



Fig. 3. Listening through one of The Mill's megaphones. (© Greg Harm)

ogy are both echoed in Bruce Wolfe's minimalist steampunk design. From the beginning, he conceived the project not as a collection of individual pianos but as "forming a complex instrument in its own right . . . a building powered by sixteen pianos" [2]. Wolfe explains the evolution of the tower-like structure:

The idea was to have these pianos packed fairly densely into a space and the design result is something of a cube; a floor plate of about 4.5 meters square allows 2 standard size upright pianos against each external wall. Two stories height produces sixteen pianos [3].

Some elements of the design were conceived with special consideration of sound. Each external wall contains large vents running from top to bottom, which can be opened and closed during performance to alter the acoustics. An enormous set of five tuned grader blades hangs from the rafters, a rustic carillon played with hammers. Adding to the steampunk look of the building are two Dr. Seussian copper megaphones protruding from the building's underbelly. Connected via large plumbing pipes to selected upstairs pianos, they act as sonic periscopes. Listeners can place their ears next to the megaphones to experience a decidedly 19th-century method of amplification (Fig. 3).

Presented with such an audacious new toy, I set about composing: brainstorming and testing musical concepts. Armed with a portable digital recorder, I climbed inside The Mill to play and record samples of various musical textures I had created, later assembling them digitally to model the sound of the 16 pianos played simultaneously. The piece that emerged took inspiration not only from the distinctive architecture and idiosyncratic qualities of the pianos but also from a range of historical piano sources and the natural environment. Avant-garde piano music is referenced in tributes to Conlon Nancarrow and Arnold Schoenberg. Birdsong, insect sounds and weather patterns are strong influences. The work includes mass forearm clusters, frantic black key glissandi and shimmering microtonal chords and arpeggios.

A pervasive sense of nostalgia is most apparent in the central interlude, entitled *Three famous parlour themes*, in which we hear Beethoven's *Für Elise*, Chopin's *E minor prelude* and Debussy's *Claire de lune* resonating through the walls and wafting from the louvers of The Mill. Musical themes were divided into fragments and assigned to each of the 16 pianos. As the composition progresses through each famous strain phrase by phrase, microtonal differences among the pianos, decaying mechanisms, rotting felt, broken strings and stuck keys reveal surprising variations in the music. Complete but fractured renditions of the pieces leave us with a strange sense of dislocation and nostalgia. The depths and degrees of degradation wrought by time, environment or neglect are highlighted. There is a palpable sense of the land reclaiming the instruments and the fragility of cultural memory. At the premiere, this feeling was heightened by the ambient sounds of thunder, rain, crickets and croaking frogs.

References and Notes

- 1 L. Kouvaras, *Loading the Silence: Australian Sound Art in the Post-Digital Age* (London: Routledge, 2016) p. 193.
- 2 Wolfe, B. (2016). *The Piano Mill Story*. Retrieved from <www.pianomill.org/read-bruce-wolfe.html>.
- 3 Bruce Wolfe [2].

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FOLTO GIARDINO

Hybrid Cross-Pollination of Score, Performance, Installation and Technology

Jonathan Impett

ABSTRACT This article presents a series of works for chamber ensemble (incorporating both scored and improvised material), electronics and an installation of long strings. The *folto giardino* of the title (derived from Mozart/Da Ponte) is a listening, performing environment in which a dramaturgy of relationships, of knowing, hearing, understanding or ignoring, can be played out. Such an approach is offered as a way of thinking about form and material when dealing with the hybrid resources typical of contemporary musical work.

The paradigmatic contemporary sound work is a hybrid of notated, improvised, computational, electronic and installation components, with access to materials across time and geography. This presents challenges to the artist in terms of interrelating the natures of materials and representations; solutions bring significant implications for the conception, construction and performance of works. In a technological environment, questions of form (why what should happen when—including starting and stopping) and of the identity

of the work are transformed. Presumably, such an identity and the key to decision-making are not located in a collage of instruments/objects/technology, a collection of text or data and a choreography of actions. Rather they inhere in the bounding relationship of these elements. In this essay I propose an approach based not on “content” but on hearing, remembering and cultural resonance. I explore this through a sequence of such hybrid works: *Folto giardino*.

