This PhD contains material published in:

Gillies, Sam. 2020. “Screen grammar for mobile frame media: the audiovisual language of cinematic virtual reality, case studies and analysis.” In *Sound and Image: Aesthetics and Practices*, edited by Andrew Knight-Hill. Abingdon: Routledge. VitalSource.

COMPOSING WITH FRAMES AND SPACES: CINEMATIC VIRTUAL REALITY AS AN AUDIOVISUAL COMPOSITIONAL PRACTICE

SAMUEL GILLIES

A commentary and portfolio of works submitted to the University of Huddersfield in partial fulfilment of the requirements for the degree of Doctor of Philosophy

June 2020

Copyright Statement

Table of Contents

List of Figures

Acknowledgements

Firstly, I would like to thank my supervisors Monty Adkins and Julio D'Escrivan for their help, support and guidance in the development and refinement of this research project over the past four years. Thanks also to Aaron Cassidy, Pierre Alexandre Tremblay, and Alex Harker for the many conversations unrelated to this specific project, but nevertheless have shaped my work, my intentions and my values as an artist.

This PhD was made possible through the Liz Rhodes Scholarship for Musical Multimedia. I would like to thank the University of Huddersfield for making this funding available, without which I would not have been able to undertake this project. Thanks to the Centre for Research in New Music (CeReNeM) for the opportunities to present my work, share my ideas, and to be exposed to the thoughts and activities of so many others. This PhD was, in part, shaped by those discussions. Thanks to Juliet Fraser, Loadbang, Sarah Saviet, DRIFT Ensemble, Greywing and the many others who have performed or exhibited my work over the course of this PhD.

Thanks to Susie for being a friend and willing green-person, Jorge for your cynical optimism, David for always being willing to get a beer, Keesia for a shared affinity for MST3K, Aviva for never shying away from lending me your voice, Henry for exuding a zen-like presence at all times, Maeve for always having a couch for me to crash on, Kevin for never visiting me in Huddersfield, and to Amy, Ellie and Jesse for reminding me to do non-music things from time to time. Thanks to Cat, Lindsay, Stewart, and Malcolm who set me on this path. Thanks to Jamie, Louis, Rhys, and Thom for your enduring support and friendship.

My greatest appreciation and affection to Barbora Vacková for your love and support, and Colin Frank, I could not ask for a better friend.

Finally, my endless love and gratitude to my parents, Jane and Peter. Without your support I would not have got this far, thank you for always encouraging me to pursue my passions. I know you do not always understand what it is that I am doing (or why) but hopefully this goes some way towards an explanation!

Abstract

This project offers a creative investigation into the medium of Cinematic Virtual Reality, identifying the distinguishing characteristics of the medium as they relate to the technical, thematic and aesthetic language the creative has access to. Drawing primarily on CVR as a cinematic construct, this investigation focuses on two key concepts that differentiate CVR from fixed frame media: frames (the window in which the virtual world is composed and navigated by the viewer) and spaces (the relationship between the viewer and the surrounding virtual environment).

The creative portfolio explores many different possible implementations of creative thought in CVR, bringing the world of contemporary electronic and electroacoustic music into the audiovisual medium of CVR. The ideas of frames and spaces are used to structure a discussion of the creative portfolio, allowing this PhD to document the act of composing audiovisual works in CVR that are conceived from the unique communicative properties of the media.

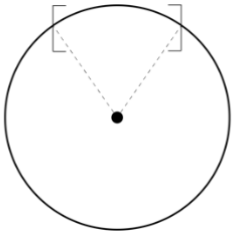
The hallowed always seems to abide in the province of the hollow.

Mark Z. Danielweski, House of Leaves

When the crisis occurs, the actions that are taken depend on the ideas that are lying around. That, I believe, is our basic function: to develop alternatives to existing policies, to keep them alive and available until the politically impossible becomes politically inevitable.

Milton Friedman, Capitalism and Freedom

INTRODUCTION



In the summer of 2016 when I began this research project, Cinematic Virtual Reality (CVR) had begun to enter the consumer market. Reflecting on the mood at the time I remember a mixture of two prevailing attitudes. The first was a sense of optimism that we were witnessing the arrival of the first new visual arts technology in many years and this in turn could only lead to some sort of new artistic experience. If Mark Fisher's assertion that we remain trapped in the 20st century was accepted, the experience that "the rapid recombinatorial delirium" of the 20th century has now given way to a sense of finitude and exhaustion, where we have run out of "newness" and the 21st century "sound of the future" never arrived (Fisher 2014, 2-29), then perhaps CVR would be the kick needed to break out of a sense of cultural malaise. The second was a sense of confusion, a sense of "what do I do with this?" Many artistic practitioners have had different creative responses to this question, and their work is discussed throughout this commentary. These two attitudes not only highlight the newness of the technology but also the lack of contemporary academic discussion taking place that assesses the aesthetic impact of new work produced in this medium. Perhaps unsurprisingly the earliest attempts to use this new technology often fell back on older creative models, resulting in underwhelming early examples.

For me, CVR was an immediately attractive medium to work with. Audiovisual elements had featured in a large amount of my work until this point, and in each case the intention was not to create dynamically synesthetic experiences of sound and image but rather to alter, usurp or reshape the environment in which sound can be experienced. My initial experiments in my undergraduate performances utilised a single projector to display a moving image as the background to chamber compositions, acting to shape the atmosphere of a concert. During my Masters studies I had the opportunity to use the Goldsmiths Sonics Immersive Media Labs (SIML) space, a rectangular performance space with six projectors and a 12.2 channel sound system. My work for this space – *All Hail South East London* – was my first experiment with diffused visuals, an experience I was interested in pursuing further.

CVR offered me a medium where, for the first time, everything I was interested in achieving in an audiovisual composition was an inherent part of the medium. It offered me the ability to situate the viewer within composed audiovisual spaces. As I began to work with CVR two things became apparent: 1) that the screen grammar of CVR is very different to that of conventional film; and 2) that the state of the discussion as to this difference was lacking. While there are plenty of articles concerning the technical aspects of how to shoot in CVR, there is little discussion of why these things do or do not work, and the impact this can have on the kinds of work created for CVR. As such, it was clear to me that any attempt to engage with CVR from a creative perspective must also address some of these core shortcomings in the discussion of the media.

This commentary addresses two research questions:

1. What are the aesthetic considerations that must be accounted for by practitioners using 360˚ video and CVR technologies for audiovisual work and how do these differ from existing media formats?
2. What creative opportunities are afforded the audiovisual composer in CVR?

The first chapter introduces overarching concepts and terminology, and attempts to position Cinematic Virtual Reality within an historical context. In doing so, I discuss how CVR functions both literally and phenomenologically, highlighting and contextualising existing criticisms of CVR, criticisms that I believe can be resolved through a deeper understanding of CVR's screen grammar. Once these foundational points have been addressed, the next two chapters identify what I consider to be the two defining aspects of CVR media, and which are ultimately the central aspects that influence the creation of work aesthetically, thematically, and practically. Chapter 2 – *Frames* – investigates CVR's unique implementation of the mobile frame, that is the ability for the viewer to dynamically change their perspective on a given scene. Chapter 3 – *Spaces* – investigates the unique relationship that the viewer has with the surrounding virtual environment and how this necessarily relates to an understanding of the 'reality' component of CVR. The final chapter addresses the creative potential afforded by CVR. While examples of existing work and creative outcomes by other practitioners form the basis of the discussion in previous chapters, the final chapter discusses my creative portfolio in depth, particularly how the unique aspects of CVR have shaped and articulated creative work that either offer new creative ideas for audiovisual work, or engage with existing creative ideas in a new way by virtue of the media. I discuss how CVR is more than an experiential media but rather a tool for realising a particular relationship of audiovisual materials that can be utilised for very particular creative ends. The portfolio demonstrates that composing in CVR is ultimately a practice of composing with frames and spaces, and that this practice offers new and relevant methods of communication for the composer of contemporary electroacoustic music in an audiovisual context.

It should be noted that, although the topics discussed are presented in chapter form, they are not hierarchical. Rather there is a high degree of relatedness between each topic – for example, it is impossible to explain the concept of CVR without the idea of the mobile frame, and vice versa. What has been collected here I hope is the most economical discussion of these central ideas, but it should be kept in mind that some elements discussed briefly in one section may be expanded on in another, more relevant section. This does not mean that an idea is more or less relevant to any other topic of discussion.

