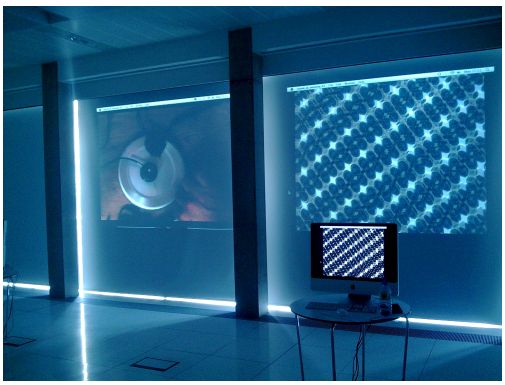
THE SOUND OF MEMORY

Memory, Technology and Obsolescence



Steven Jones
s0944229 Final Dissertation
MSc Sound Design
School of Arts Culture and Environment
The University of Edinburgh
Edinburgh
EH8 9DF
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Abstract

Scientific research suggests there are two kinds of memory, episodic and semantic. Certain events; images; sounds; smells, can trigger autobiographical memories, while others are the products of learnt behaviour, barely registering in our consciousness. We now have technologies to help us keep both personal and universal aspects of human memory. The past decades have witnessed an acceleration and proliferation of data storage systems but they often have little or no backwards compatibility. This has left a trail of abandoned platforms and discarded hardwares. These redundant and often fragile media are vulnerable to decay over time, preventing us from accessing lost memory. This visual-audio installation examines our relationship with such systems, and attempts to arrest their encroaching obsolescence. Focusing on the mechanical and electromagnetic signals the devices generate, it attempts to listen to their hidden sounds. In retrieving this data, and combining the recorded images and sounds, the works undertaken aim to allow the fetishistic properties of the devices to speak to their concealed voices. Through this process of reanimation, can we discover the sound of memory?

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Links to web resources

http://bit.ly/nVO7EI

http://vimeo.com/16970178

http://betterisbetter.tumblr.com/post/659924874/data-storage-at-the-musee-des-arts-et-metiers

http://betterisbetter.tumblr.com/post/673026656/a-witness-to-the-evolution-of-sound-technology

Description of work submitted

A printed version of the written thesis.

A DVD containing:

- A pdf version of the written text.
- A video documentary of the visual-audio installation presented at Inspace, Edinburgh.
- '*the sound of memory*' : a two part video version of the installation.
- excerpts of an experimental documentary shot at the *Réserves du arts et métiers* in Paris.
- A Max/MSP/Jitter patch used to create some of the videos in the project. Included is a folder with audio and movie files, which can be played, recorded, and saved.
- A Max/MSP/Jitter patch used in the installation. Included is a folder containing some of the movies made during the project, which the patch will randomly select and play.

Introduction

From pencil and paper to computer systems, we have always employed technology to help us remember. While moving the contents of my recording studio I became fascinated by the range of analog and digital data storage systems I had accumulated over the years; magnetic tape; floppy disks; hard disks; Zip disks; DAT tapes; minidisks; Syquest cartridges; cassette decks; turntables and reel to reel players. Seeing them gathered in one place I realized what little attention I had paid to their passing. There was always some new and better format to do the job. Few of these media were backwards compatible and, as they became redundant, I had stored them away in boxes. Reflecting on this collection of abandoned media, they appeared to represent time in a compressed form and each stage of technology could be read like a deposit of geological substrata. In this same period I was attempting to archive a catalogue of my recording career, the product of a working partnership spanning some twenty years. Reels of magnetic tape had become sticky as their plastic coating was starting to coalesce. Hours were spent on the phone trying to track down a working DAT machine, or at least find someone who could repair one. People seemed incredulous that I was asking such a question. Who uses DAT tapes nowadays? Every stage was a delicate operation of detective work and archeology, searching on dust covered computers for missing files, trying to understand cryptic notes on tape boxes. When I thought about this desire to continually upgrade, I wondered why we always think that better is '*better*'? There also seemed to be a duality to the word memory; these devices held not only memory data, but also memories of use, even the traces of physical gestures, the muscle memories, required to operate them.

With this project, I will consider the relationship between memory, technology and obsolescence, and record and document abandoned data storage systems. In doing so, I will also attempt to re-animate them in the form of an visual-audio installation, and using real time processing software, Max/MSP/Jitter, explore the interplay of image and sound. In short, I will ask the question; what is the sound of memory?

Memory, Technology and Obsolescence

Scientific studies suggest there are two forms of memory, episodic and semantic. Episodic, or autonoetic memory, is an autobiographical form, where we mentally time travel, searching through our long-term storage of data for mainly visual representations of our memories (Gardiner 2001). The semantic, or noetic form, has no self recollection and is a more instinctive retrieval of memory learnt over time – for example the muscle memory involved in typing this

sentence. A fundamental flaw in human memory is that we tend to remember either things that happened to us recently, or events that had a strong emotional impact. The amount of data we can hold is also limited. Our ability to store and access greater amounts of memory have been expanded thanks to our technological innovations. Cognitive scientist Donald Norman refers to these external devices as *cognitive artifacts*, arguing they do not change our ability to remember, but rather change the tasks we have to do (Norman 1993). As a basic example, when we write something down and then read it back, we are not actually *remembering* it. From a systems point of view, a person combined with an artifact is more powerful than either is alone. To be able to operate these systems, we must relationship with with them, a relationship to be developed over time.

I need to briefly touch on the history of technology here, from the industrial revolution and what Walter Benjamin calls the '*Age of Mechanical Reproduction'*. Our systems for remembering; from wood cutting to engraving, from lithography and photography, to sound reproduction, accelerated and overtook each other with such speed that man himself could barely keep pace. As technology changed so did society, shifting from what Jean Baudrillard calls a *capitalist-productivist society* to a *neo-capitalist cybernetic order* (Baudrillard 1983). Politically, it would seem that technological progress is inextricably bound with capitalism. Jevon's paradox demonstrated that with technological progress comes increased efficiency, which in turn lowers cost and increases demand, which, consequently, increases consumption. One hundred years later, Moore's Law predicted that memory data would double nearly every two years (Moore 1995 [1965]). In our desire to create external devices to improve ourselves, so we can move more quickly or communicate over long distances, we have entered a slipstream that only faces one forward direction. It seems everything is subsumed in this irreversible race.

Benjamin identifies two rates of transformation in technology and society: the superstructure and the substructure. The incremental day to day changes of the substructure prevent us from observing the superstructure moving at a much slower rate, and only in hindsight can we observe these transformations (Benjamin (2009 [1934]). Discussing the impact of technology on society, Andrew Feenberg identifies two established theories in attitude; the instrumental, which regards technologies as rational, neutral tools; and the substantive, a more pessimistic approach (Feenberg, 2002). An extreme determinist view can be found in "*The Industrial Society and its Future*" by Theodore Kaczynski, also known as the Unabomber [1]. In exchange for technological progress, he suggests, we have lost our freedom. With each innovation, we become ever more dependent on technology (section 129). To halt this he proposed a new ideology that would bring about the collapse of industrialised society; "*Revolution is easier than reform*". It is a bleak assessment. While not

[1] The Unabomber had been waging a one man bombing campaign, targeted at scientists, and this 35000 word essay was published by the New York Times and Washington Post on 19th September 1995, in the hope that someone might recognise his writing style and identify him. In the end , it was his brother who notified the authorities.

advocating violence, Baudrillard also warns that dependence on technology acts as a form of social control, leading to what he calls a *hyperdependance*, an urge that can never be satisfied, the desire of desire itself, that feeds on itself, leading to inevitable disappointment (Baudrillard 1983). This seems hard to refute when a recent review for Apple's iPad claims the device is;

> "*... a starter for a string of enhanced versions, that will tempt you to buy a new model every couple of years, or when the sealed-in batteries no longer work. And you'll be delighted to buy one*."
>
> (Schofield 2010)

In other words, as soon as we acquire a device, it is already becoming obsolete. As soon as possible, we upgrade. This makes us happy. Is the whole point of technological progression to keep us, as consumers, enthralled by the new, distracted by technological desire, in return for which we surrender control of our lives?

