Sonic Screwdrivers - Sound as a Sculptural Process

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Abstract

This paper discusses a Fine Art approach to the processes of digital audio. The author puts forward some ideas for a re-defining of digital audio software to embrace a wider audience and to promote the manipulation of sound as a sculptural process removed from, yet still related to, the assumed musical tradition. The authors artworks are introduced, and the impact of current research upon these artworks and upon the authors teaching are discussed.

I remember watching, as a child, the BBC TV series 'Dr. Who', in which the time traveling Doctor would repair problems in the fabric of time and universe by the use of his Sonic Screwdriver. I was particularly fascinated by the fact that this 'Sonic' device could be used to fix almost every technical problem the Doctor ever encountered! However ridiculous the notion may now seem, the connections between sound, time, and the nature of reality were laid down for me then. All that I needed was the device! As a sound sculptor, I have found that my own sonic screwdriver is not one single tool, but a collection of many, a sonic tool-kit. These tools are not physical, but virtual - machines which exist in the digital medium, and they allow me to manipulate sound in such a way that I can, at least for a time, alter reality in my own way.

Image makers and musicians have long found and fostered connections between the aural and visual; ideas such as the Golden Section and correspondences between light and sound frequencies often forming the philosophical and theoretical bedrock of their artworks[1]. Specific notions such as rhythm and harmony are more problematic and harder to translate across disciplines, frequently requiring a less 'global' interpretation, relying more upon individual practices and approaches to successfully communicate the particular resonance upon which the artist is focusing. Contemporary artists, however, are now able to link media at the structural level with computers; the digital storage, representation, and manipulation of both sound and image introduces the binary as a unifying concept across the arts. At the digital level, the 1's and 0's of any media are capable of being subjected to an infinite variety of processes, some of them specific to each media type, others common to all.

In my work I have taken the spirit of these different processes and worked them into the structural organization of the artwork, using Macromedia's Director software as a kind of conductor. The 'scores' which this 'conductor' follows are a series of indeterminate programs which trigger the appearance of various pre-arranged media over time[2].

As an artist, I have found the digital manipulation of sound to be the activity that most closely corresponds to my own sculptural practice with steel, stone and clay. Introduced initially to Macromedia SoundEdit 2, and Steinberg CuBase, I was informed that these were industry standard sound authoring software packages. However, I was determined to escape the ‘musical’ metaphors of so many of these environments, since I wanted to use the technology to develop my own sculptural approach to temporally based soundscapes. To develop my expertise, and to attempt to locate what I was doing within some art-historical context, I set about a program of research into the history of electro acoustic and computer music, and the functions and interface design of these software packages. It is quite clear in both programs, that interface design has been based on previous 'real world' technologies. In the case of SoundEdit, we can see the representation of the now practically extinct tape studio of old, and with CuBase, we can trace the design back to (and possibly beyond), the Dutch Carillon as early as AD 1200[3].

For the majority of artists, an introduction to digital media will be based around a fairly standard set of software programs (Most likely Director, Adobe Photoshop and Premiere, and SoundEdit or SoundForge on the PC). As artists, the visual packages will be more familiar, and possibly the easiest to learn. However, the potential of the sound software will be hidden until the user understands the interface, and the functions of the various tools (Normalising, Pitch Shifting, Equalizing, etc.,) on offer.

There is, however an added dimension, which is frequently overlooked and is the main idea behind this paper and the accompanying presentation. Digital sound processes reflect advances in the world of sound composition, performance and production in a way that digital visual processes do not. One thing that has become apparent in the reserarch is that advances in sound technology are largely practitioner led, responding to the requirements of those who work with sound at all levels. Image making, on the other hand has never been the exclusive domain of artists, and this is reflected in the software. We are, still, a predominantly visual society and as such, graphical software designers are able to assume a quite sophisticated awareness of the design and production of most images and image making techniques on the part of the user. This is why, for instance, Director uses the graphical representation of frames over time as its main 'score' interface - most users will already be familiar with animation techniques, and the nature of film simply through a common awareness of contemporary media. Software exists which enables anyone to make interesting and professional quality images easily due to the inherent visual skills we all develop as we negotiate our lives through society. Let us not confuse image making with art here, advances in the fine arts are as esoteric to the general public as are those in sound composition. But this also is exactly the point - visual software develops for commercial reasons, reasons unrelated to the practice and development of image making in the arts. Sound software, conversely is developed largely through the advances of contemporary sound practitioners.

