized by John in the Jordan. As Jesus was coming up out of the water, he saw heaven being torn open and the Spirit descending on him like a dove. And a voice came from heaven: ‘You are my Son, whom I love; with you I am well pleased.’”

Mark 1:9-11²

THE ABRAHAMIC GOD—WORSHIPED BY JEWS, CHRISTIANS, AND MUSLIMS—IS OFTEN CALLED THE “INVISIBLE” GOD. When compared to others worshiped during the inception of Judaic monotheism, the Abrahamic God is devoid of a visual presence or image. Abram is introduced to his God through sound—he is called, and then he responds. The importance of sound in the Abrahamic traditions’ worship of their God is paramount. Yet, in the study of Jewish, Christian, and Islamic architecture sound is frequently overshadowed by sight. Scholars often discuss and document the presence of light and darkness; colorful icons and prayer carpets⁴ offer an endless architectural hermeneutic. However, in addition to the visual interpretation of synagogues, churches, and mosques there is much to be gained in the study of their sound.

Is architecture an instrument that facilitates a sacred dialogue between the Abrahamic God and his people? In this article we discuss

an unfolding Abrahamic Soundscape project we undertook inspired by this question. The project seeks to record and re-present, through the compilation of soundscapes, the acoustical characteristics of Jewish, Christian, and Islamic architecture. Composed of music, prayer, silence, and the aural aura of space, the soundscape intercepts moments of sacred dialogue and the auditory experience of architecture.

The purpose of the project is to draw attention to the importance of the auditory experience within the Abrahamic religions’ buildings. Our research attempts to describe their architecture using sound. We select a number of urban synagogues, churches, and mosques housing Jews, Christians, and Muslims and record the call to prayer, rituals, songs, prayer, and architecture that connect the Children of Abraham to their God.

The first iteration of this project focused on Abrahamic houses in Sudbury, Ontario, Canada. We recorded two worship services at the Shaar Hashomayim synagogue, Fielding Memorial Chapel of St. Mark, and the Islamic Association of Sudbury mosque between 2014 to 2015. The services were documented with a Roland SD-2u recorder, a device

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Islamic Association of Sudbury Mosque, Sudbury, Ontario.

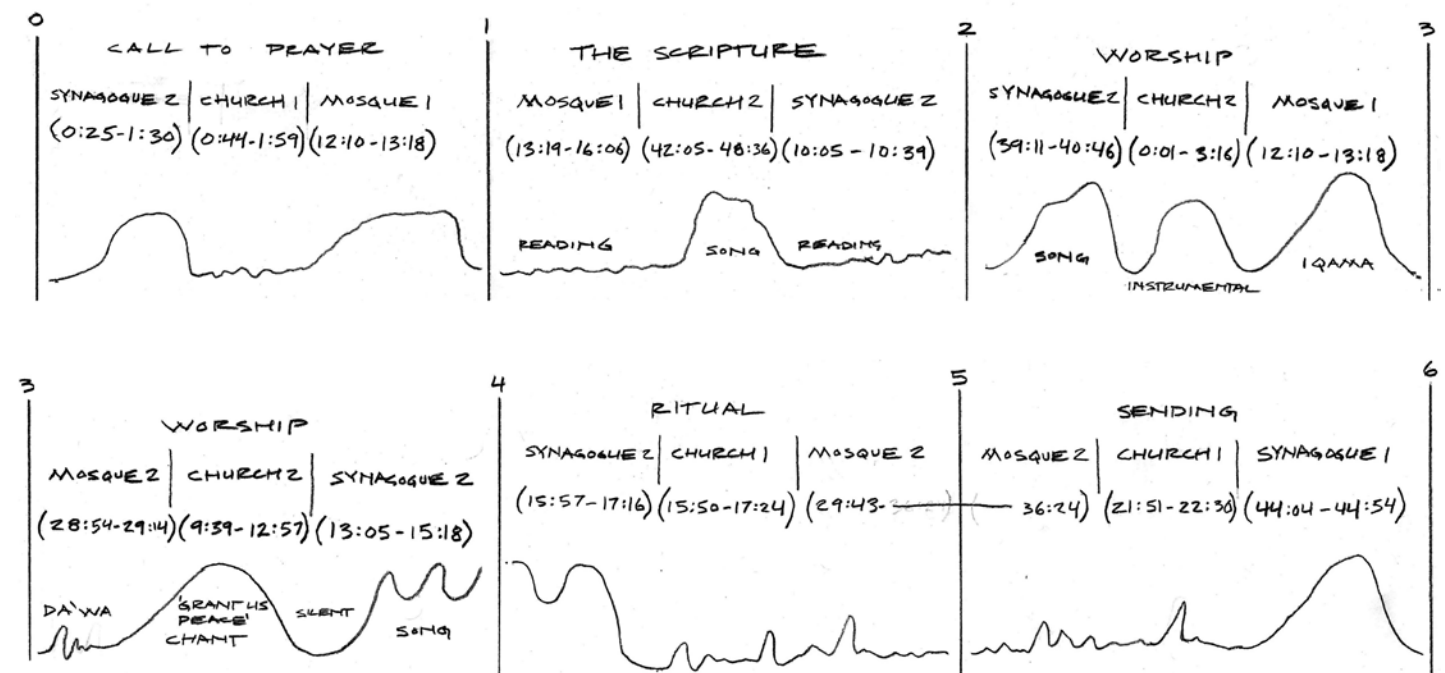
with dual microphones that sensitively capture the atmospheric sound in a space. The recorder was located centrally within each of the worship spaces. The raw recordings were collected, structured, and edited into a soundscape using Audacity software.

A study of the raw recordings revealed patterns and common rituals that informed the structure of the soundscape compilation. Our analysis suggested that the soundscape opened with a systematic layering of the call to prayer from each of the three spaces, followed by scripture readings, melodic and musical worship, ritual worship, and concluding with an invitation to speak God's word in the world. The graphic analysis shown at the bottom of this page illustrates the editing structure of the 35-minute soundscape. (*Editor's note: You can hear the soundscape on our website at: faithandform.com/feature/the-voice-of-abrahams-house).*

ARCHITECTURE AS A PLACE OF SACRED DIALOGUE

The Jewish, Christian, and Islamic scriptures point to the importance of auditory dialogue in the revelation of the Abrahamic God, and form a foundation for the study of their ritual sound. In the Book of Genesis, God speaks to Abram and tells him that he will be the father of a "great nation." At this moment, Abram joins a select few⁵ that have heard the voice of God. In time, Abram becomes Abraham and he begins a conversation with God that extends to his "great nation" of Jews, Christians, and Muslims. Abraham established a precedent for how believers are to communicate with the invisible God. And all those who followed Abraham from Moses, Jesus, and Muhammad to the faithful among us, call to the Lord and listen for His response.

In the Book of Exodus, Moses is instructed to communicate with God by entering the Tent of Meeting—a structure designed for this specific use.⁶ While secluded in contemplation, in a cave in Mount Hira near Mecca, the first word of the Islamic revelation heard by Mohammed⁷ was "recite," followed by the remaining verses of Surah 96 (al-'Alaq). Mohammad is invited to "recite" the revelation of God; he obeyed and later built a mosque in Medina.⁸ In the Abrahamic scriptures, architecture is often described as an instrument to converse with God.




Editing structure of Abrahamic Soundscape.

The tradition of architecture as a place of conversation between God and His people illustrated in the scriptures continues in contemporary Judaic, Christian, and Islamic worship as revealed in the soundscape. We hear the invitation to worship at the beginning of the soundscape, Jews enter the synagogue reciting sabbath of peace, “*Shabbat Shalom*,” similarly the threshold is traversed in a Christian prayer of call and response, and Muslims are called to submit to the greatness of God, “*Allaho Akbar*.” The Children of Abraham are drawn into the architectural atmosphere of worship. The second part of the soundscape includes readings from the scriptures that articulate the tenets of individual Abrahamic faiths. Following the recitation of God’s word, worshippers voice their melodic offerings expressing exaltation. A single delicate voice calls out from the synagogue, a piano and cello rejoice in the Christian Messiah, the prolonged incantation of the name of God echoes in the mosque. In the fourth part of the soundscape requests

to God are made, in the form of direct supplications Muslims ask for forgiveness and mercy and Christians chant “*Dona nobis pacem*” (grant us peace) in the church, in the synagogue ritual prayer is recited in unison, followed by the Christian Eucharist and the formal prayer in the mosque. In the last part of the soundscape Jews, Christians, and Muslims transition out of their conversation with God. “*Assalamu ‘alikum wa Rahmatu Allah*” (peace be upon you and may God’s mercy be with you) is voiced by Muslims, the Reverend invites Christians to “go in peace to love and serve the Lord,” the threshold of Jewish worship is crossed with “*Shabbat Shalom*.” The cyclical nature of the services is reflected in the editing of the soundscape.