I would like to counter this determinist view, that resistance is futile, and propose instead a more humanist approach. Specialist in the philosophy of technology and Artificial Intelligence, Andy Clark tells us that technological systems are able to survive because they simply do their job well, or are dependent on there being a lack of alternatives. A third route for survival is by creating a need, for example for more memory capacity, which technology is then able to provide (Clark 2003). A system like an iPad will have inbuilt flaws which its developers are then able to correct thus providing us, the consumer, with both a problem and its solution.

In "The Postcard" Jaques Derrida explores a central theme about the '*undecidability*' of a postcard's journey: the fact that the post card might or might not arrive at its intended destination (Philips 1987). Christopher Johnson sees a similarity with the possibility of failure in communication as being inherent in all systems. The postcard analogy applies to both information and biological systems. If all components or circuits of a system were finalised the system would end up paralysed, unable to adapt to a changes in its environment, with no reserves of alternatives to fall back on (Johnson 1993). Lawrence Lessig confirms that technological bugs are inherent in devices and integral to their survival. Inbuilt imperfections have driven demand in the record industry, from vinyl to 8-track to cassette to CD to mp3, which in turn fuels a new wave of demand, often for the same product (Lessig 2008). In summary, when a technology becomes effective, its obsolescence is guaranteed. Or as Marshall Mcluhan suggests:

> "*If it works, it's obsolete.*" (Mcluhan 1968)

Data/Time/Progress

One of the earliest forms of computer memory was the magnetic core planes, patented by Frederick Viehe [2] in 1947. Since then, the development of data capacity and its storage has been a balance between access time, capacity, physical size and manufacturing cost. Magnetic tape, hard disks, floppy disks, USB sticks – there seems an exponential arc of systems getting faster, with enlarged memory capacity, while simultaneously shrinking in size. It appears the acceleration in technology also has a dual effect. By speeding things up it also transforms how we remember previous technologies, making them appear slower. Only when memory capacity is larger and processing power gets faster does the preceding generation of systems appear cumbersome and slow. I had never thought that saving data onto floppy disks was a slow and laborious task until I began to use a hard disk. Only when I was able to compare the two formats was I able to reflect on how archaic the older format seemed. Maybe this is when nostalgia begins? Memories become nostalgic only after things have changed. It was Proust who told us that memory is more of a compound of remembering and forgetting (Mein 1962).

How was I able to access the information needed for this thesis? Either by reading books or sourcing articles on the internet. If I choose to access information from books, I go to a library. The act of going to a library, looking on shelves, perhaps having to order and wait for a book to arrive, now seems slow compared to the immediacy of internet access. A library is a huge data storage system but, unlike the internet, its data is in the form of physical objects that need to be stored in buildings. When researching at the Pompidou Centre library in Paris, I had to queue for up to an hour to get inside, while at the British Library I had wait four days to look at items I had requested (appendix A documents). In contemporary society, that seems a long time to access information.

Arts et Métiers

While in Paris, I visited the Musée des Arts et Métiers, a museum dedicated to technology. There they have a collection of early computers and methods of storing data: magnetic cores, IBM's first hard disks, some of the first supercomputers. It was possible to see the actual objects at first hand, existing in real space rather than in photographs. This may well have been a case of *suspicious eroticization of retro-technology* identified by Clark (2003 p.37), but I wondered how the museum stored all these objects and wanted to experience such a place. I wrote to them asking if it could be possible to visit the storage building, and was surprised to receive an e-mail from the director of archive and conser-

[2] Although Jay Forrester and An Wang and are credited with developing magnetic core memory (Audsley 2002)

vation inviting me to a meeting (appendix A). I was fortunate to be allowed to spend several hours touring the building and it had a profound effect on my understanding of technology. A more detailed account of my visit is posted on my blog (appendix A), and part of an experimental documentary shot there can be seen on the DVD. So for now I want to only briefly sum up my time there.

figure 1.1 phonograph wax cylinder at the Réserves du arts et métiers

As only 10% of the museum's collection can be displayed at any one time, the rest is meticulously stored at several '*Réserves du arts et métiers'*. The facility I visited contained over 80,000 objects, each one tagged and barcoded and linked into a database. The information on the tags ranged from the meticulously detailed to simply *'object to be identified*'. It was interesting that because the objects were not arranged using the standard taxonomic methods associated with museums, where objects are displayed across a time lines, but in a more practical arrangement due to function or physical size, it illuminated a different angle on technological progression. The strange juxtaposition – one area housed a giant two ton mainframe computer amongst a group of statues and steam organs – made me realise that my laptop and mobile phone probably had as much processing power than anything in this entire space. One area for sound recording objects was lined with glass cases full of radios, vacuum tubes, valves and speaker horns. Underneath were sliding draws full of wax phonographic cylinders, while another contained a random collection of electronic devices. In another there were giant sized records that played backwards, huge proto-cassette tapes, a box-fresh minidisk player, and tape machines whose operating buttons did not have the familiar function icons we normally associate with fast-forward or rewind.

The arrangement of the objects neatly demonstrated that the evolutionary path technological progress takes, rather than being clear and linear, is far more oblique. The process of trial and error, sometimes hitting a dead end, as in the

case of the minidisk, and the way technologies borrow from each other, is as complex as human memory itself. Both Sterne and Feenberg agree that no technology arrives fully formed, that in fact technology and society act in mutual response to each other; “technology changes in response to conditions in which it finds itself as much as it influences them” (Feenberg 2002). Progress is as much about cross-fertilisation as moving in a single forward direction. Sterne tells us that advances in one area of technology were often directly connected with developments in another, sometimes at the same time. The patent for a carbon transmitter by Thomas Edison was appropriated to increase the volume of Alexander Graham Bell’s telephone. Emile Berliner provided Bell with a variable-resistance transmitter, still used in phones today, and Lee De Forest’s *audion*, or vacuum tube, helped to boost and amplify music and speech for the radio, as well as in the process of sound recording (Sterne 2003). Andre Millard concurs that rather than competing with each other, technologies are more often in a symbiotic relationship with each other (Millard 2005).

