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UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Ollscoil na hÉireann, Corcaigh

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Formless, bodiless, purposeless

Development of a portfolio of non-teleological electronic sound works

Portfolio presented by

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for the degree of

Doctor of Philosophy

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Contents

Contents 2

Acknowledgements 3

Declaration 4

Table of Figures 5

Abstract 6

Introduction 7

Chapter 1 - Space 17

Chapter 2 - Time 26

Chapter 3 - Sine tones 39

Chapter 4 - Timbre 54

Chapter 5 - Untitled #0 (8) 66

Chapter 6 - Untitled #1 (Morning) 76

Chapter 7 - Untitled #2 86

Chapter 8 - Untitled #4 91

Chapter 9 - Untitled #8 100

Chapter 10 - Untitled Reflections 105

Bibliography 106

Notes on the media 111

The portfolio, which contains software patches, audio & video recordings, and photographs, will be accessible via the link provided on the main page for this project on CORA.

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Declaration

This is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism and intellectual property.

Table of Figures

Figure 1-1 - Horizon Field (2010-2012) by Antony Gormley. Photo by Markus Tretter. 25
Figure 2-1 - 'Morning' at Tate Modern, London 2021 28
Figure 2-2 - Detail of 'Morning' at Tate Modern, London 2021 28
Figure 2-3 - Detail of ‘Untitled #8’ in CAM/CCB, Lisbon, 2023 29
Figure 2-4 - ‘Untitled #8’ in CAM/CCB, Lisbon, 2023 29
Figure 2-5 - Performing in Prisma Estúdio, Lisbon 2024. Photo by Victoria Brunetta. 31
Figure 2-6 - Prisma Estúdio, Lisbon, 2024 31
Figure 2-7 - The Small Auditorium in Escola Superior de Música de Lisboa, 2024. 33
Figure 2-8 - The Small Auditorium in Escola Superior de Música de Lisboa, 2024. 33
Figure 5-1 - Analogue synth patch for Untitled #0 (8) 66
Figure 5-2 - gen~ patch signal flow 70
Figure 5-3 - Morphine Raum, Berlin, 12/10/24. Photo by Doreen Kennedy. 73
Figure 5-4 - SARC recording, Belfast August 2023. 74
Figure 5-5 - SARC recording, Belfast August 2023. 74
Figure 6-1 - Signal flow in Untitled #1 (Morning) patch 80
Figure 6-2 - Untitled #1 (Morning) at The Complex, Dublin. 31/03/23. Photo by Paddy Kiernan 82
Figure 6-3 - Your Location in Space at The Guesthouse, 30/03/24 84
Figure 7-1 - Untitled #2 in operation 87
Figure 8-1 - Presentation at Unit 44, Dublin, March 2025. Still from video documentation 99

Abstract

This research project explores and develops my compositional practice. I make music and sound works in which the experience of electronic sound is the sole pursuit, working with simple sound sources such as sine tones. They fascinate me, but I do not know why. The project is a portfolio of five works and written commentaries that examine them and their composition. The compositions are works for hardware and software-generated synthesis.

Each piece develops this idea of the work as sound solely to be experienced. The portfolio begins with works for synthesiser and computer, to a software piece operated by the listener, to a collaborative work between computer-generated tones and audience operated smartphone instruments, and finally a work for sub-bass tones that invites physical movement and experience of near-inaudible sound.

In the commentaries, I break down the main material of my practice into four areas: space, time, sine tones, and timbre. In these chapters, I problematise compositional decisions I make, and how I think about things like sound and its interaction with, and habitation of, space. There are also more nebulous factors to my practice that come and go throughout the commentaries: finding out, use of constrained random processes, mystery, and sensation. They are, perhaps, the unknowable parts of my practice, but they are always present and permeating one another. In these chapters, I contextualise my work among other practitioners of music and visual art. These practitioners may compose similar sounding music with very different methods, or be visual artists whose work speaks to my own sensation of sound as a three-dimensional object or substance that can move around and with a listener, as they move around and with the sound.

Introduction

One way I'm looking at it is that there are some broad categories in my practice that I think of as 'material': space, time, timbre, and sine tones. These are the core components I use and play with to make the work that I make. Inside of and around those are more nebulous things, such as various forms of constrained random processes, finding out, and mystery. Some are technical and some are much foggier. These nebulous elements move between the material components in my practice. They move continually, maybe unpredictably, around the work that I do. These things are all of equal importance. They overlap and come and go from the foreground.

The greater part of my work is built around sustained tones. My view of them aligns with Richard Glover's, that they "provide a form of decentralised landscape in which the sounds are there to be grasped freely"[1]. Using such tones, I can create, generate, paint, and sculpt an environment, object, and space. Details can be zoomed in on, examined, explored, played with in active modes and flow states of listening. There are short sounds in my work too. One of the pieces in the portfolio (*Untitled #2,* a Max/MSP patch operated by a listener) is composed primarily of these – a combination of sine tones, noise, and other simple waveforms – and I view them the same way. They are part of a landscape or colour field, occupying points in a non-linear temporal space.

Exploration of sound, especially timbre and the many effects that can be created in a space, guide my practice. I wish to create sonic spaces that are invitational to a listener, perhaps to physically navigate a room in which a work is being presented, the paying close attention to the sound, letting the sound wash over them and surrounding them, or any other way they may wish to experience it.

[1] Richard Glover and Bryn Harrison, *Overcoming Form: Reflections on Immersive Listening* (University of Huddersfield Press, 2013), 10.

The work in this portfolio is driven by my fascination with electronic sound. For me, sound that exists solely to be experienced can be the most affecting music. I take influence from visual and sonic artists and artworks that suggest to me a suspension of time, an expansion of space, and an enveloping environment in which to dwell.

Material

Time

This is something of which I am simultaneously aware and unaware. In the chapter on time, I consider the contradiction of wanting to make music that is not time-based. How can something made in a time-based medium/artform not be time-based? The chapter examines my perception of time in music and visual artworks, especially by Agnes Martin, that resemble and influence my own practice as being without pace and freely navigable. Martin's paintings are something I hold very close; they highlight how I think about time and space as overlapping, and maybe even analogous. Both are an infinite mist of points that one can move between and connect. A Martin painting suspends time when I view it, and I move my attention freely around it.

There are events or objects that are heard, seen, and experienced at different points in linear time, but I do not think about those things as sequential or causal. There is no specific aim here, but I do intend to create something that is invitational to a listener, where duration resembles Glover's description of Éliane Radigue's work, which "does not project a feeling of global shape…but rather a much more reflective space for one's own personal inquiry".[2]

I intend for the sound in a piece to be in continual motion. I develop synthesiser and Max patches that generate many forms of gradual and subtle motion in the sound,

[2] Glover and Harrison, *Overcoming Form*, 19.

so that it is never still, but crucially is never transforming into anything, becoming anything, or heading towards a particular destination. It is not a linear, causal, narrative-based thing but instead something plastic that is traversable and non-teleological. I don't think of my work as slow, even though it needs a lot of time to make sense. I think of the time it needs as part of the space that it breathes in, grows into, and occupies.

Space

I think about space as something malleable that takes different forms, internal and external to the listener. The physical space of the room and the space that the sound creates and inhabits blend together and diverge constantly, perhaps like zooming in and out of details in an Agnes Martin painting or a piece by Sachiko M. It's a substance, like dancer Mary Nunan says[3]: the sound moves through and with it, and the space moves through and with the sound. And the listener does the same.

The physical room in which the sound is heard is, in some ways, uncomplicated: the walls, floor, ceiling, and the objects within. Surfaces and bodies that absorb, reflect, and resonate with, sound. The space that the sound creates and inhabits is multicoloured and heavily influenced by my experience of visual artworks that invite me to experience their internal space(s) and their context within the room they are placed. Mira Schendel's sculptures, for instance, are so delicate, and made from fragile materials such as Japanese paper and nylon wire, that they affect the room they inhabit. When I view works such as *Trenzinho (Little Train)* (1965) or *Ondas paradas de probabilidade (Still waves of probability)* (1969) I feel the room move through and around them and myself. I intend the same with the sound in my work: something that changes the perception of the space in which it is heard, and in turn

[3] *This Is It | 8 Dance Portraits*, directed by Laura Murphy, with Mary Nunan, 2024, https://www.youtube.com/watch?v=Bf3s3Bi9axM.

offers a listener an exploratory space in which to dwell. The physical space of the room is absolute and external to the listener.

This leads to the internal space I have at various times thought of and described as non-physical: the space we hold in our imagination and become aware of within ourselves as a consequence of the experience of sound. The space that each listener can create and exist within is highly personal, bringing a multitude of influences from a person's own experiences. The sound is in perpetual dialogue with this internal space, continually recontextualising itself. I consider the "space that the sound creates and inhabits" mentioned above as something that doesn't necessarily bridge the external and internal, but moves between, around, and through them. It connects them and allows them to overlap and permeate one another. When I listen to the works in this portfolio, for example, I experience fragments of Martin paintings, Schendel sculptures, flashes of Sachiko M and Phill Niblock. They come and go, mix, and interact with the sound as I hear it in real space, affording the creation a unique piece each time.

Timbre

The thing about sound that is most important to me; the priority when I am composing. Everything I do and consider comes back to timbre, as something that is core to curating an experience of sound. It is the whole sound, and how the sound behaves. The timbre of a sound is, for me, its shape and form, its movement, its essence, and the sensation one has when hearing it. In this chapter I compare my approach to timbre to other composers and artists, considering how it can contribute to sound inhabiting and blending with a physical space, so that a listener is invited to explore that space and curate a unique listening experience. In particular, I compare my approach to timbre to that of Phill Niblock, whose work is precious to me and foundational to my practice, and that of La Monte Young, with whom I share sonic traits, but diverge strongly compositionally.

I perceive sound visually, and in this chapter outline how my thinking about pitch and timbre are deeply linked, even though pitch is not a priority in my work. This extends to my use of filtering and basic tone generators. These components of a sound are materials I combine to sculpt the form of a work. Timbre is something I can explore fully with simple waveforms, and especially with sine tones. They enable me to explore deeply my own experiences of them, and they are the types of sound I find myself drawn to most often. Their simplicity affords play in my practice and are most effective for generating complex sonic phenomena.

Sine tones

The main sound source in my work. I'm fascinated by them, their blankness, their blurriness in terms of their physical origin in a space, and overall, their mystery. How is something often described as 'the simplest sound' so captivating? How I view sine tones moves between their being a blank canvas that, along with the space in which the sound is heard, allow an experience to be 'painted', and raw colours that can be mixed to create a sonority. They are the most 'material' of sounds, and their blankness is also beautiful in itself. Instead of describing sine tones with words like 'pure', which suggests to me some kind of pinnacle to achieve and superiority over other 'lesser' sounds, their absence of harmonic content affords close and open listening. They impart something in the listener, but not in the sense that they 'tell' them something. They are an open sound explored by the ear. It's easy to describe this blankness as an absence of something, or that they can represent 'nothing'. I think of sine tones as being everything at the same time, our listening revealing what they are in a given moment.

Sine tones are something that I feel in a myriad of ways. In the chapter on sine tones, I relate my use of them to that of others, namely Sachiko M and Alvin Lucier. Sachiko M, whose work, whilst sonically far from my own, is a significant influence on how I work with sound. Short bursts of sine tones in her work feel like bubbles floating through a liquid silence, illustrating the sensuous nature I consider sine tones to

have. Her work, along with pieces such as Lucier's *Music on a Long Thin Wire* (1977) and *Outlines of Persons and Things* (1975) guide my listening to sine tones as something that resembles a primed canvas: rich and dynamic, and ready to be experienced in countless ways.

Nebulous things

Finding out

I talk often in these commentaries about 'finding out' things about my work as it occurs. When presenting the work, this could be how a work sounds in a space, where the speakers are, what other sounds are audible, how the audience moves (or doesn't): how the sound behaves and influences behaviour. This has developed from years of presenting work in small DIY music and art spaces, where you have to play the cards you're dealt. As I discuss in the space and sine tones chapters, I previously saw this as 'making do' but now realise it is a positive and essential part of my practice. It helped me realise that the unexpected makes my music more alive, that there are infinite versions of a piece, that a piece is never really finished. You hear a distinct version or iteration of it each time. It helps me find a place within myself where I can hear new things each time I play or present a piece, and aids in refining it a little more each time.

Finding out isn't just something that occurs during a performance, but a deliberate part of the compositional process. I make things by experimenting extensively, listening to synthesiser or Max patches for long durations, and letting the sensation of the sound guide me. It's a mix of happening upon things and things revealing themselves. My acts of listening during composition could be described as simply paying attention to what part of the sound may be heard next. Everything may already be there, and I find out which interventions may reveal those things. A piece is a fog of possibilities, and the decisions I make in composing and presenting, along with how each audience member listens or interacts with them, determines that

version of a piece. These selections are a mix of constrained random processes in Max patches, and iterative, playful, slow-motion improvisation methods; a different but related form of tightly defined randomness.

Early in this project, this idea of finding out had not materialised in my mind. It began to after a period of failed experiments where I attempted to incorporate motion sensors into my instruments. I spent Summer 2023 taping accelerometers to my hands and arms whilst playing a modular synthesiser, processing the data in Max/MSP[4] via an Arduino[5] board, and sonifying it in the synthesiser that I was playing. In my mind were grand ideas of expanding this idea of the sound merging with a space even further, merging it with myself as the operator of the instrument generating that sound, and creating a deeply interconnected sonic environment.

In reality, physically tethering myself to the object from which the sound originates resulted in a situation where I was not 'connected to the sound' in a deeper way than before but stuck in a feedback loop of confusedly reacting to the data of the accelerometers as I was generating it. I wasn't listening to the sound and teasing out changes that were innate to it as much as I was trying to guess what it might do and how I 'should' move, to force it into doing something it was never going to do. I turned to attempting to sit as still as possible whilst attached to this assemblage, but that was similarly unfruitful. In one test, where I sat for fifteen minutes, one accelerometer had disconnected from the Arduino; I didn't notice. This experience illuminated how crucial the finding out in my work is, and how important it is that the sound is free to move as it chooses, by way of acoustics and random operations over my tying myself to it and attempting to operate it like a puppet.

Constrained randomness (and slow, occasional chaos)

I discuss throughout these commentaries my intention to create and engender spaces that invite exploration and close, curious listening in an audience. I pursue

[4] A visual programming language for audio generation and processing.

[5] An open-source microcontroller.

this by adding many layers of continual, slow, and often barely perceivable movement in many parts of a sound. I favour constrained and tightly limited random and chaotic processes such as chaotic voltage generators (in *Untitled #1 (Morning)* for solo synthesiser), highly attenuated random signals that control the mix of several sine tones (as in *Untitled #0 (8)* for synthesiser and sine tones), or random calculation of partials from a range of fundamental frequencies that are weighted towards a particular end of that range (*Untitled #4* for computer generated sine tones and smartphones). During composition I find out what movement is required for a certain aspect of a sonority and integrate a random or chaotic process as required.

In a wider, blurrier sense, this randomness is something I see as adding to an invitational situation for a listener to explore the sound and the space in which it is being projected. Constraining a random or chaotic process to a small range is key to achieving this barely perceivable, continual flux in the sound. This motion in the sound is, in addition to being slow, purposeless. I often think of the activity of sound in my work as a sphere that can move only within a slightly larger sphere, the surface of that outer sphere gently pulling and pushing.

Pitches are often generated from randomly generated partials of randomly generated fundamental frequencies, weighted towards various areas of the pitch set(s). Spatialisation of sine tones similarly moves randomly, but very slowly and without obvious or jarring swings in movement. Changes in the cut-off frequency of a filter may be made. A listener can play a piece constructed in Max by simply turning sounds on and off (*Untitled #2*); these sounds unlabelled to encourage a sense of play and close listening. These methods are all employed to serve a simple intention: to create sonic artworks that are full of internal movement, but do not transform, imply any narrative, or even give a clear sense of time passing. My work intends to invite close listening with no goal or objective. Being with(in) the sound is enough.

Mystery

Mystery surfaces everywhere. It's the unknowable about how everything is working. It's both an overarching component and not; it relates to everything but is its own thing. It is vague and unquantifiable, and so indefinable. It piques my curiosity in the sound of my work, how it behaves, what it is made of, how it fits within the space. I talk in these commentaries about sound having form, shape, texture. A surface I can almost touch but not describe. The surface and shape are unknown until it reveals itself during composition, and in many ways remains unknown. I intend that this curiosity is also engendered in the listener.

This mystery isn't sought out; it occurs when it occurs. There will always be something mysterious about a piece, and it is always a surprise when it emerges. Nothing specific is determined when composing but rather scenarios are constructed in which the outcome is not fixed. I find out what happens in those situations by experiencing them. For instance, in describing my use of pitch in the chapter on timbre, I outline how I do not calculate exact pitch sets for a work. I do not think numerically or arithmetically, instead feeling for pitch sets that work, that fit together and create this knowable but unknowable tactile shape of the sound. The sets are also not absolute. They shift as a piece lives: each iteration or performance of a work has a slightly different pitch content. When I get to a space for performance or presentation, the work is retuned for the occasion until it feels right.

Sensation, that is neither material nor a nebulous thing

Sensation is a global aspect of my work. It's a fuzzy, prickly, vibrating thing that I anticipate but can't deliberately produce, and its ineffability makes it difficult to describe. It underpins everything but is not fixed itself. The sensation changes: it is not predictable, but it is, perhaps contradictorily, something that I actively pursue, seeking it out but with play and experimentation rather than with fixed methods. It is more fun, the results more exciting, than fixed or formalised methods. It can bring

about more complex experiences of sound, finding something that is surprising and enchanting.

The point is not to describe or explain it, because vague things in their nature are not easily defined, but to make clear that it is there. For me it is one thing, for a listener another. The sound is what it is, and you can bring yourself to it or let it come to you.

These concepts are linked very closely in my mind, and overlap, move between one another, merge, diverge, all the time. There are not specific chapters on them: they pop up everywhere and imbue all of the work with themselves.

Chapter 1 - Space

Physical space

I've presented my work in shop units, former warehouse spaces, railway arches, acoustically treated studios, and churches. They are all enchanting in their own way; the differing characteristics of each space add different flavours to the sound. Arriving at a space and finding out what it can provide has become core to my practice. Years of presenting work in DIY spaces has led to a lack of specific requirement for the space itself (shape, size, acoustics etc.), or any particular technical needs other than a source of electrical power and speakers. My background has harboured a fascination in the ways in which sound can reflect, diffract, and be absorbed by different surfaces in a space, and what external sounds may bleed in. I relish the surprise of uncovering the idiosyncrasies of a particular room; how the sound (and later, listener) interacts with it. I remember the strange interference patterns, reflections, and areas of deep bass in Spanners[6], for example, or the clarity of the sound in Morphine Raum[7]. Both of these were compelling, and something I could really work with when presenting the piece (*Untitled #0 (8)* in both). This feeds into my idea of there being no one version of a piece, or even that a piece never really ends. Those shows were two instances of my sensation of place for that work: what it happened to sound like on those days at those times, in those places.[3]

External sounds that occur during a piece are part of the finding out: if they happen, they happen. They don't necessarily become part of the piece, but I don't fight against them; they are welcomed in to interact with the sound just as the listeners do. This could be something like rain on the metal roof of a warehouse or a bus passing a shop unit, the pitch of the engine drifting around the pitches of the piece for a short time. In Morphine Raum, no sound came in from outside. The high-end sound system sounded extremely detailed and clear, but was it 'better'? I don't think

[6] A venue housed in a railway arch in south London.

[7] A Berlin venue housed in a warehouse unit in the city 's Mitte district.

of things in that way. It was what it was. Pieces presented in these varied spaces were all compelling and successful in their own ways. Rather than thinking about 'the space' when composing, I like to simply work with the sounds that I am drawn to and construct pieces in an improvisatory way that focuses solely on the sound. The surprise of what the piece will sound like in a particular venue has become part of the work, along with the interaction between the sound and the space during a performance, installation, or presentation.

But there is perhaps a small contradiction. When working on pieces such as *Untitled #8*, a work for four sub-bass tones, I explore the space of the studio in which I am developing it, and from there need to imagine a concert/installation space, and how the work may behave, so as to inform further compositional decisions. But that is hypothetical: there is lots of blurriness, play, and maybe even guesswork in how those decisions are made, especially when the pitch content is determined before I get to a venue. Space is considered, just not a specific one.

I think often about Mary Nunan's statement that space is a substance which moves through us and through which we move, and that that on its own engenders strong and complex experiences:

> Something holds you or pulls you in the practice...one of the things that I'm kind of enjoying is that I've nothing I want to say! I've nothing I even want to explore through movement apart from movement itself...space is a substance...It's not like a cold empty vacuum into which objects move. How can we attune to it and how does it impact on the moving body? To feel that the passage from the space to the space to the space so it's not like we're a block of a body; "I'm going

> to move this block in space"...it's also about a spatial organism moving as space is moving through it and with it.[8]

I could say that I am using those substances as material, connecting with the two-stage process outlined in the sine tone chapter. The piece is not really *real* until it is brought to a space, and that space's characteristics are woven into it. There is an imprint of the room on the work and vice versa. There is also an imprint on the listeners; all three imprint on one another. The (experience of) physical space is different for each person, as the presentation of *Untitled #4,* a work for computer generated sine tones and audience-controlled smartphone instruments, illustrates: the ways each person interacted with the sound and/in the room was distinct and highly personal.