In the soundscape we hear the synagogue, church, and mosque framing the sacred dialogue in the Abrahamic traditions. Several architectural scholars have written about the phenomena and clear relationship of sound and space including Juhani Pallasmaa,⁹ Steen Rasmussen,¹⁰ W.J. Ong,¹¹ and others who

describe architecture acting as an instrument as much as the source of sound. In their arguments, Christian churches are often cited as examples of buildings that offer an exceptional auditory experience.¹² According to religious scholar F.E. Peters, within the spaces of Abrahamic worship “...the Revelation comes full circle and is once again given voice by the very creatures to whom they were first addressed.”¹³ Architecture is instrumental in shaping the sound of worship and is an active participant in offerings to God.

The Abrahamic Soundscape project extends from an argument that auditory dialogue in the Abrahamic religions is scriptural and of primary importance. Further, architecture is often a mediating instrument of sacred communication between the Abrahamic God and His worshippers. Our research suggests that a true understanding of Jewish, Christian, and Islamic architecture is incomplete without an interpretation of its unique ritual sound. 

NOTES

1. *The Tanakh*, (Philadelphia: The Jewish Publication Society, 1999), p. 21.
2. *The Holy Bible (NIV)*, (Grand Rapids: Zondervan Bible Publishers, 2002), p. 833.
3. *The Sublime Quran*, English Translation, Laleh Bakhtiar, translator, (Chicago: Library Islam, 2006), p. 545-546.
4. See discussion on light in Gothic cathedrals in: Otto Von Simson, *The Gothic Cathedral* (New York: Bollingen Foundation, 1956), pp.3-20, and the discussion of the manifestation of divine cosmology in Islamic architecture in: S.H. Nasr, *Islamic Art and Spirituality*, (Albany: State University of New York Press, 1987), pp.37-39.
5. In the *Book of Genesis*, God also spoke to Adam, Eve, Cain, and Noah.
6. *The Holy Bible (NIV)*, Exodus 33:7-11, p.75.
7. The moment of revelation is described using Mohammed’s description in authentic *ahadith* documented in *Sahih Bukhari* Arabic-English Translated, Book of Revelations, 1:3, Mohamed Muhsin Khan, translator, (Riyadh: Dar-us-Salam, 1996), p. 50.
8. Al-Masjid al-Nabawi, commonly referred to as the Prophet’s Mosque in Madina.
9. Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses*, (Cornwall: John Wiley & Sons, 2012), pp. 53-56.
10. Steen Eiler Rasmussen, *Experiencing Architecture*, (Cambridge: MIT Press, 1959), pp. 224-237.
11. W.J. Ong, *Orality and Literacy: The Technologizing of the Word*, (London: Routledge, 1982), pp. 70-73.
12. Rasmussen, p. 231.
13. F.E. Peters, *The Voice, The Word, the Books: The Sacred Scripture of the Jews, Christians, and Muslims*, (New Jersey: Princeton University Press, 2007), p. 247.



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Enhancing Contemporary Acapella and Sacred Harp Worship

By Trent Smith



Acapella singers arrange themselves in a circle to sit and sing outward, one of four positions studied to understand the dynamics of Sacred Harp Worship.

This article explores a series of spiritual ritualistic experiments to “sacred harp” forms of worship within the Church of Christ in the Intermountain West region. It is primarily focused on youth and college groups and the heightened awareness of acoustics in worship and the resulting phenomenological experiences had in a variety of settings. These experiments took place with groups of 5, 15, 35, 70, and 120 worshippers of different ages, though primarily with adolescents between 13 and 20. The experiments were born out of a great desire to enhance worship, teach historical singing through re-enactment, and to create a series of sacred aural moments that raised awareness and respect for what many youth considered trivial worship to their God.

CONTEXT OF THE CHURCHES OF CHRIST

Awareness of the current state of worship in the Churches of Christ is critical in understanding why these experiments were so important to both study and to reflect on how the spirit of worship, particularly among adolescents, is being lost in the current state of technological bombardment and distraction in adolescent spiritual experience. Many teens struggle to embrace the rigorous and at times restrictive nature of worship with “sacred

harp” songs, being acapella in format and often with songs that were composed in the 1800s that do not speak to the current state of adolescent relationships with God. A team of researchers at the Barna Group¹ spent much of the time between 2005 and 2010 exploring the lives of young people who drop out of church involvement (about 70 percent). According to the report: “David Kinnaman, who directed the research, concluded: ‘The reality of the dropout problem is not about a huge exodus of young people from the Christian faith. In fact, it is about the various ways that young people become disconnected in their spiritual journey. The conclusion from the research is that most young people with a Christian background are dropping out of conventional church involvement, not losing their faith.’”²

Many of the youths that I was working with at the time (as a youth and college minister) were torn additionally by their specific denomination, Church of Christ, which has embraced many of the traditions of “sacred harp” singing and morphed them into their own, unwaveringly acapella worship in particular.³

The Churches of Christ are characteristically known for having small attendance, and although they are autonomous in church hierarchy, this small size is remarkably consistent throughout the country. Nearly half have fewer than 50 members; more than 70 percent have fewer than 100.⁴ This unique size often leaves members feeling like they are only part of a few people who understand their spiritual focus,

*“Things are such, that someone
lifting a cup, or watching the
rain, petting a dog or singing, just
singing – could be doing as much
for this universe as anyone.”*

Rumi

compounded by the fact that the Church of Christ distribution is not even throughout the states, but primarily focused in the Southeast.

As such, the adolescents in these churches look forward to “church camps,” weeks during the summer months where a handful of youth from each church come together for worship, study, and games but also to stay connected with a very isolated group of believers who can share and be open about testimony and struggles they face in their own areas. These camps are attended by the neighboring states, but rarely reach attendance over 150 campers.

SCOPE

I began serving in multiple facets for a 100-congregant Church of Christ in Murray, Utah, during my architectural education at the University of Utah and was fortunate to observe the differences in their own worship and traditions with my own religious upbringing in Tennessee at a much more conservative church. I wholeheartedly embraced many of their struggles, and set myself towards ministry with their college and youth. Finding ways to connect them to nature, as we had a park nearby as well as ample access to the mountains, became my contextual focus. Through hikes and impromptu trips, I began experimenting with acoustical settings and arrangement of the group in order to both observe and appreciate nature as well as be conducive to a loss of self in relation to the their God.

The congregants of this particular church sat in a three-quarter curve, whereas almost all my own church-space experiences were linear: everyone facing the pulpit, worshiping toward the front, the sound of the person behind you either helping or hindering. My exposure to this new style of seating intrigued me. In this arrangement you could almost literally sing towards another person across the room. I began experimenting with my own classes in the full-round, observing both the heightened acoustics but also the heightened

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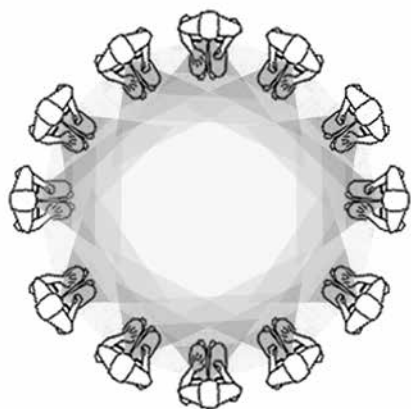


Figure 1. Acapella singers are seated facing inward, singing towards each other.

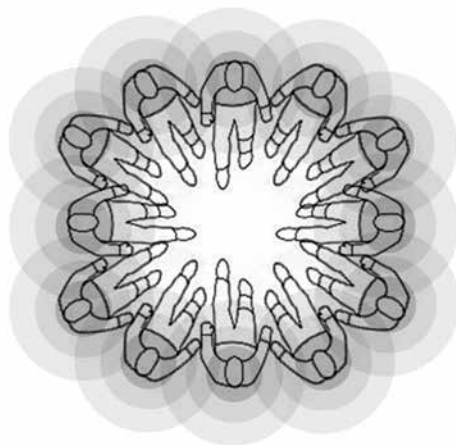


Figure 2. Singers lie down facing inward, with their heads along the outer edge.

