

International Conference on Auditory Display 2002

Advanced Telecommunications
Research Institute, Kyoto, Japan,
2–5 July 2002

*Reviewed by Bob L. Sturm
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The latest edition of the International Conference on Auditory Display, ICAD2002 (www.icad.org or www.mic.atr.co.jp/icad2002/page/welcome.html), was held at the Advanced Telecommunications Research (ATR) Institute in Kyoto, Japan on July 2–5. This conference brings together a variety of professionals, researchers, and students in fields such as sonification, data visualization, auditory perception, human computer interaction (HCI), virtual acoustic environments (VAE), as well as a few interdisciplinary artists. This year's presenters came from Europe, Australia, Japan, and the USA, and a few from Canada and Singapore. In addition to the academic presence, there were several participants from professional sectors: Nokia, France Telecom Research & Development, Minolta, Canon, Matsushita Communication, NASA Ames Research Center, Rockwell Scientific, as well as the United States Naval and Air Force Research Laboratories. The corporate presence signifies the growing interest in, and applicability of, auditory display techniques for commercial products such as cellular phones and digital cameras, as well as ongoing work in virtual reality and data-set visualization.

Auditory display (AD) is the use of sound to communicate between machine and human, and to explore and understand one's environment. Some examples are the Geiger counter, computer error beeps, crosswalks for

the blind, and hospital vital sign monitors. More complex examples are SONAR, sonification of multidimensional data-sets, and complex military simulations. AD can provide an eyes-free and non-intrusive medium to communicate essential information about a situation. For example, in the operating room, eyes should be devoted to the procedure and not distracted by having to watch a record of a patient's vital signs.

ICAD2002 was significant in that it marked the ten-year anniversary of its inception at the Santa Fe Institute (SFI). Gregory Kramer, who conceived and helped organize the first ICAD in 1992, gave the keynote address in Kyoto. He talked about the history of ICAD and how its legitimacy was established by two key publications: the proceedings of the first conference published by SFI in 1994 (Kramer, G., ed. *Auditory Display: Sonification, Audification, and Auditory Interfaces*. Santa Fe Institute Studies in the Sciences of Complexity, Proc. Vol. XVIII. Reading, Massachusetts: Addison-Wesley, 1994), and a report funded by the National Science Foundation (USA) on the field and status of AD (Kramer, G., B. Walker, et al. 1999. *Sonification Report: Status of the Field and Research Agenda*, ICAD, Santa Fe; online at www.icad.org). Mr. Kramer talked at length about the multidisciplinary nature of AD, emphasizing that its successful application requires knowledge of sound, psychoacoustics, audio programming, and HCI. This makes a conference such as ICAD to be "both focused and open," allowing for a mixed interplay of disciplines and participants. Mr. Kramer's address was also focused and open when he invited on the spot several participants to speak who have been instrumental in ICAD's continual success.

Elizabeth Wenzel, who researches spatial hearing at NASA Ames Research Center in California, was essential in organizing the first ICAD, and continues to actively participate. The current ICAD president, Eric Somers, talked about how he became involved through his sound-art work. Stephen Barrass and Bruce Walker were both asked to discuss how ICAD added legitimacy to their doctoral research, which is entirely devoted to AD. Matti Gröhn, multimodal virtual reality researcher at Helsinki University, Finland, has attended every ICAD and remarked on its progress. These participants demonstrate the wide base of disciplines that have been and continue to be active in this international research community.

During the four days of the conference there were five tutorials, several paper and poster presentations, two demonstrations, a multimedia installation, a brief concert, and the traditional open-microphone session. One was able to attend everything since ICAD is a single-track conference.

The first day was devoted to five tutorials, but only two of them fit that function. Simon Carlile, from the University of Sydney, Australia, presented a useful overview of auditory dimensions. He talked in detail about the sensitivity of our ears and the benefits and detriments of each aural dimension, such as pitch, loudness, and auditory streaming. William Martens, from the University of Aizu, Japan, presented a nice review of current work in spatial AD. Most insightfully, he addressed the tension between the developers who want demos and the scientists who want data.