The sound and the room together are the piece; the sound grows, inhabits, and merges with the space. When I think about sculptures I've seen that stick with me, my memory of the experience is as much of the room, and how the sculpture inhabits and interacts with that room, as it is of the piece itself. Artworks such as Drift Studio's *Drifter* (2017)[9]*,* a large concrete block that floats around a gallery room, or Lis Rhodes' *Light Music* (1975)[10]*,* an installation comprised of projections and sound in a dark space, bring the attention to the space and the artwork's interaction with it simultaneously. An intention with my work is to have a similar outcome, where the sound and the space are essential to one another to make the piece what it is. This is not a goal to complete it, because I don't think my pieces are ever finished, but to make that version or iteration of it. 'Finishing' a piece implies a linear process, which goes against the continual internal but purposeless movement in my work.

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[8] *This Is It I 8 Dance Portraits*.

[9] Drift Studio, *Drifter*, 2017, Concrete, robotics, tracking system, https://studiodrift.com/work/drifter/.

[10] Lis Rhodes, *Light Music*, 1975, Film, 16 mm, 2 projections, black and white, and sound (stereo), https://www.tate.org.uk/art/artworks/rhodes-light-music-t13857.

I think often about Phill Niblock's description of one of his work's interactions with a space in a 2008 interview with Bob Gilmore:

> I just recorded a piece for Susan [Stenger] and Robert [Poss] where they're both playing guitar and one's in one channel and one's in the other channel. In the end the piece will be completely Robert on the left and Susan on the right. And they're playing a slightly different chord, so there's a fundamental that they both play, off and on, but then there's one chord on Robert's side and one chord on her side. The chord actually appears in the space as it's being played, as the stereo track is being played; the sound of both channels is mixed in the performance space.[11]

What Niblock describes in this piece (*Stosspeng,* from on his 2009 album *Touch Strings*) forms a parallel with something that I work towards: making the space an active agent in a work, creating some aspect of a piece that wouldn't be present without it. Rather than using space to create chords, I use simple wave forms, primarily sine tones, in my work to create standing waves and beating patterns in the sound. These areas of higher and lower pressure make the sound and the room interconnected, affording listeners the opportunity to map their own experience of a work. La Monte Young describes how standing waves in particular can offer a compositional role to the listener,

> Since a sine wave has only one frequency component, the pattern of high- and low-pressure areas is easy to locate in space. Further, concurrently sounding sine waves of different frequencies will provide an environment in which the loudness of each frequency will vary audibly at different points in the room, given sufficient

[11] Phill Niblock, "PHILL NIBLOCK," interview by Bob Gilmore and Guy De Bievre, 2008, https://www.paristransatlantic.com/magazine/interviews/niblock.html.

> amplification. This phenomenon can rarely be appreciated in most musical situations and makes the listener's position and movement in the space an integral part of the sound composition.[12]

Sound as a sourceless object in space

Ellen Fullman's Long String Instrument's design requires a large space. The space and its resonance are crucial components of her work. The instrument's strings are tethered to a box or brace at each end, and Fullman plays the instrument by applying rosin to her fingers and rubbing the strings as she walks across the space. How much is the instrument and the music she makes with it about space? Fullman describes the instrument as having "a quality of its being a science project that displays principles of musical acoustics...it's as if now I am seeing the inner workings, the gears, pulleys and bricks that build music, and it's my intention to affect the listener the same way."[13]

I wonder if I look at the sounds I use and the pieces I make with them as the same or a similar thing. Nothing is demonstrated to a listener, nor an attempt to affect them in a specific way, and there is arguably no physical tethering to the space (except maybe the loudspeakers on a stand, the ground, or mounted to a wall). A common description of sine tones is their being a basic building block of sound given they contain a single harmonic, and combinations of them can produce almost any other sound[14]. That may be one way to look at them. I am more interested in their 'blankness' being akin to a colour field upon or within which an experience may be had. As mentioned in the introduction, I view them in one sense as everything rather than nothing. My work plays with that idea and whilst I employ standing waves and

[12] La Monte Young and Marian Zazeela, *Selected Writings* (Heiner Friedrich, 1969), 11.

[13] Bart Hopkin and Ellen Fullman, "Ellen Fullman's Long String Instrument," *Experimental Musical Instruments* 1, no. 2 (1985): 4.

[14] Nye Parry's *Significant Birds* (2013) is illustrative of this: the work constructs discernible speech from sine tones sounding from many speakers across a space. Nye Parry, *Significant Birds*, 2013, Speakers, bird cages, sound, https://www.nyeparry.com/portfolio/birds/.

beating patterns frequently, I imagine them perhaps not as discrete zones in a room, but suggestions that the sound is everywhere at once and is one with the space.

How a sound resonates, reflects, tumbles, bounces, gets stuck in and around the room in which it is projected and heard has a crucial role in what makes that iteration of a piece, or that occurrence of sound, what it is. Fullman's statement suggests an intent to demonstrate the raw materials of music as the experience. I relate to and do this also, though in a more ambiguous and less prescriptive way, for instance by incorporating the many forms of constrained randomness in my synthesiser and Max patches.

There isn't a physical object that I interact with in the same way that Fullman does. I might play a synthesiser or a computer or simply initiate a process on either or both. The tactility of it has little importance for the sound: these tools are those on which I feel I am most creative and work the best for making this work. Modular synthesisers and software environments such as Max allow me to visualise the sound in an abstracted way. The visual tangle of real or virtual patch cables affords some kind of sensation of a space that could be representative of the sound's behaviour in the room, or how it reverberates in the mind of a listener. The space in which the sound is constructed; the space of the sound that is constructed; the sound in the physical space.

I'm taken by the idea of the sound being sourceless. The loudspeakers are always present and visible, so the overall source is clear, but it is still something I am investigating. Sine tones can be difficult to discern in terms of their physical location; how does the experience of the sound change if the sound is viewed as intrinsically part of the space, part of the material of it? I think about the room vibrating, partly *from* the sound but also *with* it. The two resonate together and blend so they cannot be split apart and experienced separately.

Non-physical spaces

At one stage I felt that there was some kind of bridge or middle space between the physical room as I see it and the audience's version of it. We are in the same physical location, but they are listening to sound they haven't heard before. Their experience is different, their hearing of the room, their movement around it, and so forth. The listener has an emotional or internal space: how they hear the sound, how it moves through them, what they are thinking and feeling. Short of interviewing each audience member, I will never really know what these spaces are. How much is their room or space the same place as the one I am in? Now, I am less convinced that such a middle space exists. The space is what it is (the sound/room combination) and imagining some kind of bridge between different people's experiences of it feels like unnecessary theorising or categorising. Instead, perhaps it is similar to Antony Gormley's idea of a field of connectivity, described below.

I think often about a quotation from Mark Rothko, maybe one of his most well-known, "A painting is not a picture of an experience; it is an experience." His work does not prescribe a way of viewing and is not representational. It is experienced as itself without any other purpose. Viewing his work, I don't think about anything in particular, or imagine the paintings being or suggesting something. I view them and experience them in a similar way to how I view and experience paintings by Agnes Martin. The colours, shapes, and sensations within the paintings expand out into the room so that I feel as though I am within them, navigating an almost tangible space.[15] This idea can apply to how I think about my work and the hearing of it. Nothing is prescribed; it's not work about or of anything. The experience of it is a core part of it, just as the tones, spatialisation, reflections in the room, are.

[15] Indeed, my love for Abstract Expressionism comes from this. Works by these artists (and others, such as Franz Kline and Clyfford Still) provoke powerful responses for me.

Antony Gormley – Horizon Field

Antony Gormley's *Horizon Field* (2010-12) is a large-scale work in which one hundred iron casts of his body are spread across a 150 square kilometre area in the Alps. All situated at the same height above sea level, creating what Gormley describes as,

> ...a matrix: a field of connectivity through which living bodies pass. In its indicative presence it invites you to think about looking. All of these bodies are erect and face a horizon. Although you can go up to one and touch it, this isn't to do with admiring the wonderful way in which the hair has been rendered. There's no great instruction, or joy to be had from attending to the proportions of the body. Together, they make a field to be lived in. This is an example of a continual experimentation in how you transfer potential into overt energy in a living body, through the presence of a surrogate.[16]

I like this idea of a 'field of connectivity'. The sound in the physical space could create one of these that the listener moves through. Could it work the other way around? The listener/s create/s a field of connectivity through which the sound passes. Maybe nothing is passing through anything else, but interacting, intermingling, connecting with everything and itself. I think about this as similar to Nunan's idea of space being a substance which moves through a body, and through which the body moves. My work intends to incorporate all of these things so that it is not just passively heard but actively listened to and played with.

[16] Antony Gormley, *On Sculpture* (Thames Hudson, 2019), 46.

Figure 1-1 - Horizon Field (2010-2012) by Antony Gormley. Photo by Markus Tretter.[17]

What about the space within the sound? The continuous non-directional and non-linear movement? That could be another part of this field. Rather than the spaces between different frequencies in a sonority, I am thinking about the sound as being or containing its own internal space. Different parts of the sound moving through, with, and around other parts, interacting internally. Frequencies, but also overtones, spatialisation, amplitudes. Every part of the sound could be a point in a field of connectivity. There are spaces nested within spaces and grouped amongst other spaces.

[17] Antony Gormley, *Horizon Field – Exhibitions – Antony Gormley*, 2012 2010, https://www.antonygormley.com/works/exhibitions/horizon-field.

Chapter 2 - Time

Agnes Martin

In 2015 I attended an exhibition of Canadian painter Agnes Martin's (1912-2004) work at Tate Modern.[18] I found her work striking and moving to a degree I had not experienced before: there is a calmness and quietude about Martin's paintings, mostly of grids in soft colours, that are especially captivating for me. They are full of geometry and full of imperfection; regularity and irregularity. Viewing them, I felt that time ceased to be a concern. My eyes and my mind wandered freely around each canvas, zooming in and out, taking in small details and the paintings as a whole without concern of finding relations between gestures, colours, shapes. But there was so much; so many paintings that their presence, when placed alongside one another and combined, became overwhelming. I recall feeling both energised and exhausted upon leaving the exhibition. I wonder if in some way I wanted the show to be smaller, more private. Perhaps just a couple of rooms so that I could explore a handful of paintings deeply.

Martin's 1965 painting *Morning* was later displayed for several years as the first artwork in one of Tate Modern's permanent displays. I remember standing in front of it and feeling the room around me dissolve. The grid, the imperfections in the paint, pencil, and canvas, the soft grey, moving around my field of view as though a three-dimensional space. I view one detail: another, another. The order makes no difference. I do not think of one textural detail in the pencil lines of the painting's grid as relating to some other aspect that I had viewed before, nor to whatever corner I viewed after. I simply take it in, exploring the space of the painting and feeling a sense of infinity. I viewed this painting many times when I lived in London – often making trips to the gallery only to see it – and my experience of it became more complex with each viewing. The grey field became countless shades, the weave and

[18] Tate, "Agnes Martin | Tate Modern," Tate, accessed November 17, 2024, https://www.tate.org.uk/whats-on/tate-modern/agnes-martin.

imperfections of the canvas seeping through the dark pencil of the grid. The faint red pencil lines, forming a ghostly shimmer behind and around this main grid, in particular stand out to me. Does it feel like they tie everything together? Something that everything else hangs from? I don't think so. But there is something about them. These lines, almost invisible unless up close to the painting, are so compelling and central to my experience of *Morning* that I named a CD of two instances of my work *faint red / pencil lines*.[19] One of those tracks, an early occurrence of my research and first piece in the portfolio that was composed, I titled *Untitled #1 (Morning)*. When viewing *Morning*, the field and grid(s) of the work expand into the room around me, feeling simultaneously vast and microscopic. In those moments, nothing exists but the painting.

The art conservator Rachel Barker, who restored *Morning* in 2011, describes experiencing the painting as three-dimensional, "If the viewer stands a certain distance from the painting, the eye is not hooked to any compositional detail. Almost like a holographic image, the eye tries to rest on a flat surface but finds it focuses on a space between the field and grid."[20] There is a parallel here with the intended effect of my work: a feeling of everything blurring together and at the same time not. The interaction of sound and space creates a new space. One that is perhaps not the sound or the room at all, but something else that is at once a combination of those and distinct from them.

[19] Phil Maguire, *Faint Red / Pencil Lines*, Farpoint Recordings, 2024, CD.

[20] Rachel Barker, "Morning 1965," in *Agnes Martin* (Tate Publishing, 2015), 88–93.

Morning's infinite focal points illustrate a parallel in my work. I often begin a composition(al period) by determining some very simple system or foundation: picking a tone or frequency around which to base others; a particular flavour of chaotic voltage distributed across the synthesiser or a waveform filtered in a particular way, for example. Whatever the starting point, a single thing upon which everything else is built is determined. The colours are mixed and applied, cementing each work as being a single sonority or entity that is complex in its eventual makeup.

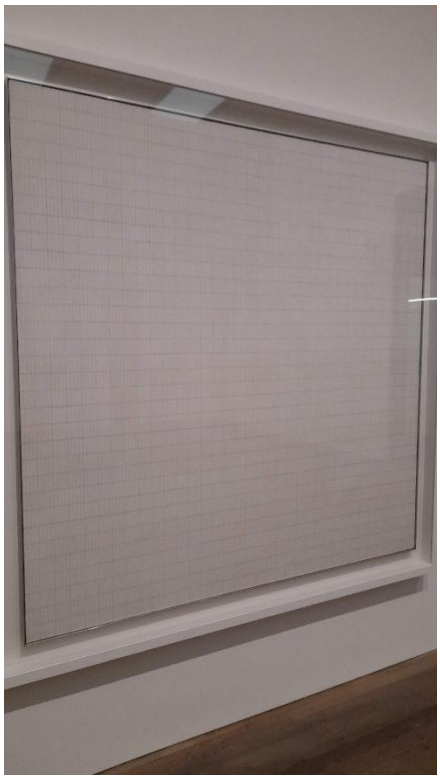

Figure 2-1 - 'Morning' at Tate Modern, London 2021

Figure 2-2 - Detail of 'Morning' at Tate Modern, London 2021

In June 2023 I took a short vacation to Lisbon and visited the cavernous Contemporary Art Museum – Centro Cultural de Belém (formerly Berardo Collection). Wandering through the vast collection, I stumbled on another Martin painting: *Untitled #8*.[21] I had a similar experience viewing this painting to *Morning,*

Figure 2-4 - 'Untitled #8' in CAM/CCB, Lisbon, 2023

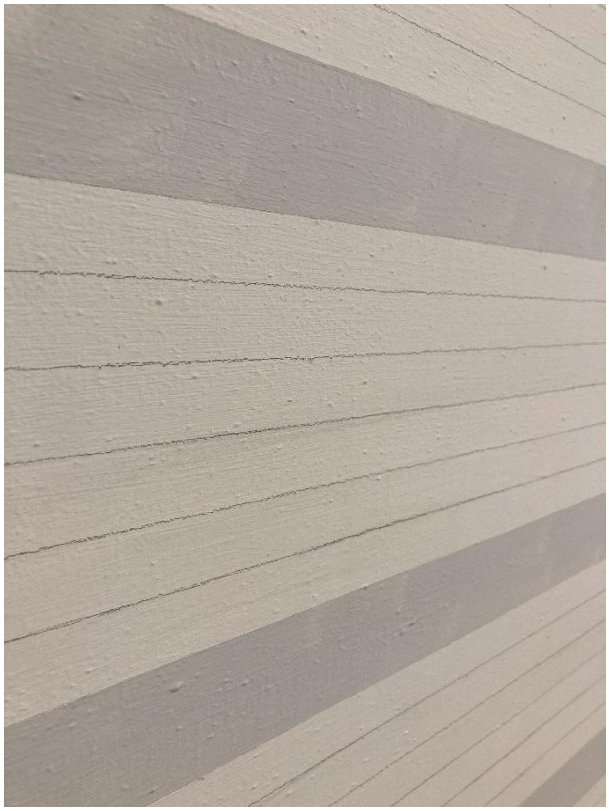

Figure 2-3 - Detail of 'Untitled #8' in CAM/CCB, Lisbon, 2023

but it was quieter: fewer visitors and more natural light in the gallery contributed, though the simpler textures of the painting and darker greys suggested stillness, and afforded me the creation of a reflective zone to inhabit. Viewing this painting felt less like being inside a three-dimensional space and more as though I was observing the surface of a calm sea or lake. The subtle variances in texture and hue coming and going from my attention like ripples on the water reminded me of Hiroshi Sugimoto's Seascapes, which he describes as embarking on "a voyage of seeing".[22] I imagine a listener embarking on a similar voyage of listening upon encountering my work.

[21] "Untitled #8, 1989," The Berardo Collection, accessed November 17, 2024, https://www.berardocollection.com/?sid=50004&CID=102&artist=236&lang=en.

[22] "Seascapes — Hiroshi Sugimoto," Hiroshi Sugimoto, accessed April 4, 2023, https://www.sugimotohiroshi.com/seascapes-1.

During this period, I was developing sound that became a work titled *Untitled #0 (8)*, again titled in part after Martin's work. This piece is based on sounds performed at a handful of concerts with in 2022, a period in which I was frequently viewing and ruminating on *Morning*. Again, I chose a reference to a painting by Martin, this time as a simple acknowledgement of the connection(s) between my work and hers. With this work, composed of sine tones and a handful of filtered analogue oscillator tones, I intend to invoke a similar stillness that I perceive in *Untitled #8* and Sugimoto's *Seascapes,* generating or affording a sonic environment of reflective zones in which a listener can place themselves, absorbing and reflecting the sound in the space (literal, physical). The tuning and sonority of the work generates standing waves – areas of higher and lower sonic energy or pressure – through which I encourage physical movement, so that the listener's location in space changes their hearing of the sound. The listener can participate directly in the composition of the work.

Perhaps the standing waves generated in the work can also be a literal manifestation of these reflective zones. Moving around the space freely, as the eye would around the canvas of a (Martin) painting, a listener can find and create smaller spaces in which to reflect on the sound and their experience of it: focal points among focal points. Pauline Oliveros suggests a similar mode of listening in the introduction to *Quantum Listening*: "As you listen, the particles of sound decide to be heard. Listening affects what is sounding...As you listen, the environment is enlivened."[23] This proposes an idea of my work containing comparably infinite but microscopic sonic environments; of zooming in and out, moving freely around a temporal space.

In May 2024 I viewed *Untitled #8* again, when returning to Lisbon for a conference presentation[24] and concert[25] performance. I performed *Untitled #1 (Morning)* and *Untitled #0 (8)* on this trip and visited the painting on my last day in Lisbon. On this viewing I considered the relationship between the space of Martin's work and my

[23] Pauline Oliveros, *Quantum Listening* (Ignota, 2022).

[24] "NoiseFloor UK," NoiseFloor UK, accessed November 27, 2024, https://noisefloor.org.uk/.

[25] "Nariz Entupido - Prisma Estúdio - 27/05/24," accessed November 27, 2024, https://www.instagram.com/p/C7cfykoukmZ/.

perception of time when viewing it, and how, or if, these ideas manifested themselves in my performances on the trip.

The performance of *Untitled #0 (8)* took place at Prisma Estúdio, a DIY music and art space housed in a peculiar unit, hidden in an alleyway off one of the city's main streets, behind the communist party headquarters and next door to a print shop. The space has large glass doors, a tile floor, several metal columns spread around, makeshift storage partitions, and a faulty PA system. These factors, which I will describe in more detail in the chapter outlining this piece, afforded me the opportunity to test the space – far from 'ideal' acoustically, but full of character – as an agent in the work. During the performance (around 30-35 minutes in duration), I let my attention move around the sound and the room, observing its activity in different spots from my fixed performance location.[26]

Figure 2-6 - Prisma Estúdio, Lisbon, 2024

Figure 2-5 - Performing in Prisma Estúdio, Lisbon 2024. Photo by Victoria Brunetta.

[26] Here is a difference between viewing a Martin painting and performing my work. When viewing a painting, I can change my physical viewpoint, as well as imagining the painting moving around me. Performing my work, I am fixed in one location. A later work in the portfolio, *Untitled #4*, attempts to deal with this; I am not an active performer. Instead, listeners move around a space with small speakers emitting sound that they control, whilst other sound is diffused through loudspeakers.

I did not describe to the audience what the performance would be before I began, but nonetheless (or maybe because I didn't prescribe a particular listening) it seemed we all sat with the sound in the space, listening together. I could draw a parallel between the audience's experience of the work and my own experience of viewing a Martin painting. Just as I simply view those paintings, the audience simply listened to the sound.

Chatting with the organiser, the other performers, and members of the audience afterwards, I received several comments following two general points: that their sense of time seemed to be diminished, pushed to the background, or entirely absent during the performance, and that they wished the performance could have been longer. One person mentioned that they would have liked to listen for several hours. This outlines how my work problematises the nature of time in my work: that it is simultaneously there and not there, crucial and unimportant.