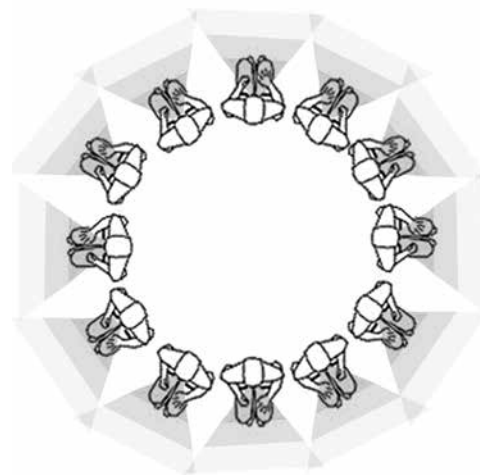


Figure 3. Singers are seated facing outward, 'singing to the world.'

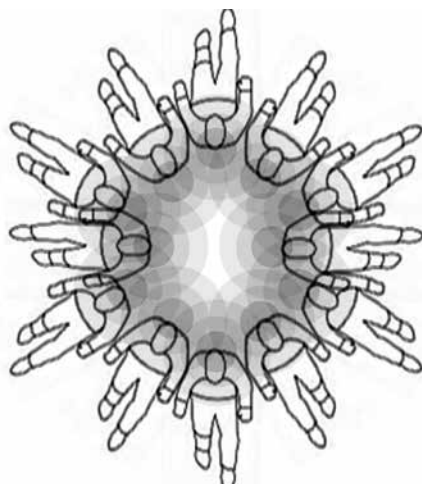


Figure 4. Singers lie facing outward, with their heads at the center of the circle.

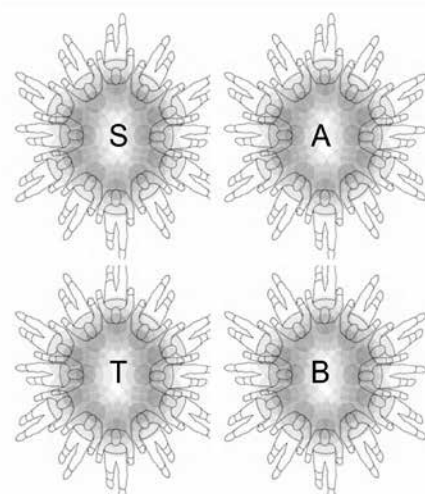
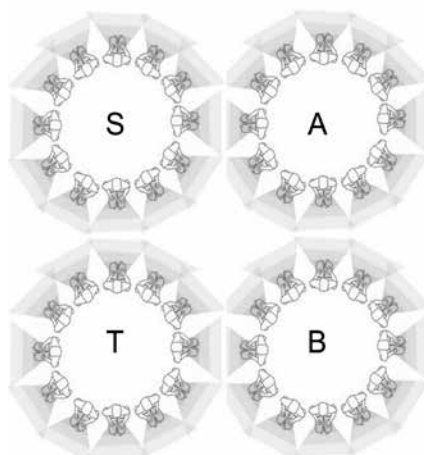
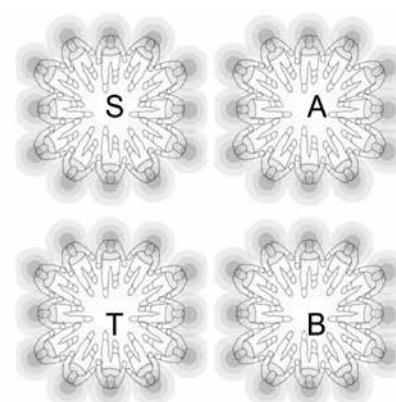
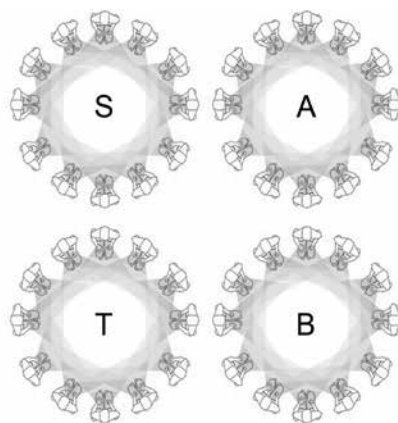


Figure 5. Adjacent arrangements of singers going through the four-song arrangement positioned sopranos (S), altos (A), tenors (T), basses (B).

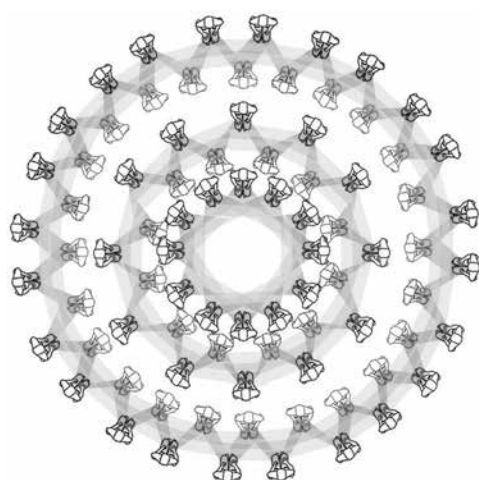


Figure 6. Nested formation of Figure 1, with singers seated and facing inward/outward.

awareness that you were being watched from both in the front and in larger, multi-row groups, from the behind, an entirely new sensation from linearly arranged congregational seating.⁵ The center of the circle became sacred space, the space of authority, which is nothing new in history or even in small groups. However, for this particular religious group so rarely meeting formally in the round, the void in the center became not only holy, but a place for questions to dwell in the silence, a place to project questions without the need to direct them to someone for an answer.

CASE STUDY IN THE OPEN AIR

On the way to speak to a group of young adults from neighboring states at a retreat in Idaho, I began experimenting with ways to both break the tension felt in-the-round as well as relate it to the axis-mundi passing through not only each of the members, but through the space we created when in-the-round--the God of the void, if you will.

With college-aged youths I was able to explain what I wanted to try without the adolescent angst or questioning; the members of this group in particular (about 15 young adults) were incredibly nimble and humble in receiving instruction and exploration related to their own faith experience. In addition to simply experimenting with arrangements, I realized that acoustical variations manifest through how they sat in the round was an incredible opportunity. This allowed an opportunity to completely envelope my fellow worshippers with sound, something that was so common in the South with thousands of worshippers singing indoors or outside, where by sheer number you could become both immersed and entrenched in sound that literally could move you with acoustical vibrations.⁶

In order to give anything close to that experience, something we missed so much out West, I had to deepen the silence in which a single sound could be heard, making the silence stronger, more powerful, so that the sound of singing could completely envelop you. So instead of trying to test these arrangements indoors, where any number of distractions could ruin the silence, I took the group outside into the center of our camp. Moving 20 or so college students onto a concrete-pad basketball court, I arranged the group in a seated circle facing each other. Four songs had previously been chosen to reduce organizational interruptions, to be led with complete silence between each song. The group was seated facing each other (Figure 1), would sing one song, pause, and then simply

lie down from their seated positions, forming a flat circle with heads on the outer edge at the next song (Figure 2).

The group was instructed not to talk, and everything was to be done in complete silence, heightened by the enormous dark sky full of stars in eastern Idaho mountain wilderness. About a minute of silence would pass once everyone was settled into the new position, and the song leader would begin whenever he was ready and in a good state of mind to begin a joined state of worship.

The seated circular arrangement was very common to the group, as discussed earlier, however when lying down (Figure 2) the immediate projected sound was now directed upward instead of toward another person, and you could faintly hear the person next to you who was farther away now by lying down, raising awareness, not only to song timing and on their part,⁷ but a deeper reflection to whom they were singing. After this song, and again in complete silence, the group was to sit back up and rotate 180 degrees to form a seated circle facing outwards (Figure 3), again making it difficult to hear the person next to you, and a deep feeling of loneliness overcome you as you sung not to your peers nor to God above, but to the world of blackness which seemed to envelope the worshipper, bringing on the all-to-familiar feelings of isolation and fear of the dark unknown, characterized by the woods and the now unfamiliar campgrounds bathed in shadows.

A moment of silence passing this song, everyone simply lied down again, this time forming a tight-knit circle with the heads in the center, so that you could barely hear yourself due to the sound of the people next to you (Figure 4). The members of the group were all looking upwards at the sky, together, forming a unified and deafening sound, a feeling of closeness that was so unfamiliar to the Western worshippers, and a sense of the Almighty's presence by the uninterrupted millions of stars that you suddenly were aware of but did not have to face alone as in the previous lying arrangement (Figure 2). As an aside, when the group was in this final position singing, the concrete started vibrating with the acoustical reverberations of our vocal worship. Insomuch as your head began tingling with the vibrations, it was quite literally a moving experience for us all. The group was completely engulfed in sound, and then immediately following the last note, engulfed in silence under an enormous canopy of stars. It was an incredibly moving worshipful experience, felt both by myself and, through testimony of other group members, by most of the group. Worship now had more than just

ritual, it had variation in audience, and by such variation a change in purpose for the worship.