The history of VR is one of cyclical booms and busts, with each bust being brought about by a shortcoming of the technology, which is solved in the period preceding the next boom. The VR boom of the 1990s ultimately failed to manifest into a common media or mode of expression because of the technical limitations of the time. The lack of a wide enough field of view is identified by Jason Jerald as a leading cause for the lack of an effective feeling of presence in the media produced at the time. (Jerald 2016, 27) In current VR

technologies, this issue has been corrected, and other important elements (head tracking, user interaction, frame rate and so on) have been improved dramatically through a concerted period of research over the past decade. However, despite these improvements, VR has not been as widely adopted as the industry had hoped back in 2016. Most recently, after a few years of critically acclaimed activity, the BBC's VR Hub wrapped up its activities in October 2019 (Watson 2019), with their work reportedly attracting "tiny" audiences compared to more traditional content. (Moore 2019) Meanwhile, Google's Pixel 4 and Samsung Galaxy Note 10 phones have removed support for their respective VR platforms from their current iterations, citing a lack of broad consumer or developer adoption for these entry-level VR platforms. (Meyer 2019)

While VR and its respective technologies have yet to become ubiquitous, what is clear is that the barrier to this technology reaching a broad userbase lies not just with the technology itself but with the lack of significant content. In reviewing the existing literature for this PhD, the discussions that were taking place revolved around the mechanics, operations, and technical best practices of the technology both by engineers and computer scientists (e.g. Jerald 2016, Lavalle 2019), and artists and filmmakers (e.g. Anderson, et al. 2016, Huang, et al. 2016). There was little discussion to be found that focused on the work itself and the larger creative languages of the medium. This PhD addresses this absence. The medium is at a point now where these larger creative questions can only be explored through practice led research and, by exploring CVR not as a film maker but from the perspective of an audiovisual artist and composer, different observations can be made, strengthening the discussion around the creative practice available in CVR. I do not know if CVR will grow or recede in popularity, but over the past four years I have come to understand that it offers a completely unique way to create and compose. I believe that the ideas offered by the technology are useful and provocative to the composer. Given the cyclicality of the VR industry, it makes me think that, even if the technology does recede into obscurity, it is almost an inevitability that it will re-emerge again sometime in the future. When it does I hope that this research will go some way towards assisting with some of the core aesthetic and creative concerns those future artists will be grappling with.

This commentary considers CVR as an audiovisual technology. The term audiovisual composition is one that reflects a diverse compositional practice, and as such this commentary cannot pretend to address every facet or idea represented by this term. As such there are some elements of contemporary audiovisual practice that this commentary does not address, discuss, or consider in either the theoretical commentary or the resulting portfolio of compositions.

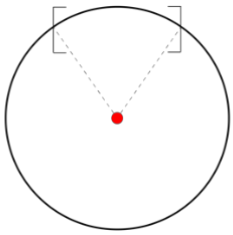
This commentary approaches CVR as a primarily cinematic medium. That is, it is interested in the medium's operation within the field of the moving image (Gaut 2010, 1), one that conceptualises audiovisual composition from the perspective of the history of the moving image as a photographic medium; that of a series of, "images made by exposing certain photosensitive chemicals to light" (Gaut, 2). As such, the kind of

audiovisual composition addressed here is focused on what is captured by a camera in a space, and how filmic conventions and techniques–light, camera position, and so forth–can function or transform the experience of the media when paired with, or arranged for, audio composition. Even in the case of addressing abstract imagery, much of the theorising about CVR comes from this cinematic tradition.

Of course such a perspective is admittedly one aspect of what can be considered an audiovisual compositional practice today. As such, other relevant concepts and practices by contemporary audiovisual composers–approaches that structure work based on ideas of activity, entropy, duration, transformation, texture, synaesthesia, granularity, and articulation, to name but a few–admittedly do not form the basis of the theorisation here. At the same time, while this commentary focuses almost exclusively on the concepts of 'frames' and 'spaces' to build a discussion of CVR, it does not claim that these are the only elements that define or construct a useful audiovisual compositional practice in this medium. Rather, the concepts of 'frame' and 'space' represent the two aspects of greatest interest to me the composer, and occupy the greatest relevance for an analysis of the compositional practice presented in this portfolio.

Some sections of this commentary have been published previously in an earlier form in my book chapter 'Screen grammar for mobile frame media: the audiovisual language of cinematic virtual reality, case studies and analysis' in Sound and Image: Aesthetics and Practices (2020). Throughout the commentary the reader will find references to online usernames as well as traditional academic references. CVR media discussed in this commentary has been collected for viewing here: https://drp.mk/FQdN1sjHcp. The creative portfolio for this commentary is available here: https://drp.mk/QvmxQNF031.

CHAPTER 1: A 360˚ PERSPECTIVE



1.1.1 Cinematic Virtual Reality

Cinematic Virtual Reality (henceforth CVR) is a technology that has emerged from developments in virtual reality. John Vince defines VR as, "a system that uses real-time computer graphics in such a way to make the user believe that they are part of a virtual domain." (Vince 2004, 7). Richard Bartle takes a broader perspective on the subject, instead describing the experience of VR as the experience of a virtual world:

> Virtual worlds are implemented by a computer (or network of computers) that simulates an environment. Some–but not all–the entities in this environment act under the direct control of individual people […] The environment continues to exist and develop internally (at least to some degree) even when there are no people interacting with it; this means it is persistent. (Bartle 2004, 1)

A lot of these ideas are drawn from an experience of VR as a gaming technology (Bartle 2004, 2), however, as a VR technology, CVR differentiates itself from that of a fully interactive environment in both the kinds of media it produces and the language in which these medias express themselves. It follows then that the cinematic element of CVR necessarily shapes the experience in a different way than regular virtual reality or cinema.

In traditional visual media, the representation of the work is bound to a frame of some kind: the edges of the canvas, the borders of the screen, the lens of the camera, and so forth. The composition of the work is focused within the boundaries of this frame, and so regardless of what happens within these boundaries, the frame remains fixed. We can use the term 'fixed frame' to refer to media that occupies itself with the construction of work within these boundaries. While fixed frame media has been the dominant media type for much of the history of visual art, VR technologies have opened up the possibilities of activating the frame as a variable. VR technologies engage with the frame as one part of a wider space and acknowledge that if the image in the frame exists then it must belong to some sort of wider context. The mobility of the frame is a central, defining characteristic of VR and as such, I propose the term 'mobile frame' as a term in which to differentiate such media from those created with a grammar shaped and articulated by a fixed frame. Necessarily, a mobile frame dramatically changes the perspective offered to the viewer from that of fixed frame media, eschewing any editorialising of view point and instead anchoring perspective within that of a physical reality with clearly drawn and familiar relationships to the surrounding environment.

CVR can be differentiated from more conventional notions of VR through its foundation in a fundamental cinematic experience. VR refers to a completely computer constructed world, allowing the subject to navigate a 3D space and interact with that world according to physical properties encoded by the designer. As Ivan Sutherland outlined in 1965:

> The ultimate display would, of course, be a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal. With appropriate programming such a display could literally be the Wonderland into which Alice walked. (Sutherland 2009)

CVR allows for the same mobility of frame that VR does, however, it is limited to the position of the camera rig itself. CVR is filmed with a panoramic camera system so as to generate an equi-rectangular video file. (Anderson 2016, 6). The equi-rectangular video can then be mapped to a sphere to recreate the proportions of the original scene. By placing a digital camera in the middle of this sphere, a particular perspective of the video is visible. As such, CVR does not allow for the same mobility that VR does, resulting in a clear dialogue between technology, creator and subject that is not present in VR, that of the role of camera positioning. While proponents of VR are often quick to highlight this as a shortcoming of the CVR, in reality it is a deeply cinematic question, one that fixed frame media has explored and refined over the history of the past 100 years, and one which CVR, as a new media, is in the process of exploring and addressing. This chapter is about that exploration, and seeks to try to define some key aspects of this evolving screen grammar for mobile frame media through the observation of the works in this field created thus far.

1.1.2 Reality

The idea of reality underpins every aspect of CVR. In contrast to fixed frame media, whose inspiration is drawn from the relationship of the viewer to the window or canvas, mobile frame media draws its inspiration from the spatial relationships between the viewer and their surrounding environment. As such, while it is beyond the scope of this commentary to discuss the nature of reality itself, we should first consider what reality means within the context of mobile frame media and more broadly VR environments. Perroud, Régnier, Kemeny and Mérienne (2019, 239) posit five different possible meanings of the term reality in the context of VR drawn from *Le Traité de la Réalité Virtuelle* by Philippe Fuchs and Guillaume Moreau:

1. Realistic looking: Very detailed shaders and materials, hard work on lights in the scene and other artistic tricks.
2. Realistic construction of the virtual world: what's implemented is based on scientifically proved models (gravity, dynamics, etc…)
3. Physiologic realism: the inputs received by the body are the same as those it would receive in a real situation, even if overall it seems odd to the observer.
4. Psychological realism: what's implemented seems realistic to the observer, even if it is, in fact, over or under powered (walking speed, field of view, etc…)
5. Presence: even if the scene is only made of non-textured polygons, the maximum the presence the better.