The performance of *Untitled #1 (Morning)* took place as part of NoiseFloor, a conference of electronic music and sound art, organised by the University of Staffordshire and hosted by Escola Superior de Música de Lisboa (Lisbon School of Music). My performance was scheduled in a lecture theatre in an afternoon busy with short concerts. The work is monophonic, though by using multiple speakers many complex patterns and reflections in the sound are possible. In the case of this concert, four Genelec speakers were placed in the corners of the room: two in the performance area at the front, and two at the back row of tiered seats. This difference in height of the speakers added some complexity to the sound.

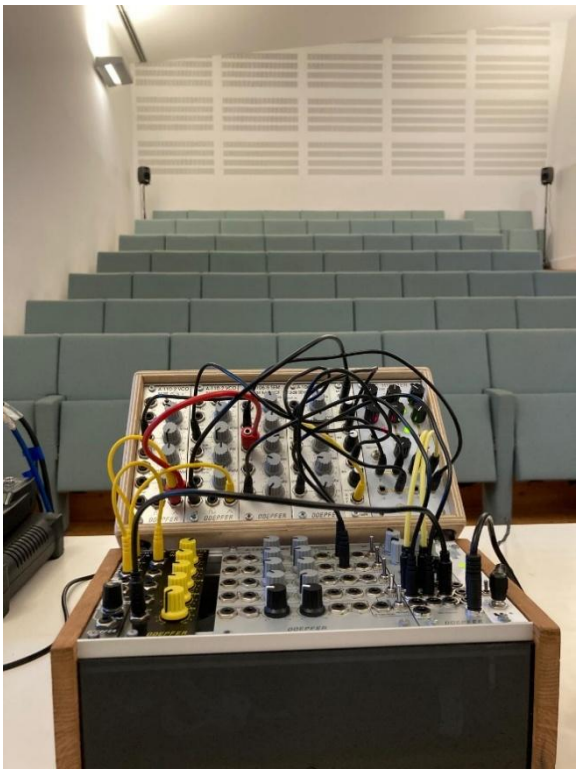

Figure 2-8 - The Small Auditorium in Escola Superior de Música de Lisboa, 2024.

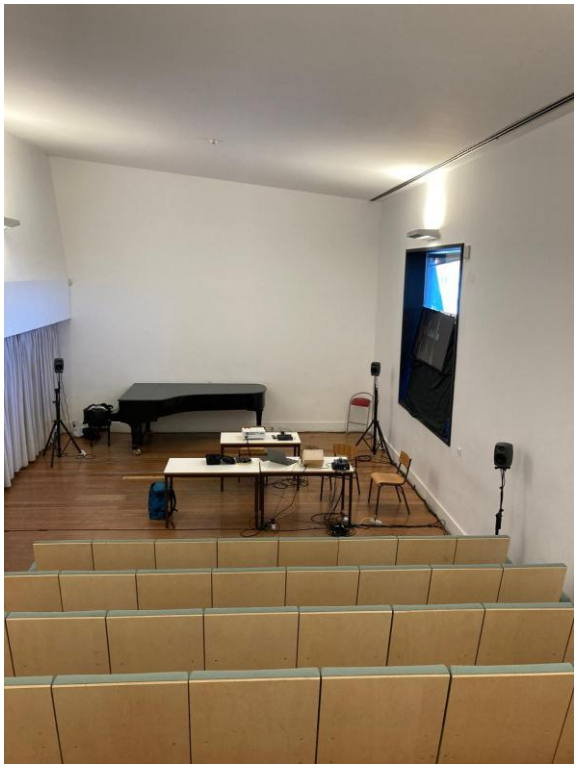

Figure 2-7 - The Small Auditorium in Escola Superior de Música de Lisboa, 2024.

My slot – 15 minutes, including introduction, set up, and pack down – was much too short. Due to the rushed nature of the concert and short performance (in the end, about 12 minutes of sound), I consider it an unsuccessful presentation, because the sound didn't have space to unfold or to *be* in the room. It does however highlight the possible paradox of time in my work, and reinforced that it does have an importance, even if I sometimes believe or wish that it does not. I and/or the listener need(s) enough of it for the sound to sit and develop in the space, even if the order of perceived things is not important.

In both these performances, a practical sense of time is highlighted, which then queries the nature and role of time in my work in general. How much time is enough if its passing is not important or a concern? Regardless of the practical considerations of these performances, this second trip to Lisbon initiated some solidification of this idea that there is one time in my work instead; a plane or field of time that can be freely navigated instead of linear sequences of causal events. These

sequences of events/occurrences are undeniably present,[27] but they don't matter, or they can be disregarded**.** Experiencing what you are experiencing in the current moment is the important thing, is the experience. How does needing 'a lot of' time relate to the idea of only one time existing and/or my work being a temporal plane through which one moves?

A couple of months after first viewing *Untitled #8*, in August 2023, I recorded *Untitled #0 (8)* and *Untitled #1 (Morning)* in the Sonic Lab at Queen's University Belfast's Sonic Arts Research Centre (SARC), the results published on Farpoint Recordings in October 2024.[28] I typically make recordings at home, taking a direct feed from a synthesiser or Max patch into a DAW. Whilst I can move around my small workspace to explore a projection of the work from speakers (or take a mix to a studio and listen there), this aspect of my work is not usually captured in the recording. The SARC recordings differ in that I was capturing direct feeds from the instruments and recording the room's three-dimensional 39.1 speaker array with a binaural microphone.[29] Exploration of the physical space as the pieces were running was, rather than simply checking a mix, a concrete part of the recording process, and an additional compositional action. Moving around the physical space, I also moved my attention around the temporal space, considering the stillness(es) of each work and altering the diffusion of the speaker array. This is done intuitively: to capture as much of the sonority of each work as accurately as I can, and to create documents of my work that could afford a listener considerable control over their hearing of the sound when played back on a stereo system (such as a home hi-fi).

[27] I use control voltage in an analogue synthesiser, and control signals in Max patches. These cause the sound to change.

[28] Maguire, *Faint Red / Pencil Lines*.

[29] "KU 100 - Dummy Head," accessed March 18, 2025, https://www.neumann.com/en-ie/products/microphones/ku-100.

Connecting my work to Martin

Martin often described her work as being about or relating to simple, often calm, states of mind or being. Of *Morning* she states, “When I painted "Morning" I was painting about happiness and bliss. I had to leave out a lot of things that one expects to see in a painting. Happiness and bliss are very simple states of mind I guess.”[30] Martin’s work speaks. Even if I have a different experience than intended, her work, with titles like *Morning* and statements like the above, has a statement to make. It explores emotions, perhaps in broad or non-specific ways. My music is not about anything; there is no statement, only a space to be explored. Feelings or states of mind can be projected onto or within those spaces by a listener if that is where their experience leads them, but my work does not speak – it is spoken with and to.

Nevertheless, I feel there is a clear connection between Martin’s work and my own. As Martin uses extreme economy of material to encourage or provoke profound experiences in a viewer, I approach my work in a similar manner. My economical use of material originates from my fascination with timbre. For me, a sound can hang in the air for hours, like a sculpture or a mobile, so as to be fully, deeply, richly explored. I view a Martin painting in the same way, and this is where I can relate time back to the experience. Time isn’t standing still in my work, neither do I think it is of little importance. As I considered in relation to my performances in Lisbon, I think you need a lot of time with my work. But that time is a space in which you wander, focussing on the sound and your experience of it, and not concerning yourself with past or future, only present. The more time you have, the bigger the space through which you can move, and the more deeply the sound can be experienced.

In a perfect world, my work would be atemporal: sound existing suspended in space, viewable in three dimensions yet still never static, but since I work with sound, and by its nature needs time through which to act, I have to accept that my work is in some way temporal. I could instead describe it as music in which *now* is the only

[30] Tate, “‘Morning‘, Agnes Martin, 1965,” Tate, accessed November 27, 2024, https://www.tate.org.uk/art/artworks/martin-morning-t01866.

thing that matters. The systems that I devise, and the ways in which I play my synthesisers and software patches, facilitate sonic occurrences in which what happened *before now* does not matter, and they do not instruct the listener to consider what may happen *after now*.

The sound is simply occurring in a space. As Suzuki says of the sound of trees, “When we hear the sound of the pine trees on a windy day, perhaps the wind is just blowing, and the pine tree is just standing in the wind. That is all that they are doing.”[31] I do not expect a listener to lose their sense of time passing when encountering my work, but I also do not encourage or suggest a particular approach to, or consideration of, time. By generating and presenting sound in which time is suggested to be freely traversable, perhaps even three dimensional – a field or plane through or around which one can move – I invite a listener to experience the sounds of my work as the sounds that they are.

Temporal, not causal

I patch modulating signals, on hardware synthesisers and in Max patches, to sound sources or modifiers (oscillators, filters, amplifiers), enabling movement of the sound. This sets up a chain of events, but I do not see this as lining up a causal sequence of specific occurrences. These signals are often derived from random or chaotic sources and are very slow moving, so the directions they will take are not obvious or predictable. Occasional manual adjustments/interventions are made as I listen. I know that things will occur, but I do not know exactly which, when, and how. They are ripples on the surface of the water, or the route around a sculpture or space that a viewer takes. The order in which things happen does not matter. Imagine the current moment not as a point in linear time, or in a sequence of events, but happening in a singular plane of time that can be freely traversed.

[31] Shunryu Suzuki, *Zen Mind, Beginner's Mind* (Weatherhill, Inc., 1995), 78.

Whilst my work is physically three dimensional (it is sound projected into space and ears), as well as conceptually or aesthetically three dimensional (similar to viewing Martin's paintings as described above), perhaps it can be useful to imagine the temporal space(s) of my work as something simpler. One could consider a composition as a horizontal plane that creates or suggests a temporal space that a listener can look around, much like a painting. Morton Feldman outlines a similar idea for his later work, as canvases upon which he applies music,

> ...my compositions are really not "compositions" at all. One might call them time canvases in which I more or less prime the canvas with an overall hue of the music. I have learned that the more one composes or constructs – the more one prevents Time Undisturbed from becoming the controlling metaphor of the music.[32]

My hope is that when encountering my work, the listener experiences *now,* and that what happened before is of little or no concern to what is happening in the current moment. They might remember previous events in or aspects of the sound, even though they are over, and won't happen again. If that happens, those memories could feel like *now.* It's not a repetition, but something that could cause a feeling of temporal displacement, slipping, or drift. A sense of the order of things mixing up, moving away from linearity; the listener wandering around the temporal plane. As Cage writes in *Lecture on Nothing,*

> Kansas has this about it: at any instant, one may leave it, and whenever one wishes, one may return to it. Or you may leave it forever and never return to it, for we pos-sess nothing. Our poetry now is the reali-zation that we possess nothing. Anything therefore is a delight (since we do not pos-sess it) and this need not fear its loss. We need not destroy the past: it is gone; at any moment, it might reappear and seem to be and be the present. Would it be a

[32] Morton Feldman, *Give My Regards to Eighth Street*, ed. B. H. Friedman (Exact Change, 2000).

> repetition? Only if we thought we owned it, but since we don't, it is free and so are we.[33]

I do not view an event that occurs after one minute as happening before an event that occurs after ten minutes. They are occurrences of their own and part of a whole. I listen, and invite others to listen, in a similar way to the early experiments of The Dream Syndicate, in which the musicians "sat inside the sound and helped it to coalesce and grow around us."[34] I imagine that by allowing the sound into their conceptual and physical space in such a way, a listener's listening will become a compositional act.

[33] John Cage, "Lecture on Nothing," in *Silence: Lectures and Writings* (Marion Boyars, 2009).

[34] Tony Conrad, "LYssophobia: On FOUR VIOLINS," in *Writings* (Primary Information, 2019).

Chapter 3 - Sine tones

Almost all of the pieces in this portfolio are composed, in part or in full, with sine tones. I use them in my work because I find simple sounds fascinating; they can enable a deeper experience and exploration than complex and/or dense sounds. The simplicity of sine waves and the ease with which one can generate complex sonic environments with them invites interaction with the sound. Listeners can move around the sound and room, exploring different zones of activity in the sound. I use sine tones over more harmonically rich waveforms as they can generate very clear standing waves and interference effects. This can invite movement around and exploration of a space and the sound occurring within it, creating a sonic environment which affords a listener a deep and complex experience of sound. I link these effects and their invocations to the idea of my work being sculptural, filling and/or interacting with a space.

A sine tone's origin in space can be hard to determine, especially at lower frequencies. I like this: it gives the illusion for me that the space is being filled with sound, and in some ways can make its movement (or specific things about its movement, like perceived direction) less important, so the focus can be more on the sound than what it's doing. It adds to the mystery of how my work works, which I embrace. I suggest that a sine tone's blankness or emptiness – they contain a single harmonic – is a main cause of this mystery: one is hearing or observing something that appears to be mostly absent. This is intriguing for me both as a composer using sine tones, and a listener to the music of others who use them in their work. Listening to sine tones, I question what it is I am actually listening to. Sine tones, and combinations of them, are fascinating and beautiful. But there is something else too: I listen to my listening and to my surroundings. I'm listening to and for movement and change. I listen to all and none of these things. This is much like how I view a painting by Agnes Martin as described in the previous chapter: something simple and static that affords the perception of motion.

Whilst some artists who use sine tones may centre their work – in full or in part – around their simplicity, that is not my primary motivation in using them, even if it is something I am drawn to. I am more interested in the complex interactions that are possible with a room, with other sine tones, and with any other sound(s) that may be audible. How the tones mix in the air and in speakers is something that I spend many hours exploring, and the experiences of sound that are possible with sine tones mean that I rarely feel a need to include other sounds. They are asomatous and using them makes my work asomatous; their seeming absence of a material form and clear point of origin in the room further adds to the mystery of their effect. They fill and inhabit a space, turning the space and themselves into a sculpture of sound that can be observed from any position. I sense them as having a shape, but one that is immaterial and intangible.

Pitch considerations

Determining pitch sets, as described in the chapter on timbre, is a slow and mysterious improvisation. Once a combination is found that has something that sounds, feels, or perhaps even looks right, I have a sense that everything has dropped into place. The tones almost feel as if they tessellate; a visual sensation and perception that the tones form a particular shape in the air, or that the sound takes on a sudden and particular texture. The tones may sound like glass, or they form a round shape with a smooth texture; something three dimensional. It is simultaneously tangible and intangible. When the tones reveal qualities such as this, they possess a charm that absorbs and enamours me, inviting or inducing a flow state of listening.

I never know when the ‘right’ combination will come along, but chip away slowly at the raw material, refining tone by tone until a shape emerges. This itself is a flow state, by which I find the flow state of listening. There is no rational explanation for how or why these sensations are induced when I am composing. I think of Francisco

López's methods of composing with field recordings,[35] where his "ideas come from the sounds themselves not from a pre-determined compositional plan...I listen to the sounds and follow what they tell me."[36] Listening closely, and experimenting extensively, I test numerous iterations of pitch sets to explore these shapes, textures, and sensations. During the process of composition, I ask myself what makes a tone or combination of tones interesting, and don't find a clear answer beyond these broad perceptions. I would suggest that I am interested in a psycho-acoustic outcome of the pitches rather than the pitches themselves: these feelings, sensations, or experiences they may induce rather than an apparent harmonic structure or relationship.

Comparisons to Alvin Lucier's *Music on a Long Thin Wire*

Alvin Lucier's *Music on a Long Thin Wire* (1977) is a sound installation in which a piano wire is extended across a room and connected to an amplifier, a magnet placed around it at one end. The wire is driven "with a sine wave oscillator, causing it to vibrate from the interaction between the current in the wire and the magnetic field across it, in ways determined by the frequency and amplitude of the driving signal and the length, size, weight and tension of the wire."[37] The resulting sound is amplified with two microphones, one placed at each end of the wire. In the liner notes for the album of the piece, Lucier writes,

> I discovered that by carefully tuning the oscillator, the wire could be left to sound by itself. Fatigue, air currents, heating and cooling, even human proximity could cause the wire to undergo enormous changes. In a dance studio in Kyoto, for example, visitors' footsteps on the Marley floor caused extremely slight shifts in the positions of

[35] Later, I outline an experience of Phill Niblock 's music that I also mention in my MA commentaries from 2014. This quote from López also appears in those commentaries. They are both threads that have followed me through my practice, and things I think about often.

[36] Cathy Lane and Angus Carlyle, *In the Field: The Art of Field Recording* (Uniformbooks, 2013), 104.

[37] Alvin Lucier, *Reflections: Interviews, Scores, Writings* (MusikTexte, 1995), 363.

> the tables to which the wire was clamped, causing spectacular changes in the sound of the wire.[38]

The work becomes an exploration of sonic phenomena, the space in which it is housed, and an audience's listening. My work too is about the phenomena of the sound in the space, listening in and to it. A listener experiences the sound and navigates the room, uncovering and curating a complex sonic and spatial experience. Two works in the portfolio have a similar feature of the listener's actions directly changing the sound source, similar to Lucier's description of *Music on a Long Thin Wire: Untitled #2* (a Max/MSP piece in which the listener turns sounds on and off) and *Untitled #4* (in which a listener can play a simple sine tone instrument on a smartphone, interacting with sine tones diffused from fixed loudspeakers). Otherwise, the sound either runs autonomously, or I perform it, and the listeners can do as they wish. There is a different kind of observation and interaction to *Music on a Long Thin Wire*, but similar outcomes: a listener's movement around and interaction with the sound can change their experience and hearing of it. The sound itself may also change, as people move around a space and alter reflections and absorption of the waves in space.

Whereas Lucier pursues the sculptural with a physical object, I pursue it only with sound. Throughout the development of this portfolio, I have felt a pull to remove myself from the live situation, and a desire that my work be in some way invisible. A core intention is to highlight the space, the sound, and their interaction. I am not interested in creating a physical object that is observed, so my work is not a sculpture in that sense. It is *sculptural* however, as the sound interacts with the room, and the room can be navigated by a listener to take a different perspective or viewpoint from which to experience and observe the sound. I imagine that one key thing that happens is that I and the listener are listening to listening. We are investigating what can be heard in the physical space of the room and the internal or emotional space

[38] "Album Notes: Music on a Long Thin Wire," accessed February 25, 2025, http://www.lovely.com/albumnotes/notes1011.html.

within ourselves, the totality of the sound. As Oliveros notes, "…when one is listening to the whole field of sound without focusing on any one sound but expanding to include all sounds that can be heard – sounds seem to become interrelated rather than chaotic or meaningless."[39] "All of the sounds" are not solely the sine tones and their reflections from various surfaces and interference with one another. They are also the listeners' bodies, sounds outside of the space that leaks in, objects vibrating in the room.

Should the speakers also be invisible? I'm not sure. Sometimes I feel that the materials I use are 'blurry' enough in their origin in space that visible speakers do not give much away in terms of how the sound is entering it. At other times, I feel an urge to remove any visual hints at the method of sound production. I have not, however, had the opportunity to test this, and am not sure in any case if it would be effective. These are electronic sound works that necessitate the use of speakers, so why not embrace it?

Making do or finding out? Dialogue with the space, and Lucier's *Outlines of Persons and Things*

Another Lucier work that is a useful comparison to my use of sine tones is *Outlines of Persons and Things* (1975), in which performers move "slowly in front of and away from the loudspeakers, creating what Lucier calls "moving sound and shadows" as the sine tones diffracted around the shape of their bodies."[40] The speakers are also placed behind various objects as another method of creating these shadows. Whereas Lucier dealt with communicating the sonic effects of speaker and performer/listener location in a space, and the myriad different hearings of a piece that are possible by having performers move around the space so as to change the

[39] Oliveros, *Quantum Listening*, 52–53.

[40] Peter John Blamey, "Sine Waves and Simple Acoustic Phenomena in Experimental Music - with Special Reference to the Work of La Monte Young and Alvin Lucier" (University of Western Sydney, 2008), 235, https://researchdirect.westernsydney.edu.au/islandora/object/uws:3631.

sound from the audience's perspective, in my work I invite the listeners to move and act freely. In effect, they are performers or co-composers themselves.

Blamey offers a useful account of why Lucier uses simple sounds, which I can apply to my own practice:

> Lucier constructed his own environmental situation, using the simple sound of sine waves as a replacement for complex everyday sounds. This is a reductive strategy that aids the production and reception of the relevant acoustic phenomenon that forms the subject of this work – diffraction … Lucier's compositional practice represents or reimagines not only the environment, but the kind of sounds that occur within it, with an aim towards the reduction of complexity as an aid to perception.[41]

I don't often have the luxury of placing the speakers where I want, as the majority of presentations I make are in DIY venues, or in a concert format in which the speaker and PA system is fixed. I also rarely have more than 30 minutes or so for a soundcheck, so am often limited in the amount of experimentation I can do with the speakers and the room. But the simplicity of the sounds, combined with the movement of the audience, and with my movement of the sounds by way of spatialisation, phase modulation, and filter cut-off frequencies when working with many sine waves, creates an environment which I see as sonically both very simple and highly complex. The simplicity of the sounds aids perception of the phenomena, which in turn aids complex experiences of the sound and space. I previously saw this aspect of my practice as 'making do'; an inconvenience over which I had little control. But in recent years it has become a central component: I now relish the finding out of what my work will sound like in a new location. I have developed a keen interest in taking a composition into a space and seeing how it interacts with that space at the time and that situation (what speakers are there; is the room full of

[41] Blamey, "Sine Waves and Simple Acoustic Phenomena in Experimental Music - with Special Reference to the Work of La Monte Young and Alvin Lucier," 235–36.

objects?), rather than imposing my work upon it. My work is rarely optimised, and maybe this is one place from which my fondness for 'precise imprecision' comes. I am particular about the sounds used in a piece, and that they move as slowly as possible, but am also open to the room and audience having agency when the work is presented. There is a conscious intent to not dominate a space or a listener with my work, instead making something in which the sound, the room, and the listeners come together.