VARIATIONS ON A THEME

With a great response to the first experiment, I continued with exploration through diagramming on how the spatial organization of both the location of singers as well as the actual position of worship might enhance the worship experience. About a month later, I was given an opportunity to work with about 60 teenagers in Colorado to experiment and teach. I introduced them to the four-position worship, and after an incredible night of worship using it, I decided to start variations on this experiment. The next morning, I divided the 60 teenagers into the formal four-part arrangement groups: soprano, alto, tenor, and bass (SATB). We then went through the same experiment, though this time with the circles adjacent to one another (Figure 5). This was akin to the "hollow square" arrangement found in "sacred harp" singing, as a means to reinforce the sound quality of each part, as well as to teach people who did not know their part, as is prevalent in teens.

Another experiment was to nest the different groups. One particular evening we had many guests as well as counselors and were under an enormous outdoor pavilion. I began the experiment after it became dark, so without the sky above it was pitch black in the outdoor room. I again grouped the worshippers, but this time also divided them into sub-groups based on camper/counselor, which simply corresponded to teen/adult. With these divisions we then nested the circular groups one within the other, so at some point in time you were seated both incredibly close to someone facing you as well as someone back-to-back to you (Figure 6). This made for complex overlaps when lying down, however the acoustic quality with such density of worshippers, heightened by rain hitting a tin roof, thunder, and flashes of lightning gave way to an incredible experience. We used more than four songs, and after a moment of silence between the songs I also gave instruction on changing the arrangement, so each group had a chance to be in the inner-circle, of particular importance acoustically and spiritually.⁸

CONCLUSIONS


While so much of our world tends towards complexities, it is the thematic setting of Rumi's words at the beginning of this article that remind us that some of the simplest acts can have profound meaning, as can the most simple of experiences. These experiences were just that: an aural means to bring heightened

awareness to something that many worshipers take for granted, and simply to discuss with these young adults the importance of thinking and experiencing who you are worshipping, how you are worshipping, and ultimately why you are worshipping.

There are many physical correlations with the position of the worshipper formally and with the formation and initial experiences/actions of teen faith. Initially, they come either with friends or family and are wholly concerned with outward-facing relationships with others (Figure 1, seated facing inward circle). When faced with difficulties or struggles, they

then turn to God, entirely on their own with the Creator (Figure 2, lying facing up, head outward). When doing so, they often become self-absorbed, neglecting their fellowship with others (Figure 3, seated facing outward). With maturity and some kind of intervention, they join in fellowship with their peer group, struggling, wrestling with their faith together, but still focused on their own relationship with their God (Figure 4, lying facing up, head inward).

Discussions with teens and working with them for four years as a minister, these exercises helped garner a greater sense of purpose

and awareness to how they interact within their own youth group but within a larger congregational whole, and a network of communities separated by distance. I feel that using a natural setting is imperative to the success of the experience, and there is a vastness wholly belonging to the West. With the rise of technological interruptions and the continued disconnect of people with their spiritual awareness, these experiments only serve as a small step in creating moments where time and space can stand still in order to force us to reflect, ponder, and commune with the sacred. 

NOTES

1. The Barna Group is an independent religious research group, founded in 1984, based out of California and provides research services at the intersection of faith and culture. <https://www.barna.org>
2. Note see Kinnaman. *You Lost Me: Why Young Christians are Leaving the Church...and Rethinking Faith*. Baker Books, October 1, 2011.
3. Many CoC church leaders quote many Biblical passages when instrumental discussions happen, but most cling to Ephesians 5:19, quoting New American Standard Bible (NASB) version: "speaking to one another in psalms and hymns and spiritual songs, singing and making melody with your heart to the Lord;"
4. See the *Churches of Christ in the United States* report by Carl H. Royster which is renewed annually, using attendance records and now enhanced with online directories and software for demographic data. 21st Century Christian Publishers, 2015.
5. The main difference here was that now you didn't feel as if someone was always watching you from behind, but almost awkwardly and constantly making eye contact with someone mouth ajar, singing.
6. Many references to "sacred harp" singing, from which Church of Christ singing is adapted, references the wall of sound, felt particularly in the center of the hollow square arrangement significant to that style. It is loud, straight-toned, and is sung with an incredible fervor and volume characteristic of rural worship.
7. Without digressing too much into the technical, most singers, especially in religious chorus or choirs, are assigned a range (soprano, alto, tenor, bass) which corresponds to a line of music in four-part harmony singing, usually emphasizing harmonies, however in "sacred harp" singing often encouraging dissonant harmonies which create a very particular, almost forlorn and tension-laden sound to the worship atmosphere, heightened by a context of small group in wilderness, forcing sound into the silent night.
8. Many references in the Bible speak to the organization of the Temple, with the Holy of Holies being the place where the high priest would speak to God, also referred to as the innermost room. See Exodus 26, Ezekiel 25, 1st Chronicles 23, 2nd Chronicles 5:7, 1st Kings 8, and Hebrews 9.



Photo courtesy of the authors

View into dome of the Church of the Savior (Soteraki), Thessaloniki, with images of angels surrounding Christ.

THOSE WHO ATTEND MUSICAL PERFORMANCES AT THE WORLD’S greatest concert halls are quick to laud the otherworldly sound of orchestras and virtuoso artists. Assisted by the acoustic properties of the concert hall, a performer can transport the listener from the mundane to the sublime. Like modern-day architects involved in sound design, the builders of medieval churches also created spaces in which chanted and spoken words lifted supplicants into the realm of the sacred. They created spaces in which sound was both intelligible and immersive.

In the context of modern performance spaces, sound is almost always coupled with visual spectacle, one sense informing and heightening another. In Byzantium—the millennium-long empire centered in Constantinople—the walls of Orthodox churches were covered with full-length images of holy men and women, as well as by angelic beings, the Virgin Mary, and Jesus Christ. These figures frequently hold text scrolls, which empower the literate viewer to hear the spoken word through vocalization of the written text. Beyond these figures, however, the physical body of the church—its shape and its fabric—also empowered the word, both communicated and received. Within the sacred space of the Byzantine church, the dome assumes a critical role, both metaphorically and acoustically. It was likened to the firmament, the heavens above, and was frequently decorated with angels whose wings appear to flutter in movement. Captured in this space, celestial beings manifest for the faithful the joining of heaven and earth through liturgical celebration. The perception that the heavenly and human comingled within the confines of the church is not a modern construct. As early as the fourth century, the patriarch of Constantinople, John Chrysostom (the “Golden Mouth”), commented on the place of man encircled by angels in sacred space: “Think beside whom you stand,

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Revealing The Acoustic Mysteries Of Byzantine Churches

By Sharon E. J. Gerstel and Chris Kyriakakis

with whom you are about to call on God—with the Cherubim.”

Even when the doors of churches were closed, the Byzantines believed that the saints—captured in their painted icons—continued to interact with one another on behalf of the faithful in a powerful and perpetual process of intercession. Were these interactions imagined, or can we perceive the echoes of sacred words exchanged within the walls of the church? Scientists have theorized that the reverberations of sound are omnipresent and eternal. The faint traces of sound thus may be present in churches, even when buildings stand empty. When sound is coupled with icons, the perceived marriage of sound and image evokes emotional and spiritual reactions in the faithful. Can these traces of sound be documented scientifically, or are they the product of our own expectations of sacred space? Can the transformative effects of sound in Orthodox churches be compared to those in modern concert halls? How do the sound effects of medieval churches differ from those of modern Orthodox churches, which frequently make use of microphones and even organs? Two years ago, as part of an international group of scholars, we began to map sounds in the Orthodox churches of medieval Thessaloniki, the second most important city of the Byzantine empire, a city with a rich tradition of ecclesiastical architecture and hymn composition. The ongoing collaboration of art historians, architects, musicologists, chanters, and acoustical engineers generated innovative questions and continues to yield some surprising answers.¹

CHAMBERS FOR SACRED SOUND

Unlike other forms of worship that include musical instruments, the medieval Orthodox liturgy was spoken and intoned by priests, chanters, and choirs. The need for audibility imposed requirements on speech intelligibility that, in turn, guided the acoustical design of the spaces. Like the most finely tuned concert halls, Byzantine churches were constructed as sound spaces. To identify how these buildings were built for sound, we studied eight Byzantine churches in Thessaloniki, Greece, ranging in shape from longitudinal basilicas to small, domed chapels. Impulse response measurements were taken at various locations within each church and were analyzed to extract the relevant acoustical parameters. We also invited chanters to participate in re-creating the soundscapes of Byzantine churches, from the virtuoso performance of a single chanter, to the resounding voices of a male choir. While the properties of the sounds can be scientifically documented, immersion into the soundscape of a lost empire had an enormous impact on every member of the team; some even claimed to hear the voices of angels.