The *Réserves* then, was no *“elephants graveyard of Un-transparent... Technology”* (Clark 2003), but rather a vibrant place, demonstrating man’s restless curiosity and invention in confronting and solving problems. It is a place of ideas and ambition and, in pausing to look at the past, I was not indulging in nostalgic reflection but was attempting to understand the present.

figure 1.2 unidentified cassette player at the Réserves du arts et métier

Methods

In documenting the obsolete objects I had collected I focused on three specific areas: the mechanical, the magnetic, and the visual. By this, I mean using contact microphones to record the sound of the device’s mechanical actions; a telephone coil to pick up its electromagnetic signals, and a video camera to film the process. The artist Bill

Viola claims a video camera is more like a microphone than a film camera; it is "*an electronic transducer of physical energy into electrical impulses*" (Licht 2007). I also set out some ground rules: each object would be placed on a trestle table, examined, filmed and recorded in exactly the condition it had been found, and at the first attempt. This served a dual purpose: some of the media were fragile and unstable, and needed to be documented quickly[3], and it helped keep the amount of audio and visual data down to a minimum. Having these deliberate parameters was also an aesthetic choice. A declaration of artistic intent.

First, I constructed two contact microphones using inexpensive piezoelectric disks, soldering them to different lengths of shielded cable, with mono jack plugs on one end. I then dipped and coated them in Plasti-Dip to give them a synthetic rubber coating which, as well as providing insulation from electrical shorting, made them robust and minimized any hums when being handled [4]. The telephone coil pickup was to be used like a stethoscope; small enough to be passed over an object, tapping into its electromagnetic fields and picking up minute changes in the operations of concealed servos and motors (Collins 2006). Sterne refers to this diagnostic technique as *mediate auscultation*; a medical practice using the stethoscope to listen to movements inside the body (Sterne 2003). I had seen Jérôme Noetinger use this method during his workshop at Dialogues 06 (2010), and since discovered a long and varied history of work using electromagnetic sound; from the invention of the Theremin by Leon Theremin in 1924, to the Japanese improvisor Haco on her CD '*Stereo Bugscope 00*' (IMJ-523 2004). A question I now had to ask was, could I contribute anything to this research continuum?

"*One must be able to let things happen*." Carl Jung 'The Integration of the Personality' (Kahn 2001)

I video-taped the process with a Canon MV960 miniDV camera (miniDV being a media also rapidly approaching obsolescence). The simple schematic diagram above shows the audio signal routing paths to an 8 track Behringer mixing desk, and a live mix was made with the resulting audio bounced down as a stereo mix to an M-Audio Microtrack II hard disk recorder. There was also a single direct line and an AKG C-1000s microphone for synchronizing sound to image. Making a signal such as clicking my fingers acted as a crude form of clapper board, allowed the audio recordings to be lined up with the video camera sound later on.

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[3] For example using a Revox B77 Mk 2 tape player that had been stored in a damp outbuilding and had acquired a coating of mildew. When it was switched on, it let out a great cloud of smoke and the acrid smell of burning. The power circuit had not only short circuited, meaning not only could it longer be used, but I had missed the opportunity to record the incident.

[4] I was collaborating on an installation project at the Jubilee Pool in Penzance, and needed to water-proof the contact microphones so that they could function as hydrophones.

The first recording did not go well: an Atari 1040 STE computer, with what now seems a miniscule memory (RAM) of 1 Megabyte (see appendix A photos). Although Atari's *Fuji* logo is usually associated with early video games like Pong or Space Invaders, the company also played an important role in the development of recording technology. The ST was the first home computer to include a built-in MIDI port, allowing it to easily run music sequencing software, and MIDI instruments could be controlled with a very low latency response time. Music software applications such as Cubase and Logic also originated from these early STs, and Atari were in direct competition with Commodore Amiga and Apple Mackintosh systems, up until 1993 when they abandoned production of this platform. Unfortunately, my own model's 20 year old internal floppy disk drive had stopped working. Similarly, neither a 1982 Atari video games system or a Casio D7 DAT machine worked. Things were not looking good.

The next recording session was more successful. I set up a 1950s portable record player, that had a multi-speed function ranging from 16 to 78 rpm. (photo appendix). I knew nothing about the record player except that it was called an RDG. A small panel hidden on its back states *"Consumer Products Division of SDC Ltd. Footscray, Sidcup, Kent, England"* [5]. Picking up the nearest vinyl record on hand, a maxi-play EP (extended play) disc, I opened up the unit to find its playing speed had been set to 16 rpm. Though I had chosen a 45 rpm record, I accepted this chance-operation in the spirit of the imposed rules. Besides the intention was not to listen to the record but rather to the workings, the interactions of the media and its player, and to listen to the voice of the device.

figure 2.1 vinyl and RDG record player

The contact microphones amplified the action of the spinning deck into gently modulating drones. Sometimes a decelerated voice could just be detected, its vibrations transferred along the pick-up arm. Passing the coil over

[5] I have subsequently found RDG (Radio Gramophone Development) listed in a catalogue of exhibits for the National Radio Exhibition at Earls Court, London, August 1951, a company hailing from the heyday of British manufacture of electronic goods, until its closure in 1952.

the body of the player, magnetic signals were transformed into deep resonant hums, with a surprisingly strong electro-magnetic field emanating from underneath the player. The unit's malfunctioning loudspeakers would intermittently produce a crackle of misfiring contacts and any clumsy hand movements would be picked up by the contact microphones. All these elements, chance or contrived, contributed to the overall sound. Monitoring on headphones, the interweaving drones had a hypnotic effect on me, intensified by the record playing at a painfully slow speed, ruptured all expectations of what vinyl record ought to sound like. What had been intended to be two pop songs lasting three minutes each became elongated to over sixteen minutes. New media theorist Arthur Kroker describes such evocative events as:

> "*... against the current of speed culture… an art of electronic slowness, an art of boredom.*"
>
> (Kroker 2004)

The method of recording I have described became the template for all the other recording and documenting sessions. Placing each object on the table, begin recording, and run through its basic functions: load, read, play, fast-forward, rewind, pause, stop or eject. The whole time, I would be manipulating the sound, mix the signal levels, adjust the panning positions, experimenting with the equalisation, while passing the telephone pickup around it. There was no fixed duration for any of the recordings, I would stop when it felt the device's potential had been exhausted.

The Revox B77 was out of action, so I needed to find a replacement tape machine. In Penzance a second-hand shop had just opened selling all types of vintage furniture and objects. The shop owner suggested I might borrow a Marconiphone machine, as well as loaning me a cardboard box with three small portable tape machines in it which he said '*might or might not work*'. This was too good an indeterminist opportunity to turn down. The tape machines were all battery operated, and all appeared to date from the 1950s; A PION recorder, a Transistorized MT-1000, manufactured by Eagle Products, and an EHRecorder, apparently popular with private detectives because it was so small, making it possible to " *record anywhere and anytime*" (Thomas 2006). This quote was the only information I could discover about these devices. While not all of them worked and having no idea about their origins, previous owners, or when last used, the clips I recorded serve as a document of their re-discovery. Switching on the MT-1000 for the first time, an unknown voice from the distant past said: "*testing, testing, I don't know if this funny little thing is going to work... over and out.*"

A Panasonic video recorder, which had, ironically, sat hidden underneath a DVD player in the living room, was brought in to be recorded. As it had no TV monitor, I decided that rather than filming the process, I would take a signal feed from a SCART cable directly into the miniDV video camera. There was a VHS tape already in the machine; a

commercial copy of Stanley Kubrick's '*Barry Lyndon*' (1975), but there was a problem with the VCR's track adjustment system. The unit would attempt to reset the tracking, allowing only brief snatches of the film to be viewed, before the picture would begin to roll and disintegrate into visual noise. This would happen in regular pulses lasting several seconds congruent with the revolutions of the tape. Despite fast-forwarding or rewinding to other parts of the tape this seemed to happen throughout the entire film rendering it impossible to watch. An interesting phenomena was produced while transferring the rushes from miniDV tape to computer. The breaks in the film also produced a break in time code. The whole recording was automatically sliced and compressed temporally providing a crude form of visual granularisation. Later, when processing the clip with Jitter, the shifting backwards and forwards of film frames produced an unintended comic effect rendering the face of actor Leonard Rossiter into a concentration of facial tics. His face had become a visual mimesis of the audible granular process.

