

# Sounds of a Community: Cultural Identity and Interactive Art

Robert J. Gluck

**T**he sound installation *Sounds of a Community* (2001–2003) is a vehicle by which visitors can explore multi-level relationships between traditional cultural identity, religious ritual and musical expression [1].

This work consists of a series of sculptures modeled on traditional Jewish ritual objects. The sculptures function as interactive musical instruments—performance interfaces for software-based musical compositions. By using very simple gestures suggestive of traditional prayer movements, visitors can shape the performance of musical compositions whose sounds and structure have been programmed in software. Many of the sounds, prerecorded in a synagogue [2], are composed of prayers and chants related to the ritual objects. The sound installation also includes two additional noninteractive elements: artistically designed listening stations, the goal of which is to encourage visitors to pay close attention to the musical qualities of sounds of familiar religious and culturally specific environments.

This work is an attempt to harness new technologies to encourage identity and cultural self-exploration. The goal is to offer a flexible, musically responsive and emotionally compelling means to engage the imagination. The electronics have a subtle presence but are not completely visible. By participating in this installation, visitors join in a musical partnership with the composer/software programmer/sound designer, with the authors of the original sounds and with computer music technology. I hope to draw upon technology as a humanizing influence, encouraging people to cross boundaries between conventional and new musical aesthetics, traditional cultures and modern life, and religious and secular sensibilities.

For people familiar with Jewish religious practice, the work's sounds and the design and functionality of the sculptures can evoke traditional prayers and ritual observances and encourage an exploration of prayer and ritual. For others, the sculptures offer an engaging opportunity for musical expression that makes use of physical gestures to shape and organize sounds.

The interactive aspect of this work is designed to present a means of reflective expression, engaging participants to listen and respond. Movements such as forward (and side) bends executed while wearing a prayer shawl, lighting a series of candles, shaking a harvest ritual object in multiple directions and moving a pointer across the surface of a sacred text become the mediating force in the shaping of sound.

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Video documentation and sound samples related to the discussion are available at <www.electricsongs.com/SoundsOfaCommunity/index.html>.

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## EVOLUTION OF THE WORK

The seed was planted for the inception of *Sounds of a Community* 2 decades before its construction and composition. In 1982 I had recently begun rabbinical studies [3], the impetus for which originated in my desire to enrich Jewish religious practice with new expressive and creative ideas that could move beyond the dry ritual I had experienced as a child. My compositional perspective continued to grow, bridging the abstraction of electroacoustic music, a broad definition of musical sound learned from John Cage and Jimi Hendrix, and the inherent linearity of traditional Jewish chant. I conducted performance experiments in prayer settings by applying Stockhausen's "intuitive music" method of inducing collective improvisation by offering the participants evocative texts [4].

## ABSTRACT

*Sounds of a Community* (2001–2003), a sound installation, is a series of sculptures modeled upon traditional Jewish ritual objects. The sculptures also serve as musical instruments. The installation is designed to offer an engaging musical experience but also a means by which people can explore complex issues relating to religious and cultural identity. Basic issues involved in the design, construction and programming of this work are presented, along with an exploration of how this work seeks to engage visitors in questions about their relationship to religious settings that involve the place of an individual within a group.

**Fig. 1. Bob Gluck, detail of sound sculpture *eTallit1*, from the installation *Sounds of a Community*, 2001. (Photo © Pamela Lerman) *eTallit1* is a wearable interactive instrument with which installation visitors create multilayered sounds by swaying and bending the body.**





**Fig. 2.** Bob Gluck, detail of the sound sculpture *eFloor*, from the installation *Sounds of a Community*, 2001. (Photo © Bob Gluck) *eFloor* is a small, navigable flooring unit that tracks the movement patterns of installation visitors who walk upon it to create multi-layered sounds.

I also dreamed of adapting the multi-sensation aesthetics of Cage's *Variations IV* to a synagogue setting. This led me to imagine translating the physical movements of a congregation in prayer into control data to process the sounds of the group's singing. After a rebuff by one of my teachers, with whom I had excitedly shared this idea ("Go back to your text studies!"), I placed the idea on hold until the late 1990s, when I discovered sensing technologies. I was thus ready and eager to continue this work when I became a graduate student in Rensselaer Polytechnic Institute's electronic arts master's program. Experiments with the original core idea, aided by Curtis Bahn's encouragement and technical advice, led to the realization of a work more than 20 years in the making.