The works described here—one a context, materials and dramaturgy for improvisation, the other a fully notated score—arise from three fundamental assumptions, responses to the above situation:

1. Musical phenomena can be viewed in terms of the distributedness of determination, of decision-making. Every musical event (improv to opera, experiment to extravagant) can be understood as the product of a series of decisions—actions facilitated and constrained by technology, technique, taste, imagination, context and habit. The map of such actions through time, through social and technological constructs, will be unique for each event, but the maps are commensurable. What is different in our contemporary technological context is the possible shape of such maps—the space of potential has evolved rapidly, but the concepts, models and discourse of music less so. The potential geographical, social and technological distribution of determining actions is vastly expanded—likewise the temporal scope: more access to the historical and local past, more decision-making brought into the precise conditions of the present.
2. Wave phenomena provide a natural model for time-based art, including sound. They can account for most “musical” or “generative” structures and can function on micro/timbral or macro/formal scales. A wave metaphor (for that’s what we’re dealing with) allows sound to be understood not in terms of objects but as an illuminating (enaudiating?) energy. It illuminates spaces, actions and events.
3. Theater—real or imagined—is a situation in which acoustic actions and memory, acoustic spaces and acoustic perceptions interact in the constructing of a form. The drama is a product of perceptions of those on stage modulating perceptions of the audience. As a well-tested model for consciousness, it affords abstraction, multiplicity and nonlinearity [1].

A *folto giardino* (dense garden) is the setting for the last act of Mozart’s *Le Nozze di Figaro*. Da Ponte’s stage directions in the score were the most detailed and complex to date (1786) [2]. However socially biting, his model is essentially that of



Fig. 1. Tempo Reale Electroacoustic Ensemble with Simon Limbrick (percussion), Jonathan Impett (electronics), *Folto giardino* / Limonaia di Villa Strozzi, Florence—Maggio Elettrico, 27 May 2016. (Photo © Mario Carovani)

farce: parallel locations, concealment, misrepresentation—a model of the mind, of the inseparability of knowledge and emotions. Mozart’s score provides another layer of commentary, of information and connections. At the same time, the knowledge of the audience is carefully managed. From this we can abstract an acoustic drama: Who knows what, hears what, remembers what?

An evolving map of spatial, listening and knowing relationships can be drawn. The configuration of hearing-spaces for the performers changes over time. Within these, not only do new networks of speaking and listening evolve but new “knowledge” is overheard or revealed. Importantly, a picture of *prior* knowledge emerges nonlinearly with the unfolding of the drama. The approach now becomes one of agent-based modeling. From this dynamical map, a set of virtual spaces is designed, populated by individual behaviors: physical, social, sonic, possibly rhythmic or pitched, and relationships that evolve with other individuals or groups. Some of these are realized electronically, but the principal behaviors are represented in parts for particular musicians. Notational lessons are learned from early *opera aperta* works (Pousseur), from Cardew, from Braxton, but important ideas derive from the dynamics of chamber music performance, with their fluid internal hierarchies and negotiations.

The dynamics of the works are determined by instructions to listen to or for certain sounds, to play in relation to others or to the physical installations in which the works are situated, or to remember moments from the performance or from the associations it invokes—including Mozart’s model. Different networks thus emerge across the performance. In addition to the sound processing—a parallel drama of which we hear the silhouette in the processed live sound—local acoustic environments are produced electronically; several of these may coexist, producing a pattern of micromodulation that may also impede or distort the performers’ perception. These spaces are constructed virtually and then populated by wave-emitting agents that can listen selectively and estimate their own contribution to a particular scenario; the drama plays out on a microlevel. Microacoustic phenomena—normally inaudible—are generated by simulating the room acoustic and fed back to the musicians electronically.

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Other “given” materials are produced by the same wave models and virtual spaces, their behaviors rendered and notated using OpenMusic.

