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The Audience in the Center:

Diffusion Practice at Sound Travels

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Sound Travels is a concert series using live and automated eight-channel diffusion to question electroacoustic practice and enhance the concert listening experience. Outlined are performance strategies utilizing the Richmond Sound Design Audiobox, the aXi0 midi

controller, and alternative seating arrangements that are designed to make the concert experience more artistically challenging for the sound artist, immediate for the listener, and more widely accessible to artists, producers, and audiences.

Sound Travels is a series of concerts and residencies devoted to eight-channel diffusion of electroacoustic and experimental sound art produced by New Adventures in Sound in collaboration with a number of organizations world-wide. Working from a home base at the Gibraltar Point Centre for the Arts on Toronto Island, Sound Travels provides composers and sound artists with opportunities to refine the practice of eight-channel sound diffusion.

The goal of Sound Travels is to use the multi-channel medium not only to enhance the creative possibilities for electroacoustic sound diffusion in performance, but also to place the audience in the center of the experience and to stress the value of their participation. We work towards this goal by taking advantage of two new Canadian technological innovations, the Richmond Sound Design Audiobox and the aXi0 midi controller, and by questioning established performance traditions for electroacoustic sound art.

The traditional practice of manually projecting stereo material en masse to an array of 16 or more loudspeakers located beyond the audience area is replaced with the Audiobox and its control software ABControl (Rolfe, 1999). The Audiobox and ABControl automate the diffusion of eight input channels to a more economical array of eight loudspeakers that encircle the audience. This provides a number of advantages:

(1) Spatial movement and placement is expressed polyphonically through a matrix of eight inputs and eight outputs. To creatively access all combinations of the 8X8 matrix necessitates the use of computer automation. By programming the automation, sound artists are able to conceive of their diffusion as an extension of the composition process with a week or more devoted to its refinement.

(2) The economic portability of the Audiobox and the eight-channel playback configuration makes repeat appearances of a composer's diffusion possible for all occasions small and large. The opportunity for making corrections and refinements in rehearsal with the Audiobox means that an automated multi-channel mix can be fully adapted to the acoustical and logistical constraints of a particular concert space.

(3) Audiences are immersed inside a surrounding dynamic sound world with the eight speakers encircling them. Conventional proscenium shoebox configurations place the majority of the listening audience outside of the area that has the highest resolution for spatial differentiation. Alternatively, Sound Travels places its audience in the center of this sensitive region so that all seats are equally important and no one is alienated from enjoying the full potential of the concert experience.

The second Canadian innovation, the aXi0 midi controller, is a more recent implementation and is still in a period of growth and discovery for Sound Travels. Therefore, I will briefly discuss it later on before concluding.

Polyphonic Spatial Movement

The main attraction for the multi-channel medium is that multiple layers of a composition can move independently in space. Before becoming involved in multi-channel concert production, I was drawn to the medium because I was composing works in which the vertical

organization was fairly compact and dense. Sounds that lend themselves to dynamic spatial movement, such as seagulls, vehicles, and percussive gestures were mixed together in my case with contextual soundscape recordings of parks, city streets, shopping malls, and so on. Moving a stereo mix of these sounds to an array of multiple loudspeakers was extremely inhibiting, and even arbitrary, because I could not express the intentions of one without contradicting the nature of the other. In my radiophonic works Life Unseen and Lapse in Perception, the multi-channel medium enabled me to position the text and associated sounds in different locations without sacrificing the stereo imaging inherent in any source. This differentiation in spatial placement minimized the effect of masking and expanded the dynamic range available to both elements.

In addition, one can achieve a greater integration of sound and text by using the movement of (or stillness of) sounds to illustrate or counterpoint spatially an idea conveyed in the text. Such spatial interrelationships whether involving text or not are not possible when everything is mixed down to stereo before being distributed to an array of loudspeakers (Truax, 1999).

Portability and Adaptability

The recent drop in price for eight-channel sound cards has created a proliferation of eight-channel works and concerts in the electroacoustic field since the start of Sound Travels in 1998. Therefore, what I have illustrated in the above is already widely available to sound artists today, which is fantastic, because the multi-channel format has provided a low cost alternative for concert producers that do not have the resources to assemble over sixteen loudspeakers. However, patching eight outputs from a recorded diffusion to eight loudspeakers in a small enclosed studio does not necessarily translate into the same experience when it is played back in a concert hall, no matter how small the venue.

The concert hall is a very different listening space than the studio. For one thing, the increased or decreased reverberation in the concert hall might hide spatial movement or reveal elements of the mix that were not noticed in the studio. Secondly, the sweet spot in the studio might only be available to a small minority of the concert audience. And finally, the resonant peaks of the hall and equalization characteristics of the loudspeakers will be different than those of the studio and again will influence not only the rendering of spatial movement but may upset the relative balance of input levels. Therefore, to simply play an eight-channel mix without further alterations prevents the work from adapting to the particular nature of its presentation context, which can result in a loss of spatial definition and signal clarity.