During my years in rabbinical college, I encountered for the first time religious people for whom prayer involved an intimate engagement with ritual objects. It was as if the object became an extension

of the practitioner, a means of inducing devotional experience. This idea was very new to me. I wondered if contemporary art and music could be a route for me to explore other creative possibilities in a manner consonant with my non-Orthodox religious perspective. Thus were laid the seeds of *Sounds of a Community*.

In this work, people like myself, for whom traditional religious rituals were experienced as rote repetition, could explore their relationship with these ancient forms. Physical manipulation of the objects would be separated from verbal expression, allowing space to open up to listen, sense and ponder. Since the installation would be considered a work of art rather than a form of religious expression and it would be shown in an artistic and thus nonreligious context, it might be possible for visitors to consider any or all relevant issues without the emotional and historical baggage with which they are usually freighted. Visitors could also consider how the religious objects

and associated sounds could become vehicles for personal—artistic, religious or other—expression.

## DESCRIPTION OF THE SCULPTURES

*Sounds of a Community* currently includes nine installation elements: seven interactive sculptures and two listening stations.

The sound sculptures include two wearable prayer shawls (*eTallit 1* and *2*), an ornate book that is "played" with a pointer moved across the book's surface (*eChant*), a long, shakable stick on which special vegetation has been mounted (*eHarvest*) and a candelabra whose lights can be tapped with a long matchstick (*eMenorah*). The 2001 premiere of *Sounds of a Community* also included a small, navigable flooring unit (*eFloor*), whose software interface has subsequently been remapped to *eTallit 2*.

The sound sculptures are home built, with specialized hardware and software. Embedded sensor technologies are used to control real-time digital sound processing. Special software interfaces track, analyze and process the sensor data and algorithmically process the sound.

The sensors used in *Sounds of a Community*—including biaxial accelerometers [5] (referred to below as tilt sensors; used in *eTallit 1* and *2* and *eHarvest*), piezo buttons [6] (in *eMenorah* and *eFloor*) and a computer graphic tablet (in *eChant*)—track various forms of participant physical gestures and send data to the computer. Mediating between the accelerometers and the computer are miniature single-board computers, Basic Stamp II microcontrollers [7]. MIDI drum modules serve a parallel function for the piezo buttons. The function of the microcontrollers and drum modules is to translate sensor data into MIDI data that can be interpreted by the software interfaces.

The software interfaces were programmed in Max/MSP [8], a programming environment for computer music and multimedia that I run on a Macintosh computer. "Patches" in Max/MSP are written by connecting elements in a library of graphical objects, which are pre-programmed mini-applications [9]. The Max element in the application can receive, process and output MIDI data to control electronic musical instruments and multimedia hardware, including lights, media players and other gear. MSP is a set of audio extensions to Max, with which one can create real-time sound synthesis and digital processing.



Fig. 3. Bob Gluck, detail of the sound sculpture *eChant*, from the installation *Sounds of a Community*, 2001. (Photo © Bob Gluck) *eChant* is an interactive instrument in the form of a sacred book, upon which installation visitors move a pointer to shape prerecorded sounds of prayer chants.

Two additional elements of the installation, discussed below, are listening stations. These include a series of “sound pillows,” through which visitors may listen to a continuously playing soundscape composition (which treats onsite recordings as musical sounds) via embedded headphone sets, and a Sabbath dinner table whose items serve as close-range speakers that visitors can hold to their ears.

### *E*TALLIT AND *E*FLOOR

*eTallit1* and *eTallit2* are wearable interactive instruments with which one can create multilayered sounds by swaying and bending the body. They are identical in design: A traditional Jewish ritual head covering, a yarmulke, containing tilt sensors, has been placed at the midpoint of one edge of the shawl, allowing the *eTallit* to be worn comfortably over the head. An earlier design, in which the shawl was draped over the shoulders, proved to offer a less stable support for the sensor. The *eTallit* instruments were constructed using custom-built Basic Stamp II hardware.

