

# **IDENTITY SPACES**

**Music Space As A Medium For Sound**

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# ABSTRACT

The work completed for this thesis starts with my initial interest in spatial music and concludes by placing space at the forefront of compositional thought. A shift in focus is attempted – from the traditional composer to the aural architect, a composer creating musical spaces within which sound is used to explore, reveal and illuminate those spaces. At the same time an unusual approach to what musical space is or could be is also outlined, along with a strong interest in unveiling virtual spaces, selected for their interesting aural identities. The portfolio contains a number of compositions created as a result of this research, as well as a preliminary set of tools based on the graphical programming language for music Max.

# **ACKNOWLEDGMENTS**

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# INTRODUCTION

As time passes by, my thoughts soiling the paper and my music-making interact.

The music changes to reflect something that could instigate an idea. My thoughts erased by the pen of the empirics.

So far, the paper seems to make more decisions than my ears do.

Perhaps this is not as bad an idea as it sounds.

I am expecting an equilibrium at some point. There must be a junction where thought and time seizes us out of this impasse.

For it is time in which the musical intent lives or dies and it is thought that spans and stretches our perception of music.

After all we are in it for the game, not the reward.

I began this Thesis with a certitude. I wasn't very experienced in matters of space but I had a notion of what interested me from a compositional point of view.

There was always the romantic idea of unity, a sense of belonging and a sense of 'natural' coexistence. The question of origin expanded into musical space.

Why here? Did it emerge from some 'silent' process? Was it the composer exercising command, or is it the natural flow of time? Does it belong?

Naiveté.

There were of course no answers. Probably there will never be. But it was fun. Turning tricks on the mother of intellect.

If I am certain now, it is of only one thing: space ridicules the bearer of meaning.

## MUSIC AND SPACE

*Any great work of art ... revives and readapts time and space, and the measure of its success is the extent to which it makes you an inhabitant of that world — the extent to which it invites you in and lets you breathe its strange, special air.*  
(Leonard Bernstein, 1958)

It is a matter of some difficulty to grasp the notions surrounding space. Definitions are fleeting and postulates about its nature are many. This is a luminous garden, a youthful playground for the inquisitive mind, yet this is not the time or the place for such an exposition and neither are we equipped to do so. Still, a brief account of some of these notions can be of interest, if not a necessity. There seems to be a parallel within the musical dialog, instigated by these ideas, and perhaps the lack of previous knowledge can confuse. I for one was baffled when approaching the matter of musical space unprepared.

We start with the debate cultivated during the dawn of the 18th century between Newton and Leibniz, in the papers of the Leibniz-Clarke correspondence (“Philosophy of space and time”, 2015). Newton believed in the existence of an Absolute space, a 3-dimensional Euclidean space as a point of reference for true motion. On the other hand, Leibniz regarded space as the relation between objects, having no existence without these.

A second ‘theme’ in this debate is the question of space’s materiality. Does space exist in some form or is it dependent upon the human mind? Mach is probably important here since he brings forth the link between the observer and the ontology of space. (Huggett and Hoefer, 2015)

Realizing the danger of sidelining beyond the need of a musical commentary, and seeing the danger of theories of relativity and alternate geometries creeping up on this dialog, a bit of Kant to conclude with, our favourite view:

*Space is not something objective and real, nor a substance, nor an accident, nor a relation; instead it is subjective and ideal, and originates from the mind's nature in accord with a stable law as a scheme, as it were for coordinating everything sensed externally.* (Janiak, 2012)

Kant sees space as a framework to organize our experiences. We are thus interested in space as perceived.

Depictions of musical space are too many to allow for a single concrete definition, yet the bond to the previous philosophical discussion runs strong. Beginning from more traditional forms of western music, pitch space as propounded by Boulez, the distance between the key and the modulation, between self and the other, is a main reference of space in music (Born, 2013). This was further expanded in musical thought to include every possible musical quality as McDermott writes:

*Every pitch, timbre, dynamic, every group of tones, every formal intricacy, every durational emphasis, even every rest — in sum, everything about a piece of music — contribute in some manner, substantially or only slightly, to the spatial organization of the work.* (McDermott, 1972)

Thus pitch, among other musical parameters, conjoins to construct perhaps arbitrarily described, n-dimensional spaces. I think it should be noted here that, although this conception is based upon perceivable music qualities, a question might still be asked whether this constitutes a perceived space, if it is experienced as such or if it is an abstraction inherited by the score based, graphical representations of space, a transference from the visual to the aural modality. Another point of interest is that in contrast to physical space, the dimensions here can be of a different nature (for example amplitude and time). In any case the lineage to relational theories of space is clear.