figure 2.2 screen grab showing timecode breaks in VHS recording

The VCR was an ingenious piece of technology for a relatively cheap device. While an audio tape passes over a head, producing a magnetic signal which is converted into sound, a video tape needs to carry far more information. To read this extra information the tape would need to pass the tape-head at a much greater speed, which in turn would require a huge amount of tape. Instead, VHS tape moved at normal speed, while the machine heads themselves rotated at high speed. Known as a helical scan, the heads were slanted at an angle for the most efficient use of tape, demanding a complex mechanical system, and a punishing amount of wear on both heads and tape. This inbuilt obsolescence; effectively limiting the amount of times a tape could be played before wearing out, ensured VHS was the last of our domestic devices to have the *'natural'* constraints of analog media, before the advent of digital technology (Lessig 2008).

The whole recording session took five days to complete. The '*one go only'* rule served as a good parameter; any attempt to reshoot or re-record seemed contrived, faked if you will. For example, I had found a Roland 606 *druma-tix* drum machine in very poor condition, abandoned and supposedly beyond repair. But after opening it, cleaning its contacts and fitting it with batteries, it immediately began to play a series of unknown drum patterns. It's probable that these were the default factory settings, a preprogrammed memory so to speak, and the magnetic signals from the coil pickup played what seemed a bass line accompaniment. Watching the video back, I had obscured the camera's point of view for most of the time, but trying to re-shoot again lacked the energy of the initial discovery, so was abandoned.

The next stage was assembling sound to image. I had to use iMovie program, ironically as my new MacBook Pro, while more powerful than its predecessor, was incompatible with previous versions of software like Final Cut Pro or Cubase VST. Transferring each clip in real-time from miniDV tape to iMovie, I had to use a Firewire 800- 400 step down converter cable, a rare example of backwards compatibility. I synchronised the clip to its corresponding audio file using the clapper board sound, removed the video soundtrack, and exported the whole clip as a QuickTime movie file. (see appendix A photos) At this point, I had little knowledge of the overwhelming variety of codec or compression settings. Consulting online resources, I discovered QuickTime is not a format itself, more a wrapper containing video and audio formats (WSA 2010) [6]. This stage of the process brought into question the concept of synchronisation. Jan Philip Müller asks where is the simultaneity of hearing and seeing produced in sound film? Is it somewhere between the viewer and the media (Müller 2010)? How can sound and image really be in synch, when so many different coding formats are at work, all with different concepts of time? The digital sound is running at a sample rate of 48000 Hz, while the video runs at 25 frames per second. Meanwhile all this data is simultaneously being compressed, buffered, synchronised and re-presented by their QuickTime wrapper. The movies I had made all contained inherent flaws that were revealed every time I lined up sound to image with my 'clapper' signal. What was interesting while compiling them was registering how the eye and ear forms what Michel Chion refers to as *synchresis*: mentally we feel we *know* when things are or are not in synch (Chion 1994).

Now I had assembled a library of raw material, I began experimenting, combining and offsetting different movies against each other using real-time composition software, Max/MSP/Jitter. Through a process of trial and error, I developed a series of Max patches. The reader can now access one of them on the DVD: a Max patch that triggers a QuickTime movie with its own audio – the movie jump to different points of its frame counter in response to changes in velocity and frequency. Although familiar with feeding an audio signal back on itself, it was the first time I had used a recursive process in an audio-visual context.

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6 I eventually opted to encode the QuickTime movies using DV-PAL, using a 720 x 576 4:3 ratio.

The next problem to overcome was how to capture and move these real-time experiments off-screen and into a form where they could be seen in other environments. The Max patch uses the jit.vcr object allowing you to save a sequence directly to disk. Unfortunately, it only records the MSP audio, and not the QuickTime audio. To resolve this, I would have to record the combined audio signals into ProTools, then manually re-re-synchronise them afterwards. In Jitter, Quicktime audio is read by the spigot~ object, but because of changes in Quicktime 7's architecture, it no longer supports sound from other applications. I learnt that spigot~ is powerful, but unstable: loading it into a Max patch would always crash the system. On one occasion I accidently made such a tremendous noise that other students came running in from other studios to check on me. I do not recommend this.

Although familiar with Max/MSP, I was completely new to Jitter, so this whole period presented a steep learning curve. The more I investigated, the more I wanted to see what could be achieved. I feel I became too fascinated with its *processes*. For instance a long time was spent attempting to capture a kaleidoscopic effect using video shot at the *Réserves*. The image captured on video never had the same depth of detail on screen [7]. With no formal training in video making, I realise there must have been simpler and more efficient ways of working with video, but I hope that this informal approach, exploring concepts outside my chosen field, has helped me to find a means of self expression. In *Artists-Musicians and Musician-Artists*, Justin Hoffman and Sandra Naumann call this dissolution of boundaries, *conceptual correlations,* that can be traced from Theodor W. Adorno's fraying of the arts to the output of German electronic minimalist label *raster-noton* (Hoffman, Naumann 2010). The final word goes to the main proponent of breaking down boundaries, John Cage:

> *"All we do is brush information against information (laughter).... that term comes from Marshall McLuhan, you know."* John Cage (Retallack 1996)

Decisions

Now the decision had to made on how best to present the work. I had been experimenting with different video clips playing on separate monitor screens and liked the way the images and audio tracks would collide, contrast and combine in often unexpected ways. It seemed to exemplify this McLuhan idea of information brushing. Like the

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7 [7] Some patches would not let me record straight to disk, so would have to be recorded back onto miniDV tape, via Firewire VOC, using the jit.qt.videoout object. Some of the clips feature on the arts et métiers documentary.

Derridian postcard, I was still unsure if this project would ever arrive at its destination. I developed a movie player that randomly selected clips from a library of Quicktime movies. The Max patch can be found on the DVD, and dragging the folder of example movie files to a drop-file will populate a menu, which will then be triggered. This provoked the question of exactly how random is random? A clip would sometimes be repeated and although it was easy to add a function preventing this I liked the repetition and felt the indeterminist approach was true to the project. Creating a standalone application allowed me to test them out on two separate computers. Projectors had been hired with the intention of screening in room G11 at Alison House, a *junkspace* (Koolhaas 2002), or a public/private space, where discarded materials seem to collect. Then, at the last moment, I was offered an opportunity to show at Edinburgh's Inspace gallery. A minimalist white-space gallery, Inspace is a technically advanced modular space, with multiple projectors capable of being directed and projected onto walls or purpose built dim-out screens, a self contained sound system, and a variety of computers that could run the standalone programs.