A physical *folto giardino* mediates between the virtual and human actions. An installation of long wires of different metals and gauges (6–12 m of copper, brass and steel) stretches across the room and above both performers and audience. It is activated by transducers, fans and the actions of a percussionist, and listens through contact mics and laser reflection. It thus creates an active acoustic space, as well as a filtering feedback system on which the musicians can also perform. The live sounds are processed by a population of different kinds of filtering agents—an enveloping ecosystem of new voices. The behavior of these agents is directed by a wave model that derives its parameters from the live input; the environment and its inhabitants are coupled as a single system. Elements of the performers’ material, and ghosts of that from farther back in the compositional process, return in faint outline, filtered through the installation. They appear in developing conversations or subsequent scenes: things heard, or things previously heard, that condition the common present.

The garden itself is both acoustic environment and memory, bearing the traces of the events that take place within it. The physical memories of experienced performers interact with their digital counterparts; each has a different relationship with performance and historical time. Listening is contiguous with local and cultural memory: They involve rehearsal, reflection, reconstruction. To return to the theatrical metaphor, the scenography becomes the script.

Folto giardino I (Florence, 2016) (Fig. 1) is written for an improvising ensemble (electric violin, electric guitar, synth/electronics, piano) and solo percussionist, with computers, 4-channel sound diffusion and long string installation. The percussionist plays a vital role in mediating between the installation and the ensemble [3].

Folto giardino II (Hannover, 2017) develops the same basic materials in a fully notated score for woodwind trio, string quartet, keyboard, electric guitar and percussion, with the same installation and technology as before. Preceded by Boccherini’s string quintet *Musica notturna delle strade di Madrid*, echoes of that work are retained by the listening installation/garden for recall during *Folto giardino*.

References and Notes

- 1 Bernard J. Baars, *In the Theater of Consciousness: The Workspace of the Mind* (Oxford Univ. Press, 1997).
- 2 Wye J. Allenbrook, “Human Nature in the Unnatural Garden: Figaro as Pastoral,” *Current Musicology* 51 (1993) pp. 82–93; Mary Hunter, “Landscapes, Gardens and Gothic Settings in the Opere Buffe of Mozart and his Italian Contemporaries,” *Current Musicology* 51 (1993) pp. 94–104; Mary Hunter, *The Culture of Opera Buffa in Mozart’s Vienna: A Poetics of Entertainment* (Princeton Univ. Press, 1999) p. 197.
- 3 Tempo Reale Electroacoustic Ensemble, with Simon Limbrick (percussion), Jonathan Impett (electronics), *Folto giardino I*, Limonaia di Villa Strozzi, Florence, Maggio Elettrico, 27 May 2016: <youtube.com/watch?v=tsMHKL4cs3Y> (accessed 19 July 2017).

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SOUNDS OF WOW

Tape Composition and the Poetics of the Index

Joseph Kramer

ABSTRACT Sound artist Joseph Kramer discusses the function of indexical signs when working with magnetic tape and tape loops to elicit a nonsymbolic connection to the past. Compositional and technological strategies using custom devices to employ indexical signification are described.

I have been using magnetic tape in composition and performance for more than a decade, and many of the resulting works seem to conjure an acute feeling of memory, past or nostalgia—even when these notions are not explicit in a composition’s other formal elements. While there are multiple reasons for this, I am particularly interested here in the linguistic concept of the index. Through both intuition and explicit intention, I have employed indexical modes of signification to create work with a sense of direct physical connection to past moments.

The Index

The type of sign known as the *index* is distinct from an arbitrary *symbol*, like the letter “A,” or the pictographic representation of *icons*, in that the index’s relationship to its referent is the direct result of a physical interaction between the sign and the thing to which it refers. Footprints in the snow are an index of a creature’s movements, and a layer of dust may serve as an index of passing time. In the case of audio tape, sounds of wow, hiss and flutter serve as indexical marks of the recording’s production. While these sounds may also be conditions of playback, their presence points to the fact that the sound being heard is an artifact of the past.

The Modified Boombox

In 2003, I completed the first in a series of a signal processing devices that would become central to my practice. Its signal-delay system utilizes a dual-cassette boombox and two cassette shells, modified to pass tape from the record head in one tape well to the playback head of the other well. Engaging both record and play transports allows the boombox to record a sound and play it back a few seconds later. The tape is

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