Moving into the realm of acousmatic electroacoustic music, there seems to be an elevated interest in space as a compositional issue as well as a performance one. When we talk about performance here we are referring mostly to the process of diffusion, propagating sound in acoustic space. Truax (1998) talking about the complementary processes of composition and diffusion presents this twofold preoccupation beautifully as, 'shaping the space inside a sound' and 'shaping the sound inside a space'.

On the other hand Blesser and Salter (2007:137-150), from the perspective of an aural architect researching the relation between acoustic space and the enclosed acoustic object, have another interesting view. Using the paradigm of an instrument sounding within a concert hall they see them blending towards the creation of a new meta-instrument. When both instrument and acoustic space are analyzed as primary and secondary resonant enclosures respectively, their difference then seems to become an issue of playability, a question of performance. In a very gripping analogy Blesser and Salter visualise a giant performing the concert hall the way a composer

uses his orchestra. The distinction thus especially nowadays, due to the technological advancements in musical tools is a very difficult one to sustain.

Harrison (1999) shedding light upon the lineage of *musique concrète*, not only as musical practice working with recorded sound but also as a concrete compositional process from the sound material to the abstract musical structure, regards sound diffusion as a continuation of the studio performance. The gestures used to shape the sound can be utilized again to shape the audience's perception within the specific performance space.

Interestingly enough one could probably see a parallel between this view and Blesser and Salter's (although there is a significant difference between the goals).

So far we have focused upon the relation between composed space and performance space, mostly to highlight the difference to previous musical paradigms. Of course there are also many commonalities. Spectral space for example, as the difference between the lowest and highest audible sounds (Smalley, 1997) makes an appearance along Truax's timbre space continuum and can be seen as a superset which includes pitch space.

The intrinsic qualities of sound material (Barrett, 2002), its spectromorphologies on one hand, and the acoustic, the 'absolute space' on the other, along with its very specific characteristics (diffusion, diffraction, absorption, reflection, etc.), are common attributes of musical space, regardless of stylistic concern.

Yet recorded sound brings forth another spatial aspect. Some sound materials, if not all, lend themselves to external associations through the process that Smalley (2007) refers to as 'source-bonding'. These associations can be real (for

example, recognizing the source of the sound) or imagined, since it seems there is a tendency of the human mind to 'fill the gaps', to place sound (even abstract sounds) into some sort of category closer to the 'experienced'.

These source-bonded sounds in return seem to carry their spaces along with them. The sound of the cicadas stridulating besides and beyond reduced listening affordances, transports the listener into a hot summer's night. The recording of a voice singing in the bathroom is inseparable from the bathroom space. Source bonded spaces, then, are a natural continuation of the source bonded sounds (Smalley, 2007).

Concluding this brief presentation, it is important to note that there are many more musical concepts and practices we haven't referred to here when discussing space: Site specific compositions, sonic art, sound installations, soundscape composition, even archaic practices like antiphony are part of this dialectic, some assuming at the same time perhaps a wider role in the interplay with the social dimension of art. These practices are concerned with, physical, social and technological spaces, spaces extending beyond strict musical concerns, spaces not internal to either music or sound, conceptualized spaces; which is why Born (2013:14) regards them as post-formalistic and separate from previous approaches. Examples of these are performances where physical everyday 'found' spaces interact and mediate the work of art, performances where the audience is in active participation effacing the 'wall' between performance and audience space, as well as collaborative live network performances where many musicians collaborate through virtual spaces afforded by new technologies.

In any case, practical issues and personal preference, when it comes to composition, will tilt the scale of this text towards composed space. One could see the issue of diffusion as one of translation, the last barrier between the composer and the orchestra, to paraphrase Boulez (1958) perhaps a barrier never to be crossed.

I admit, though, that composing for a specific space would be very alluring.