Finding that one of the projector's audio would be amplified through a 5.1 sound system, while the other would use a mono speaker arrangement, I thought of bringing in an independent arrangement of amplification and loudspeakers. While testing the space, I decided that because of the reflective acoustics in the gallery, it was preferable to keep the audio to as low and ambient a level as possible. All the loudspeakers were mounted in the ceiling, facing downwards and clustered into groups which focused the sound into zones. The sound would diffuse throughout the space depending on the listener's position in the gallery. In the area with the surround system the sound was spatially wide with greater emphasis on bass frequencies. In the mono clusters, where the ceiling was not as high and therefore physically nearer to the listener, there was a lot more clarity and detail to the sound. Now and again, the building's air conditioning system would start up, but rather than being a hindrance, I felt it provided another texture to the overall sound. Alan Licht supports this idea arguing that sound art should acknowledge the total environment of sounds, "*wanted or unwanted"* (Licht 2007).

I installed the standalone applications on two computers, with corresponding projections onto screens behind them. The same images were shown on a far wall, their edges bleeding into each other from a process called image blanketing. Although I had been using Genelec loudspeakers while recording with ProTools, for much of the time the audio had been monitored on computer speakers. Therefore, the sound had been functioning in what I would describe in a *small* way. However the same audio was now being amplified across an entire floor of a gallery and I could hear obvious differences in the sound balance between the initial recordings and the Protools sessions. While I could rectify some of this by assigning particular clips to different areas, the rest would need re-balancing. I hoped the audio might

function within the Brian Eno definition of *Ambient*, where sound can accommodate all types of listening attention: *"it must be as ignorable as it is interesting"* (Eno [1978] 2004).

For the first time I finally heard the piece in an exhibition situation, and could now experience it in a *non-presented* way (Gibbs 2007). But I began to understand how the audio had to work with the visual information, how the two elements had to work in tandem. Things I thought might be 'dull'; a hard disk powering up for example, now seemed much more powerful as its scale had been increased, blown up to a hundred times its size. I was no in longer control over which clips would be played, and with over 40 different clips to choose from on two different systems, I hoped the combination would never be the same. Even sections of silences seemed to work.

Nostalgia, Susan Stewart asserts, is a sadness, a longing for a past that never really existed (Stewart 1993). Had this whole project been a nostalgic reflection on obsolete technology, or was I really trying to understand our relationship with these systems? I propose that the abandoned media was a starting point in trying to understand something about now, the present. It would not have been possible to have made this project without the technology of Max/MSP/Jitter. I can now access all the data collected from these bulky old devices with a small portable hard disk. Additionally this data is backed on a single terabyte hard disk, as well as online with one of the many cloud computing companies. Stored in servers that can be cached temporarily onto any computer, I can now access it as and when needed, wherever I happen to be. Brian Chee and Curtis Franklin suggest that as cloud computing becomes the universal translator of our digital world, a world that grew last year by 62% to 800, 000 petabytes [8], computing no longer needs devices (Chee, Franklin 2010).

In attempting to move back and forth between the macro and the micro domain, both visually and audibly, I discovered the transforming power of scale. From big to small; by this I mean the miniaturisation of large amounts of data into a small space, either binary code or magnetic information embedded on tape; and then from small back to big; amplifying the sounds through loudspeakers, while scaling images many times bigger onto walls and screens. The transformative power when size is amplified has been identified by Stewart (1993 p.95), who cites repetition as the most obvious example. The DVD contains a movie called '*disk load*'; originally a test movie for experimenting with Jitter – a montage of four different types of disk being loaded. Watching a disconnected hand inserting a disk into a machine over and over again was strangely compelling. Separated from its context I had space to reflect on the action and its meaning. Personally, there is a muscle memory connected to this practice, one founded in a gesture I no longer use. The four different sounds, at once provoking memories of sounds I once heard many times a day [9], evolve into a new voice as

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[8] a petabyte = a million gigabytes (Wray 2010) and (Schmidt 2010)

[9] from the satisfying click of a floppy disk, to the dreaded *click of death* of a malfunctioning zip disk (Gibson 2010)

they are sped up or slowed down. The hand also becomes a recurring theme to the whole installation; a trope that appears in many of the clips, mainly because so much technology was, and still, needs to be operated by hand. Throughout the project, I have referred to the McLuhan theory of technology being an extension of ourselves, but the motor-function of the hand is one of the most transparent of technologies.

Installation at Inspace

> *"... sometimes you can make ground rules for yourself which prove unnecessary and counter-productive."* (Stanley Kubrick[10])

Until now, the project had existed in a controlled environment. Presenting it in public was a whole other experience. On a Tuesday afternoon, 10th August 2010, *the sound of memory* was shown at Inspace, Crichton St, Edinburgh. Although I had imagined it might be non-performative, it felt very much like a performance, albeit with the audience themselves on the stage. The general response was good but there were definite faults with the piece and these were pointed out to me quite clearly. I feel there is real value in such a polarity of opinion and learnt more in those few hours than I would have in weeks of tweaking and polishing in the studio. I had presented it as a visual- audio installation and therefore it needed to be seen and heard in public.

I will deal with the criticisms first, among them being that as a sound installation, the sound quality was not good. Why not use a better sound system? There was a confusion when the image and sound were emanating from different directions. Why are the films so long? Why is it so repetitive? Why not have more control over the quality of the screened images? Attempting to justify my choices with a purist approach, I counter that my motivation in using whatever system, in whatever condition it was found in, was justified, but perhaps it did not satisfy everyone. That might be fine as a rule, but in a public presentation, it appeared I had just not paid enough attention to the details. In such a situation, it does seem that better is better. A turning point came when I sat down with some visiting students who wanted understand how the Max patches were working. In revealing its inner workings they wanted to know more. How does the patch select the videos? How exactly was the audio triggering the video? What exactly was a Syquest disk? The atmosphere changed as people moved forward to see better, and by exchanging information they enjoyed the experience far more.

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[10] *Kubrick on Barry Lyndon*; interview with Michel Ciment (Ciment 1972)

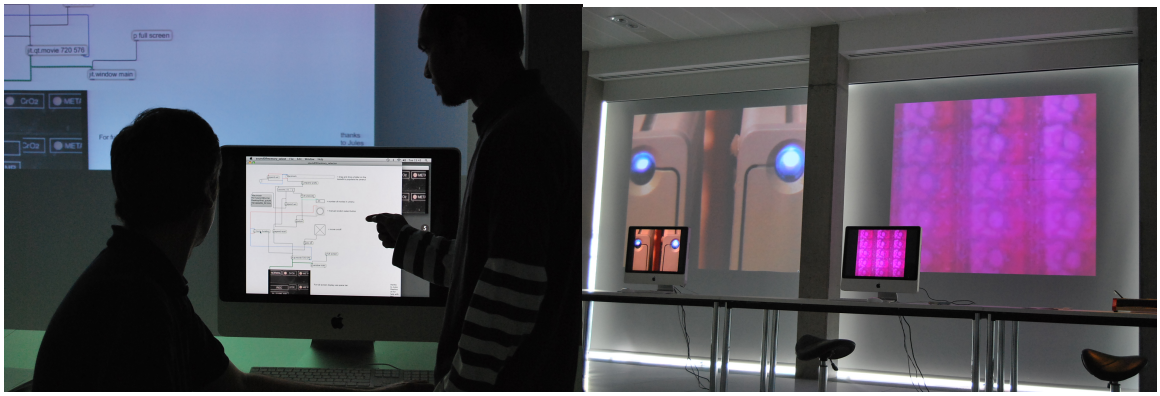


figure 3.1 Installation at Inspace, photos by Dimitris Patrikios

I had brought a lot of the objects with me to Edinburgh intending to perform with them. Thinking it would go against the minimalist approach, clutter up the space and confuse the point, I doubted that this was a good idea. I had placed a typewriter in the space however and seeing the public interacting with it *was* a revelation. I had asked people to type their own sounds of memory; some of the results can be seen at appendix A. The typewriter itself proved popular and while the QWERTY keyboard was familiar to everyone, the machine was a historical, alien object. “How does it work?” people asked. “ Do I have to move things myself?” When engaged with the installation people were enjoying it and responding. I overheard people discussing how they recognized certain objects, or how they still prefer to play X-Box, even if it is a discontinued platform.