With the Richmond Sound Design Audiobox, there is the opportunity in rehearsal to make alterations to spatial movement and placement, input and output mix levels, equalization curves and even delay settings on all individual inputs and outputs. These alterations can be programmed into a sequence and/or controlled live in performance.

One other aspect of multi-channel diffusion that can be altered with the Audiobox is the specification of speaker positions, which are expressed in the ABControl software user interface as an angle around a 360° horizontal axis (Rolfe, 1999). The conventional speaker layout for Sound Travels is a circle of eight speakers positioned every forty-five degrees. However, some concert halls have shapes, seating arrangements, or other physical limitations that require different angle positions for loudspeakers than those used in the studio where the diffusion was realized. By changing the angle positions of loudspeakers plotted in the software in what it is called a Speaker Map, one affects how the output levels are distributed proportionately to render the desired angle position for a point source. In other words, a speaker close to the desired angle position will proportionately receive more of the output signal than an adjacent speaker that is further away. This is calculated by determining the angle programmed by the composer for that input channel relative to

where loudspeakers are plotted around the 360° horizontal speaker map. The speaker map also makes it possible to adapt diffusions between double diamond, four pairs, (Copeland and Rolfe, 1999) and twisted cube eight-channel configurations, as well as to adapt for spaces that have greater or less than eight discreet outputs available for playback.

By making such adjustments to the automated multi-channel mix in ABControl, the diffusion realized by the composer is not obliterated by the presentation context, nor is it presented with disregard to the particularities of the context. However, proper adaptation of a piece to a context necessitates careful and repeated listening in rehearsal. Therefore, the luxury of automation is that one can listen in rehearsal as a critical audience member and make adjustments that are guided by judicious listening and knowledge of the diffusion and techniques employed. By following this principal, Sound Travels operates a systematic dissemination mechanism for a travelling concert repertoire that is portable, inexpensive, and of course, fully adaptable (Copeland and Rolfe, 1999).

Listener Immersion

Technology aside, there is an important element to consider in eight-channel presentations: the arrangement of loudspeakers in relationship to where the audience is positioned in the concert hall. With the eight loudspeakers in a circle surrounding the audience on all sides, the audience finds itself at the center of the experience. Ideally, when logistics permit it, the audience is seated at Sound Travels not in the conventional shoebox configuration, but in concentric circles facing inward to the central core of the hall.

Although it looks strange at first and requires audience members to make some adjustments, this alternative seating arrangement increases significantly the number of quality listening positions. In the conventional shoebox configuration, the listening experience is

severely compromised if one is not located in the sweet spot, or what is generally the middle of the seating area. If this fact is not properly addressed, than such presentations run a great risk of alienating the majority of its audience that can not sit in the middle. For further discussion about maintaining the stereo images for different listening areas outside of the sweet-spot I refer you to a recent article by Jonty Harrison about diffusion practice with the BEAST system (Harrison, 1999). Alternatively, we have found at Sound Travels that if you turn an audience member's back to the closest loudspeaker than you reduce the precedence effect. In other words, you correct the relative balance between close and far point sources, because the closer point source is diminished by having to travel around the back of the head. Sound Travels concerts generally take place in smaller concert venues of less than a hundred seats, so this fact might have a bearing on our preference for this unusual seating arrangement.

The most striking difference for composers that our seating arrangement poses is that there is no universal front and back or close and far point for the audience. Thus, every seat in the house is unique and sound artists must take this fact into account when preparing diffusion for Sound Travels. The absence of a universal front and back can be limiting for some works. Particularly for those that conceive of space as a proscenium stage on which sounds move or depart from as if they were actors in a play that also had the opportunity of moving out into the audience area.

However, if a sound artist is willing to let go of this construct, than the issue of public access can take priority. Chris Rolfe is the software designer for ABControl and has had a tremendous influence on the way sound diffusion is practiced at Sound Travels. During our diffusion residencies he has used the analogy that good diffusion is democratic, because it distributes the material in such a way that everyone in the audience engages equally in the experience and is not cut off from some sounds because of the spatial proximity of others. Therefore, to achieve good democracy is to limit the precedence

effect and masking, and to orchestrate the polyphonic placement of sounds in space with enough variation that any one listener is not stuck with one sound all the time while missing out on others. This challenge is not unlike the differences between staging a play in the round versus the proscenium. If you apply the thinking of one onto the other without accounting for the limitations and possibilities inherent in the audience's experiences, then one will likely have some problems. However, if one works with those inherent limitations and possibilities in mind than new ideas and constructs emerge and allow for a completely different path of discovery.

