Making Sculptures Audible through Participatory Sound Design

Florian Grond (researcher, sound artist), Centre for Interdisciplinary Research in Music Media and Technology, 527 Sherbrooke Street, West Montreal, Quebec, Canada H3A 1E3.
E-mail: <FlorianGrond@gmail.com>.

Adriana Olmos (interface designer), Pivotal Labs, 875 Howard St, Fifth Floor, San Francisco, CA 94103, U.S.A.
E-mail: <aolmos@pivotallabs.com>.

Jeremy R. Cooperstock (engineer), Department of Electrical and Computer Engineering, 3480 University Street Montreal, QC H3A 0E9,
E-mail: <jer@cim.mcgill.ca>.

See <www.audible-sculptures.ca/blog> for video associated with this article.

ABSTRACT

A research group explores rendering sculptural forms as sound using echolocation and the participation of members of the visually impaired community.

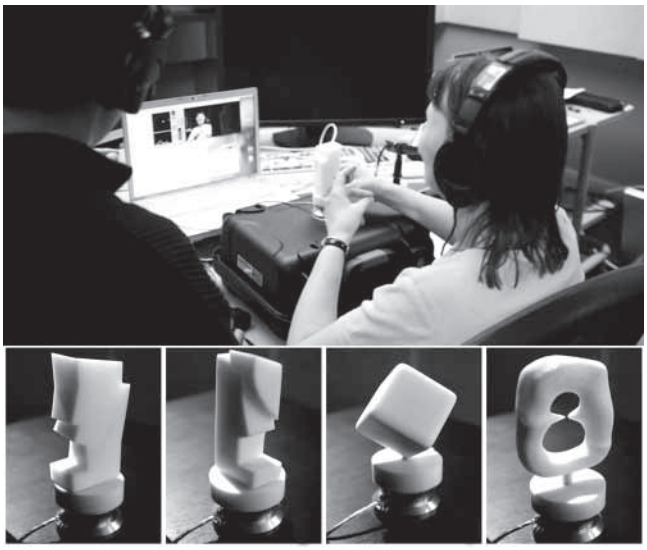

Fig. 1. Evaluation of audible sculptures, 25 September 2012 <www.audible-sculptures.ca>. (© Florian Grond)

Motivated by observations made during a field study with members of the visually impaired community [1], we were intrigued by the possibility of rendering sculptural forms as sound (Fig. 1). For many blind individuals, echolocation—listening to the acoustic reflections of sharp impulses from nearby objects—is a familiar mode of gathering information about one's surroundings. While echolocation encourages strong engagement with the audible environment, artworks such as sculptures often remain inaccessible. We attempted to enhance the audible experience of sculptures so that blind individuals could gain a mental representation of their forms and an appreciation of their presence.

We adopted echolocation as the interaction paradigm because it allows for a natural engagement with the sculptures by triggering sonic responses through snapping of fingers or tongue clicks. Our program renders back these short impulses as an echo by convolving them with sounds of approximately 1 second in duration. These sounds are not meant to be a musical reinterpretation of the sculpture but instead give a systematic representation of each listening position around the sculpture. The sounds were composed through the sonification of geometric features that vary according to the listener's perspective. The sonification is based on two complementary methods: one proposed by Meijer [2] and one by Hermann [3]. In the combined method, we map geometric information about the orientation of the sculptures' surface elements to spatial and spectral parameters. The sound changes its characteristics depending on the listener's position.

The characteristic of the convolved echo sound varies between dull and sharp, according to the sonic quality of the impulse. Since no finger-snap or tongue-click can ever be reproduced exactly, the interaction paradigm creates an increased level of engagement through the tension between repetition and variation. Although the sound depends on the listener's actions, it is less a musical gesture than a manifestation of the object itself. At the same time, however, the sound is not an expression of, but a dialog with, the sculpture. The sculpture replies, similar to an echo, with a certain delay. Action precedes perception, and hence echolocation can foster a certain mode of listening that encourages one to attend to the quality of the interaction between the impulse and what the reflections might represent. Directing the listening focus to this link allows the sound to convey information beyond its musical and associative potential.