As mentioned in the previous *Decisions* section, I had originally planned to have a speaker system, but hearing it on the Inspace sound system, I felt it was more in keeping with the aesthetic of the piece. Looking back now, at the time there were people working and talking in the space and my audio was at such a low, ambient level, it was sometimes ignored. Personally I liked this anonymity and besides, a lot of sound we hear in public spaces comes from poor quality systems in less than perfect conditions. Under the glare of scrutiny, with no other distractions, all the imperfections of the speaker system came to the fore and the installation was left vulnerable.

Just because a lot of thought had gone into producing the sounds, it does not mean this will translate to the listener. I realize now that this was arrogant, as was choosing movie clips that go on for too long, especially when repeated. Investing energy and time on producing things will not ensure another person will want to do the same. I wanted to keep the movies to their documented lengths, shortening them seemed shallow, appealing only on a surface level.

So now I have to question my motives in presenting the project as an audio-visual installation. The DVD contains two split-screen versions, which I had made a week before, and are far more concise, and should have alerted me to certain key points. The soundtrack is in stereo. The sound emanates from the same source as the moving image and I was quite happy to edit the clips down. The films have a narrative, providing interest for the viewer, with rhythm and pace alternating between anticipation, repetition and surprise. The clips in the installation were of fixed media and the interplay between sound and image had been determined beforehand. Being selected randomly does not make them interactive. In trying to make the project open-ended, to be R/W (read/write) rather than R/O (read only), I had overlooked the fact that I was working with fixed media. Randomly selecting clips, while indeterminate, proved to be as constricting as a straight-jacket and the piece was unable to adapt to changing circumstances. I was perhaps impressed with the idea of being an artist who exhibits in a white space gallery and had ignored warnings of the difficulties such spaces can present (Gibbs 2007).

What would be the best presentation environment for this project? A controlled, fixed format such as a video perhaps posted on Vimeo? Or a live performance, where an audience can see a performer playing, and interacting with the actual physical objects? Or maybe a combination of both audio-visual material and performance? If I run do it again, there will need to be far more control over its final output. Having an integrated stereo sound system for a start, mixing the audio from both machines down to a combined output, with maybe a built in compressor using Max. I will add colour and contrast controls to the video players, as well as Max object *urn~* that prevents the random repeat of the same clips. There was no point in making so many videos if the same few are going to be repeated. The clips them selves will be edited down into much shorter sections, to build a narrative into the story. Finally, there must be some from of interaction with the public. The inclusion of the typewriter introduced an element where people felt involved, learning something and not just observing. The DVD contains a short documentary of the installation.

Outcomes

So finally, the question I now have to ask is, what exactly does this all mean? To be honest, as I looked at the images during the last half hour of the installation, it dawned on me I was looking at myself, that the work was intensely autobiographical. I have always been very resistant to personal revelation and this project probably reveals far more than I would have liked. When speaking of the destructive effect of time on media and memory, I am talking about the fragility my own memory and how unreliable memories can be. When I talk about obsolescence, I am voicing my own fears of becoming redundant. This collection of dead and useless objects had felt like the weight of the past bearing

down on me. On the one hand, they had served me well during a long and fairly successful recording career but I remember now how slow and difficult they were to use. One device in particular, the CD player, seemed to stand out maybe because it kept being re-selected[11]. There appears to be some kind of immense struggle going on between me and the object. I realised there was still one more element to the project I had not properly addressed yet.

I have quoted Jung earlier and he might have recognised a key element hidden in the subtext. The space where the recordings were made also contained boxes of data files and an urn containing some of the ashes of my good friend and long-time creative collaborator. The partnership had come to an abrupt end three years ago when he committed suicide. The CD player belonged to him. Along with the sadness that a sudden loss brings, a part of my creative life had disappeared. Several years of work disappeared with him too; all meticulously backed up, yet impossible to access. He was a brilliant programmer, and had developed some innovative digital visual software for projects we were collaborating on. With his death, neither his surviving partner nor I could retrieve any of this work, let alone understand the coding that went with it. Neither could we understand what had happened to his life. The experience had been too painful to deal with; the memory and the data had been locked away. For a long time, I have been denied access to certain memories, because I did not know the code.

Conclusions

> "*... memories may have symbolic value, but of what we cannot tell, for they come to represent the depths of feeling into which we cannot peer.*" T. S. Elliot

My final thoughts on the project are; I am discovering ways of self expression that I could not have imagined twelve months ago. This project is a work in progress that could itself become a life's work. I have discovered a hybrid of technologies; from the potential of real-time processing to the hands-on attitude of hardware hacking, between digital synthesis and the grainy sensuality of junk. I have realised the power that knowledge and understanding gives us when coupled with the language to communicate ideas.

This project has demonstrated the frailty of memory and how the direct effect of time on abandoned media has acted as a metaphor for my own memory retrieval. I have learnt that the acceleration in technology not only speeds things up, it transforms our own memories of previous technologies by making them appear slow. Day to day changes

[11] The clip can be seen in part 1 the video version from 1.06 minutes. It can also be found in the max_movies file.

prevents us from observing the gathering obsolescence we leave in our wake, and only by comparison can we gauge the passing of the superstructure of change. Technological progress is as complex as memory itself, with technologies and society often acting in mutual response to each other. Imperfections in technology drive demand, it is integral to its survival. When a technology becomes effective, its obsolescence is guaranteed.

This project has been about discovering hidden things and the salvation of forgotten objects. I hope this explains in some way this compulsion to confront dead media and attempt to restore it to life. Each memory, each object, underwent a forensic examination as if performing an autopsy. Only now, after methodically exhuming the past, can I cross over to the future.

APPENDIX

1. E-mail from Mr. Gagnier, head of archive and conservation.

Bonjour
I will be happy to meet you and discuss of your project. I don't know if the word obsolescence is suitable for our collection but nevertheless we could look forward to help you in with your plan.
I would have an hour on Wednesday afternoon June 2nd at 14h30 or Friday afternoon June 4 at 16h00 otherwise it will be on the 8 or 9 of June.
Sincerely

Pierre-Yves GAGNIER
Directeur du département Patrimoine et Conservation
Musée national des Arts et Métiers
292, rue Saint-Martin - case 600
75141 Paris cedex 03

tél. : 01 58 80 89 49 fax.: 01 58 80 88 98
http://www.arts-et-metiers.net/

-----Message d'origine-----
De : steve jones [mailto:steve@hookedonclassical.com]
Envoyé : vendredi 28 mai 2010 14:16
À : musee@cnam.fr
Objet : [musee] Visite au Storage

Dear Musée des Arts et Métiers,

I am studying for an MSc. in Sound Design at the University of Edinburgh, Scotland, and am currently in Paris researching for my final project.
This will take the form of a sound installation that explores memory, technology and obsolescence.

What is the sound of memory?