In *Outlines of Persons and Things*, Lucier places objects and loudspeakers in particular arrangements to attain sonic effects, though perhaps not specific or pre-planned ones. I am not positioning speakers in such a way as to achieve a particular sound or sound effect but nonetheless see a similarity: finding something in the space and going with it. I am in the space, introduce my sounds to it, and find out what will happen. Maybe I will move some things around, or create as open a space as possible, but if this isn't possible, that's okay too and will simply generate a different (but definitely not worse) version of a piece. The diffraction in my work comes from this imprecision, in taking a space or technical situation, making the most of it, and observing interactions between the room and the sound. I am led by my ears, working with the confines of the situation and experimenting until something sounds and feels right, much like Lucier's methods: "To this day I can't really tell you what the parameters are. I just set it up...I don't think beforehand about a system or need to control or figure out tensions and weights. I do it and see what happens, and I accept or not."[42] Embracing these conditions, combined with sine tones often being difficult to locate as a point source results, for me, in sound that can entrance, and is a core component in my work. I am not using sine tones as an analogue for anything, or because other sounds are too complex, as Lucier does. I am using them because I love those sounds for what they are: simple things existing that can be experienced. What is possible from their simplicity is what fascinates me. Secondly,

[42] "Alvin Lucier - THOUGHTS ON INSTALLATIONS," accessed March 31, 2025, https://www.kunstradio.at/ZEITGLEICH/CATALOG/ENGLISH/lucier-e.html.

sine tones allow me to make work that forms a sculpture that interacts with (maybe fills, maybe not) the space, around which listeners can move and examine.

Both *Music on a Long Thin Wire* and *Outlines of Persons and Things* explore the physical phenomena of sound. Performers move around the space to explore and communicate the diffraction of sound around objects and bodies, or a wire's vibrations are altered by the movement of people in the room. Over the course of this research, I have developed an intention for this movement around a space to be central to a piece, rather than an incidental effect or supplemental layer of complexity. I communicate this by telling an audience as much at the start of a performance, or by developing simple instruments that they can use to interact with a piece, therefore implying and inviting exploration of a space. Sine tones aid this because I find their 'blurriness' compelling; it is not always obvious where in the room they are coming from, leading to my sensing sonorities made from them as having three-dimensional shapes and textures. As Blamey notes, "As sound diffracts in three dimensions, the very idea of an 'outline' of sound (the audible or visible effects of diffraction) becomes one of perspective and location, or orientation, to the sound source."[43]

Lucier's sentiment about seeing what happens, and accepting or rejecting the outcome, is something I relate to strongly. I have, until recently, been hesitant to admit that I don't always simply accept the outcome of something. When determining frequency sets quickly, for instance, there follows many months of tweaking and experimenting, both in the studio and in a performance, installation, or presentation space. Whilst I do 'find out' what the piece sounds like in a presentation space or situation, I can't claim that I just accept whatever comes out of the speakers and the room. I work within the confines of the situation to create something I find interesting, rather than simply surrendering to the circumstances. I think of my compositional practice as a two-stage process: studio and venue. Both of them are slow

[43] Blamey, "Sine Waves and Simple Acoustic Phenomena in Experimental Music - with Special Reference to the Work of La Monte Young and Alvin Lucier," 235.

improvisations to find *something*. More stages emerge too as I refine, look back, incorporate into the next work, and so forth.

Performing vs. installing works composed from sine tones

Following a performance of *Untitled #0 (8)* in Berlin in October 2024,[44] one audience member asked why I performed the piece rather than install it. I sat to the side of the space, in dim lighting, and mentioned in a brief Q&A afterwards that I did not want to be seen as the focal point of the presentation, or paid attention to. The audience member's question is one to which I do not have a solid answer. I don't want listeners to focus on me or my activity during a live presentation, so why perform it at all? One possible reason is the differing modes of listening between a concert and an installation. At the concert in Berlin, I intended to communicate that the sound was being generated and modulated live, rather than playback of a pre-recorded sound file. Perhaps too I wished to communicate that the experience between the audience and myself was a shared one, rather than sound being delivered to them in my absence. I imagine that the sound of the work is asomatous or disembodied in another way than described at the start of this chapter: as something that is not connected to myself, as coming from me. I'm not a composer who provides a fixed-media work for playback in a concert. This is not the removal of myself that I imagine. I hope instead for a situation where it is clear that the sound is being generated live, but more importantly that the audience's experience is unique to that time and place.[45]

A further question raised is how I would invite movement around the room in a concert, as the audience are in the space before the sound begins. In an installation, which can run indefinitely, often the act of entering the space is enough to

[44] Anima Mundi #5, a concert at Morphine Raum. Organised by Errant Sound and Farpoint Recordings as part of Culture Ireland 's Zeitgeist 24 festival.

[45] Another possible reason: I grew up playing bass guitar in pop and rock bands. Music, for me, was all about making it in real time. Part of me still holds that to be true.

communicate that the work can be physically traversed.[46] How can something similar be communicated non-verbally in a concert setting?

Sachiko M and the simplicity of sine tones

I feel a strong relation too to Sachiko M's[47] music. Her work, whilst sonically distant from my own, has been an influence and reference for many years. Using a sampler's test tone, M's work is often extreme in its sparsity. Her practice, developed in the Tokyo improvisation scene in the 1990s, scatters sine wave blips and pops sparely across a canvas of silence. There is a structural quality to her work: it occupies a space (whether recorded or live; physical or internal) and affords a listener to explore their relationship to the sound in and with the space. For me, M's work has no pace; it exists in the time/space within which it exists. It never stays the same, but it is not becoming something; it possesses a remarkable stillness. I have a sense that in her work, the tones are things that exist at the same time as the others, but don't necessarily have a relation to one another, or need to be heard to have one. In works such as *detect* (2000)[48], sine tones resemble bubbles, floating to the surface of a dense liquid silence, existing for a time, and then vanishing. There is space in the work to consider each sound in relation to itself, the silence around it, the other tones, and the room in which it is heard.

Bar さちこ (2004)[49] is an extreme example of the stillness in M's work. It is composed of two sine tones that do not change at all over the course of 60 minutes (the second tone enters at around 29 minutes and leaves at around 50 minutes). This offers the listener considerable agency to experiment with volume and their position in their listening space, to generate different versions of the work on each

[46] There is also no guarantee of a visitor staying for a given period of time, unless some kind of explicit suggestion (such as a text on the wall) was made.

[47] "Sachiko M Official Website -All Sounds-," Sachiko-m, accessed February 12, 2025, https://teamsachikom.wixsite.com/sachiko-m.

[48] *Sachiko M - Detect*, December 15, 2000, https://www.discogs.com/release/1488-Sachiko-M-Detect.

[49] "Bar Sachiko, by Sachiko M," Improvised Music from Japan, accessed April 3, 2025, https://improvisedmusicfromjapan.bandcamp.com/album/bar-sachiko.

listen. The stasis of the work can also generate psycho-acoustic experiences of the sound.[50] M's work predominantly features sine tones that, once sounding, do not change. There is often no modulation within a tone, it is simply a sine tone that is audible for a period of time. If more than one tone sounds at a time, some amplitude modulation occurs, but that too is largely static.

I would argue that M's work is, at least in part, about its own simplicity: M says of her transition from sampling to sine waves that sampling "must be composed largely around a meaning, conveying a message, where as [sic] sinusoidal waves are nothing more than sound".[51] She explores sine waves for their own sake and to their own end. My work embraces simplicity but rather than being about it, the simplicity of the materials I use, and how I use them, guides my work and enables the complex interactions with and experiences of sound that I intend. Sine tones are a material that I use because they enable me to make music and sonic artworks that are always moving but not transforming. Similar to Lucier and M, but not exactly like either.

Considering the perceived or actual movement of sound

A core aspect of a sound that intrigues me is often something that moves extremely slowly, and does not generate any reflections, beating patterns, or other effects that could be perceived as conventionally musical, or draw the listener's attention away from the sound (and space) as a whole. As Lucier argues, "You may be sitting in the trough of a standing wave or on the edge of a sound shadow, but since you cannot be everywhere at once, you hear only what is available at your location in space."[52] In my work, you hear what you hear at that point in that moment. You can continue listening to that – though the sound may move around you – or you may explore the

[50] During one headphone listening session, I was certain that slow beating patterns were occurring in the sound when they were not. I think what I was sensing was my pulse or breathing and was connecting this subconsciously to the sound I was hearing. I could also have simply been wishing for some movement in the sound.

[51] Jerriel & Fox, "Interview with Sachiko M," trans. Lara Garnermann, JaME, December 13, 2009, https://www.jame-world.com/en/article/75889-interview-with-sachiko-m.html.

[52] Lucier, *Reflections*, 420.

room, time, and space. Whilst the audience in earlier works in the portfolio such as *Untitled #0 (8)*[53] or *Your Location in Space*[54] are offered the suggestion of moving around the space, in *Untitled #4* this is explored explicitly: listeners access a web-hosted sine tone generator on their smartphone and play it as a simple instrument, moving around the space as sound from a Max/MSP patch is diffused across eight loudspeakers. They are directly participating and co-composing the work. Similarly, in *Untitled #8,* a work for four sub-bass tones, a comparable environment is created. Here, the tones are set to a volume at which they are more felt or sensed than heard, and modulations in phase are utilised. The troughs and sound shadows are in continual movement. This movement is caused by both the listeners and the piece itself, affording complex sonic and spatial experiences. One is able to be present in the moment and just experience the sound.

The sound in my work is always moving, but slowly; almost imperceptibly. Where is the line between movement being perceived and movement being imagined? Do I think the sonic movement in some of my work is obvious because I know that it's happening and because I programmed it? Does an audience know that when they see me sitting at a table doing something with a computer and/or synthesiser?

Technical considerations and development

When developing works such as *Untitled #0 (8)* and *Untitled #4* I have experimented extensively with various methods of sine tone generation and calculation in software. I am primarily a Max user, and so for many years used the standard [cycle~] object, “an interpolating oscillator that reads repeatedly through one cycle of a waveform, using a wavetable”.[55] An oscillator bank patch that I used whilst developing *Untitled #0 (8)* used two ‘MC’[56] [cycle~] objects to create two banks of four sine tones. The

[53] For sine tones and analogue synthesiser

[54] An installation version of *Untitled #1 (Morning),* for solo analogue synthesiser

[55] “Cycle~ Reference - Max 8 Documentation,” accessed March 23, 2025, https://docs.cycling74.com/max8/refpages/cycle~?q=cycle%7E.

[56] Multichannel objects introduced in Max 8.

wavetable that [cycle~] uses is set to 512 samples by default. This is fairly low-resolution, and after extended listening, sine tones can appear, especially when several are combined, to be dull or bassy sounding. A harmonic oscillator patch I built for *Untitled #0 (8)*[57] subsequently calculates sine tones in real-time using gen~, a Max/MSP package that allows for sample-accurate audio generation and processing, so is capable of producing much clearer sine waves than wavetable synthesis. The chosen method is by Wakefield & Taylor,[58] and to my ears has much more clarity to the sound than [cycle~]. This patch has become part of my standard performance set-up when presenting work for computer and analogue synthesiser.

For *Untitled #4* I was interested in generating sine tones in such a way that groups of tones would enter the sonority for a time and then fade away to create a different form of continual sound: one in which the pitch content morphed, but did not suggest harmonic movement, narrative, or otherwise sound like conventional pitch changes. Early sketches of this work were produced in SuperCollider, an open-source audio programming language. I have little experience of SuperCollider, but it encourages different methods of generating indeterminate numbers of sine tones that in my case was significantly cheaper in CPU usage than Max. For sketching, I used SuperCollider's SinOsc object, which generates sine tones by interpolating a wavetable, similar to cycle~. By default, SinOsc has a resolution 16 times higher than Max's [cycle~] and so sounded noticeably clearer and crisper.

SuperCollider ultimately felt unintuitive as a creative tool, so further sketches, and the final patch for *Untitled #4* were built in Max. To achieve a similar 'rolling' effect of tones entering and departing, the patch uses a 64-channel sine tone oscillator, generating four tones at a time (a maximum of 20 tones are heard at any one time). The initial Max sketch for the work used [mc.cycle~], with the wavetable set to 8192 samples to emulate SinOsc in SuperCollider. This does improve the clarity of the tones compared to the default settings of [cycle~], but sound noticeably different to

[57] Outlined in the chapter for that piece.

[58] Graham Wakefield and Gregory Taylor, *Generating Sound and Organizing Time: Thinking with Gen~ Book 1* (Cycling '74, 2022).

SuperCollider, perhaps a little duller. I wasn't satisfied by this so returned to real-time calculation using [sinx~], an object that generates sine functions. This sounded noticeably fuller, richer, and clearer than [cycle~] or SinOsc, so was used for several months as I developed the work. Later, I revisited Wakefield & Taylor's method of sine tone calculation in [gen~] and implemented a 64-channel version to compare the fidelity to [sinx~]. Further extensive studio testing and waveform & spectrum analysis showed that gen~ appears to be the most accurate method of generating sine tones. Compared to [sinx~], there is less of an impression of low-end in the frequency content of combinations of tones, and more clarity that allows the sonority of a work such as *Untitled #4* to be full of detail. The JavaScript sine tone instrument developed for *Untitled #4* uses tone.js, a JavaScript wrapper for the WebAudio API. This allows for simpler programming of synthesis for web-based applications, and sine tones appear to be calculated in real time.[59]

Adding dirt

Another question: if I experiment so deeply with sine tones generated in software, and am so fascinated by (and ultimately satisfied with) them as a source material for my practice, why do I, on occasion, pair them with analogue synthesisers? If I am interested in generating sine tones as accurately as possible, as described above, would adding analogue tones with more harmonic content, generated by an instrument that can sound different depending on its temperature, not destroy the sonority? In practice I find that the opposite can be true. I use Doepfer oscillators, which are good quality but far from top of the line, and I primarily use the triangle wave outputs of three oscillators, tuned approximately to one or two of the sine tones in the computer, mixed together, and run through a low-pass filter with relatively high resonance. The added 'dirt' or 'fluff' that this creates when combining with sine tones

[59] "Web Audio API 1.1," accessed April 3, 2025, https://webaudio.github.io/web-audio-api/#dom-oscillatortype-sine.

gives a different flavour of diffraction in a room. It is something I employ intuitively, giving the sound a different shape and substance than using only sine tones.

Chapter 4 - Timbre

I often find myself describing my work as that which is concerned wholly with timbre. I am fascinated by timbre of electronic sound, how it invites focus on minute details. Exploring these details and how a sound interacts and merges with a space are primary concerns in my aesthetic. My core intention is to generate complex sounds and phenomena from economical means and sonic material.

Considerations of timbre in relation to pitch

How I think about timbre is directly linked with how I think about pitch. I use it in a specifically imprecise way: an initial condition that is set quickly and intuitively, with the sole purpose that timbre and space can be explored. I rarely, if ever, revise pitch sets for a piece once they have been determined. They are a raw material from which I sculpt the piece, as my intention of creating sonic environments in which complex sounds and phenomena that afford close listening and deep experiences of sound is more effective without elements that signpost my work as music. Focussing on exploration of timbre allows me to create sonic artworks that possess no narrative or pace and can serve as three-dimensional objects.

Pitches, once present, often do not change in an obvious way. I do not hear a need for them to change and change itself can distract the listener. I prescribe no particular way of listening, so as to invite the listener to create their own sonic and spatial environment and experience. They can be completely afloat in sound, in a flow state of listening. They are able to experience the totality of the sonority whilst attentive to details; simultaneously focussed and unfocussed. A relatively large or rapid change in the sound can distract the listener, potentially pulling them out of their flow state and away from their current focus. Changes in pitch appear to make a strong demand for attention and in the context of my work have the potential to be highly disruptive to a listening experience. They are also a strong signifier of time passing;

of one event causing and leading to another, which I feel can interrupt or even break these flow states.[60]

An example of this in practice is a harmonic oscillator instrument I have built in Max, for use with analogue synthesisers and as a stand-alone instrument. Derived from a pair of fundamental frequencies, two groups of four partials are generated. Once selected, these frequencies never change. Any change in the sound comes from adjusting the mix and stereo placement of the tones, and a listener's position within the space. Similarly, the synthesiser patch for *Untitled #1 (Morning)*, as outlined on pages 76-80, is a relatively simple subtractive synthesis patch in which three oscillator tones are coloured with wave shapers, sub-harmonic generators, and filters. The pitch of these oscillators is modulated subtly and slowly to the point that it is almost unnoticeable. I do this to alter the timbre of the sound in the space rather than producing some kind of harmonic or melodic movement. The pitch modulation serves the overall sound rather than being a musical statement that signposts a particular change in the sound that could be construed as giving the piece a narrative.

I usually have an approximate idea of a frequency range that a piece may occupy. The ranges are broad: low, mid, high, very high. There is no fixed frequency at which one range ends, and another begins, and I often work within a single frequency range. I am not concerned with what the specific frequencies in a given piece are, so long as any beating patterns produced are not so pronounced that they become more prominent than any other aspect of the sound (much like my use of steady

[60] An exception to this is the audience behaviour in *Untitled #4,* a work in the portfolio in which listeners control a web-hosted sine tone instrument on their smartphones to interact with tones from a Max patch through fixed loudspeakers. In a presentation of the work in Dublin in March 2025, I observed continual and relatively fast pitch changes from the participants. This was not distracting, however: there were around 10 participants all controlling their devices in a similar way, and the tones diffused through the fixed loudspeakers are numerous and dense. The resulting sound became complex enough that this continual change in pitch on the part of the audience was not a distraction. They were exploring as they wished, which is a key intention of the work.

pitch). At that point in the compositional process, the chosen frequencies are embedded as a part of the sound of the piece, so exact frequencies are not important. This selection of pitches is an improvisatory technique, delivering a complex sonority even with a small number of individual tones.

An assumption may arise that I am looking for and selecting pitches according to harmonic ratios, but this is not the case. For example, in *Untitled #0 (8),* the pitch content can be analysed as groups of tones separated by approximate octaves and fifths that are de- and re-tuned slowly across the course of the piece. These pitch relationships are arrived at unconsciously, however. I select pitches entirely from listening and considering the sensations that come from listening, shaping them into a sound as outlined in the previous chapter. Not thinking numerically, I feel no impulse to calculate precise pitch ratios or other such relationships.

Comparison to Phill Niblock's use of pitch

Phill Niblock (1933-2024) is a key influence on my aesthetic. My first experience of his music, as a young student in 2011, was playing it in a large faculty ensemble led by Dr. Bob Gilmore (1961 – 2015) at concerts in Brunel University and Café Oto. We played *Two Lips, Disseminate,* and were silent participants in *Poure.* All three pieces feature many layers of recorded instruments (and live instruments in the first two) so are extremely dense and are played at very high volume. Fourteen years later I hold extremely vivid memories of specific moments in the pieces, but also as a whole; a sense that the sound was a heavy fluid slowly tumbling around the room, moving with no purpose other than to inhabit the space. It formed a three-dimensional *thing.* Not an object or a form, but a sensation that invited me into the fine details of the sound and their interaction with the space, the other performers, the audience, our ears. Niblock generates complex sonorities that can afford visceral and perhaps even transcendent experiences of sound.[61] What draws me to it? I doubt there is a

[61] The commentaries for my Masters portfolio, completed at University of Huddersfield in 2014, opens with a prosaic description of this same concert. If lightbulb moments are real, these concerts are two.

single technique or method that Niblock uses that enables these experiences. There is something mysterious and indefinable about his work that comes before technique. For instance, the complex beating patterns and phenomena in Niblock's music are achieved by layering multiple versions of a sound, creating clusters of close frequencies and very dense sonorities.[62] There is also the volume of his work, most of which is designed to be performed and played back as loud as possible.[63] I never consciously or actively listen for or to these components of his music. They are there as part of a holistic experience rather than parameters that draw my attention.

We share a fascination and pursuit of beating patterns that serve the timbre and experience of sound but approach it in very different ways. The beating patterns in Niblock's work come from many layers of tones that are very close together in pitch, such as in his pieces constructed in Pro Tools, where he would "manufacture a whole cluster around each note and use that".[64] Pitches in my work are often much further apart, such as the approximate octaves and fifths present in *Untitled #0 (8),* and still generate complex beating and fluttering in the sound. Density is not necessary for a complex sonority.