## A METHOD

### The Aural Architect

*A man walks on the moon. His shape is familiar, his walk distorted through the rules of gravity, the rules of physics, the rules that define that space, the rules that breed and are being bred by that space. Still this is a walk. Within that strange circumstance a cirrus cloud of what is recognizable still remains. Tomorrow he will walk in a different space, with a different set of rules. For sure some different trace of him will survive. What is of interest though, is the space we discovered with him.*

I am flirting with the idea of the composer as an aural architect, crafting a space, a space which later on he will illuminate<sup>1</sup>. In designing, selecting that space, I can search for behaviors, qualities that afford intrusive, immersive spatial experiences. This has two implications. First of all in searching for original spaces, one isn't looking necessarily for balanced soundscapes. This is not a search for smoothly diffused models of reality: rooms, halls, churches, concert halls, remains of 17th century music practices. What I am looking for is virtual, not necessarily because it does not exist, rather because it has not yet been seen as such. I am looking for character, not a means to present material. And here we arrive at the second implication.

The materials are not chosen with their extra-musical connotations in mind. This is not our vehicle for creating space or form. Indeed I am not looking for earcons, the sound of cicadas in a hot summer night, cars passing by, the sound of a

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1. See below for explanation.

bell ringing from the center of a small village. We are not toying with their perspective, not looking to manipulate perspectives and generate spatial experiences from these. It is not an issue of perspective, since the complexity of the space asks for a spatiomorphology that perhaps is not there yet. It unravels around the *listener* as central to the development of the composition. Perhaps, to oversimplify this, there is only one perspective, being or not within that space, now! The sonic materials entering the space develop the piece by revealing, fully or partially, an existing virtual space set beforehand. Their characteristics are not presented as the clay to form that piece; I am not looking for the development of the materials, their transformation or their juxtaposition *per se*. Form comes from unraveling the space. Sound, through the passage of time, illuminates. And this is where the materials play a significant role, their spectra, their dynamic envelopes, their temporal developments, are what react with that space, the primary events that reveal the space wherein these are located. Assuming that the identity of our space is strong, the materials entering it become part of that space; their differences, used to highlight and reveal aurally dark corners, do not seem out of place.

They belong.

## Form

... *changes in spatial perspective are a means of delineating music structure.*

(Smalley, 1997:122)

Prioritizing absolute space as a musical playground inevitably marginalizes time. Time becomes the result of what is experienced, bounded however by the spatial attributes. Formal considerations then adapt a more concrete character. Perception takes center stage in our exposition of musical structure.

Smalley (2007:54) discusses three space-form processes of interest. The first process, the 'journey', follows a narrative approach and is described as a passage between a variety of spaces. The second process, perhaps closer to what we have already touched upon, is an expose of different views of one specific space. And, finally, the third process concerns itself with multiple simultaneous spaces. I believe we could add one more. Inspired by Alvin Lucier's famed composition *I am sitting in a room* (1969), we could imagine the juxtaposition of a recurrent space feeding back on itself; the aural snapshot of a sounding space as a document of history towards resonance<sup>1</sup>.

A problem occurs. In contrast to Smalley's spatial conception we have limited ourselves—partially because of preference but also due to a different approach—to concrete pre-existing spaces. These spaces, being bare of extra-musical, symbolic associations face the danger (well, danger is perhaps too intense a word) of not being perceivably separable from our sound objects. Barrett (2002) signifies this

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1. Of course one could see this as a kinship quality belonging to any one of Smalley's space-forms.

while talking about illusion spaces<sup>1</sup>: ‘without source recognition, because some of the illusion keys are missing, the differentiation between an object sounding and a single resonant sound object will be less apparent.’

One then could imagine a few combinations that would lead to different perceptions: abstract sound into recognizable spaces; recognizable sound in abstract spaces; abstract sound in abstract spaces and recognizable sound in recognizable spaces.

Later on we will be showing a Max patch<sup>2</sup> implementation related to some of these processes.

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1. Spaces that appear real, abiding to spatial laws.

2. Max is a music programming language. ([www.cycling74.com](http://www.cycling74.com))

## I Place My Ear

I am reading about Orbieu, struggling to visualize a map. I almost know how it sounds, I think I can aurally visualize the soundscape, but the details of where everything is elude me. The wall of trees, the allotments, what is a quay really?<sup>1</sup> The laptop is burning and Merriam-Webster throws at me for the 20th time today its word of the day. I am tired!

I place my ear on the desk in my office and, instantly, sound changes. I can detect the distinct resonances of the wooden structure, I can play with the point of contact and change that, but I sense something more. The distance between my ear and the desk constitutes a space, I can imagine microscopic orchestras performing under that, within that space. Tiny particles of aluminum foil scrolling in, being blown, moving, revealing.