Bringing Back Live Performance

After having discussed the virtues of an automated system for eight-channel diffusion, I want to address the issue of live performance in electroacoustic sound art, which has been a contentious issue for the contemporary music community since the pioneering days of musique concrète in France. By relying almost entirely on automation to diffuse sound polyphonically, the limited role of live performance in our practice becomes awkward for an audience who is not familiar with the acousmatic lore of listening without seeing. This is particularly the case in our home base of Toronto, which is a city that has not cultivated electroacoustic practice to nearly the same degree as Montréal (Copeland, 2000).

We have addressed this problem a number of ways in the past by shaping the audience's expectations when they arrive at the concert venue. First, we shift their visual focus from the outward void to the inward assembly of listeners. Second, we present our local concerts outdoors on Toronto Island, which is a vehicle-free park land located 15 minutes by ferry from the downtown core of Toronto. This way people do not just come to hear the music on the concert, but also come for the experience of the environment in which the concert takes place.

However attractive these alterations to standard practice might or might not be they do not deal wholeheartedly with the fact that audiences expect music in the concert hall to be a form of social communication. In the social context of the concert hall, as it has been practiced in the west for hundreds of years, a performer living and breathing in the same environment as the audience becomes the focal point of the experience, the assumed mediation point between music and listener.

Addressing this issue more directly lead us to the implementation of another Canadian technological innovation. By adding a live midi controller to our diffusion system the audience is given that human mediation point that is so difficult to deny. The midi controller we are using is called the aXi0, which is short for Alternative Expressive Input Object.

The aXi0 was designed and built by Brad Cariou in Calgary for composer David Eagle. It is cross like in shape and can be played while either standing up or sitting down. On the left hand side is a palm-rest joystick. It can respond to movements around a 360-degree axis, which maps very well to the diffusion vectors in our software. It can also respond very sensitively to downward pressure and this too can be programmed to effect certain characteristics of the diffusion, such as amplitude or the number of speakers that a source is sent to at one time. On the right hand side is a small midi keyboard with after touch that can be used for triggering sound samples or any number of other devices that can communicate through midi. In between these two controllers is a vertical strip with switches that rests on the performer's shoulder. These switches can be used to send program messages to the software for cueing and triggering presets and sequences or for triggering other midi devices (Eagle, 2001).

David Eagle introduced the aXi0 to Sound Travels during a residency at the Banff Centre in October 1999. With the touch sensitivity joystick of the aXi0 being comparable to a conventional instrument,

David Eagle could intuitively move sound around the space in an instant that would previously take composers a few hours of careful programming to render. When combining his live performance with automated diffusion gestures generated by software we discovered a very powerful performance tool that gracefully combines the philosophies of live electronics with studio-centered acousmatic art. Incidentally, these are two worlds that rarely cross paths, as we are used to associating with them has having separate histories, philosophies, and traditions.

Thankfully the integration of the aXi0 was so natural that the stronger points of our practice were not changed. Therefore, in the center of the space, surrounded by the audience stands the aXi0 performer. Around the audience are the eight loudspeakers in a circle and lying beyond that in our local concerts are the shores of Lake Ontario and the forested surroundings of Gibraltar Point on Toronto Island. The performer can either diffuse pre-recorded material live in tandem with automated diffusion moves, or act as both an instrumentalist and live diffuser with or without automated assistance. During the studio residency the performer and composer together have the option of using the aXi0 to create diffusion gestures that can be captured and played back in an automated sequence. Thus, the performer becomes both conductor and soloist after working closely with the composer over the typical ten-day studio residency.

The implementation of the aXi0 is still at an early stage of development so I will save further discussion of it until a later time. However, it does represent a step into the future where live performance in electroacoustic diffusion is not a poor artistic compromise for the artist or an awkward social experience for the audience. Instead live performance can work in tandem with electronic assistance, as evidenced in practices that use the recording model of sequenced automation or those that use rule-based chance procedures. Both forms of electronic assistance are possible with the combination of the aXi0 and the Audiobox, and similarly studio based acousmatic

practices are also possible with these same resources. Such diversity of opportunities expands the accessibility of Sound Travels to new audiences both locally and abroad.

Thankfully making electroacoustic sound art accessible to the public does not require musical compromises that force it to play it to an unwanted, probably unattainable, standard. Instead, it is about including the audience in on the experience, which can be addressed by where audiences are positioned in relationship to the loudspeakers, and about providing them with a guidepost, such as the aXi0, that steers them through the experience. Reaching an audience in my opinion is the greatest creative challenge to an artist and to a concert producer. Thus, Sound Travels has departed from conventional electroacoustic practice not only to enhance the listening experience of its attending public, but to extend the opportunity to the greatest number of people. This would not be possible without a flexible, portable, and affordable multi-channel playback system.

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