During my research, I became very interested in the software developed by practicing sound artists and musicians - Tom Erbe's SoundHack, Akira Rabelais' Argeiphontes Lyre, Curtis Roads' and John Alexander's Cloud Generator, Arjen Van Der Schoot's Thonk and Barry Traux's PODX system to name but a few. What fascinated me most is the way that these packages represent specific ideas about sound and sound composition, their purpose is process, not necessarily the making of music. In 'Audible Design', Trevor Wishart locates the analysis and practise of 'traditional' music making within the tradition of text, in that we regard the score as the authoritative representation of the musical work. In this sense, we might also view software such as Pro-Tools, SoundEdit and CuBase (there are many others, I refer only to these packages due to their status as market leaders) as essentially text based, since they represent sound to us visually in an essentially traditional, 'musical' way. In the artists software, however, sound process are more important than their depiction. For example, in Thonk, the user has only two options represented by simple buttons; there is no attempt to present a visual analogue of either sound or process. In SoundHack, a progress bar shows us that a process is being performed, to access the visual depiction of this process in action is an option which actually slows down the program; there is no way to view the 'sound' as a static image (unlike, say, the 'tape' view of sounds offered by SoundEdit). Perhaps these designs are due to the limitations of the artist as a programmer and hence the absent or basic visual features. I prefer to think however, that there is a genuine reluctance to design this kind of process specific software around the old 'Musical' metaphors.

So, culturally, we know a lot about images, we know a lot about texts, and we know that the history of music performance and composition is located within the text tradition. But there are new ideas about sound, new sound processes and new ways of making art with sound that do not easily fit into this picture of what the end user already knows. If our aim is to encourage the user to engage with the new approaches we have two tasks - get more of these artworks into the public domain and refine the design of the software. The artworks (by which I mean music, sound compositions, software and sonic art) are already in the public domain, and it is not the purpose of this paper to suggest methods for reaching a wider public. Refinements to the software, however, might include: Easy to understand descriptions of processes and mention of artworks which show these techniques 'in action', in the Help systems (good examples are SoundHack and Argeiphontes Lyre), or perhaps developing new systems for the visual representation of processes, away from conventional models such as tape (SoundEdit) and score (Cubase, Cakewalk) such as those seen in Max, SYD and Cecilia.

Perhaps in the world of sound professionals, these refinements may seem unnecessary, after all amplitude and frequency/time depictions of sound, sonograms, etc., are understood by all, and most would agree that these depictions would be hard to improve. My point though, is not to sweep these traditions aside, but to realize that a whole new attitude to sound and its artistic use is emerging. For example, artists such as Barry Traux and Trevor Wishart produce soundworks which do not easily fall under the umbrella of music tradition, and base their work around notions of sound which seem located more within the world of sculpture than anything else. "The common language is one of intelligent and sophisticated sound transformation so that sound composition has become a plastic art like sculpture.” (Wishart, 1994, p.2) For many artists, until fairly recently, working with sound has meant making 'music', with or without other musicians, which has meant engaging with a whole new tradition, centered around idealized performances of texts, a world of rhythm, melody and harmony in which they have little or no training. The manipulation of sound however, offers a whole host of sculptural processes, processes more familiar to artists than the musical tradition of composition. Freed from the conventions of 'music', sound emerges as a plastic medium, both representative and abstract, a medium in which artists can readily engage.

In my steel sculptures, process was brought to the fore in what appeared to be unsightly welds and unmeasured fragments. Interior spaces were created with beaten and stretched metal, their surfaces formed from a patchwork of irregular shapes, covered in a web of seams. These sculptures were wholes, composed of many parts, the network of welds and steel fragments enclosing interiors which could only be partially seen through tiny openings. Underneath the surface, hidden structures supported and stabilized the pieces, providing a skeleton for the enveloping skin. In all of my computer sound works, the aim has been to refocus attention on the computer as a space in which processes unfold, and are revealed in the unfolding. Random and probabilistic systems, the 'hidden structures', govern the unfolding soundwork, which is composed of the layering of many pre-recorded sound files. For example, in my piece "Generative Sound Structures" (1997) the programs are based upon the number series from 1 to 10. In Sound Structure No.3, soundfiles which are time stretched water samples are triggered by the movement of images upon the screen, which are in turn based upon the idea of ice crystals, or frozen water. Sound Structure No.2 uses piano samples manipulated in Cloud Generator and Thonk, to create an indeterminate soundscape which triggers the on screen images. These images comment upon the aggregation and movement of buildings as we move through cities, in the same way that the sound software has formed moving sound masses from simple sounds. Lack of space prevents me from discussing all 10 programs, but each was focused in some way or other upon sound processes or the history of electro-acoustic music. Each piece of software became a 'sonic screwdriver', a tool which affected some real world material, and a point of departure in setting these processes within an art historical context.