Niblock states of his work that he tries to "make pieces that don't have development...there's constant shifting of the mix of microtones, and so the overtone

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This first experience of Niblock's music is so important for me that it is difficult to articulate. Bob Gilmore's enthusiasm for his work was infectious and opened my ears to a new way of listening to, and composing with, sustained tones, as well as the world around me. Bob did so much for me during and after these concerts; I cannot repay his kindness. They are very dear memories and contributed to my deep love of sustained tone music. It was a privilege to know, be taught by, and play music with Bob.

[62] For example, his Pro Tools works, in which a solo musician would record single notes, and Niblock would make multitrack pieces by pitch-shifting these recordings. Works such as *Hurdy Hurry*, constructed from hurdy-gurdy tones recorded by Jim O'Rourke or *Valence,* constructed from viola recordings by Julia Eckhardt, are demonstrative of this technique.

[63] At the Café Oto performance, the venue manager interrupted the soundcheck to reluctantly tell us to turn down: "Guys, it sounds amazing but you're way over the legal limit!"

[64] Niblock, "PHILL NIBLOCK."

patterns keep changing",[65] but his work is nonetheless teleological. His use of pitch is often based on a linear movement from one state to another, or from one to another and back again, described by Glover as "a move either from divergence to convergence, or vice versa, employing very gradual linear glissandi (some pieces are more strictly linear than others), for instance the gradual convergence of *Five More String Quartets* (1993), and gradual divergence, for instance, *Sethwork* (2003), which ends with a mirrored convergence back to the unison from the beginning of the piece".[66] There is always linear movement in addition to the music's internal movement of pitch clusters. As with the pitch density and volume, I do not listen to or for this but experience the sound as a totality.

In my work, pitches either remain steady and any movement in the sound is spatial or timbral, or they are modulated very slightly, very slowly. Pitch movement is more of a meandering thing that, when present, is often unnoticeable; it serves this totality of sound rather than highlighting a specific part of it changing. *Untitled #1 (Morning)* is a useful example of how I alter pitch without having a linear movement to or from something, using minute pitch changes to adjust the timbre as a whole. My work is in constant motion, but it is purposeless. Rather than moving from one state to another in linear time, it is not going anywhere or becoming anything.

Close to, and far from, La Monte Young

It may appear on the surface that my practice takes influence from the work of La Monte Young, given our shared extensive exploration of sine tones and interest in the behaviour of sound in a space. From there, we diverge. I work with the belief that intuitive and playful methods of crafting sound can lead to wondrous experiences of it, and that quantifying, measuring, or otherwise determining its parameters mathematically renders it obsolete, robs it of life, diminishes its character. When

[65] Niblock, "PHILL NIBLOCK."

[66] Glover and Harrison, *Overcoming Form*, 16.

viewing a painting by Martin, I do not consider the exact spacing of the grid. Measuring sound in the same way I find disagreeable.

Sine tone works by Young are tuned precisely, with carefully calculated frequencies. Kyle Gann writes at length on Young's complex tunings full of prime numbers and precisely calculated frequency ratios, describing in relation to *The Base 9:7:4 Symmetry,* for instance, how such tunings mean "you'll hear a whirlwind of pitches swirl around you. Stand still, and the tones suddenly freeze in place. Within the room, every pitch finds its own little niche where it resonates…"[67] Whilst this may be true, is it necessary? Playful, heuristic, and improvisational composition methods can also generate such effects; more so, I would argue. Happening upon an initial sonority that can be refined and introduced to many different spaces invites exploration and the chance of surprise. Adrift in liquid sound, the listener can discover a multitude of points of interest and resonance and have a highly personal experience.[68] They can find the focal points among focal points mentioned on page 28.

Such mathematical tuning is antithetical to me when searching for a deep experience of sound, especially when pitch is used in my practice only to serve the timbre. Young's level of calculation and specificity towards pitch content removes the sense of mystery and play, and I wonder what impact it would have when being presented if I incorporated such methods. Would a listener find the sound in my work less stimulating if I worked in this way? I have experimented at times with only using certain multiplications of a fundamental frequency[69] for example but find that the resulting sound is dull and lifeless, the timbre flat and predictable. The finding out I

[67] Kyle Gann, "Mela Foundation," Dream House: The Tingle of p x m n - 1, accessed June 20, 2025, https://www.melafoundation.org/gann.htm.

[68] I listened to *Filament 1* shortly before writing this section. Recorded by Otomo Yoshihide and Sachiko M on records, CDs, sine tones, and empty samplers, this work of improvised music features many sections in which a small number of high frequency tones interact in the speakers and the air, creating fascinating movement in the sound. "Filament - Filament 1," accessed September 28, 2025, http://www.japanimprov.com/filament/disco/filament1.html.

[69] For example, only using prime numbers, or multiplications of a fundamental below a given, arbitrary number.

mention on pages 43-8, the blending of the sound with a space to uncover new aspects of a work, would be greatly diminished if I took this to a performance or presentation. In my view an approach such as Young's prioritises mathematics, or the expression of an idea through or as mathematics, over the experience of sound. I favour discovery through playful methods and using those to create an invitational sonic environment for a listener to explore.

Toshimaru Nakamura and Onkyō

I have long been influenced by, and a fan of, Onkyō,[70] a genre originating in Tokyo in the late 90s and early 2000s, centred around improvised music with no defined structure, and predominantly low volume. This focus on low volume is claimed by some to be due to the nature of Off-Site, a venue located in a small residential house that was "so small and close to other houses as to require quiet performances, since neighbours would complain if sound leaked through the thin wooden walls".[71]

I am fascinated with Onkyō's economy of material, sparsity, abstract qualities, and its practitioners' deep focus on sound. Onkyō musicians often describe or talk about their work as being in some way just, only, or solely, sound. Toshimaru Nakamura, an improvisor associated with Onkyō in a 2003 interview, for instance, says that his "music is just happening. Maybe listeners want to make some association with something else and then want to understand more deeply."[72] Here, he is talking in the context of Western listeners mistakenly associating his music with Zen Buddhism or other aspects of Japanese culture,[73] but he is also describing his work in general as being abstract, free of narrative, and 'just' sound. The word Onkyō's simplest translation is simply "sound"; David Novak argues that "the totalizing abstraction of

[70] Sachiko M, mentioned elsewhere in these commentaries, is another key figure in Onkyō.

[71] David Novak, "Playing Off Site: The Untranslation of Onkyō," *Asian Music* 41, no. 1 (2010): 36–59.

[72] William Meyer, "Toshimaru Nakamura Interview," July 2003, https://www.furious.com/perfect/toshimarunakamura.html.

[73] A disappointingly common misconception with Onkyō in the West is that it must, because of how it sounds, be 'Zen' or 'Buddhist' music. There is no evidence for this and Nakamura, and the Onkyō scene in general, reject the idea.

the name allows performers to defer the descriptive burdens of musical categorization".[74] Perhaps there is a hint here to why I am drawn so strongly to the genre.

Nakamura's music is created from feedback generated on a 'no input mixing board'[75] and takes many forms: repeating patterns; swells of sound that gradually evolve; and high-frequency blocks of tones. The timbre of Nakamura's work is fascinating: there is such a richness to it that I sense it as three-dimensional, perhaps similar to how I experience visual artworks. The repetition and slow evolution of his work, whilst not something I pursue in my work, invites me in. I zoom in to explore it. Maybe like Oliveros' idea of zooming "into a waterfall to hear individual sounds of the falling drops"?[76] It is a space that I explore and move around within. But it's more than just three-dimensional for me. There's a tactility to it. It's so rich I feel as though I can sense it as a physical texture, like the sensations I have of my own work, of smooth surfaces and detailed shapes. Those things together afford complex and deep experiences for me. Comparable to my experience of Niblock's music, Nakamura's moves around my physical and internal spaces, expanding and contracting. It's not going nowhere, but it's not aiming to achieve anything.

This sensation I get from his work is something that I think about in relation to, and incorporate into, my work. Sound being sound and nothing else. I also have a sense that Nakamura, and Onkyō in general has no pace and maybe isn't based in time. These things are fascinating, and I think about them when I am writing my own music. How can I make music that doesn't move purposefully? Or music that is not moving through linear time? How can I prioritise timbre? Nakamura's music is a lens through which I can view electronic sound.

[74] Novak, "Playing Off Site," 41.

[75] A mixing board on which there is no external input. The output is sent back to the input to create a feedback loop.

[76] Oliveros, *Quantum Listening*, 48.

Filtering

When I work with analogue synthesisers, the sound is most commonly modulated by filtering. It suggests subtler, slower, less discernible movement in the sound than do changes of pitch, and changing the colour of the sound, in my view, affords more complex sonorities (and experiences thereof) than changing the pitch. It feels to me that the sound becomes more a part of the space this way, making it more sculptural. A listener's perspective and hearing of the work shifts as they move around the space, and as the sound moves around them. The space becomes that which contains the sculpture/sound as the sculpture/sound becomes that which inhabits the space.

I see parallels in artworks that examine the viewer's relationship with a space, such as Drift Studio's *Drifter* (2017),[77] a large concrete block that floats around a gallery space, seemingly without purpose. Its shape does not change, but the viewer's relationship to it is in constant flux as both move through the space. The viewer's relationship with, and perception of, the space, is linked with the existence of this object floating around it, and their relationship with the object is entwined with the space within which it moves.

Mira Schendel's *Little Train* (1965),[78] made of sheets of Japanese paper strung on a piece of nylon, hangs on the wall in the corner of a space. There is a quietness about this piece that is particularly compelling to me. I think about the rest of the space as much as the work itself and the area that it occupies. As with *Drifter,* the work does not engulf the space, but I perceive it as merging with the space. It invites me into the corner in which it hangs, and in doing so pulls my attention between it, the rest of the room, and whatever else may be there. My experience of *Little Train* is an

[77] Drift Studio, *Drifter*.

[78] Mira Schendel, *Little Train*, 1965, Japanese paper and nylon, https://www.moma.org/collection/works/108829.

experience of the artwork and the space, rather than an experience of the artwork in the space or exclusive of the space.

On pages 48-9 I summarise the influence of Sachiko M's work on my approach to sine tones as material. Her work similarly informs my thinking around timbre. Its lack of pace, continual movement without transformation, and highly restrained aesthetic composed from sine tones peppered across a silent background. Whilst my work seldom sounds similar, M's work fascinates me and invites me to think deeply about how I can shape sound into a sculptural form that simply exists in space and occupies a singular time rather than a linear event sequence.

These artworks and artists illustrate how my use of filters as the primary point of modulation in the sound of a synthesiser contributes to my intention of making music that interacts and merges with a space, is not based in time, and has no pace. The sound moves, but purposelessly and often imperceptibly. As with the works described above, it inhabits the space, forms a symbiosis with it. It exists in the space for the time that it exists.

Everything else in the sound moves very slowly in order to connect it with the space, in a similar way to *Drifter* and *Little Train*. The sonic movement becomes the space, and vice versa. Even when the sound appears still, there is movement. It is perhaps comparable to a beach: not thought of in terms of the individual grains of sand, but as the whole. The tide comes in and out, washing sand away and bringing more in, but it remains the same beach. In a work such as *Untitled #4*, groups of sine tones enter and depart continuously. The frequencies of these tones are generated randomly within a set range, but even though the frequency content is in constant movement, I don't consider those frequencies as changing. If a group of tones with frequencies [150, 211, 332, 353]Hz fade in for example, the next group of [144, 201, 225, 300]Hz is not a change in pitch(es). They are discrete things that come from nothing, exist, then go back to nothing. They are different frequencies but are not

predictably repeating. I don't view that as a change in pitch: the sine tones are not transforming, are not becoming anything other than what they are. The pitches themselves are steady, even if many enter and leave the sonority.

These interactions are created playfully and holistically, for example by shaping a sound which features amplitude modulation between different tones within the sound source, creates standing waves in the room, and leaves space for the listener(s) to absorb and reflect sound as they move through it. I am drawn to these phenomena because they invite spatial exploration, one's position and movement affecting their hearing of the sound and space, like viewing a sculpture. I avoid anything that implies a pulse, rhythm, or other conventional musical component because, as with changes in pitch, I feel it distracts a listener from experiencing the sound and space as a single entity. If such a pattern appears in my work, I will consciously remove it.

Untitled #4 creates a space in which the audience can actively participate in and contribute to with a simple web-based sine tone instrument. They interact with the space, one another, and automated tones from fixed loudspeakers. A similar plane to *Horizon Field* (described on pages 24-5), the listener thinks about their listening to the sound, to the space, to others, and to their own listening. They move through it as it moves through them. The clusters of tones move around the space in such a way that when many are present, a three-dimensional object exists that can be interacted with. The continual variations present in that object's surface, density, size, and position combine to form the timbre.

As a key intention in my work is creating an environment in which the sound and the space merge, and that which the listener can immerse themselves, I am interested in blurring where the sound source(s) appear to be and originate from in a space. My work often uses multiple speakers, and I experiment with diffusion and number of channels. For example, *Your Location in Space,* an installation version of *Untitled #1 (Morning),* is a monophonic sound source – a modular synthesiser – diffused over

four speakers. Whilst the sound of the piece is relatively still – the primary motion in the sound is the filtering of the oscillators – intricate patterns can be achieved in the space. This can be achieved through placing the speakers in irregular positions, using non-matching speakers, and by using a space that has large windows, curved walls, or is full of objects, so as to reflect and absorb elements of the sound in unpredictable ways.[79] Similarly, a performance of *Untitled #1 (Morning)* at Unit 44 in Dublin in August 2023, was commented on by a friend as sounding "so multidimensional and spatial in the room",[80] despite being monophonic, played over a standard stereo PA system, and the audience were sat in fixed seating.

Whereas *Untitled #1/Your Location in Space* is monophonic and composed of just three oscillators, *Untitled #4* can be configured to be diffused across one to eight speakers and features 64 sine wave generators, a maximum of 20 are heard at one time. There is far more movement in the sound than *Untitled #1 (Morning):* panning, phase, and filter modulation of these many tones is happening constantly. But the intention is the same: it's not about diffusion as much as it is about the sound and space being the same thing. I find finding out with a space and sound system thrilling. Each configuration offers new possibilities for me and contributes to my viewing my work less as discrete pieces and more a range of sonic environments. I am interested in how the sound moves, or appears to move, and how this could encourage exploration of space/sound.

[79] The space in which *Your Location in Space* was presented, The Guesthouse in Cork City, had all of these.

[80] Text message, 26/08/23

Chapter 5 - Untitled #0 (8)

Untitled #0 (8), as outlined in the Time chapter, is a work for sine tones and analogue synthesiser. The sine tones are generated with a harmonic oscillator instrument built in Max's gen~ environment. The analogue synthesiser is a simple modular synthesiser comprised of a quad oscillator/LFO module, a mixer, and a filter. The synthesiser patch, outlined in the diagram below, is three oscillators mixed together

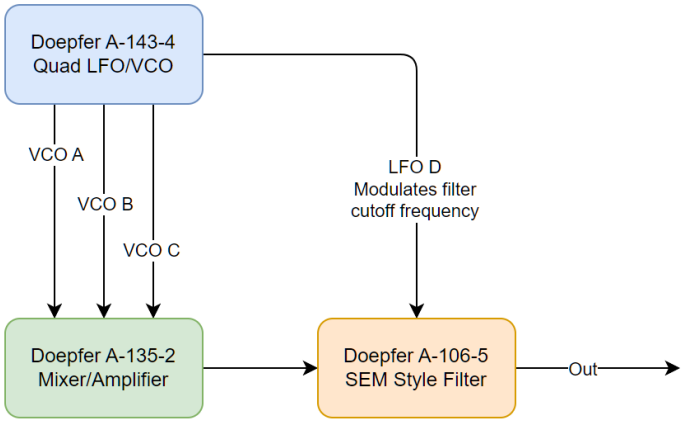

Figure 5-1 - Analogue synth patch for Untitled #0 (8)

and run through a low-pass filter. It is intended to be heard at the same time as the sine tone harmonic oscillator built in gen~ that I describe on page 55 in the timbre chapter.

The Doepfer A-143-4[81] is a quad oscillator module. Each oscillator can run in audio or CV ranges, outputting square and triangle waves. It has an extremely wide frequency range that is configurable with various jumper pins on the circuit board,[82] offering a total range of 60 minutes (0.00028Hz) to over 18kHz. This range[83] makes it an invaluable tool in my work both as a sound and modulation source.

[81] Doepfer, "A-143-4," accessed February 11, 2024, https://doepfer.de/a1434.htm.

[82] "Https://Doepfer.de/A100_man/A143_4_jumper.Pdf," accessed September 8, 2024, https://doepfer.de/a100_man/A143_4_jumper.pdf.

[83] Almost 26 octaves.

Oscillator A is tuned approximately to one of the chosen fundamental frequencies or partials in the gen~ harmonic oscillator. Oscillators B and C are tuned to taste: usually an approximate octave above or below Oscillator A, and a consonant interval such as an approximate perfect fifth. I do not intend to create specific chords or harmonies; this tuning helps to add some extra dirt or colour to the overall sonority. This is a useful example of the mysteries (or perhaps contradictions) in my work: I avoid musical conventions but employ one here to aid this. Once this module is tuned, I do not make any manual adjustment to their pitch.

The sine tones in the gen~ patch can remain at their chosen frequency indefinitely, whereas the A-143-4 must warm up for around 20 minutes when powered on; the nature of the circuitry and proximity of components on the circuit board means that the pitch can drift by minute amounts, or one oscillator can 'lock' on to another. The quirks of this module give it a personality that I find intriguing, and it often proves a helpful tool to add something indefinable to a work. All tunings are approximate, with the aim of creating complex standing waves and summation tones in the air that are altered further by minute changes to the either instrument's parameters.

The triangle outputs of the oscillators are mixed and processed with a low-pass filter. The fourth oscillator – D – is in LFO range, and the triangle output slowly modulates the filter's cut-off frequency by a small amount. The filter is a Doepfer A-106-5,[84] based on Oberheim's SEM filter circuit[5]. Often seen as a 'colourful' filter, higher resonance settings add subtle harmonics, adding colour to the sonority of the work. This filter has a feeling of imprecision about it that is particularly interesting and useful in my work. It softens the sound in a way that mixes especially well with 'cleaner' sounds like sine tones, and its resonance circuitry generates some imprecision that forms a parallel to one aspect of sine tones that intrigues me.

[84] "A-106-5," Doepfer, accessed September 8, 2024, https://doepfer.de/a1065.htm.

gen~ patch development

The Max patch originally used for *Untitled #0 (8)* was a simple MSP[85] patch from 2022 from a different piece, in which two [mc.cycle~][86] objects each generated a bank of four sine waves. In each of these banks, two unrelated fundamental frequencies are selectable, and the audible tones were up to four partials of those. Up to four sine waves were audible at any time; the partials of each fundamental could be cross-faded. The duration of this cross-fade was determined pre-performance and was often in the region of 5-10 seconds. These short, fixed durations made the change in sound far more noticeable than intended, and performances with this patch could feel blocky; the relatively fast fades felt like the work was composed of chunks of waves that run from one to the other, rather than a unified sound with many continual, barely-there motions.

For *Untitled #0 (8)*, I wished to build a sine wave instrument that delivered smoother and slower movement in the sound. Beginning from scratch, I built a harmonic oscillator in gen~, an environment within Max that is capable of sample-accurate signal processing. Whereas objects like [mc.cycle~] generate sine tones by interpolating a wavetable, gen~ can calculate them in real-time, one sample at a time. To my ears, sine waves generated in gen~ sound clearer and more present, a useful attribute when combining with analogue synthesis, and for generating standing waves in a space to encourage listener interaction. In one sense I treat them as the canvas on which I paint the other sound, and movement of the work.

The gen~ patch operates in a similar way to the original MSP patch: two independent fundamental frequencies are chosen, and up to four partials of each can be mixed. The crossfading has been altered so that I can manually fade between partials of each fundamental or is automated with a random signal in the patch. The four partials of each fundamental are paired, as with the original MSP patch, and can be cross-

[85] Max Signal Processing. The standard suite of audio processing objects in Max. New multichannel objects were introduced in Max 8.

[86] Multichannel version of the [cycle~] object, a sine tone oscillator.

faded. These partials do not have to be the same, and when using very high partials of very low fundamental frequencies,[87] subtle beatings are possible. This is a simple instrument with an expansive range of possible sounds. A benefit of using gen~ to build instruments for my work is that the sample-by-sample generation and calculation of signals allows me to incorporate very slow modulation signals more effectively, as modulation using MSP objects, when very slow, can sometimes result in a stepped sound. More flexible and complex sounds can be generated from the same economy of materials.

A simple wave-shaping algorithm has been incorporated,[88] adding harmonics to the sine tones and increasing complexity in the combined sonority with the analogue synth. I leave the amount, and depth of, wave-shaping at a low level so as to generate subtle, almost imperceptible shifts in the timbre of the patch. Finally, I added a 'harmonic scan', based on the harmonic scan section of the Verbos Electronics Harmonic Oscillator[89] module.[90]

The gen~ patch and the synthesiser's outputs are mixed before being sent to stereo speakers. I had tested a three-channel arrangement, in which both sources had independent speakers, but the difference in how I perceived the sound was negligible. It is also often not possible in a venue, so a stereo mix is more practical. This doesn't appear to affect the intended sound, and complex interferences in the sound still occur.