When a sound stops being emitted, the space around the source takes over. This is most readily observed when we clap our hands and listen, but it can also be observed in the short silences between spoken or chanted words. The sound bounces from surfaces until it eventually decays below our audibility limit. The time it takes for a sound, once stopped, to decay to an inaudible level is an important characteristic of large spaces and is called reverberation time. Measurements taken in eight Byzantine churches in Thessaloniki demonstrate that the reverberation time is generally longer in spaces with larger volumes (see Table 1, page 16). Beyond just the acoustical definition of reverberation time, however, there is also psychoacoustic perception. The sensation of spaciousness and envelopment by reverberant sound is very powerful



View of central nave of Acheiropoietos Basilica, Thessaloniki.

because it arrives at our ears from many different directions. In fact, the more complex the reflection pattern, the more dissimilar is the sound arriving at each of our ears. The increased feeling of spaciousness and envelopment combined with the reverberant sounds that appear in

the silences between the words could have been responsible for the perception of the co-mingling with the heavenly described by John Chrysostom and other Byzantine theologians. These elements are completely lost when listening to a modern-day recording of sacred music produced by two loudspeakers that are unable to reproduce properly the spatial reverberation cues required for envelopment. A recreation of the experience requires a playback system with multiple loudspeakers surrounding the listeners, replicating the arrival of sounds as dictated by the shape of the medieval building with its domes, vaults, and other acoustic devices. The sensation of envelopment in the church is also completely distorted when the liturgy is performed using microphones and poorly placed loudspeakers. Spaciousness is frequently sacrificed to achieve higher intelligibility. Sound—even the sound of angels—yields to visual spectacle.

The perception of reverberation is also influenced by the sound energy density in the lower and higher frequency ranges. Acousticians refer to the perceived fullness of low frequency sounds as “warmth,” and this is characterized by the Bass Ratio (ratio of reverberation times at mid frequencies to reverberation times at low frequencies). Similarly, the subjective perception of sound rich in high frequency harmonics is called “brilliance” and is characterized by the Timbre Ratio (ratio of reverberation times at higher frequencies to lower frequencies). Warmth is often described by listeners as “smooth sound,” but too much warmth makes the space sound “dark.” Brilliance is described as “bright” or “clear” sound, but too much brilliance makes the sound “harsh” or “shrill.”

ACOUSTIC QUALITY OVER CENTURIES

How do Byzantine churches compare to modern-day concert halls in terms of sound? Leo Beranek studied the acoustical characteristics of concert halls around the world and correlated them to subjective preferences.² In Beranek’s study, the halls that were subjectively rated at the top exhibited a Bass Ratio in the range of 0.93 – 1.18 and a Timbre Ratio range of 0.77 – 1.04. In our measurements we found the Bass Ratio and Timbre Ratio values of the eight churches as shown in Table 2.

Beranek further recommended that a Bass Ratio between 0.9 – 1.0 is the ideal range for speech. It is astounding that the churches of Thessaloniki, built from the 5th through the 14th century, exhibit such a close match to the optimal acoustical parameter ranges that were not formalized in the acoustics literature until the 20th century.

Church	RT60 (sec)	Volume (m ³)
Hagia Sophia	2.86	15,250
Acheiropoietos	2.72	19,230
Prophitis Elias	2.47	2250
Savior	2.00	250
Holy Apostles	1.65	1575
Panagia ton Chalkeon	1.51	1290
St. Catherine	1.32	1230
St. Nicholas Orphanos	0.75	520

Table 1. Reverberation time (RT60) and its relation to volume

Church	RT60 (sec)	Bass Ratio	Timbre Ratio
Hagia Sophia	2.86	0.98	1.01
Acheiropoietos	2.72	0.88	1.09
Prophitis Elias	2.47	0.89	1.37
Savior	2.00	0.96	0.71
Holy Apostles	1.65	1.05	0.92
Panagia ton Chalkeon	1.51	0.98	1.01
St. Catherine	1.32	1.00	1.03
St. Nicholas Orphanos	0.75	1.03	0.94

Table 2. Warmth (Bass Ratio) and Brilliance (Timbre Ratio) in the eight churches


Byzantine churches were not only spaces for chant; they were also sites of homilies —many preserved for us until this day. Preaching to a full church in highly rhetorical language earned certain churchmen fame and followers. Certainly many of Byzantium’s great church orators must have preferred to deliver homilies in spaces that facilitated the spoken word, which had to be both audible and intelligible. Speech intelligibility is described by the Definition Measure C50, which corresponds to the ratio of sound energy arriving in the first 50 milliseconds (ms) after the direct sound to the remaining sound energy arriving after 50 ms. C50 is calculated in the range of 500 to 4000 Hertz (Hz) and it is considered to be “good” when it is above 0 decibels (dB). Concert halls typically have C50 values in the -1 dB to -4 dB range because they are designed for music and not speech. The eight churches that we measured showed very high values for C50. Table 3 summarizes the results and also reveals some unexpected findings. In general, shorter reverberation times are associated with an increase in intelligibility. This is supported by the measurements in St. Nicholas Orphanos, a 14th-century church that had the lowest reverberation time and the highest speech intelligibility. Surprisingly, however, the Acheiropoietos, a late-5th-century basilica with a long nave and side aisles, exhibited very high intelligibility despite having the second highest reverberation time. These findings, which were verified by chant recordings and several hours of listening, supports the historical record that the church was used for homilies. Certainly these powerful speeches were enhanced by the orators’ use of a high ambo located at the east end of the nave. Like many church furnishings that augment sound effects within the building, the Acheiropoietos ambo was long ago removed from the building, along with marble slabs that blocked the lower openings of the colonnades, rendering the nave a sound corridor.

REVERENCE FOR AURAL SACREDNESS

What is astonishing is the critical role that sound played in the construction of Byzantine churches. Sound—human, angelic, primordial, heavenly—is fundamental to the formation and perception of the sacred. Nearly every religion acknowledges the importance of sound, which is manifested in the voice of God, the call to prayer, collective chant, and in other profound ways. Sound unifies communities in sacred worship. It affirms sacred hierarchies. It is captured in images and contained in built environments. What is becoming increasingly clear to scholars is that medieval builders were as aware of the importance of



Speakers and recording equipment in St. Nikolaos Orphanos, Thessaloniki, during testing.

sound environments as we are today. Even without the benefit of scientific testing and modern instrumentation, these innovators were able to create spaces that were transformative. 

Church	C50 (dB)	RT60 (sec)
St. Nicholas Orphanos	13.20	0.75
Acheiropoietos	11.70	2.72
Holy Apostles	9.90	1.65
Hagia Sophia	9.30	2.86
Prophitis Elias	7.90	2.47
Panagia ton Chalkeon	7.80	1.51
St. Catherine	6.00	1.32
Savior	5.20	2.00

Table 3. Definition (intelligibility) remains high despite long reverberation times

NOTES

1. In addition to the authors, scholars involved in the project include Spyridon Antonopoulos, James Donahue, Amy Papalexandrou and Konstantinos Raptis. The principal chanters, led by Spyridon Antonopoulos, are: Nektarios Antoniou, Fr. Spyridon Antoniou, and Dimos Papatzalakis.
2. L. L. Beranek, *Concert Halls and Opera Houses: Music, Acoustics, and Architecture*, 2nd ed., (New York: Springer), 2004.



'The Quietest Place on Earth,' according to Guinness World Records, is the Anechoic Chamber at Orfield Laboratories, here set up with a head and torso simulator.

Of Sounds And Silence

By Steven J. Orfield

What is the experience of attending church in the modern era? How has it changed from our childhoods and those of our family a number of generations removed? What is it that earlier people experienced, what do we experience, and what is the experience of children? And what part does the aural (acoustic) and perceptual environment play for these different generations?

It's safe to say that in the early to mid-1900s, entering a church was that act of leaving the

world and entering into a quiet, sacred space that was designed to provide a contrast to the rest of our lives. Joseph Campbell had much to say about this experience of "transcendence" to an alternative world, whose very contrast helped create the religious experience. Perhaps one of his most famous quotes is: "Your sacred space is where you can find yourself again and again."