I am very interested in the storage and documenting of memory, and was wondering if it would be possible for me to visit the museum's storage department? I would hope to make a sound recording of the space, perhaps film if it was permitted as well.

Please let me know if it would be possible and what references you would require.

Many thanks,

Steven Jones

2. List of objects and devices

Atari STE microcomputer

Casio DA-7 DAT machine

Atari *computer system super sound* video game

Commodore 1541 and 5 1/4” floppy disk

RDS record player and 7” vinyl

MT100 Eagle Transistorized reel to reel tape recorder

PION reel to reel tape recorder

EHRecorder reel to reel tape recorder

Marconiphone reel to reel tape recorder

Akai S3000 sampler and 3 1/2” floppy diskette

iOmega 250MB Zip disk

Sony MD Minidisk walkman

Sony CD player

Grandstand video soccer game by Epoch Co. Ltd. 1981

Denon DR-M10 cassette player

Syquest 44MB disk cartridge and reader

Roland TR-606 Drumatix

Olivetti *Roma* Portable Typewriter

Konica 35mm camera

Minolta slide projector and 35mm slides

Aldis slide projector

JVC HR-J680 VHS video recorder

Tascam DA-88 multi-track recorder

LaCie hard disk 250 GB x 2

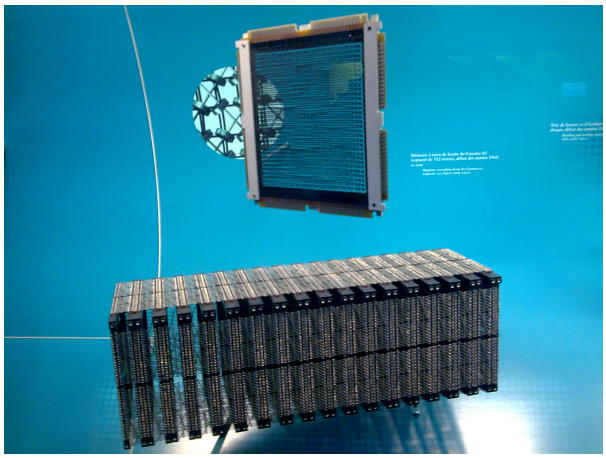
LaCie hard disk 180 GB

LaCie “Porsche” hard disk 80 GB

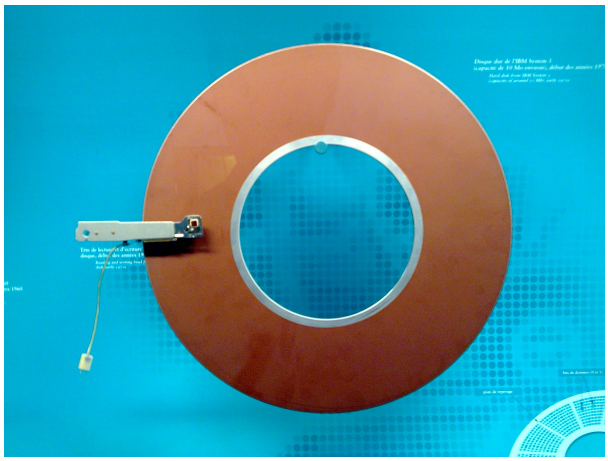
LaCie hard disk 1 Terabyte

Sigma TRS 6012 pd desktop cash till calculator

3. Musée des arts et métiers



early 1960s 7030 magnetic core 18Mb



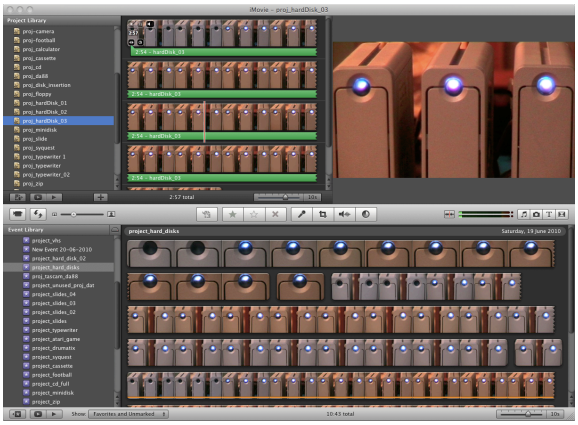
early 1970s IBM System 3 hard disk 10 Mb