[87] e.g., the 96th partial of 1Hz and 93rd partial of 2.5Hz,

[88] Paul M. Christian, "Stkr.Waveshaping," GitHub, accessed September 8, 2024, https://github.com/meta-meta/MaxPatches/blob/master/_3rdParty/stkr.waveshaping/absAndGenExprCode/stkr.waveshaping.genexpr.

[89] "Harmonic Oscillator," VERBOS ELECTRONICS GmbH, accessed September 8, 2024, http://www.verboselectronics.com/modules/harmonic-oscillator.

[90] A version of mixing the tones, this function affords me a further dimension of control by sweeping across the pairs of partials by small amounts and extremely slowly, modulating their amplitude to generate an additional dimension of subtle movement.

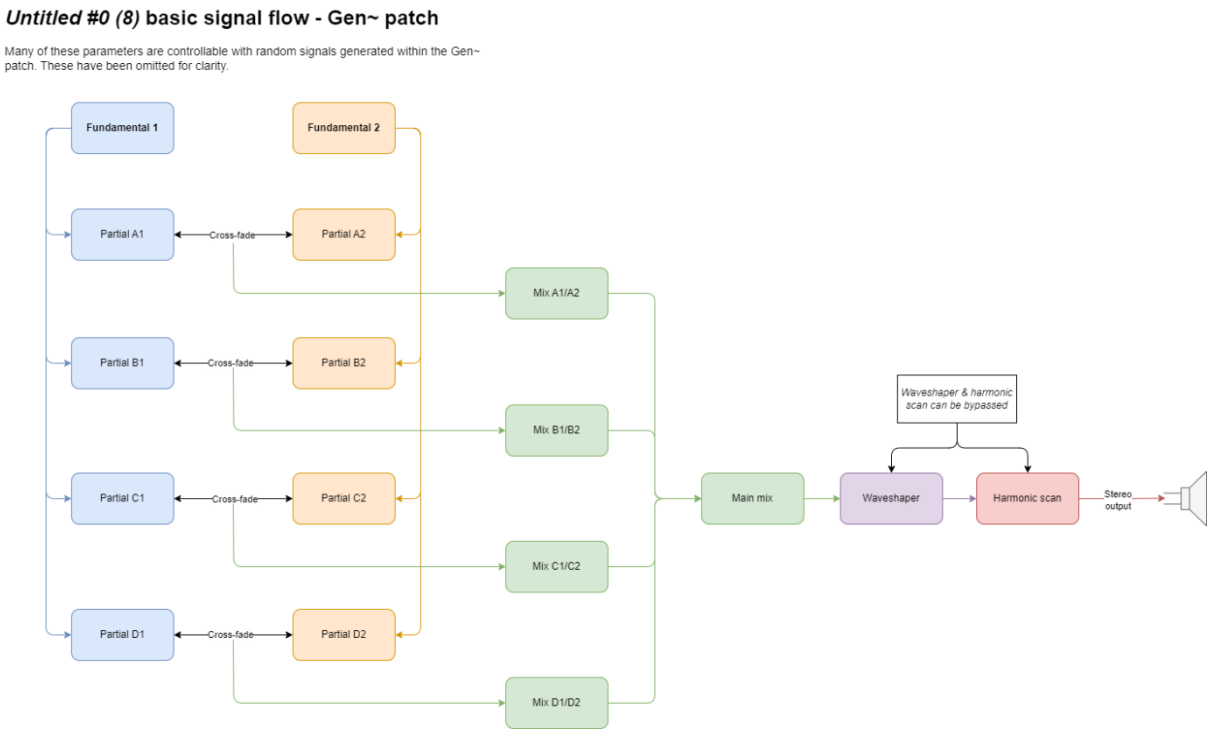

Figure 5-2 - gen~ patch signal flow

Random signals

Two random signal generators are present in the gen~ patch and can modulate most aspects of the sound. Taking a Bezier curve generator by Wakefield & Taylor,[91] I have added another abstraction from the book that simulates [line~][92] within gen~, to further smooth the output signal. This runs at rates of 0.1Hz or slower, and I control its depth of modulation with a master attenuator. This signal can modulate cross-fade, harmonic scan centre position, and a pseudo-ring modulator section of the patch. To avoid the sound of the patch feeling like one undefined mass, I have scaled the output of this random source in various ways so that changes in sound are related but different[93]. A duplicate of this random signal generator modulates the frequency of Fundamental/Partials A, though this is unused as I feel the change in pitch is too noticeable, and could remove the listener from a focussed state of

[91] Wakefield and Taylor, *Generating Sound and Organizing Time: Thinking with Gen~ Book 1*.

[92] A ramp generator.

[93] Consider my comparison to the activity of sound being like a sphere inside a larger one that is pushing and pulling at it.

listening. I opt instead for the sine tones' pitches to remain steady, as explained in more detail on page 54.

The second signal generated is a duplicate Bezier curve generator, onto which I added filtered noise that feeds its shift register, making it a burst generator. A probability can be set (0, no probability; 1, certain) for a single event of random signal to occur. At slow rates this generates randomly occurring, slow, signal ramps. This signal modulates the wave-shaper depth.

Spatialisation/performance

As of May 2025, *Untitled #0 (8)* has been performed in stereo at Spanners (London, September 2023), Prisma Estúdio (Lisbon, May 2024), Morphine Raum (Berlin, October 2024), The Guesthouse (Cork, December 2024), and Maureen's pub (Cork, June 2025).

Spanners is housed in a small railway arch in Brixton, south London. It houses a large PA system; speakers suspended above the audience in a dual stereo arrangement. Despite being underneath one of the main railway lines in and out of London, no sound interference or vibrations were noticeable. The audience moved freely around the space. The shape of the room generated a myriad of complex reflections in the sound, and a particularly strong bass trap in the bar area.[94]

Prisma Estúdio is a small DIY art space in central Lisbon. It is a single room, with several partitioned areas for storage. The floor is tiled, metal columns are present throughout the space, and the glass doors were left open during my performance. These characteristics provided many interesting reflections for the sound in the space. The PA was a standard stereo speaker system that had an unknown fault: one speaker would periodically sound muffled for other performers. This was not

[94] The owner of Spanners described her experience to me afterwards as exploring the space and happening upon this area of heavy bass activity. She chose to remain in that spot for its intensity.

noticeable for my performance however, as the work's frequency content was well below the threshold at which the fault was occurring. The audience were seated for the performance.

Morphine Raum is a recording studio and venue in Berlin, located in a working warehouse and factory complex. The room has been acoustically treated, with no external sound audible, and has a high-end sound system that delivers extremely detailed sound. The room is large enough to create an open area that people can move around; most people moved for roughly half of the piece, then stayed in one spot. At the end of the performance I was joined by sound artist Anthony Kelly, who improvised for a short time before beginning his own performance.

All three of these spaces are in busy areas of capital cities, but little or no external sound was heard. Whilst I don't think about these things when composing a work/sculpting the sound, when it happens at a concert, I welcome it as part of finding out. The fact that it didn't in these spaces was a surprise: maybe I expected it unconsciously. In any case, the works were not 'better' or 'worse' for outside sounds being absent.

The Guesthouse's performance space is a room on the first floor of a building in Cork's Shandon neighbourhood. It is not acoustically treated, so some external sound (passing cars and people, church bells) is audible. Whilst a different sonic context to the other performances, the piece still felt the same, in that it was no better or worse than the other performances. It is the same piece but a different piece each time. Sound coming in from outside (or not) is just one part of it. The piece's various iterations are the same thing and different things: iterations rather than a continuation.

Maureen's, also in Shandon, is a small pub with space for around 20 people. As with The Guesthouse, street noise enters the room. This version of the piece felt very different to previous performances. Maureen's is a space treasured by many Cork locals, and I was touched to be invited to share the work there. I felt that the audience's listening was particularly attentive, perhaps due to the space, their close proximity to one another, and the comfortable and welcoming environment that owner Maureen McLaughlin fosters.

Figure 5-3 - Morphine Raum, Berlin, 12/10/24. Photo by Doreen Kennedy.

Recording

I recorded *Untitled #0 (8)*[95] at the Sonic Arts Research Centre (SARC) at Queen's University, Belfast in August 2023 and it was published on Farpoint Recordings in October 2024.[96] Diffusing the synthesiser and sine waves across the centre's 39.1 speaker array, which was configured in a sphere around the space, afforded considerable flexibility for testing these ideas of immersive sonic environments. The

[95] Using the MSP-based patch, as this was before development of the gen~ patch.

[96] Maguire, *Faint Red / Pencil Lines*.

sound sources were recorded direct from the instruments, through a binaural microphone in the centre of the space, and through a stereo decode of the speaker array. This combination of sources allowed for detailed capture of both the instruments and the space: the binaural microphone captured the standing waves generated by interaction of the diffused sine tones and synthesiser in the speaker array.

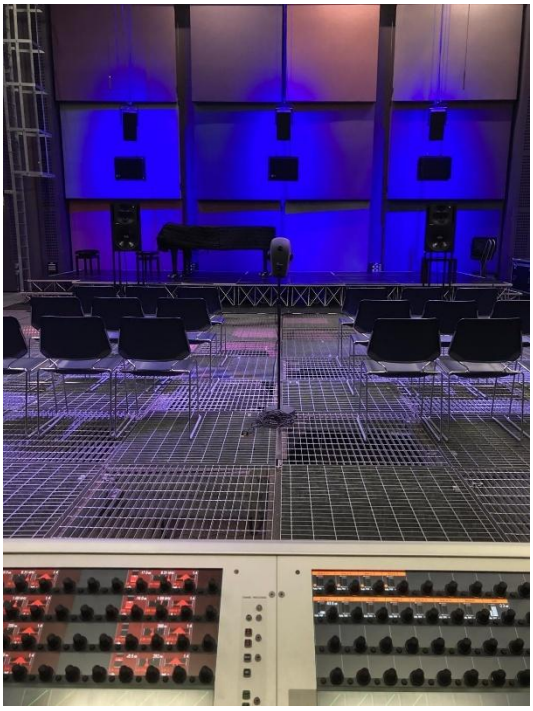

Figure 5-5 - SARC recording, Belfast August 2023.

Figure 5-4 - SARC recording, Belfast August 2023.

I have also tested the work on a 5.1 speaker system; with each pair of sine tones and the analogue synth each assigned a speaker and spatialisation of the sine tones controlled with the SPAT suite[97] of Max external objects. This generated interesting sensations of rotation in the space, but after extensive testing, I feel that a stereo setup is more than adequate for the work. Panning across a surround system created what I feel is a confusing and distracting situation, in which the listener could become unsure if they should remain in one location or move around. Such obvious movement around the image distracts from the intention of the work as an experience of sound.

[97] Externals developed by IRCAM for spatialisation of sound.

I am wary of over-reliance on technology for generating or contributing to a listener's experience; the technology is a means rather than an end. Ideally the technology of the work would be 'invisible'. Whilst impossible – since the whole work is produced by technology – I wish to create a space in which the sound is what is considered, with little or no focus on its method of production and modulation. The work intends to invite movement from the listener, so I prefer a simpler palette for spatialisation.

Chapter 6 - Untitled #1 (Morning)

Synthesiser patch

Untitled #1 (Morning) is a work for analogue synthesiser. The synth patch is driven by two cross-patched[98] chaotic voltage sources: a Nonlinear Circuits implementation of Ian Fritz's 'Hypster' hyperchaos generator[99][100], and a Nonlinear Circuits Triple Sloth.[101] These generate slow moving chaotic voltage that controls oscillator frequency, oscillator pulse width, and filter cut-off frequencies. The Triple Sloth's 'Inertia X' output is fed into the Hypster's rate input. This output has no controls and so runs freely. I use these two chaotic voltage sources to influences many parts of the patch with different but related movement. I favour this over a simple random voltage source as it unifies the various parts of the patch into a continually moving, coherent sonority.

Voice

The audible section of the patch is a subtractive voice from three oscillators: Two Doepfer A-110-2 Basic VCOs, and a Doepfer A-111-2 High End VCO. The A-110-2 is a simple VCO with square, saw, and triangle outputs. The A-111-2 features the same inputs, but has a six octave range (rather than three), and a sine wave output.[102] In *Untitled #1 (Morning),* I use the triangle outputs of one A-110-2 VCO through a low-pass filter, and a mix of the sine wave output of the A-111-2 run through a Doepfer A-137 Waveshaper, and its square wave output. The square wave output of one of the A-110-2 VCOs is sent to a Doepfer A-113 Subharmonic Generator. This

[98] The modules are patched into one another to create more complex and less predictable behaviours.

[99] Ian Fritz, "The HYPSTER Hyperchaos Generator," 2018, http://ijfritz.byethost4.com/Chaos/fourth_worddoc_1.pdf.

[100] Andrew Fitch, "Ian Fritz Hypster," Nonlinearcircuits, accessed March 7, 2023, https://www.nonlinearcircuits.com/modules/p/ian-fritz-hypster.

[101] Andrew Fitch, "Triple Sloth," Nonlinearcircuits, accessed March 7, 2023, https://www.nonlinearcircuits.com/modules/p/triple-sloth.

[102] The A-111-2 is also more precise than the A-110-2, due to its using a high-end dedicated oscillator chip. In my work, though, the methods by which I mix and filter their respective waveforms, this is rarely evident.

module generates sawtooth waves of selectable divisions of the input frequency. I commonly use a simple configuration of the first four sub-harmonics (Fundamental /1, /2, /3, and /4). A mix of these four tones is sent to a low-pass filter. These three sounds are mixed and form the sonority of the work. The output of the patch is monophonic.

Chaotic Control Section – Hypster

Designed by Ian Fritz specifically for use in synthesisers, the Hypster is a fourth-order hyperchaos generator. This differs from chaos in that there are four factors orbiting around an attractor, rather than one. In simple terms, this results in more complex and potentially erratic orbits.[103] The Nonlinear Circuits module of the circuit has eight outputs: four main outputs, and inverted copies. In practice, when running the module at frequencies of say 1-5Hz, the voltage generated is far more volatile in its motion than a simpler chaotic circuit such as the Triple Sloth. At slower rates of several minutes in duration, I find that it can deliver almost imperceptible change in sound, with unexpected moments/periods of greater activity, giving the impression of a swell in the sonority. The module is highly controllable, with potentiometers for the rate of orbits, the gain of the signal, and damping. All of these also have control voltage inputs that can be attenuated. There is a dial for fine control of the rate, and two switches that make significant changes to the behaviour of the module, essentially allowing the operator to choose from four different modes of volatility.

The Hypster is the main modulation source in the work, and its outputs, of which six are used, are sent to many modules in the patch. The rate is set close to its slowest orbit speed, the gain has a medium setting, and the damping is set just beyond its halfway point. The outputs are sent to FM inputs on two of the three oscillators, the ‘Multiples’ and ‘Symmetry’ inputs of a waveshaper, and the CV inputs of two channels of the main mixer (for amplitude control). In my observations it behaves somewhat

[103] In the description of the Hypster module, Nonlinearcircuits ’ Andrew Fitch describes hyperchaos as “chaos on steroids”.

like a quadrature oscillator, its outputs appearing to 'follow' one another. This, combined with the inverted versions of each output offers many possibilities for having various components of a patch to be modulated in different ways, but connected to one another. When running at slow orbits a sense of barely perceptible but definite movement is suggested, similar in my mind to a calm sea, atoms/particles connected by string drifting in space, or artworks such as *Drifter,* as described on page 62. This slow, chaotic motion in the control signals reflects how I view the wider movement of sound in my work: continual motion that is not moving towards a destination.

Chaos Control Section – Triple Sloth

The Triple Sloth contains three 'Sloth chaos' circuits. This circuit is a design by Andrew Fitch based on a chaotic attractor circuit proposed by J C Sprott.[104] The circuits in Triple Sloth each have three output sections[105] and run at different rates: 15-30 seconds, 60-90 seconds, and 30-40 minutes. The Inertia section has no controls and runs freely. Apathy and Torpor both feature attenuators that "do not specifically alter the frequencies, rather the weight of the outputs. Various settings will cause the signals to spend more time traveling around one strange attractor rather than the other."[9] Their CV inputs are similarly unpredictable in their operation, with incoming CV signals sometimes "injected onto the chaotic signals but depending upon conditions may cause windows of periodicity or voltage jumps."[106]

In *Untitled #1 (Morning),* the Inertia X output is fed into the rate input of the Hypster. Its lack of control causes unpredictable changes to the rate of the Hypster. These are subtle: the Hypster is set close to its slowest rate,[107] and the signal from the

[104] J C. Sprott, "A New Class of Chaotic Circuit," *Physics Letters A* 266, no. 1 (2000): 19–23, https://doi.org/10.1016/S0375-9601(00)00026-8.

[105] The X, Y & Z outputs for each Sloth are taken from different stages of the circuit and are all different to each other, although Z is simply the inverted version of Y. Fitch, "Triple Sloth."

[106] Fitch, "Triple Sloth."

[107] Approximately three minutes per orbit.

Triple Sloth's Inertia X output is heavily attenuated once it reaches the Hypster. The Inertia Z output modulates the cut-off frequency of one of the filters that acts as the patch's main output. This, like the Rate input on the Hypster, is heavily attenuated so that changes are subtle. An Inertia output is chosen here for its slow rate of travel: its 30–40-minute travel time means that in most performances, one orbit of an attractor will not complete, resulting in change in the overall sonority that does not repeat or return to an initial state.

Finally, the negative output of the module's built-in Difference Rectifier circuit modulates the pulse width of one oscillator's square waves. This oscillator feeds a sub-harmonic generator; the resulting change is to four filtered sawtooth waves, a technique I use that reshapes part of the overall sonority, perhaps drawing a listener's attention to the space in which they are listening. A Difference Rectifier is an original circuit by Fitch, in which an additional voltage is derived from the difference of various input signals. This circuit features in many of Fitch's designs, subtracting two input voltages from one another if their sum is either greater or less than 0v. The negative Difference Rectifier outputs 0v if its input is greater than 0v.

The Triple Sloth, whilst comprised of simple parts and operating essentially autonomously, is an extremely useful and flexible modulation source. Though the three attractor circuits are independent, their respective X, Y, and Z outputs deliver three sets of related yet distinct control voltages, and the two Difference Rectifiers bring these discrete attractor circuits together.

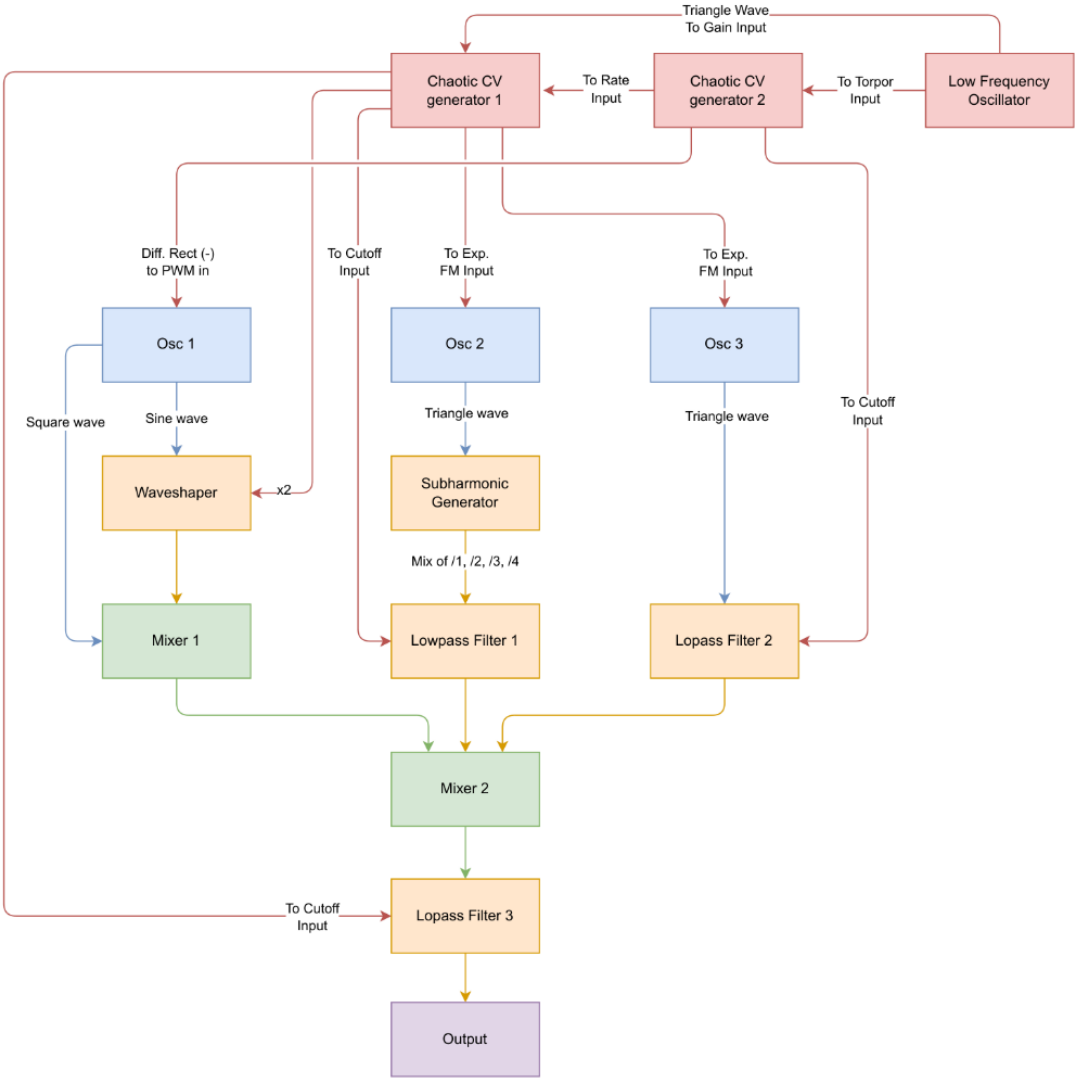

Figure 6-1 - Signal flow in Untitled #1 (Morning) patch

Tuning

The tuning of *Untitled #1 (Morning)* is, in keeping with my practice as described on page 40-1, determined intuitively through slow improvisations, without adhering to a fixed harmonic, rhythmic, or otherwise musical vernacular. Frequency analysis of two versions of the work – one in Dublin in March 2023, and a recording session in Belfast in August 2023 – show there is no correlation with the harmonic series, nor any particular patterns in intervals of the selected pitches. The two instances of the work do not feature the same pitches; they are in the same ballpark, but do not match exactly. One thing that is present is groups of tones that are very close together that

often move around one another. Beatings arise from these tones' closeness, and the modules and patching methods outlined above deliver the continual slow movement that is central to my work and its effects.