This is not simply a filter. And I wonder... How can I use that? Is it possible to use that? How can I compose within that space, with its multiplicity of constraints and affordances?

And then I look around: objects, inanimate, passive objects, waiting. Every object in the room could be a space: the drinking bottle, my old sofa, that kalimba a friend gave me for Christmas, the conch shell lying on the top shelf of my bookcase (yes I am that lucky).

I just need to place my ears around them and listen.

So now I am curious.

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1. This section refers indirectly to Smalley's description of space while residing at the French village of Orbieu.

## The Response

I run around the room placing contact microphones on inanimate objects looking for spaces of interest.

I strike them, scrape them, record them. I know technically, that I should be using the shortest of impulses, a sample, the impulse response but I don't care, when it comes to matters of space, accuracy is perhaps overrated.

I put my head inside the kitchen cupboard, inside the piano, I knew about these but I never thought of them as spaces to be explored. I gather, I select responses now to convolve.

When talking about composed space, the space as composed on to recorded media, Smalley (1997) makes a distinction between the internal and external spaces. External spaces are perceived because of the reflections around spectromorphologies; internal spaces are the resonances internal to a sonic event's spectromorphology. I believe it is of interest to elevate these internal spaces to play the role of the external ones.

We will have to choose them carefully, of course, and Blesser's idea of musical spatiality can help us out at this point. Considerations about their temporal and spatial spreading should be made, but in the end we will be interrogating these spaces, a trial and error affair. Returning to Harrison (1999) it is organic spaces that we are after, qualitative spatial evolution, not architectonic spaces as quantifiable distances.

In trying to describe the spatial attributes of an internal experience when no external references are present, i.e. the experience of a virtual space, Blesser and Salter (2007:134) bring forth the idea of musical spatiality, a language not bound by

the descriptions of physical space. Within that framework, a resonant enclosure as an abstraction of the virtual space can be seen to have two main attributes: temporal spreading and spatial spreading. Both these attributes are linked to and characterize a specific space. Temporal spreading describes the way the reverberation extends the duration of a sound. Spatial spreading describes the way our space broadens the direction from which our sound waves arrive. It is interesting to notice, here, that in open space, in contrast to a resonant enclosure, there are no reflections, thus no temporal spreading; we are in a sound vacuum. At the same time, directional sound can be seen as the opposite of a sound enclosed in a virtual space.

*The form of an organism may be viewed as the various instants of a process of continuous evolution successively frozen in time to create a structure existing in space. (Wishart, 1996:88).*

This could be a start. One can select these impulse responses with variation in mind. By placing the microphone in different positions or under different impulse situations<sup>1</sup> one can select various responses that could later on be crafted into unique virtual spaces. Depending on the object at hand one could use multiple microphones to record a spatial image which could be transferred and adopted entirely as a fixed space to be experienced.

We can take this even further. There is no need to limit ourselves to using only responses stemming from physical objects. Indeed there are many options here; one could sculpt or even generate these responses with the assistance of the computer

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1. A surface for example can react differently to different impulses as well different positioning of these impulses.

(the difference between the two being perhaps one of intuition with the method). For some compositions<sup>1</sup> in the attached portfolio, for example, I have used pinged resonant filters<sup>2</sup> I recorded from an analogue modular system; in other pieces I have edited recordings of sound material, which had spectra I thought interesting. Applying custom envelopes on a sound editor, extending their duration through time shifting processes, one can control the temporal spreading. Choosing and assigning these, in points in space affects spatial spreading.

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1. The 'birdlike' sounds in the final part of Loggin' Day starting from 5:40s until the end are an example of convolution with these resonant responses.

2. An analogue resonant filter, being on the cusp of self-resonating, can lead to 'pluck' type of sounds with specific frequencies, when receiving a pulse. By frequency modulating at audio rates and clever use of voltage modulation, one can get very 'natural' sounding percussive events with rich spectra. The decay time of such a filter is characteristic to the individual filter topology.

# TECHNIQUES

## Convolution

So far we have hinted at, although not explicitly described, our method for crafting spaces. On the technical side of things we should devote a fraction of our commentary space to a brief description of the terms and technique. Our simple method relies on understanding what convolution is and how it is being used with the assistance of an impulse response (IR). Then we should discuss how to take this and apply it to create an immersive spatial experience. Convolution is a mathematical operation upon which a ubiquitous digital signal processing (DSP) method is based.