4. Recording

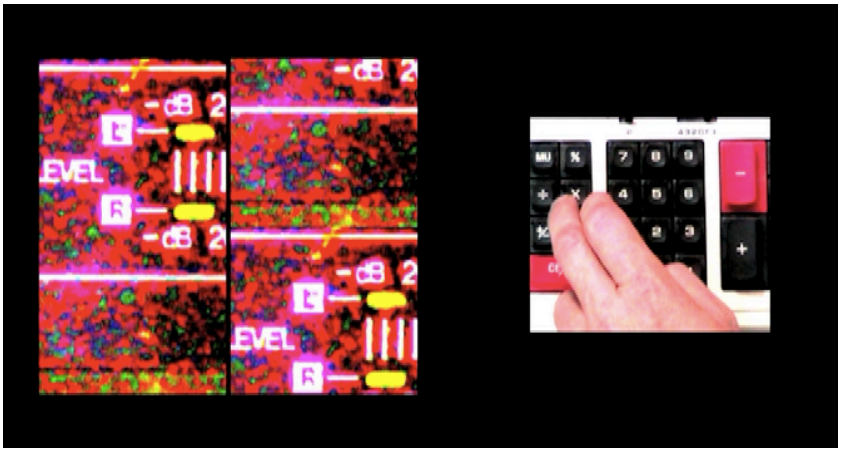
Plasti-Dipping contact microphons

recording/documentation set-up

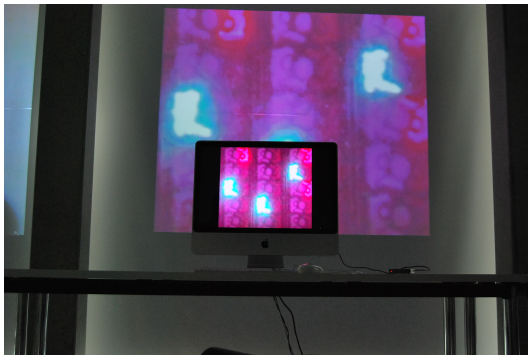
5. Sound and Vision

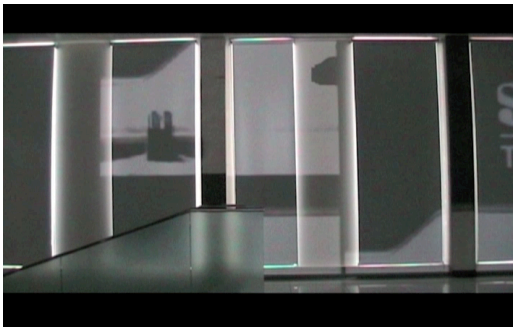


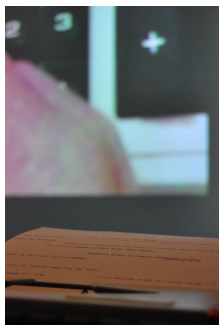
clips from 'sound of memory' videos



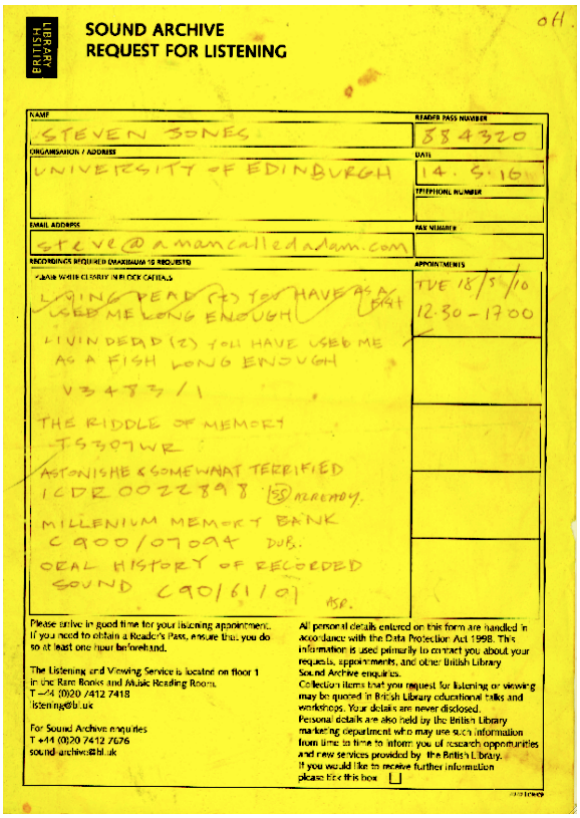
installation at Inspace (photos by Dimitris Patrikios & Steve Jones)







6. Documents



SOUND ARCHIVE
REQUEST FOR LISTENING

NAME: STEVEN JONES
READER PASS NUMBER: 884320
ORGANISATION / ADDRESS: UNIVERSITY OF EDINBURGH
DATE: 14.9.16
TELEPHONE NUMBER:
EMAIL ADDRESS: steve@a-mancalledadam.com
FAX NUMBER:
RECORDINGS REQUIRED (MAXIMUM 15 REQUESTS)
APPOINTMENTS

PLEASE WRITE CLEARLY AND QUOTE CATALOG

LIVING DEAD (2) YOU HAVE USED ME LONG ENOUGH — TUE 18/9/16 12.30 – 17.00
LIVIN DEAD (2) YOU HAVE USED ME AS A FISH LONG ENOUGH
V3473/1
THE RIDDLE OF MEMORY
T5307WR
ASTONISHE & SOMEWHAT TERRIFIED
1CDR0022898
MILLENIUM MEMORY BANK
C900/07094 DUB.
ORAL HISTORY OF RECORDED SOUND C90/61/01 ASR.

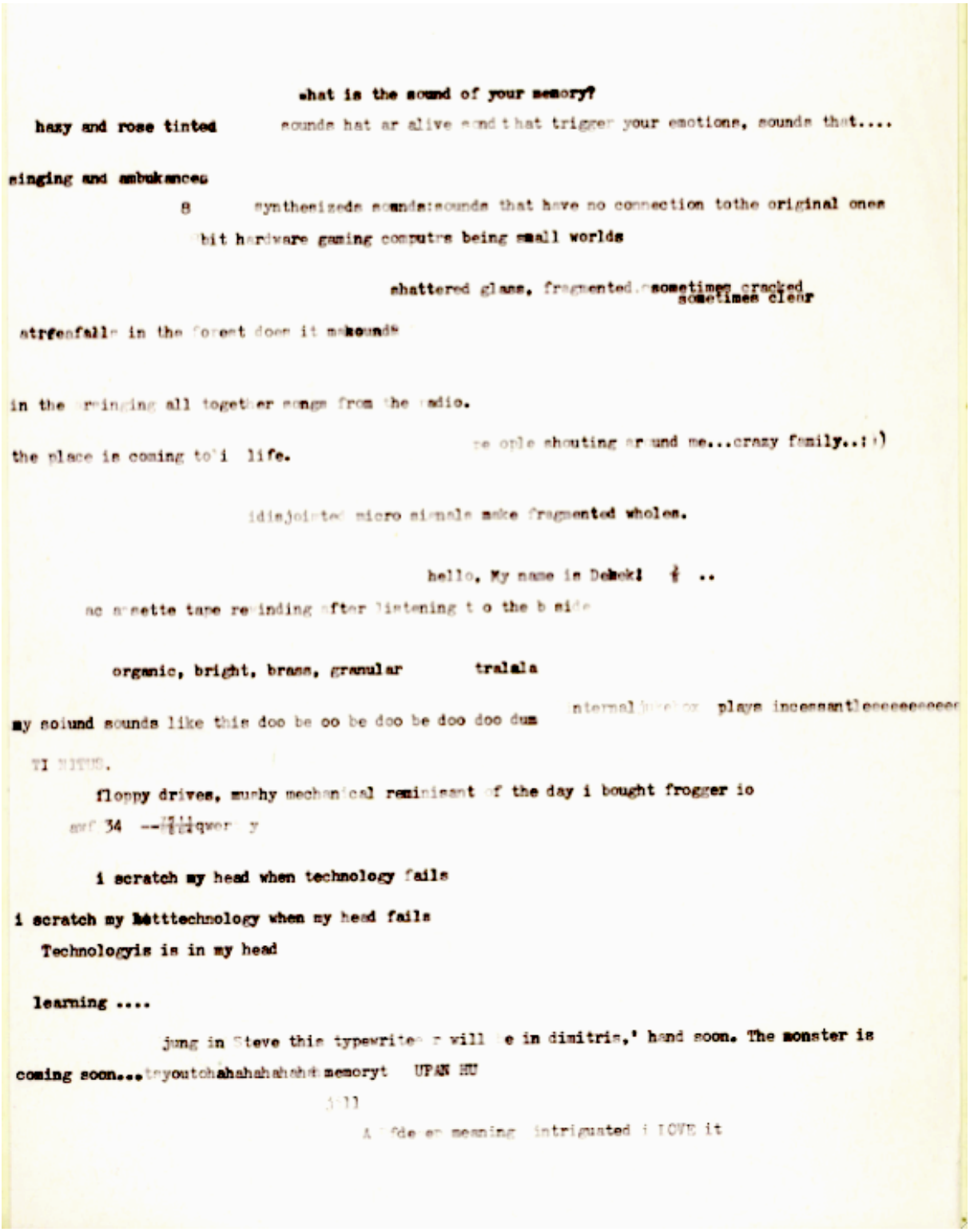
Please arrive in good time for your listening appointment. If you need to obtain a Reader's Pass, ensure that you do so at least one hour beforehand.

The Listening and Viewing Service is located on floor 1 in the Rare Books and Music Reading Room.
T +44 (0)20 7412 7418
listening@bl.uk

For Sound Archive enquiries
T +44 (0)20 7412 7676
sound-archive@bl.uk

All personal details entered on this form are handled in accordance with the Data Protection Act 1998. This information is used primarily to contact you about your requests, appointments, and other British Library Sound Archive enquiries.
Collection items that you request for listening or viewing may be quoted in British Library educational talks and workshops. Your details are never disclosed.
Personal details are also held by the British Library marketing department who may use such information from time to time to inform you of research opportunities and new services provided by the British Library.
If you would like to receive further information please tick this box ☐

A long time to access information: request form for material from the sound archive of the British Library



what is the sound of your memory? public typed contribution at the installation at Inspace.

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My thanks got to the teaching staff at the University of Edinburgh for their help and advice: Martin Parker, Owen Green and Jules Rawlinson.

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