Tuning/refining/shaping in and to a space

As the frequency content of the work is similar for each presentation, and does not need to be exact, much of the playing of the work is shaping it to a space. This is achieved primarily by adjusting the cut-off frequency and resonance of the two filters, as well as the parameters of the waveshaper, to settings that generate interesting resonances and reflections. The volume of the synthesiser is also carefully, but intuitively, determined, to the same end. If possible, I will also experiment with placement of speakers[108]. As the work is monophonic this can be a valuable method of finding complex interactions between the sound and the space.

Performances

I have performed *Untitled #1 (Morning)* in Dublin (March and August 2023), in Lisbon (May 2024), and presented an installation version (retitled as *Your Location in Space*) in Cork (March 2024).

The March 2023 performance in Dublin was at Reception Weekend,[109] a two-day festival of experimental music held at The Complex, a repurposed warehouse. Heavy rain on The Complex's metal roof is audible in the recording of this performance. I embraced it, didn't try to fight, augment, or play to it. It was just there; part of the environment just as the speakers, the audience, the air.[110] The performance scenario heavily influenced this iteration of the work. The room was laid

[108] As I was afforded the opportunity with *Your Location in Space,* the installation version of this work.

[109] "Reception Weekend," Reception, accessed April 30, 2024, https://www.receptiondublin.com.

[110] An audience member arriving late to the performance told me later that they could hear my performance around 100 metres from the building. Where the acoustic space started and stopped blurred with these two occurrences. Sound flowed in both directions through the walls of the space, something I find particularly interesting given the noisy inner-city location of The Complex.

out with conventional seating facing a raised stage. With a bright spotlight on me, I found myself imposing a clear musical shape on the sound, instead of my intention of creating a sound that has no start or end; always morphing both when sounding and not (i.e., in the listener's memory); a shared experience between myself, the instrument, the audience, the space. The August 2023 performance took place in Unit 44, an event space run by Kirkos Ensemble from 2021-2025 in a shop unit in north inner-city Dublin. The audience were seated in rows as with the Reception performance, but in this instance, I sat behind them: it was clear the piece was live, but that I was not the focal point.

Figure 6-2 - Untitled #1 (Morning) at The Complex, Dublin. 31/03/23. Photo by Paddy Kiernan

NoiseFloor 2024

At NoiseFloor, a conference organised by University of Staffordshire and hosted by Escola Superior de Música de Lisboa, a short performance was made. For travel reasons, I rebuilt the synthesiser used for the piece into something smaller: the bare minimum required to generate the tones and filtered textures that comprise the work. The sound was close to the original iteration, but the absence of the subharmonic

generator module,[111] for example, resulted in what I feel is a less rich sound. The concert scenario was also very rushed with little time to prepare and test the work in the space.

Your Location in Space

An installation version of *Untitled #1 (Morning), Your Location in Space* ran at The Guesthouse for six hours on 30th March 2024. The synthesiser's monophonic signal was sent to four speakers placed heuristically in the space,[112] and several comfortable chairs were placed in a similar manner. Visitors were not instructed to interact with the sound or space in any particular way. The arrangement of the seating, and that a visitor must walk into the room to take one of the seats, was intended to non-verbally convey the possibilities in the work. Moving around the space changes its sound from the listener's location.

The title is taken from a description Alvin Lucier makes of the listener's experience of music that explores standing waves, "You may be sitting in the trough of a standing wave...but since you cannot be everywhere at once, you only hear what is available at your location in space" (mentioned already on page 49).[113] I take this as a proposal that there are infinite points of focus in a piece, both spatial and temporal, the perceiver choosing which to occupy at any given moment: the sound is a mist within which the perceiver creates what Ryoko Akama calls "a unique ephemeral sculpture".[114]

[111] The Doepfer A-113 Subharmonic Generator is a very deep module (nearly 10cm from the front panel to the end of the circuit board), which makes it impractical to travel with and incompatible with many Eurorack cases.

[112] The signal was sent to two pairs of speakers that differed substantially: one being reference monitors with a flat frequency response; the other having a frequency response tuned to the human voice, which the work mostly occupies. The synthesiser's output was sent through a 31-band graphic equaliser, which allowed for 'tuning' of the sonority to the space. A subwoofer was also used.

[113] Lucier, *Reflections*.

[114] Ryoko Akama, "Inefficient Ways to Comprehend The Matter (2021): Sound Installation Exploring Sine Waves," in *Perspectives Sinusoïdales • Sinusoidal Perspectives* (Librairies formes • ondes, 2023).

The Guesthouse is a large living room-like space, with large windows (which were blacked out), a high ceiling, and an alcove at one end. These caused a variety of reflections, standing waves, and points of increased perceived volume, as well as highly localised interference patterns, and summation/difference tones. The variation in sound was far greater than I anticipated, and the diffuse nature of the sound demonstrates that the work can be installed in a variety of spaces, without reliance on multichannel speaker arrays, of which there are few in Ireland.

Figure 6-3 - Your Location in Space at The Guesthouse, 30/03/24

Several visitors described their experience of the work as immersive. One visitor said that their experience was similar to being in a sauna: the intensity of the experience building and then releasing periodically. Another likened the work to a “rich sauce”, the various aspects (or ingredients) revealing themselves over time. Others spoke of the spatiality of the sound, at first thinking many more speakers were being used than in reality.[115] Whilst I intended the seats as an invitation for the listener to explore the space, they perhaps performed the opposite function for some. Many visitors

[115] It was mentioned however that some points in the space were perceived as very – or perhaps too – loud, and that in others, particular tones were particularly present, therefore removing the sense of the work being a single sonority for some.

spoke of finding a seat and remaining there for an extended period, then perhaps trying one more location before leaving. The fixed location of the seating may have restricted the possibilities of the visitors' creative act of listening, and discouraged exploration of the variance in the sound vertically for some. Some visitors mentioned that they spotted the synthesiser hidden in the alcove of the space, but most did not. If I were to opt for a more conventional 'white cube' gallery style space, how would the synthesiser be highlighted, or not?

Recording

The work was recorded at the Sonic Arts Research Centre (SARC) in Belfast in the same session as *Untitled #0 (8).* Diffused and recorded in the same way as *Untitled #0 (8),* I again recorded several iterations, exploring the room during the process, examining the sonority at different points and making minute adjustments to the patch to capture what I felt was a strong representation of the work. Unlike *Untitled #0 (8),* I have only tested and performed this work on a stereo system. The monophonic sound source always delivered a complex enough experience that further diffusion seemed unnecessary.

Chapter 7 - Untitled #2

Untitled #2 is an interactive composition presented as a Max patch, in which several forms of sine tone synthesis and noise are controlled with a number of on/off switches. These switches are not labelled and are scattered around the screen space. A 'readme' window suggests a low volume, and this is baked into the patch: all signals are output at a low volume. The output of the patch is stereo.

Three sound sources have an additional control. A noise generator that emulates the sound of rain has a four-way toggle to select the 'heaviness' (the density of the noise), a three-way toggle selects both the duration of the amplitude envelopes for both a bank of 32 sine wave oscillators, and a sine to sawtooth oscillator. These, like the other controls, are not labelled,[116] and are not placed near the on/off controls for their respective sound sources. There are two large spectrograms as the background. These display three of the sound sources (rain, delay, and high tones labelled as 'blip' in the patch). Due to the sparsity of those sources, the background often appears blank.

This obscuring of how the patch works intends to invite the listener/operator into an exploratory, playful mode of listening. The visual arrangement of the work is to present it as a score for improvising with a group of semi-autonomous sounds. I compare this to Ryoko Akama's *tada no* series of text scores,[117] in which short, often ambiguous texts encourage playful sound making and listening in dialogue with the environment. A further intention of this mode of presentation is to abstract the technical nature of computer music as a tactic to increase its accessibility, akin to how Akama's text pieces – written on walls, park benches, rocks, and later as a

[116] They are displayed in a different colour to the other switches to suggest an alternative function.

[117] Ryoko Akama, *BORE 03 / Ryoko Akama こそこそ [Koso Koso]*, April 4, 2013, https://borepublishing.com/2013/04/04/issue-03-ryoko-akama/.

series of cards – democratise experimental music by “looking for a way to communicate with people in term [sic] of mutual language”.[118]

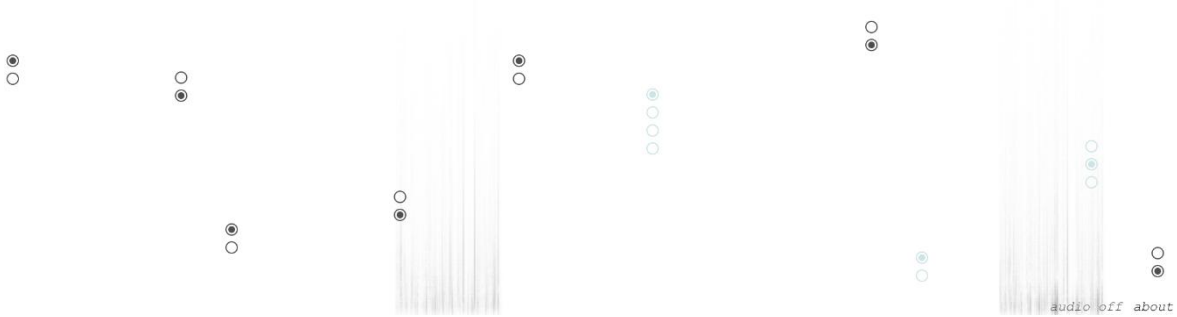

Figure 7-1 - Untitled #2 in operation

Sound sources

The sound sources in *Untitled #2* can be categorised in two different pairs: tones and noise, or high and low density. Many of the sources are triggered with a simple fluctuating clock. Each sound source triggered in this way has its own instance of the clock. Any mention of a ‘fluctuating clock’ in this chapter is an instance of this. The clock is a [metro] object that has its interval time adjusted at random on each new pulse.

Rain

This subpatcher filters noise to emulate rain and is a recreation of a Pure Data patch found online.[119] Three noise generators are sent through a series of filter and signal multiplication stages and mixed through a final low-pass filter. The resulting sound overpowered the other sounds in the work, so I added a final fixed gain stage to achieve an appropriate low volume. I also removed the ‘ambience’ section from the

[118] Ryoko Akama, *Sound in Life*, September 28, 2013, https://akamaryoko.wordpress.com/2013/09/28/tada-no-score-project-flickr/.

[119] *Pure Data Rain Simulator*, n.d., - https://web.archive.org/web/20150303015820/http://www.obiwannabe.co.uk/tutorials/html/tutorial_rain.html.

original Pure Data design, moving it elsewhere in the patch, with its own on/off control. The rain simulator is visualised with the spectrogram.

Blips/pulses

Two sine wave oscillators generated using a 'gen~ optsine' abstraction made from a calculated sine wave example patch within Max[120]; one tone being heard in each channel. A slow, fluctuating clock triggers very short amplitude envelopes (30ms), and each tone plays a randomly chosen frequency between 14kHz and 15kHz. The frequency is selected by reading through a series of numbers stored in a [multislider] object that is randomly generated when the patch loads. This is independent of the clock, so there is no pattern to the tones and frequencies that are heard.

Clicks

One of the simplest sound sources in the piece, controlled by a fluctuating clock. There are two instances of these clicks: one for each audio channel. They are always running, and when the source is toggled 'on', one of two flavours of click will be sent to its respective output. The first type of click is white noise filtered first through a [>~] object, which passes through noise that is above a given value (in this case, 0.99), and then through a highpass filter with a fixed cut-off frequency of 5000Hz, delivering very sparse click sounds. The second type is a [click~] object, which generates a short impulse. On each clock pulse, a [decide] object chooses one of these sounds at random. The two click types are similar; their subtle variance in sound adds an additional variation in the sound of the work.

Hiss

White noise processed through a one-pole filter with a fixed 5000Hz cut-off frequency and subtracted from an unfiltered version of itself. This generates a thin hiss-like sound.

[120] Gen~.computed_sine example patch.

Delay

A [noise~] object is duplicated to four channels and filtered in the same manner as in the *clicks* subpatch, but with a much higher threshold so clicks are sparser. These are processed with a simple delay line, which has its delay time continually moving between 10 and 50 milliseconds, and the feedback amount is moving similarly, between 75% and 99%. Both are controlled with a random walk algorithm, which also modulates the cut-off of a high-pass filter at the output of the delay line. The resonance of this filter slowly moves around 70% to 90%. This sound source is visualised with the spectrogram.

Sines

Two more sine tone oscillators, generated with the same gen~ optsine algorithm as the *pulses* subpatcher, one sounding on each channel. These have amplitude envelopes of the same shape but mirrored: one a fast attack and slow release, the other a slow attack and fast release. The duration of these envelopes is between 10 and 20 seconds, selected randomly by their own noise object, filtered in the same manner as the *delay* subpatcher. The pulse from this filtered noise selects a random envelope duration and selects a frequency between 400Hz and 415Hz. A metro object triggers an additional random number (between 1 and 50) every five seconds. When this generates ‘1’, both oscillators sound at the same time; there is a 2% chance of both oscillators sounding on a clock pulse.

Sine/saw

A sine to sawtooth oscillator that I built several years ago. It uses [2d.wave~], a two-dimensional wavetable, to interpolate a wavetable half filled with a sine wave, and half with a sawtooth wave. The oscillator has a carrier and a modulator, as well as a ‘depth’ parameter for modulation, offering many complex waveforms. Its envelope is triggered with another fluctuating clock. One of 10 presets for this oscillator is generated randomly, with a weighting that favours some presets over others. This sound source has an additional control beyond ‘on/off’, the three-way switch

mentioned above that selects an amplitude envelope time. This is randomly selected within three ranges: short (10-190ms), medium (5-10 seconds), and long (30-90 seconds).

Sine bank

Finally, a 32-channel bank of sine wave oscillators is generated using [mc.cycle~]. A fluctuating clock selects an ease function randomly, weighted towards certain functions. The code for these functions has been adapted from Max's MC Wrapper help patcher and affects the balance of each oscillator's amplitude. Two ease functions are present: one for amplitude, and one for frequency spread. The amplitude is always controlled by the same function but has a continually changing lower value and midpoint value, dictated by two random signal generators. The frequency function is chosen with the weighted random described, and the lower range value moves continually, with a third random signal generator.

Performance and recording

I performed an early version of the piece in Dublin[121] in Jan 2023. Sitting in front of an audience, operating a handful of switches in a Max patch, did not satisfy what I wanted from the piece. The work is intended to be operated by a listener, so presenting it in this way felt more like a demonstration without explanation than a performance, and as such felt a little ridiculous and antithetical to the work's intention. *Untitled #2* is intended as a private experience for a single listener, and this performance contributed to that decision.

[121] At Kirkos ' Unit 44 space in Stoneybatter.

Chapter 8 - Untitled #4

Untitled #4 is a work in which sine tones from fixed loudspeakers combine with sine tones controlled by listeners through their smartphones and played through portable speakers, affording the curation of intricate sonic and spatial experiences. The numbers of both fixed and portable speakers are indeterminate, so the density of the work can vary depending on this, the characteristics of the space in which it is presented, and how listeners play their instruments. The work has an open duration.

The sine tones heard through the fixed loudspeakers are generated in Max, and the mobile sine tones controlled by listeners are accessed through the web, on a simple browser-based instrument.[122] The Max patch features a 64-channel sine tone oscillator[123] built in gen~; a maximum of 20 are heard at one time through an array of 1 to 8 speakers. A simple amplitude envelope triggering system activates four tones at a time, which enter, exist, and leave slowly, creating a sonority in which the sound is never still. The browser-based instrument is composed of two sine tones, controlled by dragging a finger or mouse around the browser window. Each axis controls the frequency of a tone within the range 440Hz to 660Hz. In the hope of improving cohesion between the two methods of sound generation, rather than having them perceived as two separate things happening at the same time, the frequency range of the Max patch is set at 88-1320Hz.[124] Thus, the pitches from the phones are embedded within the pitches produced by the Max patch, with no extreme outliers that would create a sense of separation. The frequencies in the Max

[122] This instrument is made with JavaScript: specifically, p5js, and tone.js packages.

[123] The patch uses MC objects extensively. MC objects mentioned in this chapter have 64 channels unless specified.

[124] In an early sketch of the piece, I experimented with fundamental frequencies of 88 to 132Hz and their partials. 440Hz, the lowest frequency of the JavaScript instrument, is the 5th partial of 88Hz. 1320Hz is the 10th partial of 132Hz, and the highest summation tone possible from the JavaScript instrument. This is the closest I have come to a calculated pitch set, but really it was still arrived at through play and experimentation. The range of the fundamental frequencies relative to the range of the JavaScript instrument was chosen for no reason other than it creates an unknowable sensation to which I am drawn.

patch are generated randomly at the start of each envelope, but the sound moves slowly enough that the result is a sonority that is continual movement, whilst not becoming anything, moving without transforming.

Development of the Max patch and browser-based instrument took place across several months. The constituent parts of the piece are simple, but their construction required extensive experimentation, sketching, and refinement: calculating in which way, and at what speed(s) the sound should or could move. The Max patch uses various random signal generators to modulate the phase, panning, and filtering of the bank of sine tones,[125] slowly and by relatively small amounts. The intended result is that the sound moves continually but in such a way that it affords consideration of the sound in the room. The panning, for instance, moves the tones around the speaker array in a way that sounds not like definite movement in a particular direction, but rather that the shape of the sound is what is in motion. I focus on the minutiae of the sound, making extremely small adjustments to parameters such as the resonance level on the patch's filter. This is a highly intuitive process, and one that I view as a very slow-motion improvisation. I do not have a particular goal in mind when composing. I know that I have found the right thing in a work when it feels right. For me this is something intangible that perhaps can enable a flow state of listening to and experiencing the sound.

Max patch and use of randomness

In contrast to how I use analogue synthesisers, in Max I make substantial use of random number and signal generation, due to the myriad ways in which they can be calculated and processed. With an analogue synth, I am more sparing, and do not control an entire patch solely with random or chaotic sources. Some analogue synth patches (such as in *Untitled #0 (8)*) don't feature any random sources or control, but a single LFO and small manual adjustments.

[125] The sine tones are processed with a low-pass filter in order to attenuate the higher frequencies and achieve a sound in which no one frequency, or band of frequencies, dominates.

In *Untitled #4*'s Max patch, almost everything is initiated and controlled with a random process of some kind. I might describe it as aleatoric: the many forms of randomness are taut; constrained to small enough possible areas of activity and possibility, yet combining in enough ways across many aspects of the sound that no one random process stands out from among the dense network. The [random] object is used with various methods of number generation and scaling for Max events, and random signal generation is usually derived via control messages for MC signal generator objects. These occur slowly enough, are contained in their motion, take place at the same time as enough other things, and have enough channels that they are modulating, to avoid any sense of there being true randomness or disorder in the patch. It all serves the same intent of slow, unpredictable, and almost imperceptible movement as the rest of my work. Any random sources I use run extremely slowly, and any jumps in value are obscured or smoothed at some point in the process.

Why is the patch made this way?

This wide-ranging use of random processes is employed in order to satisfy a core intention in my work: to generate a sonority that is always moving but not becoming something. To achieve this requires the extensive experimentation and iterative design described earlier in this commentary; I come to compositional and programming decisions through play. For instance, the pitch sets in the work are generated randomly, using constrained random processes that favour lower pitches, so the generated partials don't sound 'all over the place'.[126] I arrived at this decision from extensive listening and comparing to an earlier sketch of the work made in SuperCollider. The Max version, whilst generating frequencies in the same manner, appeared to generate more high frequencies, which could feel or sound abrasive after a time, leading to the weighting of the frequency generation towards lower

[126] Illustrating the tension between randomness and control in my work.

pitches described above being implemented.[127] The patch selects pitches by randomly choosing partials in the range 1 - 10 from randomly selected fundamentals constrained to the range described above. The restriction delivers a sound that is more compelling to my ears. I imagine a more lucid three-dimensional shape to the sound, that can afford a deeper experience and interaction from an audience member operating the JavaScript instrument.