Unlike what the name suggests, its use in audio processing is quite intuitive, so although it is always useful to understand the math, we will not deal with that here. In layman's terms, convolution takes as an input two audio signals, and outputs a third whose characteristics are defined by those inputs. In our implementation we focus on the convolution between an arbitrary signal and an impulse response. An infinitely short signal is said to have a very wide spectrum. In the digital domain that signal consists only of one sample; this is called the *unit impulse*. If this signal feeds a filter, in the most general use of the word<sup>1</sup>, the result is what we call the *Impulse Response* and characterizes that filter<sup>2</sup>. Because of the interaction of the input spectra, leading to the end result, choosing an impulse response is a way to choose the process. Roads (2001:213), states a fundamental Law of Convolution: '...the

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1. Every resonant enclosure can be seen as a filter. A room, a bottle, glass, a wall, etc

2. The IR corresponds to the system's amplitude-versus-frequency response (Roads, 2001:211)

convolution of two waveforms is equivalent to the multiplication of their spectra...’ and also: ‘the multiplication of two waveforms is equal to the convolution of their spectra...’. If our IR is that of a physical room, the result would sound as if our signal exists within that room (convolution as reverberation). If our IR is something not as spectrally rich, a finite sine wave for example, then the result would sound like bandpass filtering; if it is the recording of a vowel, the result will sound like a formant filter (convolution as filtering in both cases). If we generate and use an IR with only 3 samples, each some milliseconds apart, the result would sound as if our signal was processed by a tap-delay algorithm, each sample being a tap (convolution as delay).

If, on the other hand, the previous 3 samples are only a few samples apart, our signal would be smeared. There are many more cases and Roads (2001:216-218) describes most of them in detail. However the best way to understand this process is to actually experiment with various signals and responses. Depending upon our IR selection the result can be a process with significant complexity, being somewhere between a combination of all these processes. What is important to note here is that convolving with properly selected responses can lead to spatio-temporal effects not unlike those of temporal and spatial spreading we discussed previously.

### **Matrix Of Convolutions**

What we have described so far accounts for a monophonic signal convolved with a monophonic IR. Cook (Born, 2013:229) writes about music’s ability to retain meaningfulness even in highly reduced forms; further on he describes music as ‘a powerful connoter of place’, and indeed something similar exists in sound<sup>1</sup>. The

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1. We have actually touched upon this when referring to source-bonded sounds and places.

monophonic sound convolved with a room gives the familiar impression of that room, though this impression is not immersive. This is not what we promised! The first step towards that immersion was, naturally, to use more responses and more speakers.

Establishing the implementation on a typical quad speaker setup (see sketch p.22) towards circumspace<sup>1</sup>, each speaker was 'assigned' to a different IR and convolution process. A monophonic input signal would then 'enter' the space passing first through a quad panner controlled by an xy interface<sup>2</sup>, which we will describe further on, feeding the individual convolution processes. The problem with such a method, especially when one is trying to be creative in one's selection of responses, was the strong bond between the actual place of the sound and its character. The results resembled more a mix of four sound-emanating points in space than an actual space instigated by the monophonic signal<sup>3</sup>. Another issue, related to the previous one, as well as to the nature of this process, was the determinacy of the results. Indeed with the same input material and the same responses the outcome is very specific, stale and does not help with the development of the sound, or even a composition if one is going to work with these restraints. To overcome this hurdle, we took two steps. The first was to assign, not one, but four impulse responses per speaker, creating effectively a matrix of convolutions. The second step was to detach the input sound from any fixed position in space by removing the panner. Now our xy interface became the interface to morph between the various responses while our sound's position was defined by the way that sound would convolve with the moving

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1. Sound that can move around the listener (Smalley, 2007).

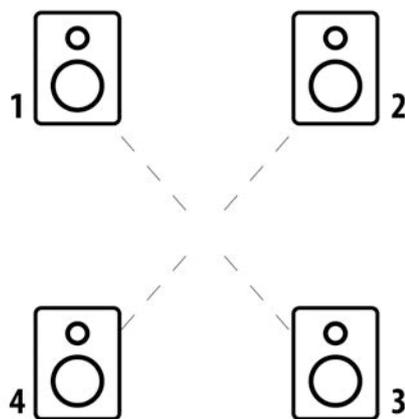
2. A point in a two-dimensional space, whose Euclidean distance from the corners of that space controls the patch.