These five points cover a range of possible responses to a virtual reality. However, not all of these elements are necessarily relevant at the same time, or for every mobile frame media experience. A deeper discussion of space and its relationship to a convincing experience of reality in film and CVR is undertaken in Chapter 3, but for now, Fuchs and Moreau's points provide us with an understanding of how realism is assessed by the viewer in a VR context.

1.1.2 Perception

VR relies upon a seamless interaction between the subject and the technology. When VR technologies project stimuli that surrounds and matches the users' expectations, an immersive experience can take place and the subject experience 'presence' – the internal psychological and physiological state whereby the subject has a sense of existing in a physical space even when physically located in a different location. Generally, the more effective the VR system is at stimulating the subjects' senses in a realistic and expected way, the more immersive the experience can be and the greater the potential for the subject to feel present in the virtualised world. However, when the mechanics of this stimuli are visible the illusion of a virtual reality is disrupted, immersion is limited or lost, and any feeling of presence is lost. (Jerald 2016, 46)

This relationship broadly holds true but is substantially different in the case of CVR. While CVR similarly relies on a hidden technology to convince us of the reality of the space we are seeing, there is generally less of a focus on the direct involvement of the subject in the scene and more of a focus on allowing a scene to play out around the viewer. One of the main component illusions for creating a sense of reality in VR is that of a stable spatial place, that is that the stimuli presented to the subject needs to feel and behave as though originating from real world objects in a three-dimensional space. (Jerald 2016, 47-49) Cutting and Vishton propose that the space around the subject can be segmented into three circular and egocentric regions that crossfade into one another:

1. Personal space. The zone immediately surrounding the observer's head, generally within arm's reach and slightly beyond. Typically, others are allowed to enter it only in situations of some intimacy or in situations of public necessity. Generally, within two metres.
2. Action space. The circular region just beyond personal space, a sphere of public action, within which we can move quickly within, talk to others, throw a projectile or undertake another, similar, interaction. Generally, between two and thirty metres.
3. Vista space. The space beyond this thirty-metre zone, where there is little immediate control, and perceptual cues are fairly consistent and lack depth. (Cutting & Vishton 1995, 19-20)

It is interesting then to note that the experience of personal space ends at a distance of around two-metres, which just so happens to be a key point for CVR. In most 360˚ camera rigs, moving closer than two metres

results in a distortion of the image. Moving an object or person closer to the rig requires more cameras spaced closer together to ensure an accurate representation of the image. (Anderson 2016, 24) While there are compositing tricks that can be done to work around this, most 360˚ camera rigs available to the amateur and semi-professional film maker do not allow for variations in their rig, often utilising simple rigs of two cameras. While this makes the technology cheaper and more available, it has resulted in a large amount of output that eschews action taking place within the personal space of the camera (and by extension the viewer), resulting in a widely recognisable feeling of distance from the subject. While there are cases where distance benefits the material, as discussed below, generally speaking this distance can benefit CVR. Unlike a VR environment where the viewer has a degree of agency and interaction in which to respond to actions within their personal space (they can interact or move away from an intrusion, for example), CVR plants the viewer in a fixed space. Intrusion into personal space directly involves the viewer, however, unlike VR they are unable to make any response to this other than turning their backs on the intrusion. The result, in my opinion, is something akin to locked-in syndrome, where the viewer is aware but ultimately paralysed, something potentially distressing, again creating a highly unnatural situation and ultimately reinforcing the presence of technology in mediating the experience.

This role of the viewer as an observer of the scene is, in many ways, the cinematic component of CVR, and in keeping with the cinematic action of watching a moving image projected onto a canvas. It is this combination of observation, immersivity, and presence that defines CVR as a unique media, foregoing VR's focus on embodying the subject in a space but immersing them in a space or place just the same. *Führerstandsmitfahrt U44 in 360° // DSW21*[1] demonstrates this perfectly. The video is a 25-minute real-time recording of the Westfalenhütte to Marten tram route, in Dortmund Germany from the perspective of the driver's cab. Across this journey we see the sights and sounds of the city from the familiar perspective of public transport, looking out the window as the city passes by. While the experience is passive, it is ultimately the same kind of passivity as the lived experience of being driven by public transport, arguably helping create immersivity by placing the subject in a situation that we know through lived experience is naturally lacking in agency. Meanwhile the technological screen is unbroken, allowing the viewer to experience the sights and sounds of a foreign city without a clear disjoint between perspective and technology.

While intrusion into personal space can often be undesirable, it can nonetheless be effective if the mechanisms of the technology are readily addressed as a part of the immersive experience. That is, if the medium of CVR is not trying to convince the viewer of a space but rather convince them of the documentation of a space. *Scott Base 360 VR Walkthrough* by Anthony Powell is 45-minute real-time documentation of the Scott Antarctic base, designed to help prepare new visitors to the location. The video consists of Powell's

[1] CVR video works referenced in this commentary have been collected into a single playlist [https://drp.mk/FQdN1sjHcp]

walkthrough of the site with the 360˚ camera attacked to a selfie-stick in a single unedited take. The technology of the video is clearly visible throughout, however, this broken illusion reinforces the reality of the spaces presented. The stunning external landscapes of Antarctica are quickly replaced with familiar clean but utilitarian, cramped work spaces and corridors, largely non-descript but immediately familiar. As Powell walks around the site the sounds and lighting of the field change accordingly, the functions of various rooms narrated constantly. What we have here is not an immersive site per se, but rather an immersive documentation brought about through CVR. Viewer agency and intrusion into personal space is less problematic here because it is not an intrusion into a virtualised reality, rather we are clearly watching the documentation of Powell's intrusion into the cameras personal space as a product of his navigation of the surrounding environment. This reinforces the truthful expression of physical space, added greater weight through the inside-look nature of the documentation itself, creating an equally immersive experience.

1.1.3 Immersivity

In the previous section the word 'immersive' and its derivatives was used in a fairly broad way, and it is worth discussing this further as it is a central and problematic aspect of VR and CVR technologies. One fundamental idea of immersivity is that of the viewer entering a total 'flow state'[2] to the exclusion external stimuli. In artistic contexts it can often be used to refer to the idea of being subsumed in a created space of material, such as Antonin Artaud's 'Theatre of Cruelty', and echoed in countless projects since. It should be clear that the terms immersivity and flow are not necessarily the same. While being placed within a state of total material immersion this does not necessarily result in a 'flow state' or the exclusion of the outside world. The impact that being placed within a world of material depends on a wide range of factors, from the materials themselves, the way they are communicated, and the mentality of the viewer. As such, it is easy to see why immersivity has become a go to descriptor for VR technologies, since they necessarily situate the viewer at the centre of the material. However, this situation is no guarantee of an 'immersive' experience in and of itself.

In 'Flow', Mihaly Csikszentmihalyi discusses the conditions under which a flow state can occur. Focusing on activities is an ideal entry to flow state – in that they mostly facilitate concentration and involvement in a task as distinct as possible from the background reality in which they are set. Csikszentmihalyi identifies four classes of activities or games that can be associated with flow state, as previously defined by French psychological anthropologist Roger Caillois:

[2] Mihaly Csikszentmihalyi defines flow as "The holistic sensation that people feel when they act with total involvement" (Csikszentmihalyi 1975, 36) and notes that "In the flow state, action follows upon action according to an internal logic that seems to need no conscious intervention by the actor." (Csikszentmihalyi 1975, 36)

1. Agon: Games that have competition as their main feature
2. Alea: Games of chance
3. Ilinx: Activities that alter consciousness or perception
4. Mimicry: Activities in which alternative realities are realised (Csikszentmihalyi 1990, 72)

In discussing flow state in relation to these kinds of activities it is clear how VR technologies can create a sense of flow when interacted with in a video game context. After all, video games can be based in one or all of these activities and some component parts of VR potentially allow a greater element of personification with a given activity. It is somewhat more difficult to discuss CVR in this context however, since rather than being an active participant in a virtual world, a key element to the game, the viewer is significantly more passive.

Nonetheless, the games of ilinx and mimicry can still find clear embodiment in CVR, albeit in a different manner to VR technologies more broadly. Chapter 2 – *Frames* – discusses the many different elements relating to the viewer and their manipulation of the mobile frame that affect the unique experience of CVR. Mimicry is every bit as possible either through the viewer acting as a character in themselves or, more commonly, the viewer occupying an omniscient perspective on the surrounding activity, no less involved with the scene itself and actively engaged by the world around them. Similarly, we discuss examples that rely on presenting alternative experiences of the world, with videos that, in adopting a mobile frame, seek to provide an alternative mode of perception through CVR, a perceptive practice that does not fit conventional experience. Arguably, although not discussed in depth in this commentary, both Agon and Alea activities are able to be experienced should they be incorporated fully into the scene and the viewer is able to associate with the activities they are being led to experience. In Chapter 2 I discuss the implications of the mobile frame across a number of examples, all of which can affect the experience of a flow state.