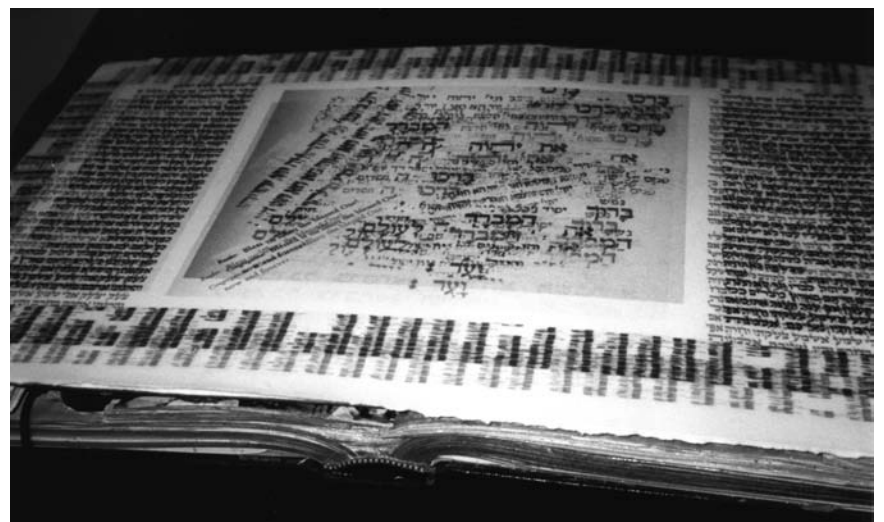
The composition performed while wearing *eTallit1* (Fig. 1) draws upon a sequentially sung traditional prayer chanted by a single voice. A forward and backward rocking motion initiates sound playback. Pauses in motion will stop the playback, which continues when motion

starts again. The experience is akin to chanting while engaged in traditional prayer movements. Bending to the sides brings forth an additional layer of chanting. These sounds continually change in length, depending on how far, how fast and in which direction one bends to the sides. Movement to the sides also controls the volume of the singing sounds initiated by forward and backward bends. The combination of movements on both axes creates the performance.

For me, the traditional rocking prayer movements recall childhood memories of my grandparents’ traditional synagogue. Prayer in more liberal synagogues tends to value decorum; worshippers generally sit in their seats or stand still. Creating this sculpture was an attempt to experiment with the connection between physical movement and prayer. To a person familiar with Jewish religious practice, the movements that trigger *eTallit1* are familiar and natural, although the musical results are novel. Prerecorded prayer sounds, as opposed to singing, allow the visitor to focus and reflect on the physical movements. Directing the interplay of sounds through quiet movement allows the visitor to find a personal, private and comforting space for such reflection. A number of visitors reported a similar experience. Indeed, some visitors experience their body movements as a form of prayer, while others move in ways akin to dance performance and still others select movements geared exclusively toward shaping the sound compositionally.

*eTallit2* requires movements that are distinct in quality from those relevant to *eTallit1*. While wearing *eTallit2*, the visitor

Fig. 4. Bob Gluck, close-up of the interactive sound sculpture *eChant*, from the installation *Sounds of a Community*, 2001. (Photo © Bob Gluck)







**Fig. 5. Bob Gluck, detail of the sound sculpture *eHarvest*, from the installation *Sounds of a Community*, 2001. (Photo © Bob Gluck) *eHarvest* is modeled upon traditional Jewish ritual objects, *lulav* and *etrog*. When installation visitors shake it in various directions, the amplified sounds of its shaking wooden dowels are digitally processed.**

leans forward and to the sides at varying angles, temporarily freezing in place to hold one of nine postures, a combination of one of three levels and one of three directions.

The sounds of *eTallit2* draw upon 11 tracks of singing voices, ranging from solo voices to choral chanting. The text being sung in each track derives from an ancient ritual statement that begins with the word *Shema* (listen). This is the core ritual statement of God's oneness that appears throughout the Jewish liturgy. The postures held by the visitor wearing *eTallit2* trigger one or more of these tracks. Facing forward while standing erect activates solo voices; facing left or right calls upon groups of singers. The sounds are spatialized across four speakers. The overall effect is that one is bathed in a variety of sound densities.

My concern was to capture the experience of varying degrees of isolation and companionship, of being alone in the presence of others or more actively connected with other people, while in a prayer setting. The emotional qualities of each grouping are distinct from one an-

other, allowing the visitor to explore very different types of sounds that articulate the same text. Jewish worship includes moments of quiet individual prayer, situated within a collective of others similarly individually engaged, as well as moments of individual singing within a group of individuals that are following their own relative pace and movements of collective expression. As with *eTallit1*, the use of prerecorded sounds rather than the visitor's own voice allows one to reflect upon his or her place within such a collective.