3. This behaviour was also previously encountered in the spectral freeze patch where again the panner was coupled to the xy interface.

space. The result was much more rewarding and would offer a large field for experimentation.

A few details of practical nature were added a little bit later: a way to save and recall the matrices (selecting 16 different responses every time one uses the patch was quite laborious); a multichannel compressor (convolution basically tends to enhance the common frequencies of its inputs and suppresses those not common, which can lead to distortion in specific frequency regions); a chorus between the input signal and the convolution process (this was suggested by Alex Harker<sup>1</sup>, the creator of Hiss tools, a suite of DSP externals for Max which includes the convolution external we used in our implementation); an amplitude follower to control the xy interface; and finally, the most important<sup>2</sup> control of all, a dry-wet knob to adjust between the original input signal, sounding on all speakers as monophonic, and the processed version.

The patch then was adapted to allow for various input signals, monophonic, stereo, quad so that there was a certain flexibility afforded to the material as well as a way to reprocess our results.




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1. The suggestion came in the form of post in a thread in the popular forum specialized in modular synthesizers, Muffwiggler. (<https://www.muffwiggler.com/forum/viewtopic.php?t=112121&start=all&postdays=0&postorder=asc>)  
 2. Convolution has a tendency to smear the transients of a signal in relation to IR selected. The inclusion of this control allows getting some of that transient back.

## **Where Do We Go Now**

I believe there are many avenues left to explore. The obvious one is to expand the patch to more and different speaker setups. Another option is to use more responses, moving at the same time from 2-dimensional to 3-dimensional control – a cube – as well as increasing the richness of the results; this is something we definitely look forward to. We could also look for less linear, alternative methods of crossfading, morphing between the outcomes of the convolution processes in order to perhaps improve the sound quality of results. Another idea could be to be able to feed the results of one process into others, creating a network of responses, although finding a way to control the problems we mentioned before, such as distortion, might be then a nightmare.

## Previous Work Leading To Convolution

### Cartesian Approach

My first experiments with spatialization were focused on the previously mentioned 'serialist' approach.

A Max patch was designed in which, any monophonic audio input could be projected to the eight speakers available at the University of Birmingham studios in a number of ways (sequentially, randomly, based on a probability table, in linked pairs, etc).

The speed of this spatial movement was linked to the amplitude of the incoming events, either as a trigger to a new selection or as data to be mapped one-to-one on the available speakers. Later on I made a few adjustments in which the speed of movement could be linked to the duration of a given sound file moving in some proportional relationship to it.

This approach, although initially impressionable, soon seemed limited in scope. Indeed as my sound materials were hopping around, there was no indication that these belonged to any particular space. The connection between the amplitude of the sound material and the spatial movement was also not perceptually strong. In hindsight, detailed spatial movement (as in trajectories) seems to me not very important in the perception of space, and movement in the periphery is not very effective either.)

Remnants of this procedure appear in two pieces (*crossBorder Slug*<sup>1</sup> and *probable identity*).

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1. Listen to the first part of CrossBorder Slug for an example of these (00:00-1:20s) and file probableOutake.

## Spectral Approach

At the time I was using a suite of Fourier based Max patches by Jean-Francois Charles.

JFC had the idea of storing the results of an Fast Fourier Transform (FFT) analysis in Jitter matrices, allowing for a better visualization of the data as well as opening up the data to a large number of jitter objects available for processing that data.

One of the most interesting ideas for me was his spectral freeze patch, where he would freeze a small number of FFT frames and play them back using noise<sup>1</sup>. I took this idea and built a matrix of frames and linked them with their position in space.

The result was a very abstract wall of sound, but a complete lack of space, a void not different to the sound of open space. It was perhaps the lack of timing information (no temporal spreading to give a sense of a resonant enclosure), or the perception of the sound material, frozen, unmodulated, not unlike the prevailing feeling a sine wave gives as eternally present.

Indeed, time was only dependent on my 'play' with the interface, the frozen sound had no timing information, so the only movement available, which in itself would generate a sense of time, was that of moving through the various frames.

Perhaps it might be interesting to develop this further using a similar matrix of timing envelope information, so one could freely surf amongst the various combinations such a method can offer.