This research and my work for MA went on to inform the development of MPhil research into the practise of sound-artist programmers, the aim being to locate this activity within the canon of fine art practise. As part of my research duties, I was asked to devise and teach part of the module 'Sound in Multimedia'[4]. Instead of focusing upon the practical skills necessary to put bleeps, boops and loops of background music into 'interactive' packages, I chose to present a brief history of the development of electro-acoustic, electronic and computer music. In this way I was able to add a contextual background to the software packages the students would be using for sound production. There are many packages available which enable the user to make 'music', even if they have no previous experience of music making. I showed how the mechanical approach to music making had led to the development of the carillon, and on into the arrival of the player piano. These methods were shown to be the basis of the musical thinking behind software such as Cakewalk, Virtual Drummer and CuBase, and the capabilities of the synclavier (Music historical examples of this argument came from Morton Subotnic, Gyorgi Ligeti and Frank Zappa). Electro-acoustic music was shown to lead, through its early basis in tape equipment in radio stations (Examples here were from Cage, Pierre Schaeffer, Xenakis, Jean Claude Risset, Bruno Maderna, Luciano Berio, Mauricio Kagel etc.) to the creation of environments for sound recording and editing such as SoundEdit, DeckII, Peak etc. Next, we looked at ideas about the nature of sound such as Granular synthesis, AM and FM synthesis and how these ideas were developed into software packages such as Cloud Generator, Thonk, Argeiphontes Lyre etc.(Sound examples from Traux, Xenakis, Paul Lansky, Curtis Roads) There was also a demonstration of various GUI's for CSound such as SYD, Cecilia and Bol Processor. (Again, examples provided by the work of Wishart and Lansky). The results of this programme were very encouraging; students with no musical experience showed genuine interest and a great deal of confidence in using processes, (especially granular synthesis) of which they had no previous knowledge. If the students had not been presented with the ideas and historical contexts behind these processes, and given recorded examples to listen to, then I am sure that the work they produced would have been much less interesting and rewarding. The sound processes they were shown would have remained esoteric and confined to the outer recesses of 'experimental music', and quite outside of any of their experience. As a result they have broadened their understanding of the whole field of digital art, and in some cases become very interested in developing their 'sound skills'.

The practical part of my research involves the creation of several artworks which demonstrate and enrich the findings of the investigation. The first of these, "Between Breath and Substance" receives its premiere at DAFX98, and concerns the process of brassage in sound composition. Samples of the river Mersey and a spoken poem are manipulated using brassage techniques and form the resource bank of sounds from which the piece will draw. The program combines random and probabilistic number generation systems and a flaw[5] in the programming language, Lingo, to undertake a journey from the real (river samples) to the abstract (combinations of 'brassaged' river and voice samples) and back to the real again (sampled voice). Images and text relating to the sonic material are presented on screen in response to the unfolding soundscape, the work revealing itself as a whole through the accretion of many fragments. Without my research into the history and processes of sonic art, this work would not be possible; I would certainly have had no awareness of the sculptural processes available to me as an artist using sound.

Conclusions

Redefining contemporary sound processes, away from the traditional notion of 'music making', does not have to mean an abandonment of the rich heritage which that implies. Rather it requires a re-think, and a re-presentation which embraces the notions of media manipulation which are constant across all the arts. In this way, the user base is expanded and space is made for a broader influx of ideas from areas previously excluded through lack of both understanding and access to technology or information. The availability of so many free, and shareware packages of the quality of SoundHack, Cecilia and Cloud Generator, brings the world of sonic manipulation to a much wider audience than ever before. Surely it can be no bad thing to address the skills and ability of this new audience, and redefine the software accordingly. This process need not be a 'dumbing-down', rather a democratizing exercise. Surely this can only be good for all of us.

Notes

1. It is assumed that these ideas are common knowledge, and the reader is directed to the following for further information:

Xenakis, I, (1985) Arts/Sciences:Alloys, Pendragon Press, New York
Cage. J (1995) Silence, London, Marion Boyars Publishers Ltd.
Kandinsky, W (1977) Concerning the Spiritual in Art,
Trans. M.T.H.Sadler, Dover, New York.
Holtzman, S. R (1995) Digital Mantras, Cambridge Massachusetts, The MIT Press
Truckendbrod, J, (1992) Integrated Creativity: Transcending the Boundaries of Visual Art, Music and Literature, Leonardo Music Journal, Vol. 2, No. 1, pp. 89-95.
for more extensive detail on these matters.

2. The scores to which I refer are not to be confused with Director's own score interface, which is a graphical representation of 'frames over time', for the purposes of animation and other linear processes. Director offers the user its own high level programming language - Lingo, which is an extremely versatile environment for developing interactive pieces etc. It is possible to use Director solely as a programming tool, although Lingo is not as powerful as languages such as 'C', Visual Basic, FORTRAN, etc.

3. Roads, 1996, p662

4. One of the modules which forms the elective part of the MA in Multimedia Arts at Liverpool Art School, Liverpool John Moores University.

5. This is not a flaw in the sense of an error. Lingo allows the user to play more than one soundfile at the same time, however due to the nature of the language, only one message can be dealt with at any one time. Thus, no two soundfiles can ever be played exactly synchronously unless one works around this problem. This flaw can be used, therefore, to create delay effects, if identical sounds are to be played at the same time. This time lag is, of course, ultimately affected by the speed of the processor which is running the program.

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Other Media

Burton, A and Piché, J. 1998. *Cecilia 2.0.2 online help system.* Université de Montréal

Bumgardner, J. 1997. Syd 1.0.5 (formerly “SoftSynth”) User Manual

Erbe, T. 1998 *SoundHack user's manual*, version 0.881, School of Music
CalArts

Roads, C and Alexander, J (1996) *Cloud Generator Manual*

Nelson, P. (1997) Interview with Trevor Wishart on “Iconoclassics” BBC Radio 3, 22.9.97