The initial sculptural interface for this composition, *eFloor* (Fig. 2), was a 4-ft square of carpeting. Embedded beneath were nine trigger points clustered in concentric circles from front-center to the periphery. The visitor would first step upon those in the front and center, pausing and listening before moving further. There was no simple one-to-one correspondence between movement and sound. Rather, the interface was designed to track patterns of movement within various sectors of the space. Front and center tended to trigger solo voices; the

peripheral points tended to trigger massed sounds. However, after the visitor stepped upon particular triggers beyond certain threshold numbers of steps, the dynamics could change.

## ***E*CHANT**

*eChant* (Fig. 3) is an interactive instrument in the form of a sacred book, upon which a participant moves a pointer to shape a musical composition. The movement of the pointer is reminiscent of the technique by which a liturgical singer of biblical text (a "Torah reader") follows the text while reading.

On the surface of *eChant* is an abstract collage of images from a medieval mystical prayer book (Fig. 4). The featured text is one that serves as the traditional call to prayer and the opening section of the prayer that precedes liturgical biblical readings (*Barechu*). The sounds consist primarily of voices chanting this text in a traditional call-and-response format. An additional set of sounds, enacted when greater pressure is exerted on the book's surface, consists of prerecorded liturgical biblical chant.

*eChant* was constructed by embedding a graphic tablet under the surface of the text. The pointer, constructed from balsa-wood strips in the shape of a hexagon, covers a graphics stylus. Movements of the pointer and its stylus are tracked by means of the tablet circuitry, sending position coordinates to control sound playback and processing.

The visitor begins a musical phrase by touching one of the words printed in black. When the pointer is placed upon a black letter or word and moved around the surface, a continuously changing sound gesture is played. When the pointer is moved across certain sections of the text, the call-and-response sounds are digitally processed in ways that abstract the singing voices, creating steadily shifting sound clouds. Additional "surprise" recorded vocal sounds are hidden throughout the text, awaiting discovery.

## ***E*HARVEST**

*eHarvest* (Figs 5 and 6) is a stick-shaped interactive ritual object that is playable as a musical instrument. It is a papier-mâché-and-wood model of a *lulav* and *etrog*, a pair of ritual objects central to the celebration of the autumn harvest festival of *Sukkot*. A *lulav* is traditionally made from a palm frond, with attached branches of myrtle and willow (here represented by wooden dowels and dried grasses). An *etrog*, a greenish-yellow cit-

ron found in Israel, is held by hand against the middle of the *lulav* during the ritual. During morning services, the worshipper shakes this combined object in the four cardinal directions, as well as toward the sky and ground.

*eHarvest* is unique among the sound sculptures in that all of its sounds are created acoustically: As one holds it at different angles and shakes it in different directions, the amplified sounds emerge and change. *eHarvest* was constructed using custom-built Basic Stamp II hardware (embedded in the yellow citron). The shaking gestures provide the most visceral experience of *Sounds of a Community*, one that many visitors have found particularly satisfying and engaging.

As the visitor reaches down to lift *eHarvest*, she or he grasps it toward the bottom of the pole. Above one's hands is the *etrog*, within which is embedded a biaxial accelerometer, a sensor that calculates the angle of tilt on both axes. Above the *etrog* are tied two clusters of colorful dried grasses. When the visitor lifts *eHarvest* and shakes it, its dowels bump against one another, creating a distinct yet quiet sound akin to that of wind blowing through reeds. At the bottom of *eHarvest* is a thin black cable snake, which connects to a black box containing the microprocessor that translates movement into MIDI data, sending it to a computer. The amplified and processed sounds are heard through a nearby pair of small stereo speakers.

The biaxial accelerometer measures the angle at which the visitor is holding *eHarvest*. As *eHarvest* is tilted, the sensors report the angle of tilt, which is translated by the computer into information that shapes the digital sound processing. When *eHarvest* is held vertically, the sounds generally become higher pitched and shimmering. When the visitor shakes it toward the ground, the sounds tend to have a rougher, more gravel-like timbre. Visitors are encouraged to shake *eHarvest* at different angles, in different directions, exploring the available sound palate.