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1. Listen to the three examples of this method (framesM, framesQuad, framesWithDeath)

# THE PIECES

## CrossBorder Slug

A struck omelet mixer excites the condenser membrane; the closeness reveals low frequencies vibrating lazily; the transient metallic mark triumphs when at greater distance; variations gathered. There is a spectral balance<sup>1</sup>, perhaps endemic to small metallic objects that in reality shouldn't be pushing that much air, that one can control by careful microphone placement. Too far away the low vibrations disappear, too close and they 'own' the scene, distorting and smoothing temporal detail. The materials were processed through an old custom granulator Max patch and an FFT player I modified allowing to choose frames in a non-linear fashion. These were then spectrally smoothed and filtered. I had no spatialization plan so grains were thrown stochastically at an eight-channel speaker configuration. Four of them, all even numbered, were removed to add some jerkiness and ease<sup>2</sup>. With their removal, chunks of the sound vanish. Jerkiness becomes the main theme. Playing with time, causing temporal hiccups. Spatial gaps. Unsettle time! And there we reach a point, an 'intro'. A strong gesture expecting a certain way to be explored; perhaps audience and material are alike in that anticipation. But here lies a question. I believe there is a very clear way to work with this, pushing around the gestures from spectrum to spectrum and from space to space, stretching, shifting, densities, clouds. Exploring intrinsic qualities. One could even label this as the electronic way – after all this is part of what technology allows us to do. But do we want that? There is a

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1. Not to be confused with the proximity effect of dynamic microphones.

2. Ease as in compatibility between the University's studios and my personal one. The latter of which only has 4 speakers.

degree of artificiality in such an exploration, yet it is perhaps expected. On one hand you have a stylistic approach, a dialogue with history tending towards mastery, the hope for excellence, and on the other a chance for a new experience. The piece is more interested in playing with the expectation, always a tricky path for sure. That big 'gap' in the middle about which everyone wonders is there purely for the wondering. Its not that one doesn't expect it really; after all how can one know what the other expects with certainty? It's just too wide for comfort I guess. Unsettled form!

### **Loggin' Day**

Sand pebbles, falling on wood stumps washed up on the beach, or rolling on an aluminum plate of some culinary usefulness, I now forget. It began as an exercise in foley, trying to record individual pebbles, as well as masses of them in motion. From detail to intensity there was a performance leading to some gestures within the material. Two-minute segments were assigned and developed separately, I don't have a logical explanation as to why, probably because it was more like an exercise with the technique... These scenes functioned as placeholders for spaces to come. I would work, exposing different spaces, using mostly similar material though each segment, through each different spatial image. Sound adopting the cinematic role of the valise, pushing forward our narrative. So I created these different spaces using different responses: self-resonating pings, samples from a squeaky wooden closet, the mute response of a table. But something doesn't work. A disaster really. Smalley's journey from hell<sup>1</sup>. Perhaps the spaces were too strong, breaking the continuity of the material. Then there was no reason to travel through them or

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1. As in Smalley's journey, space-form, a form focused on moving between spaces, badly executed.

perhaps I should have used a different method to do so. Abrupt changes instead of transitions? Perhaps... Nice ending and nice beginning though. Space succumbs to the might of sound design. I definitely need to revisit this piece. The first part could have been developed into a separate entity using only 'natural' sound. Anyway the primitive version of the convolution patch makes its first appearance here, the lack of transient detail shows, I think. That might have been one issue.

### **Identity Likembe**

Spatial thinking at last! Again the jerkiness; it is important. We should not bore ourselves with time. Time should not be clear or smooth. Time at the service of something else... Monophonic pulses and noise alternate, illuminating a complex uniform space. Likembe responses – our space! Different pitches spread out in the matrix, almost a pitch-space materialized from the old. Of course here we go beyond the space of the score, still pitch does play a 'navigational' role being specific in its spatial distribution. Variations of our responses, responses with nails vibrating on the metallic surface of the likembe, provide the internal movement. The cry of a newborn, stretched beyond reason. No idea why. Environmental, ambient, indecisive. Change of perspective, outside that space and now inside again, but different. Almost cheating. No reason always to follow the plan. Abstract sound inside familiar spaces. I mentioned previously the issue of artificiality when it came to musical form based on the development of material and in this piece it played an important role. In essence this is about not using what a sound pattern can give you, favouring a 'natural' occurrence of events. Now obviously labeling something as natural can be quite subjective, but what we are focusing on and perhaps promoting as natural is a form

that allows for variations of a perceptible pattern, but not the exposition of that. What we are exposing is in agreement with Smalley's second space-form process the space itself. I used to call this piece Delve sanis xv, toying with the names Salvatore (Sotiris) and Dennis (Dionysis) of my two children that enjoy playing with the likembe at home. Living with children waveshapes time. A few seconds can last an hour and a day is gone in a few minutes. It's a nice rhythm.