From entering and smelling the brick or stone, to perceiving the drop in temperature, to adapting to the dimmer level of illumination and to listening to the reflections of our footsteps reverberating in the silence, we were moving from a circumstance of perceptual noise to one of perceptual silence. If we visited the church when a service was not in progress, this silence was all the more enveloping. Religion to many of us—particularly Christians—was this sensory experience of leaving one world to enter another, and it was strongly shaped by the visual, aural, thermal,

olfactory, and tactile sensations that we experienced when we visited.

Experiencing traditional church environments moved us out of sensory abundance (or overload) into sensory deprivation, from sensory confusion to sensory clarity, with few sensory signals and a clear identity signature as part of the experience. Acoustically, such spaces were quieter, more reverberant, and so full of simple sensory cues that it was easy to imprint on an aural or other sensory memory that can resurrect the feeling of this space when recalling it.

CURRENT TRENDS INFLUENCING CHURCH DESIGN

While the spirituality of the last century was a common expectation, we are now facing a multitude of forces that have for some time been pushing the design of churches in other directions. The typical Christian church is now more of a social environment, a far

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In Many Ways, Younger Americans Are Less Religious Than Older Americans

Percent of US Adults who say...

	Silent Generation (born 1928-1945)	Baby Boomers (born 1946-1964)	Generation X (born 1965-1980)	Older Millennials (born 1981-1989)	Younger Millennials (born 1990-1996)
Religious Behaviors					
They pray daily	67	61	56	46	39
They attend services at least weekly	51	38	34	27	28
Religious Beliefs					
They believe in God	92	92	89	84	80
<i>With absolute certainty</i>	71	69	64	54	50
They believe in heaven	75	74	72	67	68
They believe scripture is the word of God	69	64	61	50	52
They believe in hell	57	59	59	55	56
Religion's importance					
Religion is very important in their lives	67	59	53	44	38

Table 1. Source: 2014 Religious Landscape Study, conducted June 4-Sept. 30, 2014

PEW RESEARCH CENTER

more intense musical environment, and (as is a shopping center) a marketing environment. It is aurally far less reverberant. And while it could be a quiet place to visit when services are not occurring, only small numbers of people visits empty modern churches for prayer and meditation.

So the experience of the modern church is one of activity, noise, bright lighting, entertainment, and mainly the scents of the modern construction materials that were used to build the building, make the furniture, or assemble the pews. In terms of an aesthetically pleasing aural environment, there really is none. There is just the sound of the audio system, the music, the choir, the congregation, and their process of worship. The acoustics have been supplanted by reinforced audio. In so many churches now, there really is no “acoustical presence” of the room itself. This is not an indictment of the newer approach to church design. It may be very satisfying to the congregation and worship staff. Yet the current state of worship in the US and other countries is worth attention and reflection.

CURRENT TRENDS IN CHURCH ATTENDANCE

While we are investing far more heavily in buildings and technology systems, as well as

sharpening our focus on entertainment and better storytelling, church attendance is falling among the young worshipers who are assumed to be the future of these institutions.

Is the American public becoming less religious? Yes, at least by some key measures of what it means to be a religious person. An extensive new survey by the Pew Research Center of more than 35,000 US adults finds that the percentages who say they believe in God, pray daily, and regularly go to church or other religious services all have declined modestly in recent years.

The falloff in traditional religious beliefs and practices coincides with changes in the religious composition of the US public. A growing share of Americans are religiously unaffiliated, including some who self-identify as atheists or agnostics as well as many who describe their religion as “nothing in particular.” Altogether, the religiously unaffiliated (also called the “Nones”) now account for 23 percent of the adult population, up from 16 percent in 2007.¹

If churches are to be a physical representation of the their attendees, there are some interesting questions to answer. And there may be lessons to be learned from their Christian past and from the present practices that circumscribe “spirituality” among many who do

not support traditional Christian or other faith traditions. This includes those who find new resonance with the practices of mysticism and meditation. And there are some interesting findings in the current research into perceptual noise and perceptual silence.

ENVIRONMENTS OF MYSTICISM AND MEDITATION

The traditional designs of Christian churches were based on the practice of prayer and meditation that were inherent in early Christian spiritual practice, and in the mysticism of being removed from the real world and vested in the mystical practice of communing with God in a very private way. The aural practices that supported these worship forms included silence, chanting, and repetitive prayers that were unconscious methods of transcending the world outside. Joseph Campbell called this practice of religious symbolism “myth.”

In an interview, Tom Collins asked Joseph Campbell: “What does myth do for us? Why is it so important?” Campbell responded: “It puts one in touch with a plane of reference that goes past one’s mind and into your very being, into your very gut. The ultimate mystery of being and nonbeing transcends all categories

of knowledge and thought. Yet that which transcends all talk is the very essence of your own being, so you're resting on it and you know it. The function of mythological symbols is to give you a sense of 'Aha! Yes. I know what it is, it's myself.' This is what it's all about, and then you feel a kind of "centering."² Thus, Campbell believed that myth could create a bridge beyond thought to the direct experience of transcendent aspects of oneself.

And whatever you do can be discussed in relationship to this ground of truth. Though to talk about it as truth is not the point, because when we think of truth we think of something that can be conceptualized. It goes past that. (This is a reference to Campbell's interest in non-dualism, the early Christian belief of the mystical saints that religious thought could, in the end, not be expressed, as it was "transcendent," and religion was a symbolic representation of that transcendent, non-ego-based experience of religion.)

Campbell was concerned with the translation of the symbol inherent in mythology with the literal attribution of this symbolism as historic reference. He wrote: "I'm calling a symbol a sign that points past itself to a ground of meaning and being that is one with the consciousness of the beholder. What you're learning in myth is about yourself as part of the being of the world. If it talks not about you, finally, but about something out there, then it's short. There's that wonderful phase I got from Karlfried Graf Durkheim, 'transparency to the transcendent.' If a deity blocks off transcendency, cuts you short of it by stopping at himself, he turns you into a worshipper and a devotee, and he hasn't opened the mystery of your own being."³

Campbell also noted: "There are plenty of mystics in the Christian tradition, only we don't hear much about them. But now and again you run into it. Meister Eckhart is such a person. Thomas Merton had it. Dante had it. Dionysus the Areopagite had it. John of the Cross breaks through every now and again and then comes slopping back again. He flashes back and forth."⁴

Thus Campbell was talking in the same terms as the early Christian non-dualists and other mystics who would argue that God cannot be found in a literal interpretation of the concrete symbolism of religion. He argued that you must look past the symbolism to what it reveals about you. Part of the embrace of silence and mysticism related to the design of the spaces at that time, as well as the structure of the services themselves. And the early Christian churches were built in such a way as to support the unfolding of transcendent experiences.

ENVIRONMENTS THAT FACILITATE RELIGIOUS EXPERIENCE

If we are to look to religious environments for what they evoke in us, do we need to go back to traditional environments? It could be quite useful to do so, as our visits to those old cathedrals and basilicas can quickly engender great shifts in our feelings and sensations. Yet we can also take another turn and simply look at how those spaces were designed, what evocative symbolism was contained within them, and how this can be transferred into more modern churches and religious buildings. Our work in Christian church design (acoustics, lighting, daylighting, thermal comfort, indoor air quality, and occupancy research) suggests that a church that has a lot of the feel of the older spaces, yet is a modern in architectural design, can be designed very economically. This is true because the acoustics of the traditional church were based on its vertical plan (long front to back), and this type can carry more reverberation time, due to its production of more useful reflections. It is also relatively easy to incorporate the elements of more traditional church buildings, such as barrel vaults, without building them as structural elements.

Since these buildings have narrower structural spans they are often considerably less expensive to build than the more modern shapes so often used now, including the diamond, pie, square, boat, and circular churches that are often based on less distance between the worshiper and the celebrant or the worshiper and other congregants. These churches can also be built with adjustable acoustics, so that services can be held with the longer or shorter reverberation times that may be preferred for different styles of services.