## *eMENORAH*

*eMenorah* (Fig. 7) is an interactive instrument designed after a Hanukkah menorah. I conceived, designed and painted *eMenorah* in collaboration with my daughter, and the vocal sounds are those of my family. For me, the polyphonic interplay between voices of family members evoked childhood memories of singing with grandparents and cousins. In the spirit of the festival of Hanukkah, this sculpture was designed to be a fun child's game.



Fig. 6. Bob Gluck, close-up of the interactive sound sculpture *eHarvest*, from the installation *Sounds of a Community*, 2001. (Photo © Bob Gluck)

Set upon a base are eight sculptural elements modeled upon candles. These can be lightly tapped with a long, thin wooden stick painted red on the end, based upon a match. A ninth candle is strictly ornamental. When visitors tap the candles, starting from the right, they hear phrases from a song, "Mi Yemalel" ("Who Can Retell"), traditionally sung on the festival of Hanukkah. The song has been broken down into three individual phrases, sung in three different voices. The sound material can be performed in a large number of ways.

The three candles on the far right initiate playback of each of three phrases, sung in a child's voice. They can be intentionally replayed in any sequence (including the "correct" order), including more than one phrase at a time. The fourth candle triggers sounds of the same singing voice. However, the software interface has been programmed algorithmically to generate a random sequence

of the phrases. The next two candles to the left trigger the sound of a second, adult male voice. Like candle 4, candles 5 and 6 generate random sequences of the phrases, each reflecting a greater degree of randomness [10]. Candle 7 adds an adult female voice, also algorithmically replayed. Up to 7 candles can be performed simultaneously, allowing complex polyphony. The fugal qualities of the performance continually change, depending upon which candle is being tapped and upon the material generated by each respective algorithm in the interactive software.

## SOUNDSCAPE AND SOUND PILLOWS

A second goal of *Sounds of a Community* is to heighten participants' awareness of sound within ritual and prayer settings, where such awareness is often limited. In this sound installation, visitors are

Fig. 7. Bob Gluck, detail of the interactive sound sculpture *eMenorah*, from the installation *Sounds of a Community*, 2001 (2002 revision). (Photo © Bob Gluck) Installation visitors tap the "lights" of this candelabra with a long "matchstick," triggering algorithmic polyphonic renderings of a children's song for the Festival of Hanukkah.





encouraged to consider the sound attributes of ritual and liturgical sounds and voices. Indeed, visitors have observed that an important aspect of *Sounds of a Community* is the cacophony resulting from all the sculptures sounding simultaneously.

The electroacoustic soundscape composition [11] *Woodstock Soundscape* (composed from sounds previously recorded on site) may be heard within custom-built “sound pillows.” The pillows are comfortable cushions within which headphones are embedded. Visitors, lying on the floor, place their heads upon (and slightly within) the pillows.

This prerecorded musical work draws on a range of sounds of the synagogue. Some are from religious services, some feature the voices of schoolchildren and others are the sounds of people singing or in conversation. The multilayered sounds flow from one to the next. Sometimes the sound textures begin with familiar singing but grow more abstract. One percussive section abstracts slices of cymbal and drum sounds, as if they were frozen in time. There is a joyous, festive mood to these sections. At other points, the voices of children predominate. These sounds move between the headphones. The tone is light and playful.



**Fig. 8.** Bob Gluck, detail of the listening station *eSabbathTable*, from the installation *Sounds of a Community*, 2001. (Photo © Pamela Lerman) Installation visitors listen to the electroacoustic soundscape composition *Woodstock Soundscape* through speakers embedded in the pillows.

## ESABBATHTABLE

*eSabbath Table* (Fig. 8) is a listening station cast in the form of a Sabbath dinner table. Resting upon the table are sculptures based upon traditional ritual objects and foods: a pair of candlesticks, a *kiddush* cup (wine goblet), a dinner plate, a loaf of *hallah* (braided bread) and a flower vase. Embedded within each object is a speaker through which one may listen to family-history narratives about the early-20th-century immigrant experience. These are from a 1980 interview with my late great-aunt Jennie Dressner, at whose table my family often ate Sabbath dinners and celebrated Passover seders. Also included are two sections from my 1998 work, *Scene/Seen in Shul* [12] that draw upon sounds of prayer. Visitors to *eSabbath Table* have commented upon the humorous juxtaposition of unusual narratives with the experience of placing food and table items against their ears.