Now I know why I prefer the jerkiness!

### **Probable Identity**

Familiar sound inside abstract space. Performing the piano; it's always easy. This piece was very easy. Fluid. Responses gathered from a session with an analogue modular synth. Sustained, persistent, long responses craft a diffused space, a space though with a very strong preference on specific frequencies. The piano is not monophonic. It entered the space as the result of a probability table, selecting sides. Its amplitude triggers the change in space. The spectrum of the piano illuminates the space; the pace is slow; revealing details is slow. This was a performance, not unlike an engineer's method, who claps his hands when entering a space trying to understand its properties. Time then was more controlled, founded upon the reaction of the space and my listening to it. Playing and listening, listening and playing.

## Identity Silica

The sound of glass fragments, broken and time-stretched, enter a space of rubbed glass. The responses of that space are quite similar, tiny time-differences leading to phase differences. This piece is very much dependent on the listening space and listening level<sup>1</sup>! It doesn't fill the available spectrum bandwidth, it doesn't even ask for attentive listening. It is just an excuse, an opportunity to listen to the surroundings, very Cagean at that. It is a space with a purpose, so to speak. I always considered this to be nocturnal not due to some descriptive mood but because it is a piece I enjoy listening to at night. It is then that I feel it works best, or I should say it works at all, as an aural cornice for the discreet soundings of the night, when man's and nature's activity are drained, lacking the energy and intensity of the day. This also sidetracks a little bit from our main theme of exploring a space. It is difficult to say if the piece with its surroundings unite, if they are two different spaces or even if the piece works simply as a somewhat melodic ison to our surrounding space. The version I submit for the purpose of this Thesis is however 'compromised' since listening in the studio might not allow for that interplay with the surroundings and also I couldn't possibly bring myself to ask for a specific time of audition. So I took the liberty of adding one aural possibility, quite different though to the 'version' I am more accustomed to (the sound of dragged chairs from above, the sound of distant traffic, the sound of timid wind, cats hauling, cicadas again, etc). This is a distant daily space.

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1. The phase differences create a beating pattern between speakers and between ears. This can actually be dangerous, especially in loud environments, of which as I have the bleak first-hand experience. Since the beating occurs at the low end of the spectrum, it can easily give the impression of being quiet or even inaudible in a noisy environment. If you make the mistake to raise the volume, you might end up with a post-flight ear block. I know I did...

## **Cirrus Cloud**

We begin again from a familiar starting point: crafting a space, monophonic sound entering to illuminate etc. Still it seems here that the material saturates the spatial experience to a point where motion dominates that space. We are in it, because it moves around us; we are circled. I think it's the spectral width of the sound, too dispersed, too complete, too noisy. The material is the result of an unusual process: noise reduction. Remnants. Usually this is the part you throw away. Electronic bleeps, coming from granulating sand pebbles at extreme pitch ranges are cross-modulated with their original sources, filtered at resonant settings that allude to a sense of tonality. The form of the piece is different from previous efforts as well (or I should probably say the goal is different). There is a direction towards the use of sound stems, the original sound sources, starting from the processed, denoised vestiges. It is not always easy to make this transition audible – processing can break perceptible relations if overused, and a simple volume change can tilt this balance as well. However there is also another transition, a transition from noise to pitch; at least this is easy to spot!

## CONCLUSION

This thesis started with a technique and ended with a possible method for composing with spatialization as the primary musical concern. The method was very much influenced by the book *Spaces speak, are you listening?* by Blesser and Salter, a book that came to place a framework to guide and challenge the technique, a spatial thinking from the perspective of the aural architect. However there was no time for the technique to be developed further based on that new method. I am very much eager to continue towards that goal – there are many ways to skin a cat, as they say. One can imagine a space being constructed algorithmically with a physical model in mind, not unlike our astronaut-moon graphical example. Placing the rules of how a space can be and how it will react to vibrations is an open field for research. I am not sure about the extent to which the various techniques can affect the quality of the final musical result, however. There is an influence, but whether it is measurable or not is probably related to the composer. I do consider, though, the music submitted with this thesis to be part of the experimentation with the main idea.

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