Csikszentmihalyi expands the concepts of games or activities out more broadly to cultures in general. In defining cultures as prescribing norms, evolving goals, and building beliefs to tackle the challenges of existence, he is able to use games as an analogy to wider cultural forces:

> It is in this respect that games provide a compelling analogy to cultures. Both consist of more or less arbitrary goals and rules that allow people to become involved in a process and act with a minimum of doubts and distractions. The difference is mainly one of scale. (Csikszentmihalyi 1990, 81)

He also identifies two conditions which make flow difficult to experience culturally: Anomie – a lack of societal rules – and alienation – a condition in which people are constrained by their culture so as to act against their interests (Csikszentmihalyi 1990, 86). Chapter 3 – *Spaces* – addresses this broader

environmental concern. While VR video game environments may be able to reward or punish viewer activities directly through a core game mechanic, and thereby inform the cultural forces in the space the viewer occupies, I propose that CVR bases much of this potential to enter a flow state as being drawn from the surrounding environment, and being informed by the presentation of space. In particular, the idea of a coherent environment, one that has both understandable rules so as to form a coherent experience is used to construct the idea of alternative modes of reality potentially on offer for a CVR experience.

For the most part, this commentary agrees with the idea posited by Jerald that an effective CVR experience occurs when the viewer is able to enter into an immersive state and therein experience presence. Conversely, when frames and spaces are handled in such a way as to discourage an immersive state, this results in a lesser experience of presence. There are, however, two tensions that I would like to highlight. The first is of the highly personal experience of immersion and the individual's own varying degree of ability (consciously or subconsciously) to be receptive to such a state. This issue persists beyond technological elements. Even when following all the rules of best practice to immersive a viewer, the viewer may just not be receptive to entering into such a state. This issue goes for all experiences of art and music, not only VR technologies. Given the role that immersivity plays in a VR experience however, this tension must be acknowledged.

The second issue with this idea of immersion is one of degree. Immersivity does not necessarily exist as a binary experience, rather it is possible to drift between different states of immersivity. For example, Brown and Cairnes identify three different states of immersivity with relation to video games – a state of engagement, which follows to a state of engrossment, which proceeds to a state of total immersion, a state of, "being cut off from reality and detachment to such an extent that the game was all that mattered." (Brown and Cairnes 2004, 1298-1299) While this study does not necessarily map directly onto an experience of CVR, most definitions present immersion as an experience that is pursued, with an experience fluctuating between being more or less immersive rather than being a fixed binary of being or not being immersive.

As such, it is my view that discussions of immersivity in CVR contexts are best handled as something to aspire to, that the effectiveness of a CVR experience can be assessed by the degree to which it encourages or discourages an immersive state from a conceptual point of view, that the media itself always strives for immersivity as a potentiality, and is not a guaranteed outcome. That it is possible, and important, for CVR to communicate in an effective manner, and that doing so, while rooted in ideas of immersivity, is not necessarily an immersive state in and of itself. In the chapters that follow I outline technical and aesthetic approaches and ideas evidenced in CVR with regards to frames and spaces, and, with examples from other creatives, highlight situations where different approaches are more or less effective, with an eye towards their ability to encourage or discourage an immersive experience. These ideas are then explored through the creative portfolio, where they are applied to the practice of audiovisual composition.

1.2 Critical response to CVR

CVR is a topic of discussion amongst many in the film and video industry, with some inspired by this new technology, whilst others decry CVR as a fad. In Radu B. Rusu's opinion piece for Venture Beat (Rusu 2015), he describes several problems with CVR reflective of the wider state of debate. The first three of his five points as to why CVR is a 'fad' (these being: 1) poor quality; 2) the average consumer is priced out; 3) it is taxing on devices from a CPU and bandwidth perspective) are being gradually addressed with the refinement of the technology and the adaptation to the demands of the media by wider industry. His last two points, however, are perhaps the most telling of the biggest problems those working with traditional fixed frame media have with CVR: 4) it asks too much of its audience; and 5) it removes the artistry from filmmaking.

While I could address these points individually, the more important observation to make is that these views are from an individual whose understanding of expressing themselves through film is constructed from contemporary film language. This is reflective of a wider creative community who, frustrated by the more passive and theatrical nature of CVR, decry the media as having no value, instead of attempting to understand and appreciate the different value offered. The tools of traditional film language – framing, lighting, editing, juxtaposition – are all absent in CVR, or at the very least must be utilised in a drastically different way.

Based on my work with CVR, it seems to me that CVR most effectively communicates space and place. Where figures and objects are present in the field of view, the viewer is naturally inclined to assess these with respect to their relationship to the environment and position in our field of view. By comparison, while traditional cinema can certainly approximate space and place, the function of the technology itself is less naturally inclined to lend itself to a seemingly neutral appraisal of space. Film techniques of framing, shooting, and editing video seem to direct the medium towards actively shaping the viewer's perspective, and more forcefully leading them towards a deliberate perspective.[3] By giving the viewer agency over how the material is viewed, CVR affords them the potential to govern their own perspective, allowing them to focus, ignore, or miss entirely, visual and audio cues presented to them.

As such, conventional language of film and video is not available to the creator of CVR, and it is logical that this might lead to frustration (Neafus 2014, 13-15). It is not possible to focus specifically on a single object without capturing the entire surroundings, and so more care must be taken to stage and position the movement and action on-screen in a sensible and comprehendible way. Techniques such as far, mid and

[3] There are of course examples of cinema that, I would say, have similar conceptual preoccupations to that of 360° video. Michael Snow's *Wavelength* (1967) is perhaps the most notable. In focusing the viewer's attention on a single, static space for 45 minutes, and slowly adjusting the frame and the interaction of characters within it, Snow establishes the space itself as the primary focal point of the film.

close-up shots are not possible, and editing is difficult since quick cuts between angles or scenes can result in immediate disorientation and/or motion sickness for the viewer. Editing conventions, such as the 180° rule[4], are problematic when working in 360°, which explains why directors and editors who favour quick cuts to convey mood and theme may find CVR unsatisfying. Changing shots transports the viewer to a completely different location, and they must spend time reorientating themselves before they can correctly process and understand the scene before them. As such, the spirit of the 180° rule still exists – that is, an editing convention that helps correctly orientate the viewer to the action is still necessary, but the manner in which this takes form in editing video is now materially different.

In his discussion of New American Cinema, Ken Kelman categorises film of the mid-20th century as undesirably passive:

> [Old American Cinema] is sluggish, its reflexes are gone. It removes experience, making us see things along with (or through) a protagonist with whom we identify, and a plot in which we are caught. Such an approach tends toward not only a lack of viewpoint, of definition of whose experience it is, but also filters the power of sight into mere habit, and dissolves insight into a mere vicariousness. The spectator is reduced to a voyeur. (Kelman 1964, 24-25)

While this assessment is used to support work by experimental filmmakers such as Stan Brakhage and Gregory Markopoulos, it highlights the rationale for Kelman's call for a, "fresh perception of the physical world around us." (Kelman 1964) More than fifty years later, CVR is arguably a media with which to address these criticisms, highlighting the audience's view of the physical world as integral to the media itself, and tying the viewer's perspective to the experience of the media itself. In this way, CVR reinforces the experience as belonging to the viewer, separating the responsibility of creating an audiovisual space from that of navigating and experiencing this space in a meaningful way.

This commentary recognises that the existing screen grammar for fixed frame media is insufficient when discussing CVR and that too many studies discuss the language of CVR from the perspective of fixed frame media rather than building an understanding that reflects the unique characteristics of CVR. The next two chapters discuss what I consider to be the two fundamental aspects of CVR unique to the medium as compared to fixed frame media: 1) the ability to alter the perspective of the viewer dynamically; and 2) the relationship between the viewer and their surrounding world. Through observing existing works, different approaches are considered and assessed with regards to these elements of CVR. Following this, I discuss my

[4] The 180˚ rule is built upon the concept of 'planarity' (Murch 1995, 17-20) and discussed in relation to this idea in a subsequent interview (Hullfish 2020).

portfolio where I relate the works I've created back to these key concerns and address how the media has shaped an artistic practice that can engage creatively with the screen grammar of CVR.