## DISCUSSION

The intention behind the creation of *Sounds of a Community* was to craft a sound installation that harnesses interactive music technologies to facilitate the explora-

tion of cultural and religious identity. My goal was to do so in a manner that is musically engaging, accessible and enjoyable.

Identity is a term that refers to a sense of belonging. A major way by which people affirm their connection to a culture is to enact the symbols, values and core beliefs of that culture. Jewish identity is a complex, often contested construct. For Jews, the unprecedented welcome and openness experienced within Western culture, especially in North America, has proven to be a double-edged sword. Demographic surveys of the Jewish population in America [13] suggest an increasingly complex and some would say declining Jewish identification and involvement. The very definition of who is a Jew is hotly contested [14].

One of the focal points for Jewish identity is religious ritual. For some, this is the locus of greatest challenge [15], due either to personal preference, feelings of alienation from Jewish religious institutions, or the difficult Jewish legal and, some would add, political, issues relating to who is a Jew.

Nonetheless, religious ritual remains one of the few enduring and traditionally moored anchors of Jewish identity. Jewish religious traditions have been transmitted within families and communities for thousands of years. While the meaning and style of performance of rituals evolve over time, their essential core often remains unchanged. Many Jews, even those who are alienated from Jewish religiosity as adults, retain easily accessible and often warm childhood memories of rituals. For those whose lives include active religious involvement, ritual remains a cherished *sine qua non* of Jewish identity. It is for these reasons that I selected religious ritual as a reference point for identity exploration in *Sounds of a Community*.

People enact and transmit religious rituals through word, physical gesture and drama. R.R. Marett observes: “Primitive religion is danced out, not thought out” [16]. Religious ritual often involves the use or manipulation of ritual objects. In fact, there is a close relationship between ritual objects and the sung or spoken element. In traditional Judaism, prayer is accompanied by physical gestures, which include bowing, bending and arm extensions.

The most obvious example relevant to *Sounds of a Community* is the garment (*tallit*, or prayer shawl) that Jewish worshippers often wear [17] when praying. In this case, the wearing of the shawl establishes the context, if not an aid, for prayer.

When reading biblical text (Torah) in a liturgical setting, the one who chants follows the written text by use of a pointer (*yad*) held in one hand. Not merely a place keeper, the pointer has, over time, become inseparable from the reading of the text. This connection contributes to the embedded meaning connecting the sounds and Torah pointer of *eChant*. A third model is represented by *eHarvest*. In an actual ritual setting, the shaking of the *lulav* and *etrog* is preceded by prayers that establish a context for the manipulation of the objects. Additional recitations accompany the carrying and shaking of the objects. What unites these three examples is the integral relationship between ritual object and verbal utterance.

People for whom use of these ritual objects is part of a personal religious practice tend to experience the sound sculptures of *Sounds of a Community* in a distinctly intimate way. A number of visitors who have sent written comments about their experience observed that they found themselves reflecting upon the meaning of the texts with which the ritual objects are associated. Others have described reflections upon the context or nature of the ritual or prayer setting. This was one of the goals of the installation.

Many visitors who grew up familiar with Jewish ritual practice but for whom it is not a regular part of their current life, find that the sculptures evoke childhood memories of experiences in Jewish religious settings. This is true even for people who reported negative cognitive ideas about those experiences.

A key to the success of this installation has been its accessibility to people of all ages. It was a design goal for visitors to require less than 5 minutes to gain competence with each of the sculptures. At the same time, it was important that interest be sustainable for a more extended period of time.

For people familiar, yet uncomfortable, with traditional Jewish ritual, the use of prerecorded sounds, rather than visitors' own voices, allows visitors the ability to

physically engage while maintaining a degree of cognitive distance. Some visitors have described the resulting experience as looking in at themselves from outside, becoming aware of their emotional reactions.

One closing observation: The enactment and transmission of religious ritual generally reflects values of cultural conservation, not innovation. It is generally accompanied by conservative attitudes regarding the nature of religious and cultural expression. In this installation, sculptural design seeks a middle path as a creative expression of traditional models. The physical appearance and the sounds that they enact reflect ancient collective Jewish traditions, yet engage distinctly contemporary musical ideas. Visitors have asked: "Is the work about religious ritual or musical performance?" Indeed, *Sounds of a Community* aims to address both [18].