Developing sonifications with a blind audience made this project an interesting artistic challenge. Like any other art form, sound art relies on some contextual knowledge and aesthetic references of the field. In our case, however, the key to engaging with the sound is related to a listening skill. For this reason, we involved a member of the blind community in a participatory design approach, hoping to ensure that our target audience would find interpretable sonic results. In a small qualitative study with four blind participants, we found that in some selected cases, the sounds could be well identified with the orientations of small 3D replicas of the sculptures.

In this project we experienced that "echolocation-based" interaction not only has the potential to translate the geometric features of sculptures into sound but that it also refers to the sense of touch and, by engaging other modalities of perception, shares a commonality with sound art [4]. During the qualitative study, we observed that our participants enjoyed being able to experience both sensory modes at the same time. From an artistic point of view, sound can complement the experience of the immediate realm of touch by giving the sculptures a presence that projects into space, resonating persistently in the audience's mind.

References and Notes

1. The field study was carried out within the In Situ Audio Services (ISAS) project. The audible sculpture project is funded by a Strategic Innovation Fund award from the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT).

2. P.B.L. Meijer, "An Experimental System for Auditory Image Representations," *Biomedical Engineering, IEEE Transactions* **39**, No. 2, 112–121 (1992).

3. We used the data sonogram. See T. Hermann, "Model-Based Sonification," in T. Hermann et al., eds., *The Sonification Handbook*, (Berlin: Logos, 2011) pp. 399–427.

4. A. Licht, *Sound Art: Beyond Music, Between Categories* (New York, NY: Rizzoli, 2007).

Manuscript received 2 January 2013.

Florian Grond works as a researcher and sound artist at the intersection between the arts, science and technology, with a focus on sonification and sonic interaction design in auditory display and artistic contexts; his artworks have been presented at various venues across North America, Europe and Asia.

Adriana Olmos works as a design researcher and interaction designer with a focus on visual- and audio-driven interfaces across many devices, contexts and communities, ranging from blind people to professional musicians to power plant engineers.

Jeremy R. Cooperstock is an associate professor in the Department of Electrical and Computer Engineering and director of the Shared Reality Lab, which is broadly concerned with human-computer interaction technologies, emphasizing multimodal sensory augmentation for communication in both co-present and distributed contexts.

Presentness in Displaced Sound

Yolande Harris (composer, artist),
DXARTS, Box 353414, University
of Washington, Seattle, WA
98195-3680, U.S.A.
E-mail: <yo@yolandeharris.net>.
Website: <www.yolandeharris.net>

See <www.mitpressjournals.org/toc/lmj/-/23> for supplemental files associated with this issue.

ABSTRACT

The author discusses her works that explore sound's influence on creating a sense of presentness and her aim to increase the audience's awareness of this influence.

The deceptively simple process of recording sounds from a chosen environment and replaying them at another time and place is laden with assumptions about context and portability. Whether considered documentation, preservation or musical material, this practice, usually referred to as "field recording," provokes important questions about establishing relationship to place through listening. The theory and practice from the 1970s to today of sound artists and acoustic ecologists, such as Schafer, Westerkamp, Lockwood, Oliveros, Dunn and LaBelle, echoed in visual art (e.g. Robert Smithson's concept of "Site/Nonsite") provide a rich variety of approaches to this topic. Although field recordings make sounds available to a distant public, any de-contextualization of a soundscape from its environment forces us to listen as outsiders, inevitably biasing our understanding. This can lead to a pseudo-understanding of a distant location, which, at its worst, I call "sonic colonialism." When listening to field recordings, we need to consider our relationship to the recorded sounds: the context in which they originate, the place in which we hear them and how our experience is mediated by technology. This also applies to environments that we cannot physically access, such as underwater, inside the body or other extremes of physical and temporal scales.

If sound is a form of energy, generated and embedded in place and describing acoustic relationships occurring within a specific location, then a recording is like a sonic ghost of place. How can a sense of presentness—an acute awareness of embodied location—be achieved in such displaced soundscapes? In my work, I consider the listener as the spatio-temporal locus of a perceptual event, emphasizing how techniques of listening can potentially

Fig. 1. Yolande Harris, *Tropical Storm*, sound and video installation, 2009/2012. Installation view, Museum of Contemporary Art, Leipzig, 2012. (Photo © Yolande Harris)