1.3.1 Historical approaches to VR presentation

> Form is henceforth divorced from matter. In fact, matter as a visible object is of no great use any longer, except as the mould on which form is shaped. Give us a few negatives of a thing worth seeing, taken from different points of view, and that is all we want of it.
>
> Oliver Wendell Holmes, The Stereoscope and the Stereograph (1859)

This commentary posits that CVR exhibits two distinctive characteristics which drive the medium as a communicative tool: the mobile frame and the innate relationship of the viewer to a sense of environment or space. These two features, and their function as part of my wider audiovisual composition portfolio, are discussed in depth in subsequent chapters. However, it is worthwhile to discuss these characteristics with respect to wider visual art history, specifically with regards to developments in VR-like technologies over time and how these characteristics have been present or absent prior to the emergence of technologies that the discussion present in this thesis is based on.

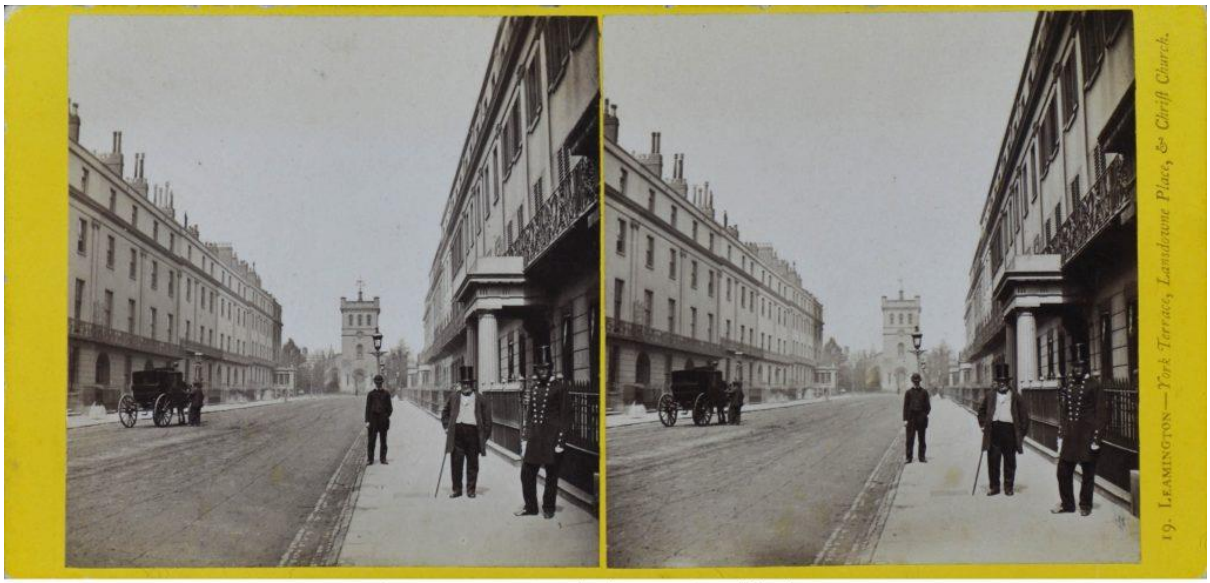
We can consider two different kinds of presentation modes in VR technologies: user-fixed displays, to which the VR headset owes its lineage, and world-fixed displays, which focuses on the creation of audiovisual environments in which an audience can be situated. The former is an intensely personal experience, isolating the viewer from the outside world in order to place them within a virtual space in pursuit of greater immersion. The latter is potentially more inclusive, opening up the possibilities of a shared experience for an audience greater than one, but with potential sacrifices to immersion or greater costs of production.

1.3.2 User-Fixed Displays

One of the earliest starting points for user-fixed display VR technology was the development of stereo photography in the 19th century. The development of stereo photography by Sir Charles Wheatstone began in 1832 and engaged a headset to take two slightly different images of an object and present it to each eye, creating the impression of depth within a still image (Plunkett 2013, 389-390). The two prominent enthusiasts for the technology at the time, David Brewster and Oliver Wendell Holmes, would both contribute technical innovations to the concept. Brewster's Stereoscope exhibited at the 1851 World Fair gained favourable attention from Queen Victoria and Prince Albert which helped popularise the technology, while Wendell Holmes' own, cheaper design rose to market dominance in 1860 (Butler 2007, 17). These early developments in stereoscopy utilise the same technological idea for the creation of a perceptible 3D image in VR today,

highlighting the spatial elements of an object (see Figure 1). In an article from The London Journal in 1860, the experience of Brewster's stereoscope is characterised as:

> While living forms appear to stand out in all the roundness of life, statues, in like manner, are almost realised again in their minute representations; every image in landscapes is given, formed again in apparently the most perfect solidity and truth of distance, and architectural piles are seen in all that exactness of proportion and gradation of distance which, in their minute reproduction, is singularly interesting. (The London Journal 1860, 664)



Leamington - Upper Parade by Francis Bedford ca. 1860

Figure 1: Stereoscopic Image of Leamington, Upper Parade by Francis Bedford ca. 1860 (Wilkinson 2017)

What we find in this early development is the first instance of an experience of space tied directly to the viewer's individual perspective. In utilising the stereoscope, the viewer effectively replaces their visual experience of the real world with that of the image provided by the technology, and essential to this is the sense of being positioned within that virtual relationship to an environment.

While a virtual sensation of being in another, unreal space can be traced quite far back, the mobilisation of the frame only really started to come about in the 1960s. Expanding on Morton Heilig's Telesphere Mask, the first head-mounted display akin to today's VR headsets, the Headsight introduced motion tracking to the headset experience. Developed by the Philco Corporation, the design allowed the viewer to control the perspective of a remote camera, with the camera tracking the viewer's head movements and allowing them to look around the environment in a naturalistic manner (Virtual Reality Society 2017). This development set the standard for what a User-Fixed Display would entail for the 20th century. Here, the viewer's mediation of a virtual environment, either through a camera or computer-generated environment, is tied inexorably with

that of the viewer; creating a 1:1 relationship in scale and perception between the virtual world and the real world that it is standing in for. This establishes the mobile frame as a defining characteristic of the User-Fixed Display and introduces a field of possibilities, and at the same time a degree of exclusivity. When the viewer is facing forward at 0˚ they will necessarily be unable to see any events occurring behind them at 180˚, and the act of redirecting their focus will require the same amount of energy to do so as in the real world. The full effect of this mobile frame, and its effect on the visual expressivity of the medium, is discussed in depth in Chapter 2.

1.3.3 World-Fixed Displays

> Motion pictures have been described as like looking at something through a keyhole. You see what is straight ahead, you hear what is straight ahead.
>
> This Is Cinemara (1952)

The alternative consideration for the construction of a virtualised reality is, rather than mapping the perspective of the viewer through a virtualised headset display, instead to change the environment around the viewer such that their physical reality is altered in some way so as to achieve a similar goal of immersion, presence, and flow in the viewer's experience. The desire to provide a space that immerses the viewer in an image by occupying their entire field of vision has early origins in the panoramas and murals of the 19th Century. As described by Shelly Jarenski:

> Panoramas' reliance on illusion and virtual reality results in a constructed imaginary, and it is in this space that viewers feel "taken in." Immersion, the feeling of being "taken in," provides both the pleasure of spectatorial power and the trauma of spectatorial disempowerment. (Jarenski 2015, 81)

As photographic means took over from painting as the most common means of depicting panoramic scenes in the early 1900s, a multitude of image projection systems were developed. Charles A. Close projected images over a 360˚ surface via his Electronic Cyclorama at the 1893 World's Fair, followed in 1901 by the Lumiére brother's circular still image projection system the Photorama. Raoul Grimoin-Sanson's Cinéorama produced the first 360˚ projection for moving images at the 1900 World Exposition in Paris, utilising ten 70mm video projectors to cover every surface of the circular screen, capturing the perspective from inside the basket of a rising hot air balloon (see Figure 2). The utilisation of sculptural elements was also of interest, with the top of the screen masked by hot air balloon material and the base with wicker basket material (Uricchio 2011, 229-230). These early experiments demonstrate some of the first attempts to use video projection to create a world-fixed display environment that approximated a spherical (or at least circular) perspective, the process of capturing such a view having a clear parallel to CVR. The development of this space in turn shows an early attempt to create a visual experience that mobilised the viewer's perspective,

allowing them to look around the 360˚ space freely, while also engaging with a realistic portrayal of space, that of the accurate perspective of the scene from the position of the hot air balloon basket (see Figure 2).