## References and Notes

1. QuickTime video clips, MP3 samples and other documentation for *Sounds of a Community* may be found at <[www.electricsongs.com/SoundsOfaCommunity/index.html](http://www.electricsongs.com/SoundsOfaCommunity/index.html)>.
2. The Woodstock Jewish Congregation, Kehilat Lev Shalem, in Woodstock, New York.
3. I completed my studies in 1989 at the Reconstructionist Rabbinical College near Philadelphia, Pennsylvania.
4. Karlheinz Stockhausen, *Aus Dem Sieben Tagen* (1968).
5. "A low cost, low power, 2-axis accelerometer (with a measurement range of  $\pm 2$  g), built onto a ADXL202EB Dual Axis Evaluation Module circuit board." It sends pulse-width modulation signals based on the angle of tilt that can be interpreted by a microcontroller. See <[www.analog.com](http://www.analog.com)>, or <[www.alliedelec.com](http://www.alliedelec.com)>, 2003. "The ADXL202 can measure both dynamic acceleration (e.g., vibration) and static acceleration (e.g., gravity)." See <[www.analog.com](http://www.analog.com)>, 2003.
6. These sensors are similar to those used for electronic drum triggers.
7. See <[www.stampsinclass.com](http://www.stampsinclass.com)>. See also <[www.parallaxinc.com](http://www.parallaxinc.com)>.
8. Max/MSP is available from its commercial developer David Zicarelli at <[www.cycling74.com](http://www.cycling74.com)>. Max (and the core of MSP) was originally created by Miller Puckette at the Institut de Recherche et Coordination Acoustique/Musique (IRCAM) in Paris.

9. This method was used instead of writing in the form of text-based code.

10. The algorithm assigned to candle 4 generates sequences that are likely to repeat the same music phrase or a similar one. Subsequent candles generate increasingly random sequences.

11. A composition of the sounds drawn from field recordings and structured to capture qualities of the particular place and its people, as interpreted by the composer.

12. Robert Gluck, *Scene/Seen in Shul*, EMF Media CD 008 (1998) <[www.cdemusic.org](http://www.cdemusic.org)>.

13. See, for example, The 2001 National Jewish Population Survey: <[judaism.about.com/gi/dynamic/offsite.htm?site=http://www.ujc.org/njps](http://judaism.about.com/gi/dynamic/offsite.htm?site=http://www.ujc.org/njps)>, 2003. A summary is available at: <[judaism.about.com/library/2\\_americanjewry/bl\\_njps2000.htm](http://judaism.about.com/library/2_americanjewry/bl_njps2000.htm)>, 2003). See also: 2001 American Jewish Identity Survey: <[jewishdelaware.esmartweb.com/NJPS.htm](http://jewishdelaware.esmartweb.com/NJPS.htm)> (2003). About the 1991 National Jewish Population Survey, see Sidney Goldstein, "Profile of American Population Survey," American Jewish Committee, 1992.

14. Among the many issues are whether a Jew, in religious terms, is the child of a Jewish mother (according to Conservative and Orthodox Judaism) or of either a Jewish mother or father (as in Reconstructionist and Reform Judaism) or a convert (Orthodox Judaism only recognizes conversions under its own auspices, as do some Conservative rabbis).

15. Judaism is unique in constituting not only a religion, but also a culture or, as in the title of Mordecai Kaplan's magnum opus, a "civilization." Mordecai Kaplan, *Judaism as a Civilization* (New York: Schocken Books, 1934, 1967). As a consequence of the modern secularization of Western culture and early-20th-century political trends, there are Jews who identify as "cultural" but not religious Jews.

16. Robert Ranulph Marett, *The Threshold of Religion* (London: Methuen, 1909), cited in Annemarie de Waal Malefijt, *Religion and Culture: An Introduction to Anthropology of Religion* (New York: Macmillan, 1970) pp. 8–9.

17. The *tallit* is traditionally worn by men but, more recently in liberal Judaism, by men and women who so choose, during morning services and on the eve of Yom Kippur.

18. Other musical works recontextualizing traditional Jewish religious and cultural ideas include Richard Teitelbaum's *Golem: An Interactive Opera* (1994), Alvin Curran's *SHOFAR* (1991, 1994) and *Crystal Psalms* (1988) and Ari Shapira's *Kastner Trial* (1994), as well as my own work, especially *Scene/Seen in Shul* (1998), *Shofaralong* (2001), *Sshofar* (2002) and *Shofar* (2002).

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