EXPLORING CONGREGATIONAL NOTIONS ABOUT DESIGN

Discussions about traditional shapes and symbols tend to be very controversial in modern congregations, as there is so often a set of rules about design as well as a liturgical consultant directing interior design. It is a fair question to wonder whether these types of solutions are "old fashioned" or actually do encourage more transcendence (or engagement) in modern services. We explored this question a decade ago via the use of our visual jury process in order to measure the feelings and associations of the congregation. Our visual jury process, called Perceptual Market Research (PMR), is based on showing sequential images of a product or building (church) while a group of subjects takes a written or computerized test. In the test they rank and select a set of bipolar attributes that represent two nominally opposite pairs of words. In our past articles for *Faith & Form*, the semantic choices for each church design are noted in Table 2, with a 1 – 7 semantic differential ranking:

	1	2	3	4	5	6	7	
Religious								Not Religious
Calming								Stressful
Symbolic								Not Symbolic
Traditional								Contemporary
Public								Private
Bright								Dark
Spiritual								Not Spiritual
Settling								Unsettling
Inspiring								Not Inspiring
Joyous								Meditative
Liturgical								Not Liturgical

Table 2

This PMR process was originally developed for assessment of sound quality of products, and has been used extensively on products by major manufacturers, such as Harley Davidson, Whirlpool, Black & Decker, Kohler, Cessna, and Herman Miller.⁵ PMR is based on the fact that qualitative research on groups of individuals participating together (focus groups, design charettes, etc.) has no predictive validity, as they gather opinions rather than feelings, and they are very group dependent and group biased.⁶ So if you want to measure a congregation's feelings about church design accurately, you must use methods that eliminate group dynamics and that measure feelings and associations, rather than opinions.

In the case of the congregation we measured, they thought they wanted a modern white box church with a vaulted ceiling, and they knew architects that designed those. Yet their rankings suggested, as Campbell may have guessed, that symbolic shapes and symbols were highly influential in moving them in another, yet modern, direction. Their opinions echoed design practice of the time, but their rankings were far more elemental and spiritual. This effort demonstrated that the



Photo: Courtesy of Orfield Laboratories

Acoustical treatment of a round worship space

congregation's feelings were far more textured and deeply complex than their associations.⁷

This process is fundamental to the measurement of people, and without that measurement we drop back into the design charette process that architecture depends on.

SILENCE AS A CALMING EXPERIENCE

While silence was clearly a predominant aspect of the early Christian experience of attending church, some may wonder about the utility and value of silence in this day and age, and whether perceptual and auditory silence ought to be a variables of significant consideration in current church design, and in the lives of the population in general. There is ample current research to support that the answer is yes.


We have long known that silence lets people relax and tends to bring their minds to more clarity. This has been established by meditation practice, by quiet prayer, and more recently has become the subject of scientific study. Orfield Labs has tracked this impact of silence closely, as we have a federally accredited acoustic lab with an anechoic chamber called "The Quietest Place on Earth" by Guinness World Records in 2005 and 2013, with levels of (-) 9.4 dBA and (-) 13 dBA as levels of background sound below the threshold of human hearing.⁸

In our own informal tests of the value of silence, we have seen subjects

spend a half hour to one hour in the chamber, and to report substantial "reset" to their level of relaxation. We also experienced one sailor, from an aircraft carrier in the Middle East, who came to visit with a persistence of sound (he could not stop hearing takeoffs and landings, while on leave), who spent one hour in the chamber, and his persistence of sound was gone (as reported on the NBC "Today" show). We've had visits from a number of people diagnosed with autism who have had similar experiences with reduction of anxiety, and we are now in discussions with a number of medical centers with regard to silence and Post-Traumatic Stress Disorder (PTSD).

We've had a 10-year specialty in developing architectural standards for perceptual environments (increasing environmental silence by selectively decreasing the complexity of some stimuli, visually and cognitively, and tailoring specifications to the needs and preferences of the target population) for those with perceptual or cognitive losses or disabilities, most recently aging and autism. We are currently engaged by Gallaudet University in Washington, D.C. to help with a design competition, which includes developing Building Performance Standards and Perceptual Space Standards for a Universal Design effort to deal with all the possible disabilities on campus, including deafness, blindness, aging, autism, PTSD, mental illness, SPD, ADHD and others.⁹ These populations describe at least 40 percent of the general population, and design should always taken them fully into account. Environments that tend to calm down people with disabilities are generally preferred by non-disabled persons as more peaceful environments as well.

CONCLUSIONS

The silence we feel when visiting a cathedral or quiet church is more than just an interesting phenomenon. It influences the brain, sleep, well-being, relationships, and our entire journey through life. In the wisdom of spiritual and religious traditions, our ancestors must have had some clear sense of the importance of silence in their traditions of worship and meditation. As we watch our younger generations claim spirituality but not religion, it might be good to revisit the wisdom of our traditions and to try to give young people more meaningful experiences on their own terms (which used to be ours) and to learn from them the value of spirituality that we once understood and that has been lost, as noise in churches has overtaken silence, and there is no longer a modulation between the social and the spiritual in many of our houses of worship. We need to look back and learn from many traditional symbols and patterns and to understand the psychology and perceptual basis behind their success. 

NOTES

1. Pew Research Center, Religious Landscape Study, 2015.
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What Is A 'Stabilized Relic'?

An approach that offers new life to religious buildings

By David Wessel

Photographs Courtesy of ARG Conservation Services

Many congregations and cemetery associations own historic assets that play an important role in the organization's mission, offering not just ornate architecture but also a sense of timelessness and spiritual consolation. Caring for these assets on nonprofit budgets, however, is often a challenge. If years of deferred maintenance have taken their toll, it is not always financially possible to carry out a full restoration. There is another option, however. We worked with Cypress Lawn Cemetery Association in Colma, California, to develop a cost-effective approach that halted a monument's deterioration and allowed its grandeur to once again serve as a consolation and invitation to contemplation for mourners and visitors alike

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until funds are available for a full restoration. The approach is to create a "stabilized relic." Variations on this approach have been used to preserve ancient ruins, sites of archaeological interest, and historic churches. For example, just this year it was announced that the 130-year-old St. Patrick's Church in Halifax, Nova Scotia, would raise money for stabilization efforts while it gathers funding for a complete (and far more expensive) restoration.

The Cypress Lawn Cemetery Association, founded in 1892, was one of the earliest and grandest examples of the garden cemetery movement on the West Coast. The landscape was designed to provide a peaceful place for people to visit their loved ones. The association is organized as an IRS Code Section 501(c)(13) nonprofit corporation that owns a for-profit funeral services company. Cypress Lawn's cemetery endowment care trust fund

provides money to pay for improvement and maintenance of the property, but it does not offer enough income to meet all of the cemetery's restoration and preservation needs.

One part of the solution was to create the Cypress Lawn Heritage Foundation, founded in 2000, which provides tours and lectures to the public as a public service and additional source of revenue. To maintain the private mausoleums, the descendants of the original owners contribute to an endowment fund. However, in some cases, the families have dispersed. This was the case with the de la Montanya Monument. Designed by Bernard J.S. Cahill and constructed in 1909, the de la Montanya Monument was one of the first monuments at Cypress Lawn and an integral part of the initial plan for the landscape. The private mausoleum was patterned after a three-stage Spanish Gothic tower in Burgos, Spain. It originally had Tiffany stained glass windows, but these were destroyed by an earthquake in the 1950s. The monument also occupies a prominent site in the cemetery, right next to Noble Chapel, the historic centerpiece for the cemetery and its primary source of revenue.

After a century, the ornate monument, carved from soft Colusa sandstone, had



Before and after of the de la Montanya Monument, disintegration of which was halted as a 'stabilized relic.'



Detail of condition of monument top before stabilization took place.



Selective demolition of the upper part of the monument made way for stabilization of remaining masonry.



Completed stabilized section of the monument's upper portion; removed masonry has been stored in anticipation of a future complete restoration.

deteriorated significantly, particularly the upper portion. Damage from earthquakes and ivy, along with years of deferred maintenance, had left their mark. The wide flange beams and steel angles embedded in the sandstone had rusted and were pushing the structure apart from within. In these ways, the monument was challenged by deferred maintenance and lack of on-going attention to the fabric that plagues the facilities of many congregations struggling to preserve their older buildings.

The cemetery association's initial solution was to shore up the monument temporarily and surround it with scaffolding to contain any loose masonry pieces that fell. However, this did not improve the aesthetic quality of the monument. The organization's chief executive officer, Ken Varner, had hired our firm to create a historic resource report in order to gather information about Cypress Lawn's buildings. At one point, while walking through the cemetery together, we stopped in front of the de la Montanya Monument. I suggested that there might be a solution other than leaving it as it

was or paying for a full restoration. A third possibility was to preserve it as a "stabilized relic": we would perform selective demolition, documentation, and stabilization that would obviate the need for scaffolding and keep the monument in a state of readiness until funds eventually became available for a full restoration.