The processes in the patch are indicative of how I use Max in my wider practice. A number of very simple processes occur to create an indefinable whole. These processes may be synchronous, asynchronous, or a combination of the two. Part of the sketching and refinement stage of a composition often involves introducing many processes to a patch, then removing them one at a time until some essential state has been achieved; a sonic environment in which nothing is extraneous or appears distinct.

Subpatchers

Clock

The same basic fluctuating clock as in *Untitled #2,* the clock in *Untitled #4* triggers the frequency calculation and amplitude envelope for the oscillators. The clock interval is not completely random in this case but derived from the amplitude envelope duration. The minimum (fastest) interval is 1/20th of the envelope time, and the maximum (slowest) is 1/8th of the envelope time. The clock interval is a random duration within this range. Each pulse generates four bangs with an [uzi] object, which controls the frequency selection in the *freq-gen* subpatcher.

[127] I opted for building the piece in Max rather than SuperCollider because, despite the weighting of the randomly generated frequency favouring higher partials in the Max patch, my familiarity with the software led to a more playful and creative composition process.

Freq-gen

Pitch sets in the work are determined in this subpatcher, which generates four fundamental frequencies and four partials within the range 1 – 10 of them. The bangs from [uzi] generate the partials, and the fundamentals are calculated from messages sent from [mc.voiceallocator~] when the amplitude envelope is triggered (the envelope is triggered four times from the same [uzi]). The fundamental frequency range is 88-132Hz, and each is selected randomly, although with a weighting favouring lower frequencies. The partials are calculated by multiplying each of the fundamentals by a random integer between 1 and 10. A list of four frequencies is sent through [mc.target] to assign them to four of the sine tone oscillators.

Phase

This subpatcher uses a sample & hold to generate modulation signals for the phase input of the 64-channel sine tone oscillator. The signals from [mc.phasor~], whose frequency fluctuates between 0.09Hz and 0.14Hz,[128] drive the [mc.sah~] object, which has [mc.noise~] as its input. This is a classic method of using sample & hold: [mc.sah~] samples each channel of [mc.noise~] when a channel passes a threshold (0.5). The new value is slewed with [mc.slide~], causing a smooth transition from the previous value. These signals are attenuated, and very slowly modulate the phase of each sine tone generator by small amounts.

Oscillator

A 64-channel sine tone generator made with [mc.gen~]. This was favoured over [mc.cycle~] and real-time MSP sine tone calculation, as outlined in the sine tones chapter. The subpatcher contains a message formatting section to properly assign the incoming frequency information to the oscillators.

[128] Using the 'scaledexponential' message. This "generates an exponential series with the exponent scaled by the total number of channels". When retriggered periodcally, this generates multichannel signals that slowly spread by tiny amounts.

Filter-mod

The resonance of the filter is modulated by a duplicate of the sample & hold code that drives the *phase* subpatcher. The cut-off frequency is controlled by [mc.rand~], running at 0.025Hz, scaled to 100-3000Hz.

Pan

This subpatcher generates random panning values and times for each of the oscillators. The panning of each oscillator can be from 10 to 60 seconds in duration. Panning values are 0 – 1, and are sent to mc.mixdown~, which pans according to the number of channels set with the *activechans* attribute.[7] The panning values are generated by two [uzi] objects. The first generates groups of four random numbers, and the second generates a fluctuation value for those numbers. These two sets of numbers are made into lists and added together with [vexpr]. The final numbers are processed with [mc.line~], smoothing the transition between values. The result is the oscillator moving slowly and independently around the speaker array. The effect is less one of directional movement than the shape of the sound changing.

Other

Voice allocation

This section of the patch uses [mc.voiceallocator~] to manage the allocation of the pitch sets to the oscillators. It assigns four oscillators at a time, in a round robin arrangement (64 to 1).

Envelope generator

A simple amplitude envelope using [mc.function] to control [mc.curve~]. All oscillators receive the same envelope shape and time. The shape was determined from experimenting extensively, the chosen shape dovetails incoming and outgoing oscillators most effectively.

Mixdown

One to eight output channels are selectable and panned accordingly.[129]

Presentation

As of May 2025, *Untitled #4* has been presented once, at Kirkos Ensemble's Spatial Music series in Dublin, in March 2025. The speaker array at the concert had eight loudspeakers, and nine audience members participated with a combination of portable speakers and the built-in speakers in their smartphones. The presentation was around 20 minutes in duration. There were a few technical issues during the presentation, but it nonetheless served as a useful test of the work.

It took several minutes for speakers to connect successfully to phones, caused by a combination of old or damaged phones, and my using multiple identical Bluetooth speakers. These had identical names in users' Bluetooth settings, so was not clear initially which speaker each audience member had connected to. The Max patch was also diffused to a single speaker in the space for the first half of the presentation, rather than the full eight speaker array.[130] Nevertheless, when combined with the audience sound, the sonority still filled the space, the audience's actions and movements creating complex sonic effects. The panning built into the patch was effective in generating additional movement and undulation in the sound, without implying specific directional change.[131]

As can be heard in the documentation, occasionally a phone would dis- or re-connect to a Bluetooth speaker. In testing this was a frustration, as all speakers of this type play a short sound or jingle when they connect to a device. In the setting of the concert however, it had a strange sort of beauty. Unit 44 was a shop unit on a busy road in Stoneybatter, with a bus stop outside the door. The sound of the street is

[129] Where a value of 0 is speaker 1, and value of 1 is speaker X (e.g., speaker 8 if the patch is set to output 8 channels.

[130] This was corrected during the presentation.

[131] Whilst frustrating, this technical issue illustrates that the fixed loudspeaker component of the work is effective on any number of speakers.

clearly audible at all times, and so these extra sounds of devices breaking and making connections added an intriguing imperfection to the work. I feel it connected the work more to the humans participating and the wider environment,[132] adding colour to the sound. Given that my primary pursuit is exploration of timbre achieved by imprecise means, these errors with personal and portable devices are something I can view as a feature of my work rather than a bug. Similarly, in testing I was frustrated by distortion from Bluetooth and phone speakers when playing the JavaScript instrument at high(er) volumes. Working alone in a quiet room at home, or in an acoustically treated studio, these artefacts and imperfections in the sound are obvious. They were noticeable at times in the presentation but, as with the speaker connection issues, did not colour the sound in a negative way. It blended with the sound of the work, the street sound, and the sound of people moving around inside the space. The technical challenges of relying on Bluetooth speakers, and personal devices with internet connections that are fully functional, have led to consideration of an alternative instrument for listeners to operate.

Unlike other pieces of mine, there were many clear changes in pitch from the audience's playing. This contradicts my usual intentions of creating environments in which sounds that can be construed as conventionally musical are absent, but in this instance, I found it compelling as my hope that the audience would explore the sound fully and deeply during the piece was realised. I gave a brief introduction to the work before it began but did not prescribe any particular listening or participation from the audience. I explained how the JavaScript instrument was operated, and suggested

[132] Problems with Bluetooth connectivity could also have been caused by people passing the building; their devices emitting and receiving signals and interfering with devices inside the space. I have noticed such interference when listening to music on Bluetooth headphones and passing through a crowded area such as a train station.

slow and considered exploration of the space, but I did not suggest any particular way of using the instrument or speakers, nor did I prescribe a specific volume.

This contradiction is intriguing. I don't feel a need to remove such noticeable changes in pitch as a possibility in this work. Instead, I feel it feeds into the mystery that I

Figure 8-1 - Presentation at Unit 44, Dublin, March 2025. Still from video documentation

pursue – a charm or enamouring quality to the sound. I work with many 'rules' in my practice with the intention of achieving particular, but non-specific sonic environments and experiences, but sometimes they break themselves. Usually, I find noticeable changes in pitch in my work to be too prescriptive of some kind of musical convention, perhaps suggesting to a listener a particular narrative or direction of motion that is not in fact there. In this presentation, perhaps the sheer amount of movement in pitch (more or less constant, and from nine speakers moving around the space) removed this possibility. The sound is of exploration and interaction with the fixed loudspeakers, the space, and the external sound. I also did not make or prescribe these changes of pitch myself: the audience did. Perhaps I enabled it by the way in which I have constructed the component parts of the work, but the audience were nonetheless co-composers.

Chapter 9 - Untitled #8

Something I have long suspected about my practice, and myself, that this research confirmed, is that I am an observer[133]. The way I write and present my work illustrates this. In the studio, I set some initial condition/s of the sound and listen. Presenting and performing is much the same. I make small adjustments when I feel they are needed, aiding the internal movement of the sound. Maybe it is the only thing I wish to do with my work: observe the activity and qualities of sound. I use phrases like “placing timbre under the microscope” or “being afloat in sound” to describe how I approach sound, and as described on page 30, my experience of sound can be much like my experience of an Agnes Martin painting; continually zooming in and out, often simultaneously.

When talking about myself or a listener interacting with sound and a space, I see that too as an act of observation. My interest is in the awareness one has of one’s relationship to the sound in/and the room. How the two interact, and how you are interacting with and experiencing it. I think again of Nunan’s description of the space (and in this case, also sound) as a substance that moves through and with us. Gormley’s idea of a field of connection I too relate to this experience of sound. Maybe if everything is an act of observation, a listener is not simply afloat in, or inside of, the sound. Maybe this zooming in and out continues to being external and internal to the sound that is occurring at the same time.

To examine this, I have constructed a piece in Max/MSP for four sub-bass sine tones, using the same gen~ oscillator core I use in *Untitled #4*. I have had in the back of my mind for years an undefined idea for a ‘subwoofer quartet’, with vague thoughts about making something in which the air ‘wobbles’ with one sine tone in each speaker. The piece was composed in UCC’s Pauline Oliveros Sound Studio, which has a Genelec 7060B subwoofer and three Genelec 8050 active monitors. The 8050s have a large frequency range and are rated for a minimum response of

[133] As I allude to on page 31.

35Hz.[134] Frequencies between 35Hz and 36Hz happen to generate particularly intriguing effects in the studio, with the wavelength approximately double that of the width of the room. After extensive sketching and searching for different combinations of frequencies across the four speakers, a total range of less than 1Hz delivered the most interesting phenomena. The work generates standing waves that, due to the minute differences in pitch between the four tones, alter extremely slowly in the space. To augment this, I experimented with various forms of modulation: amplitude modulation, panning across the speaker image, and phase modulation.

As is usual for my practice, this sketching triggered a period of removal. With all three forms of modulation active, the tones moved around the space with a speed that made them wholly uninteresting. The listening experience that I had (along with friends and peers who were shown the work in the studio) amounted to indifference. The sonic activity seemed novel but was too active, and moved too fast, to maintain interest. The motion and change in each tone were easily perceivable, too obvious, and seemed to stop any active listening. This reflects the necessity of slowness in my work. The movement should be almost imperceptible to invite curiosity and engagement with the sound.

As a result, I removed all modulation sources but the phase modulation.[135] With that parameter active, some compelling effects are possible. In studio testing I observed areas in the space of almost total silence, but that had a physical sensation of vibration. These, with the phase modulation active, were not static, so gave the impression of the sound moving through the body as the standing waves modulated, producing a sense that the sound was traversing the space.

[134] Though in the course of composing the work, I found that frequencies down to at least 32Hz are audible.

[135] The phase of each tone is modulated independently by a simple random signal generator.

Subpatchers

OSC

A simple subpatcher for testing. OSC[136] messages are received from my phone to invert the phase of each oscillator independently, so I can test these effects and remain mobile.

Phase mod

Two forms of signal generation are triggered every 10 seconds and mixed with a random multichannel signal to slowly morph each oscillator's phase. As there are four oscillators, there are four channels of these control signals. These mixed signals are selected with an [mc.selector~] object to enable or disable the modulation. An [mc.sig~] object is connected to the other input of the selector. When this input is selected, the phase modulation is disabled, and the constant signal from [mc.sig~] resets the oscillators back into phase alignment.

Phase invert

The phase of each oscillator can be inverted independently whether the phase modulation operations are running or not. This is calculated by dividing each oscillator's frequency by the current sample rate.

Pink

Simple pink noise, with an option to switch between 2 channel mc.pink~ or a duplicated single channel. Each has its own subtle phasing and spatial effects.

[136] Open Sound Control, a wireless communication protocol useful for musical applications.

Preset morph

The work utilises a handful of presets. The stored parameter values differ by small amounts, and movement between them can be automated with a simple random walk algorithm. The values differing by small amounts works in tandem with the phase modulation subpatcher to add an additional level of subtle motion in the sound. The addition of the noise, at very low volumes, in some of the presets, I intend to communicate the idea of zooming in and out of the sound, the room, your internal space, as I discuss elsewhere in the commentaries.

The sound feels as though it is moving through and with and around the body and the space. That invites movement and interaction, and very close listening. The dead spots I find most interesting because there is still a sensation that there is sound present. It's not just that it's inaudible; there is a shimmer of it in my perception. Something is vibrating and I can sense/feel it, but the tone is not audible. Like a shadow of sound, similar to Lucier's *Outlines of Persons and Things,* but perhaps also comparable to his 1975 work *Bird and Person Dyning*. In the latter, the sound of a bird is received by binaural microphones worn by the performer, and fed into a speaker system, creating a sound world that ties the movement of a person to the sound in the space. As Cathy Van Eck notes, listening "becomes a performative act within this piece".[137]

The piece is an experiment in how 'not there' my music can be, to really push the idea about the sound and space merging. During development of the work I thought deeply about the ideas I outline in these commentaries, about the sound having a three-dimensional sculptural quality. This piece is a combination of the observation that I mention on the previous page, and this intention of exploring the tessellation of the sound into a coherent but still abstract form that I discuss on page 40. A hopeful consequence is the sound being its own thing, inviting movement and exploration. The extremely slow movement of the beating patterns in the work I use to further

[137] Cathy van Eck, *Between Air and Electricity: Microphones and Loudspeakers as Musical Instruments* (Bloomsbury Publishing USA, 2017), 91.

examine ideas of sound not necessarily being free of linear time, but more freely experienced as a non- or atemporal environment.

I feel *Untitled #8* is the most successful piece I've written in exploring this idea of exploration and solely experiencing the sound. I am in a mode of complete listening and observation when engaging with the work, like when I view a Martin painting, listen to work by Sachiko M, or walk around a sculpture by Schendel; the flow state I mention, also on page 40. It's not simply four tones radiating from four speakers. It doesn't sound like that, but instead a complete sound that is three-dimensional and is really inhabiting the space.

Chapter 10 - Untitled Reflections

This research project has been, in a sense, an act of unlearning. During its course I have removed elements and material from an already restrained practice and have made sonic artworks that excite me sensorially through those acts of removal and their consequences. I find myself without a clear idea or statement about what my practice is or does, or who or what it is for. I can say, though, that the myriad effects that can occur in infinite combinations of frequency, timbre, volume, spatialisation, location... are captivating; the endless possible configurations of something very simple like a sine tone or twenty. Perhaps I removed clear intent and ideas along with the materials I removed and now have a practice that simply exists. The absence of clear intention, narrative, or goal affords the space to make sonic artworks that create a space that is open and explorable. That space is physical and non-physical, and the sound inhabits it.

I have dismantled many preconceptions I held about my work, specifically around why I make it, and find myself in a space of thrilling uncertainty. What my work has to say is that it has nothing to say. The sound happens and it is experienced if there are ears present to hear it. That experience may be profound or mundane. Maybe there is an audible thread to my intent for a purposeless, structureless, music-less music, maybe not. The simple fact is that I love sound that behaves in the many undefinable ways that it occurs in my work and in the work of those that influence me, through the not-straight, not-defined lines I draw and follow. It can create three-dimensional shapes, objects, and sensations that inhabit and interact with a space and a listener.

It exists and inhabits for a time.

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Notes on the media

The submitted media includes photographs, audio, and video recordings. They are illustrative of each work, and multiple versions are presented where necessary (for example, to show that a work's frequency content is not fixed).

The following notes outline all submitted media, with the exception of the Max patches. The patches were made by me, with code by others cited within those patches. If using Windows, use either your audio interface's driver, or FlexASIO.[138]

Untitled #0 (8)

Audio

Farpoint - Morphine Raum - 241012 – Phil.wav was recorded at Morphine Raum, Berlin on 12th October 2024 by Rabih Beaini, and assisted by Lucas Brell. The event was Anima Mundi #5, organised by Farpoint Recordings and Errant Sound as part of Zeitgeist 24, a festival of Irish arts in Germany organised by Culture Ireland.

Untitled #0 (8) - Excerpt.wav is an excerpt of the studio recording of the work made at SARC's Sonic Lab in Belfast in August 2023. Engineering assistance from Craig Jackson, Jonny McGuinness, David Mahaffy, and Ben Brown. It was published by Farpoint Recordings on *faint red / pencil lines* in October 2024. The full work can be streamed and downloaded at https://philmaguire.bandcamp.com/album/faint-red-pencil-lines, or farpointrecordings.com.

[138] https://github.com/dechamps/FlexASIO

Phil Maguire – Maureen's – 250628.wav was recorded at Maureen's, a pub in Shandon, Cork City on 28th June 2025. The concert was organised by Maureen McLaughlin and hosted by Maureen, and Denis Cotter. It is a direct recording from my mixer to a Zoom H8 audio recorder.

Photo

Morphine Raum photographs 1 & 2 were taken by Doreen Kennedy on 12th October 2024.

Phil-Spanners-1.jpg was taken by an audience member in Spanners, London, 21st September 2023 at a Tread Into Mulch concert organised by Paul Margree.

Phil-Spanners-2.jpg was taken by Kate Carr in Spanners, London, 21st September 2023 at a Tread Into Mulch concert organised by Paul Margree.

The Prisma Estúdio photo was taken on 27th May 2024 in Lisbon by Victoria Brunetta.

Video

The Prisma Estúdio video was recorded on 27th May 2024 in Lisbon. The concert was part of the Nariz Entupido series organised by Joao Castro.

Untitled #1 (Morning)

Audio

Untitled #1 (Morning) - Excerpt.wav is an excerpt of the studio recording of the work made at SARC's Sonic Lab in Belfast in August 2023, the same sessions as *Untitled #0 (8)*, and also published on *faint red / pencil lines.* The full work can be streamed and downloaded at https://philmaguire.bandcamp.com/album/faint-red-pencil-lines, or farpointrecordings.com.

Photo

The Reception 2023 folder contains photographs taken by Paddy Kiernan on 31st March 2023. The concert was held at The Complex, Dublin, as part of Reception Weekend. Organised by David Lacey and Aonghus McEvoy.

The Lisbon NoiseFloor photograph was taken by an audience member in Escola Superior de Música de Lisboa Music on 28th May 2024.

Unit 44 - 230825 - 1.jpg was taken by John Macedo in Unit 44, Dublin on 25th August 2023.

Unit 44 - 230825 - 2.jpg was taken in Unit 44, Dublin on 25th August 2023.

Unit 44 - 230825 - 3.jpg was taken by an audience member in Unit 44, Dublin on 25th August 2023.

Video

Phil - Unit 44 – 230825 - Blurred.mp4 was recorded by Paul Scully in Unit 44, Dublin on 25th August 2023. I have obscured the faces of the audience.

Phil Maguire - Untitled 1 Morning - Dublin 31-03-23.mov was recorded at The Complex, Dublin on 31st March 2023 as part of Reception Weekend. Video recorded by Ruaidhri Conaty, and sound engineered by Iain Faulkner.

Untitled #1 (Morning) - NoiseFloor 2024 - 240528.mov was recorded on 28th May 2024 in Escola Superior de Música de Lisboa.

Your Location in Space

This installation took place in The Guesthouse, Cork on 30th March 2024. Audio and video recordings were made by me. I have added blur to the timelapse video.

Untitled #2

Audio

The audio recording was made as a direct output of the Max patch on 8th March 2023.

Untitled #4

Audio

Untitled No. 4 - Sine Tones - Stereo Binaural Mix - 250328.wav was recorded on 28th March 2025 in the Pauline Oliveros Sound Studio, UCC Department of Music. The recording demonstrates the activity of the Max generated sine tones in isolation, as a binaural mix.

Photo

The photographs are screenshots of the video documentation that I made in the presentation of the work at Kirkos' Spatial Music series at Unit 44, Dublin on 22nd March 2025.

Video

I recorded the video at Kirkos' Spatial Music series at Unit 44, Dublin on 22nd March 2025. Participants in the work are Sebastian Adams, Paul Scully, Liselle McMahon, Laura Hutchinson, Anna Garvey, Steve Maguire, Francis Hegarty, and Sharon Phelan.

Untitled #8

Audio

The three audio recordings were made on 28th March 2025 in the Pauline Oliveros Sound Studio, UCC Department of Music. They demonstrate the phase modulation in the Max patch. Due to the low frequency content (<36Hz), these recordings are inaudible on many speakers.