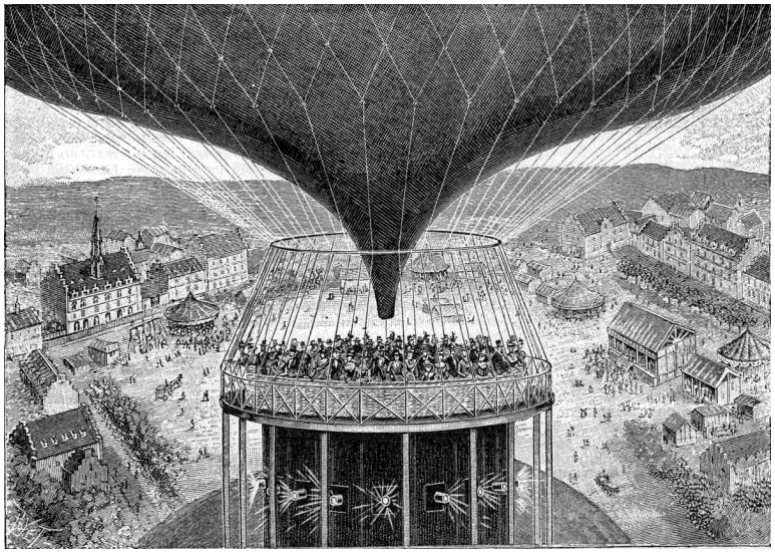


Figure 2. Illustration of the Cinéorama balloon simulation at the 1900 Paris Exposition. (Poyet 1900)

This approach to immersion through scale was adopted for the moving image through widescreen technologies in the 1950s, primarily the development of Cinerama (1952) in America. The Cinerama system was developed by Fred Walker to create an effective illusion of three-dimensionality dependant on the presence of peripheral vision. The Cinerama system utilised three interlocking projectors, allowing for the creation of a single unbroken image with an angle of view of 146˚ x 50˚ (approximating the angle of view of human vision of 165˚ x 55˚). The system utilised a 7-track tape playback system to envelop the viewer (Krukones 2010, 285).

The parallels between Cinerama with CVR are interesting. Like CVR, Cinerama was initially configured to communicate space and capture the panorama. Close ups were not originally possible and as such, the editing language of Cinerama differed from conventional film. From the outset of Cinerama, the viewer's attention was drawn to the role of the frame. The first Cinerama film, *This Is Cinerama* (1952), began with a prologue by actor Lowell Thomas presented in the conventional, small 4:3 aspect ratio. After talking about the history of cinema he concludes the story with "Ladies and Gentlemen … This is Cinerama", at which point curtains retracted to transform the small cinema projection screen into the wider, larger, peripheral gaze-engaging Cinerama screen (Krukones 2010, 286). This theatrical device demonstrates the difference between conventional cinema and Cinerama, while the first was focused in presenting action on the canvas, Cinerama sought to place the viewer within the canvas through complete occupation of vision.

This Is Cinerama is a series of vignettes. The film alternates between active and first-person perspectives including: the front of a moving roller coaster; the underside of a helicopter flying across Niagara Falls; the seat of a gondola navigating the canals of Venice; static panoramas and footage of the temple dance from Verdi's *Aida* captured at the Teatro alla Scala; and footage of the Edinburgh Military Tattoo. It is noteworthy that the kinds of footage that made up Cinerama films is reminiscent of much of the footage captured and released over the past five years by CVR film makers. That is, recordings designed to place the viewer at the centre of the action, allowing them to be a participant in the scene or to let their eye wander around the setting and gain a real sense of perspective and place. While frame was not truly mobile, it was certainly more mobile than traditional cinema of the time. More importantly, Cinerama taps into a sense of perspective that, while present in documentary film of the period, allows for a more direct engagement with a sense of space and place.

Other widescreen projection systems were developed from the idea of Cinerama including Cinemiracle (1958) and the Russian rival Kinopanorama (1959); single projector formats such as CinemaScope, VistaVision, and Todd-AO; as well as several new 360˚ screen developments, including the German Cinetarium (1958) system - a precursor to contemporary dome projection technologies, and Disney's Circlevision (1955) - a 360˚ projection system using nine projectors to fill a circular screen that was installed at Disneyland and Disney World's Epcot Centre (Belton 2004, 284). More recently, the 21st century has seen a rise in dome screen technology, a technology established in the mid-20th century, and now more widely available:

> The dome envelops the audience in a way that no flat screen, no matter how large, can achieve even in stereoscopic 3-D […] the best dome films and animations make full use of the huge canvas offered by the dome interior. They deploy multiple viewing points that locate action to the sides or directly above the viewer, and take advantage of the height at the apex of the dome. This sensation of height, distance and scale is essential to the dome experience and perhaps its most unique feature. (Lambert & Phillips 2012, 1)

Most importantly, the full-dome format represents a transition to a projection format that embraces a more complete spherical experience, occupying not just the walls around the viewer but the roof and skybox as well, a clear continuous exploration of creating a world-fixed display approach to immerse the viewer.

1.3.4 Approaches to CVR presentation in this portfolio

As demonstrated above, historically there are a number of technological and conceptual approaches as how best to present VR and CVR work. For many practitioners, the medium of transmission is an important factor in the creation of a work, shaping the materials, structure and artistic language of a CVR work based on

whether it is to be presented for headset, projection, online mobile frame navigation, or another method of presentation. This commentary and the accompanying portfolio offer an alternative perspective. The central conceit under which this PhD portfolio was created posits that the significance of CVR is not located in the method of its consumption or transmission. Rather, the significant aspect of CVR is that in composing an audiovisual work the artist is necessarily composing a collected state of possibilities.

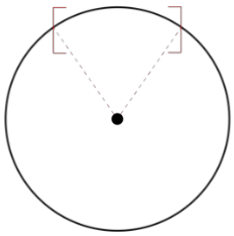
This awareness in thinking about these materials came about through working with ambisonic audio, both as a method for musical spatialisation and for creating meaningful 3D audio to pair with my CVR work. In the case of ambisonic audio, the ambisonic encoding is only a container for the spatialised audio, which is then realised to the audience through some sort of decoding process (either by taking multichannel higher order ambisonic audio files and decoding them to a speaker array, or a binaural headphone environment). While an ambisonic audio file might have an 'optimum' way of being heard, it can nevertheless be decoded to a number of different listening environments, each of which has repercussions for the audience experience.

For the duration of this project, working with CVR felt like a very similar process to working with ambisonics. In capturing video, I was recording footage in an equi-rectangular format, a format that has no significance outside of its ability to function as a container to be decoded to a viewing experience. CVR's function as a surround video format then came to be a point of fascination. Much of this portfolio explores the exhibition of CVR, not as a visual technology designed for a single method of consumption but as a container able to be distributed in various different ways. As such, the portfolio of works is not firmly adoptive of any one of these established historical approaches to VR, but rather, each piece has adopted ideas from both user-fixed and world-fixed displays in transmitting the audiovisual compositions to an audience. In some cases, these decisions were the result of wanting to engage directly with the resulting aesthetic of a particular approach to decoding this audiovisual material. In other cases, these decisions were the result of technical limitations of a particular opportunity for exhibition. As such, while the works are discussed in terms of the decisions that went into the process of audiovisual composition, each unique decoding signifies, to me, one possibility of many ways to realise the source material of each work. As such, I would posit that one of CVR's most interesting elements is the way it lends itself to there being no 'right' way to experience a work; rather that the process of decoding a work presents another layer of decision making, one which opens up iterative possibilities of broadcasting that are otherwise rarely encountered in film.

While this chapter has discussed CVR both conceptually and technically, outlining many of the specific factors that comprise a CVR experience, the next two chapters investigate the core elements that result from the media of CVR itself. These two elements are unique to CVR through the mechanisms of the media itself, and in my view, it is these two elements that must be focused on if we are to come to an effective understanding of the screen grammar of CVR and the creation of audiovisual content that is significant to this media.

Chapter 2 discusses the role that the frame plays in CVR, specifically the effect that mobilising the frame has in facilitating the navigation around a space, or at least, the potential to do so. This mobile frame, and its significance in both articulating visual perspective and audio feedback, is a defining feature of CVR, and so a detailed discussion of the various elements of the media this impacts on is necessary. Chapter 3 discusses the spatial element of CVR and its role in building up an understanding of space and reality. In this chapter I propose that audiovisual CVR compositions are uniquely positioned to address ideas of documentation, reality, and representation as a result of the media's situating of the viewer within a field of potential perspectives.

CHAPTER 2: FRAMES



2.1.1 The Frame

Central to a discussion of moving image media is a discussion of the frame. The importance of the frame to cinema is articulated by Michel Chion in Audio-Vision:

> "The Image" = The Frame
>
> Why in the cinema do we speak of "the image" in the singular/when a film has thousands of them (only several hundred if it's shots we're counting, but these too are ceaselessly changing)? The reason is that even if there were millions, there would still be only one container for them, the frame. What "the image" designates in the cinema is not content but container: the frame … it nevertheless remains perceivable and present for the spectator as the visible, rectangular, delimited place of the projection. The frame thus affirms itself as a pre-existing container, which was there before the images came on and which can remain after the images disappear (Chion 1994, 66-67)

The frame is the essential element around which conventions of presenting moving image material has been built upon. Aside from shaping narrative, camera, and editing conventions the frame also offers concepts such as elements being 'on' or 'off'- screen, and facilitates techniques such as montage and transition. The language of sound in the moving image is also shaped by the function of the frame. Chion distinguishes between onscreen, offscreen, and nondiegetic sound, as well as more complicated sound relationships such as ambient, internal and on-the-air sounds (Chion 1994, 74-77), all conceptualisations of which are given form and function by the frame. Indeed, later in Audio-Vision Chion claims "A film with no image, or at least without a visual frame for projection, is not a film" (Chion 1994, 143) further highlighting the importance of the frame to define visual media.