Paper and poster topics included: sonification techniques, sound as navigational aids in cellular phones, auditory perception in three dimen-

sions, VAEs, and experimental results in auditory perception. One interesting idea was customizable Head Related Transfer Functions (HRTFs), whereby only a few parameters of a generic HRTF can be changed to suit any user. One paper demonstrated the inability of sighted listeners to accurately estimate the distance of a sound source greater than one meter away. Though it had little to do with sonification, one paper presented a tool that reduces an audio signal to a MIDI approximation. Most memorable was the transformation of speech into MIDI marimba. This software has compositional curiosity, but is only available for Japanese Windows-based computers (www.dcaj.or.jp).

Most of the papers and posters were excellent, but quite a few were redundant or had little to do with AD. Had these been eliminated some posters could have become papers, and more time could have been spent going through the posters. One poster that should have been a paper was the work of Thomas Hermann et al., who are creating novel techniques for exploratory data analysis using acoustic data representations. One such technique involves virtually placing a multidimensional data-set into a haptic device that resembles a potato with buttons. Shaking, twisting, squeezing, and hammering the device makes the data-set react and create sounds that provide insight into the data.

Only two demos were presented, even though they were a bit under-advertised. The first was of a hypersonic sound system that produces frequencies from 20 Hz to 100 kHz. In a soundproof room, they played a soundtrack of the Japanese animation movie *Akira* that was recorded at a sampling rate of 3.072 MHz. Their research argues that while humans cannot hear above 20 kHz,

higher frequencies affect the regional blood flow in and around the brain. This creates a measurable positive effect that they term the "hypersonic effect." Unfortunately, there was no standard sound system there with which to make a comparison.

The other demo was of the Sound Lab (SLAB), developed at the NASA Ames Laboratory, which creates a dynamic VAE that responds to listener position. The demo consisted of a laptop and headphones equipped with the small Polhemus Fastrak electromagnetic tracking sensor. The VAE had a man and a woman speaking in a room, and each voice could be positioned and made to travel different trajectories. There was a realistic difference when the source was either moving in front of or behind my virtual head. In an "off-ICAD" presentation by Joel Miller, the programmer of SLAB, I auditioned two of his compositions that impressively use SLAB and binaural recording. This software is developed for PC computers running Windows 98 and 2000, and is now available for free from human-factors.arc.nasa.gov/SLAB.

In addition to the demos, there was a multimedia installation entitled *Acoustic Acclimation* by Coscilia (Lulu Ong and Damien Lock, Singapore). Within a quadraphonic loudspeaker array was a complex handmade controller with a large spinning potentiometer, four slide controllers, and a button. On the projection screen in front of this was an inviting though confusing graphical user interface. The visuals were 360-degree still shots of environments from Singapore, such as a reservoir, a beach, or a neighborhood. The sounds were all recorded on location and could be altered, mixed, and panned through Max in response to the user's controls. Rotating the potentiometer makes the visuals and

sounds pan in the same direction. Each of the four sound layers could be faded with slide controllers. Even though this installation had little to do with aesthetic uses of sonification, it inspired thinking about the sense of meaning contained in an AD, and provided a comfortable escape from the conference.

The concert was short and provided a limited but pleasant experience of traditional and modern Japanese music for two kotos and one shakuhachi. There was also a piece for solo cyber-shakuhachi, which senses the movement of the performer's head, shoulders, fingering, and the sound of the instrument. This was rather like the usual sort of piece for such an instrument, demonstrating every sensitive feature over a long period of time. But the piece did have its moments of beauty and insight.

At ICAD2002 there was certainly more focus on data rather than demos. Too few presenters used the room's sound system to demonstrate their research. In his keynote speech Mr. Kramer said that there has been a significant under-representation at ICAD of those who are actually synthesizing sound, and even more so of people who intimately know how to work with sound, such as musicians and composers. Of 68 papers and posters this year, I counted only eight that deal with synthesizing sound from data. Two of these papers touched upon the artistic use of sonification.