The challenge was to determine what historic fabric could be saved and what would have to be removed because of instability. Due to the advanced state of the deterioration of the monument's upper section, selective demolition was necessary to address life-safety issues and repair the deteriorated steel frame within the structure.

In addition to the selective demolition, any loose or cracked masonry that could be salvaged was stabilized by setting or pinning. We used threaded fiberglass rods, in conjunction with epoxy grout, to pin loose and unstable sandstone masonry to the structure's existing stable masonry. To prevent moisture intrusion, all roofing and gutters were recoated; all failing


mortar joints were removed and replaced with a compatible hydraulic lime pointing mortar.

After we documented all aspects of the monument, all material that we removed was stored in a covered location on the Cypress Lawn property. Permanent marking of each individual masonry unit, together with extensive photo and annotated drawing documentation, will allow the upper portion of the structure to eventually be restored to its original height.

This approach is very much in the European tradition: stabilized relics are common in Europe, especially in England, where beautiful ruins are cared for meticulously and enjoyed as ruins. To draw on this tradition was particularly appropriate for Cypress Lawn, given that the design of Noble Chapel was based on the design of St. Giles Church in Stoke Poges, England, where Thomas Gray wrote his famous 1751 poem "Elegy Written in a Country Churchyard."

Noble Chapel itself received a full renovation after a fire in the adjacent crematorium damaged the chapel. ARG Conservation Services removed layers of previous, piecemeal renovations, which had significantly compromised the interior, and brought the building back to its original character. With the chapel restored and the monument stabilized, bookings in the chapel have increased notably. People respond to the connection to history.

Building upon this work we are currently consulting St. Patrick's Church in Halifax, Nova Scotia. The Archdiocese of Halifax-Yarmouth deemed the Victorian Gothic edifice, built between 1883 and 1885, unsafe. A full restoration is estimated to cost more than \$3 million. However, the church's restoration committee is raising money for a much smaller sum, \$700,000 to \$800,000, to carry out structural upgrades that would stabilize the steeple, bell tower, and main façade. This approach will allow the church to be used while fundraising efforts continue for the full restoration.

The incompleteness of a "stabilized relic" can even make the structure more evocative. The stabilization of the de la Montanya Monument provides an example of how deteriorated features, in this case sandstone, can be removed while still allowing the rest of the structure to serve its role for a spiritual community. Carrying out the stabilization in a thoughtful, well-conceived manner allows enough of the historic resource to remain so that the mind's eye can complete the picture. In other words, stabilization can be done in a way that provides evidence of what was there originally, but is now gone, inspiring contemplation and providing a solution to fiscally challenged congregations. 

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LANDSCAPE AS POETIC AND SACRED ARCHITECTURE

THE LAST WORD ★ BONNIE LARSON STAIGER, HON. AIA

"Maybe seeing the Plains is like seeing an icon: what seems stern and almost empty is merely open, a door into some simple and holy state."

Kathleen Norris,
Dakota: A Spiritual Geography

Eons ago, a retreating glacial blade gouged a region through the center of North America known as the Great Plains. It left a vast and rugged beauty, an endless sky, and from it came peoples that are also enduring, pragmatic, and spare. More recently, German architect Gottfried Semper's *The Four Elements of Architecture* appeared in 1851, about the same time that the U.S. and Canadian Homestead Acts were passed. Thousands of people, including my ancestors, came to start new lives and prove their land claim. Unknown to those homesteaders, Semper's four building elements (the hearth, walling, roofing, and terracing) were essential to more than rudimentary shelter. His princi-

ples also applied to establishing communities, building houses of worship, and implanting a culture of respect for a place that was sometimes bountiful and unforgiving.

Long before Thomas Jefferson commissioned the Lewis and Clark Expedition through this region in 1804, fur-traders and indigenous peoples built structures that sustained life. Each preserved sacred sites and a deep reverence for this area. The natural evolution beyond survival mode brought building designs that reflected vernacular traditions and the practical realities dealt by the harsh extremes of bitter winters and blistering summers.

Now these homesteader descendants (like me)—whether we live in small towns, big cities, or maybe still live on "the home place"—continue that fierce love of the land and the dome of sky overhead. It has inspired writers and poets such as Willa Cather, Tom McGrath, Ted Kooster, Larry Woiwode, and Kathleen Norris. After all, the curvature of the earth is all that stands between infinity and me.

SECTION LINE COMMUNION

The Abbey's sanctuary transforms before me. A gravel road carpets the center aisle.

Dust of sacred relics cloud around my ankles.

Grain the bread of life ripens in the pews to my right and left.

Shelterbelts form choir stalls lined with monks praying silently in the shadows.

Pelicans in pearled vestments circle their vaulted blessing.

The Profit Mountains piled on the prairie offer an altar in the sunrise.

THE AUTHOR, A BENEDICTINE OBLATE, LIVES IN AND WORKS FROM BISMARCK, NORTH DAKOTA. A PUBLISHED AND PERSISTENT POET, HER WORK HAS BEEN ANTHOLOGIZED IN *LEANING INTO THE WIND* AND *WOVEN ON THE WIND*, AS WELL AS INCLUDED IN VARIOUS PUBLICATIONS.

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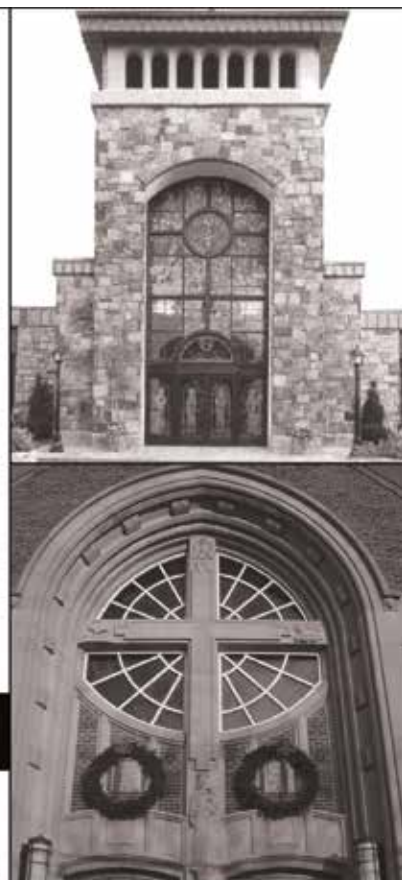
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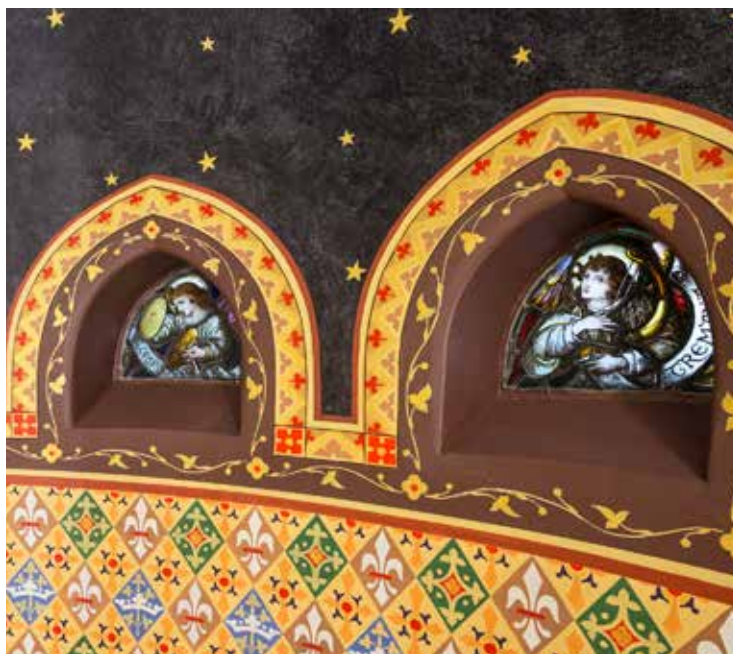
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THEME ISSUE: DISPLACEMENT, SAFETY, SECURITY

Sacred spaces and places have for millennia been the targets of man-made and natural disasters; our own age has been marked by tragedies at religious buildings and sites around the world. How do we make our sacred places and spaces more safe and secure in the event of displacement through attacks or natural calamities, and how can we make sacred spaces and places for communities in transition because of these events? This issue will explore the possibilities, techniques, and practices to create safe and secure sacred places and spaces that respond to upheavals in our contemporary world.

If you would like to contribute projects, articles, insights, or other items for this issue, please contact: mcrosbie@faithandform.com