The most noticeable distinguishing characteristic between conventional motion image media and CVR is that the frame as conventionally experienced is no longer bounded by the camera. Instead it is mobile and freely manipulated by the viewer. It is the consequence of this mobility of frame that this chapter will explore, and which I posit is one of the main distinguishing elements of CVR. As such, throughout the rest of this commentary I will use the term 'fixed frame media' to refer to work characterised by the construction of media within a frame, and the term 'mobile frame media' for work characterised by a frame that is not fixed. While mobile frame media may refer to VR and CVR technologies, it may also refer to media that is created in a World-Fixed Display for example, where the mobility of the viewer is in effect generative of a mobile frame experience.

A mobile frame experience represents a significant change in visual and audiovisual language from that of fixed frame media. This chapter will discuss the impact of a mobile frame perspective on viewer attention, camera function (including height, movement, and editing) and audiovisual relationships.

2.2.1 Viewer Attention

While the function of space and sound to create an effectively immersive experience can be addressed separately, they often act as mutually affective forces to guide the viewer's interaction with CVR. One important part of CVR where both elements combine is in the effective direction of viewer attention. Kath Dooley has discussed the implications of CVR's viewer attention mechanic, explaining that:

> Whereas a filmmaker working with traditional screen media contained within a rectangular frame can use close-ups and edit points to draw attention to certain actions or objects, the active VR viewer has a much larger field of vision to explore. The 360-degree video environment allows the viewer a great amount of freedom […] (Dooley 2017, 168-169)

This freedom opens up potential problematic elements however. The audience can choose to ignore or simply miss the action the filmmaker is attempting to direct their attention towards (Dooley 2017). As a way of counteracting this effect, Anderson suggests that the action of a shot should take place within a 150˚ space in front of the viewer. This is based on a field of view of 90˚, with an extra 30˚ of space made visible through head turns (Anderson 2016, 39). Action that takes place outside of this 150˚ field of view requires some degree of contortion by the viewer which at best makes for an uncomfortable experience and, at worst, can result in the viewer either losing attention or becoming unsure as to which direction they are supposed to be looking.

Through observation it appears that in watching a work of CVR, there are four possible outcomes with respect to directing the viewer's attention during a CVR experience:

1. The viewer's attention is effectively directed to the desired focus point.
2. The viewer's attention is lost or misplaced, leading to them to miss the subject or points of action.
3. The viewer's attention is split between two equal points of focus in exclusionary positions in the field, leading to the viewer being unsure in which direction to look.
4. The direction of the viewer's attention is not an essential element to the audiovisual work.

To explore these four states, we can examine three different CVR music videos – Gorillaz's *Saturnz Barz (Spirit House)* (2017), Muse's *Revolt* (2016), and Björk's *stonemilker* (2015). Gorrilaz's *Saturnz Barz (Spirit House)*

[henceforth *Spirit House*] is filled with well-executed and intuitive viewer direction. The pacing of action within, and cuts between, scenes is established early on and remains consistent throughout, such that the viewer quickly develops an understanding of the expected rate of change they should be experiencing throughout the video. When a perspective lacks action for a period the viewer is given a subtle hint to move their head in another direction through lighting or some sort of minor action or activity. The decision to do so is immediately rewarded by the presence of a new subject interaction. As such, at points of ambiguity, the viewer is clearly empowered, and subtly directed, to find the desired perspective in a manner that feels free and intuitive. Most importantly, all of the action guiding viewer attention takes place within the action space of the viewer, maximising viewer engagement.

We can compare this experience of viewer direction to the behaviour exhibited in Muse's 360˚ music video *Revolt*. The viewer witnesses the action ostensibly from the perspective of a drone flying around a clearly staged and stylised clash between a civilian rebellion and authoritarian stormtroopers. Issues arises where there are potentially a large number of elements on screen to look at, and no clear visual line to follow. For example, the video begins with a military convoy converging on an empty lot, with government vehicles approaching and passing by the viewer-drone as it flies through the convoy in the opposite direction. As the viewer flies over the scene, the impulse is to turn around and watch the convoy pass by as this is clearly a point of interest and there is little of note on the horizon in the direction in which the drone is heading. However, doing so, positions the viewer facing away from the subject of the next shot as, when the scene changes, the viewer now has their back to the band performing live, requiring a further 180˚ turn once they realise the point of interest is behind them. In this way, there is a lack of perspectival continuity between shots.

At some points this is a mere annoyance, but at others it results in the viewer potentially missing important plot points. In one case (at 1m46s) the viewer's perspective cuts from being surrounded by figures to a distant shot of the conflict, seemingly giving the viewer a respite from the intensity of being within the riot. However, immediately after this cut, an important plot point of revolutionaries being arrested takes place almost directly below the viewer at a distance (in the vista space or at least beyond the viewer's action space). Some attempt is made to orient the viewer through the use of sound design, adding audible glitch sounds to accompany changes in the viewer/drone's Heads Up Display, drawing the viewer's attention to the action. However, these cues are reliant on the viewer facing in the general direction of these events for them to be effective. If the viewer was facing away from the action, as they would be if they were turned towards the aggressors in the previous scene, they might start hunting for the source of the sound and visual markers rather than engaging with the scene unfolding in front of them.

The end result of this poor inter-scene construction is that the viewer is disoriented and does not feel meaningfully engaged with the action in the space around them. Instead of intuitively navigating the virtual world to follow the action in a meaningful way, they are instead constantly forced to engage with the technology to reorient their perspective to try to find the more desirable perspective. Much of the action appears to have been created with an eye towards interesting spaces in which to inhabit – the 360˚ views of riots and drones both near and far, are all engaging spaces in their own right. The problem is that these scenes do not communicate between one another as a coherent entity. The way in which the video is edited appears to encourage the viewer to look freely around in some scenes, but then constructs others such that they can only convey meaningful information when the viewer happens to be looking in a particular direction and at a particular angle. This perceptual dissonance ultimately reminds the viewer of the virtual world they are inhabiting.

One possible solution to this concern with viewer attention is to create an experience that does not rely on guiding the viewer's perspective. Björk's video for *stonemilker* effectively creates such a space. Set on the Icelandic beach where Björk wrote the lyrics for the song, the video takes places across two key scenes on this beach, the first on an empty stretch of desolate beach, the second amongst the rocks in a lightly more detailed environment. Both scenes focus on Björk slowly working her way around the camera, singing to the viewer, and always occupying the viewer's action space. As scenes progress, multiple instances of Björk appear and occupy different points of the field. In many cases there may not be an easy way to take in all of Björk's action, forcing the viewer to focus on one particular instance of the singer at any given point in time. However, the actions themselves are fairly non-descript, consisting of Björk singing, dancing or moving in way that feel unconnected to her multiple instances.

In *stonemilker*, Björk becomes a part of the field, and the significance of the space becomes less about the action taking place within it than of the viewer being situated in a space significant to the song's creation. Indeed, the original VR mix of the track takes the string arrangement and situates each of the 30 instruments in a tight circle around the viewer, steadfastly placing the viewer in the middle of a spatial experience (Björk 2015) – but a spatial experience that has no directional queue, rather orienting the musical components as objects in the field, crafting a sonic character for the space. As such, while there are elements for the viewer to focus on, viewer attention is not a key element of narrative comprehension. This approach is in many ways contrary to the conventions of fixed media, but highlights the unique characteristic of CVR – its ability to convey and communicate space accurately.

2.3.1 Camera Height

While cinematic virtual reality replaces the fixed frame canvas with a technological mediation of the viewer's perspective, the relationship of the viewer inside the scene itself remains determined by the cinematographer. The height of the camera speaks directly to a viewer's sense of immersivity in a particular scene, and plays an important function in implying a relationship with the viewer in a scene. There are four relationships between the viewer and the scene that are determined by camera placement that are utilised throughout the majority of CVR: 1) ground-level; 2) waist-level; 3) eye-level; and 4) elevated. These relationships exhibit some similarities to the screen grammar of their fixed frame counterparts of varying low and high-angle shots, however, their utilisation in a mobile frame context and the ensuing relationship with the wider spatial context of a scene can result in a very different outcome.