In response to this artistic dearth, ICAD2002 Secretary Rodney Berry reserved a part of the open-mic session to the few artists in attendance. The open mic is generally a time to give critiques and suggestions, as well as to advertise upcoming events. Computer programmer/artist Alan Dorin discussed his *LIQUIPRISM*, a work for video and MIDI sound gen-

erated by cellular automata. Composer Eric Somers discussed his use of polyphonic spoken text in a recent piece informed by the "cocktail party effect." Composer/scientist Bob L. Sturm presented his 4-min composition *Torrey Pines: 200110-200112*, a sonification of the inner and outer buoy data at Torrey Pines State Beach, La Jolla, California. There are ongoing discussions that future conferences should incorporate more artistic content, for instance a curated concert of compositions that utilize sonification and AD techniques.

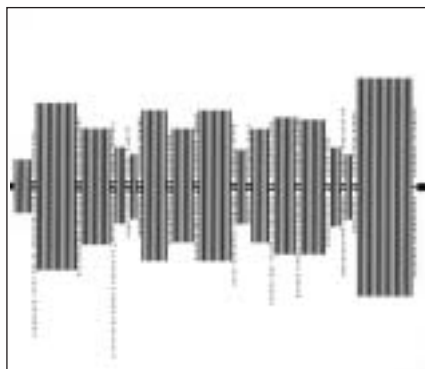
Overall, ICAD2002 was a successful and informative event in an inviting and historical locale. ATR, the Kansai Technology Park, and the research occurring there are impressive, and the people there were very welcoming. Congratulations to Chair Ryohei Nakatsu and his wonderful team for making ICAD2002 a successful and memorable event.

ICAD2003 (www.cns.bu.edu/~ICAD2003) will be held in Boston, sponsored by the Boston University Hearing Research Center, chaired by Professor Barbara Shinn-Cunningham.

Publications

Brandon LaBelle and Christof Migone, Editors: *Writing Aloud—The Sonics of Language*

Softcover, 2001, ISBN 0-9655570-3-0, 279 pages, illustrated, CD-Audio, US\$ 20.00; Errant Bodies Press, Los Angeles, California 90093, USA. Ground Fault Recordings, P.O. Box 4923, Downey, California 90241, USA; electronic mail mail@groundfault.net; Web www.groundfault.net/. Distributed by Distributed Art Publishers, Inc.,



155 Sixth Avenue, 2nd Floor, New York, New York 10013, USA; telephone (+1) 212-627-1999; fax (+1) 212-627-9484; Web www.artbook.com.

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Writing Aloud—The Sonics of Language addresses many issues which must be considered in any serious investigation of the expressive powers of language. For example, the self-reflexive nature of language inevitably creates problems for anyone attempting to write about it. We are forced to ask: what type of language is appropriate or adequate when describing and examining the structures of language itself? This kind of problem was, of course, a preoccupation for many poets in the late 19th century. All attempts to establish exact correspondences between concepts or objects in the world and the words used to denote them were unsuccessful. The webs of private meanings that surround each word prevent any precise mapping from author to reader. The result has been the proliferation of literary theories emphasizing the demise of authorial intention.

Language imposes its own structures, and subtexts are produced over which writers have little, if any, con-

trol. All attempts to analyze a text and fix its meaning (or meanings) simply produces another text which can in turn be subjected to analysis resulting in another text . . . and so on. So, is there an alternative? In fact, does this resistance to stability create the very tensions that artists can exploit?

No book can investigate all the ramifications of these problems but this extremely interesting publication examines language by a combination of scholarly work with reflections by practitioners in addition to presenting actual art works. *Writing Aloud* reasserts the concrete nature of the sounds of language and explores some of their relationships with the written forms of language. Thus, the "primacy" of the spoken word (or, strictly speaking, the "articulated utterance," given that several authors are concerned with extended forms of vocal communication) begins once again to occupy the central position in the work of many artists and writers using language as their principal medium.

Furthermore, the inclusion of a compact disc containing audio works by several of the authors in addition to other artists such as Michel Chion and Vito Acconci is an inspired strategy. The inexpensive nature of CD recordings now makes the dual presentation of text and sound a feasible proposition for many publishers. A well-known example is the CD provided in the reissued version of Charles Rosen's book *Sonata Forms*. Mr. Rosen's performances of Beethoven's sonatas Op. 106 and Op. 110 illustrate his intelligent commentaries on a musical form which resists simplistic description. The recording itself emphasizes the problem which analysis cannot avoid: what is the relationship between the notation and the actual concrete musical realization. Do we analyze the score or a