The ground level camera placement, as the title suggests, sees the camera placed on, or as close as possible to, the ground. This means that a majority of the scene plays out in the hemisphere above the viewer's eye-line, causing a very direct movement of the frame upwards to take in their surroundings meaningfully. This positioning is similar to the worms-eye shot in fixed frame media, where the camera is positioned low to the ground, with the skybox dominating the frame. In fixed frame media, this placement makes all objects look big compared to the viewer, creating a sense of vulnerability. In a mobile frame context, it is worth reconsidering this assumption.

The use of ground level camera placement can be seen in the example of Grae Burton's *Creep*. A Lynch-inspired exploration of homelessness and isolation, *Creep* exists as both a fixed frame short film and as an almost three-times longer CVR experience. There are a multitude of differences between the two versions of the film, most notably a completely different construction of mise en scène. We can take for example the hospital scene. In both cases this scene depicts a confusing interaction between our protagonist Cate and a male nurse in a hospital waiting room. In the case of the fixed frame version of the film, there are two camera angles used; the first a downward angled close-up of Cate from over the shoulder of the nurse, and the second an upwardly angled close up of the nurse's emotionless face from over Cate head. The framing is conventional; the scene is constructed to indicate clearly that Cate is the less powerful actor here, while the sharp jumps in shot between phrases of dialogue reflect her fractured psyche and the unstable nature of the exchange.

In the version for CVR however, the scene is shot quite differently. Here, the entire scene plays out in real-time, with the scene lasting three times longer than the original, and without any movement of the camera. The camera is placed on the floor, just underneath a bench sitting opposite the characters. The viewer must angle their perspective upwards to see the exchange between Cate and the nurse. However, from this

perspective the scene plays out in a far more naturalistic way, and the poeticism of the angled camera work in the fixed frame version is lost. While it can still be argued there is a reinforced power dynamic at play through the staging of the characters, to have one sitting and one standing, the overall impression of this scene is not the same as that of the fixed frame realisation. The scene itself plays out in a far more naturalistic manner, but the use of a mobile frame perspective at this camera height has a unique effect on the action. By using a perspective that is so unnaturally close to the ground the viewer is reminded of the mechanisms of the technology itself, that they are viewing the scene not as a person in the waiting room or as a tiny human in the world of the giants, but through a (hidden) camera recording the scene. This camera placement makes no sense in any lived experience of perspective, and thus a ground level camera placement creates a feel of viewing the scene covertly.

In discussing the idea of waist level, eye-level, and elevated camera placement we need first clarify what this is in relation to. As previously discussed, CVR creates an immersive experience providing a digital analogue of a navigable environment. However, what feels comfortable for a given viewer might depend greatly on their own lived experience of perspective. It is my observation that a camera placed at a height of 5'4" (1.65m) will feel like a normal perspective for someone who is of that height, while a viewer who is 6'1" (1.85m) would find this perspective more unnatural, and vice versa. It is an experience that might draw some parallels to the experience of listening to binaural audio recorded by someone with a different sized head – you might well be able to get a sense of the spatial audio but the degree to which the interaural time differences (ITDs) differ from the original due to the unique shape of the listener's head, the more distorted the spatial representation will be. It is outside the scope of this chapter to explore this phenomenon in detail, suffice to say that when discussing these camera placements, I am doing so quite generally – a waist-level camera placement occupies a space roughly halfway between the ground and the eye-line of the average adult, something we could reasonably recognise as waist height. An eye-level camera placement occupies the eye-line of an average adult, and an elevated camera placement is a space above the eye-line of an average adult that realistically can be thought of to no longer be linked to a physical perspective.

In fixed frame media, a low-angle shot, pointing upwards at the subject usually serves to minimise the surroundings, presenting the subject as more prominent or intimidating. An eye-level shot on the other hand "approximates the angle at which we meet and interact with people, so the viewer tends not to notice its use." (Phillips 1999, 102-103) A high-angle shot, or 'God's-eye shot', pointing downwards at the subject, makes the subject look smaller and by association, implies vulnerability (Dick 2005, 52). One of the key factors in this construction of screen grammar is the relationship that a particular angle creates between the subject and the environment. A low-angle creates a sense of dominance because the subject occupies more of the frame, and therefore, more of the environment. Similarly, a high-angle shot frames the environment in a way that dominates the subject. In the case of mobile frame media, the placement of the camera in either waist

level, eye-level, or elevated position does not affect the composition of the frame in the same way. For example, by placing the camera at waist height, the environment is made to appear bigger and more dominant in relationship to other figures in the scene.

We can take the example of *The Gate*, a short film produced by VR production company HIDDEN and directed by Adam Donald, Brian Gonzalez (Taxiplasm), and Vanessa Walters. *The Gate* is a dynamically staged contemporary dance piece that, "finds us at the center of a collection of squandering figures, each suddenly caught by a magnetism above and below their bodies as the ground rumbles, pushing and pulling them into chaos until an ethereal voice lures them." (HIDDEN 2018) The camera is encircled by dancers who are in turn encircled by lights which punctuate the gestures of the dance. *The Gate* begins with dancers in a kneeling position, positioning them at eye-level to the camera when bent, signifying that the viewer is in a similarly subjugated position. As the figures are pushed and pulled by an unseen force, the coordination with lighting changes reinforces the environmental nature of this manipulation, that standing figures are only doing so through the whims of an outside force, and the viewer is constantly reminded of the status quo through the placement of the camera at waist height. At 2m36s, the "trio of ghostly Guardians" (HIDDEN 2018) arrive to open a celestial gateway. With the gateway opened, the Guardians disappear. It should be acknowledged that the positioning of the Guardians within the scene is far more indebted to that of a fixed frame screen grammar, with their costumes and placement carefully constructed to have them looming over and dominating the viewer in a conventional manner. As the subjects rise and enter the gateway, the camera shifts from a waist level placement to an eye-level placement. At eye-level, the environment is framed as less oppressive, more neutral, reflecting the ascension of the subjects. As they walk towards the gateway to seeming salvation, accompanied by peaceful ethereal music, the viewer's placement at eye level reinforces the shift if dynamic that has taken place.

While the combination of these positions in *The Gate* clearly reflects the thematic development of the work, many examples of cinematic VR seem to opt for an eye-level camera position out of a desire for neutrality. In adopting a position approximating a perspective of that of a typical adult there is no distortion in perspective for the viewer and the representation of space is the most equivalent to that experienced by physically being there. To this end, non-narrative works that seek to represent a space in an unbiased manner utilise eye-level camera placement to good effect. *Sights & Sounds of a Coffee Plantation* by Shivakumar Lakshminarayana is a one-minute field recording of a space in a coffee plantation accompanied by audio from the site itself. The camera is positioned at eye-level, presenting the space as is, with realistic proportions as though the viewer were standing in the space, listening to the environment.

So far, I have not discussed the effect that having the viewer occupy the point of view (POV) of a character in a scene can play in CVR. While occupying a characters POV (generally) requires eye-level camera position,

the net experience of this is not too dissimilar to that of a POV shot used in fixed frame media. For example, Christina Heller's *FIRST PERSON | 360˚ Virtual Reality | Episode 1* is one instalment in an episodic series that casts the viewer as a protagonist of the scene. The result is not too dissimilar to the sort of interaction one could reasonably expect from the same scene shot in a fixed frame media with the added detail of being able to more fully look around the scene and comprehend the space in which it is set. Most interestingly, while the overall language of the scene is not noticeably different to that of its fixed frame counterpart, it cannot be denied that there is a greater sense of cognitive dissonance at work here, since the additional agency of a directly embodied perspective is not met with a similar agency of interaction. Rather than watching a POV depiction of a character and their thoughts, the viewer embodies a character, but is then instructed on the thoughts in a scene. This in turn reinforces the technological construction of the media, and in extreme cases can result in a less immersive experience.

Positioning the camera above eye-level divorces the viewer from a sense of a lived experience, and, similar to a ground level camera position, emphasises the technological mediation of the scene – that we are viewing the scene through the lens of a camera. An elevated camera placement can be used to provide a better perspective of the environment when the activity of a subject is less important, or when other positions might be too crowded. An interesting comparison can be made between two recordings of orchestral performance. *360: Behind the scenes: Gothenburg Symphony*, places the camera just in front of the conductor and at eye-level to the string section. In this position, we have a sense of being surrounded by activity, and as such, it becomes very difficult to decide where to look. While we can see the first row of performers in great detail, we see less the further back the performers are sat, due to the distance, resolution, or blocking. The overall experience is very cramped and confusing, and navigating the scene becomes a distracting rather than immersive experience.

We can compare this to a recorded performance by the Rotary Youth Symphony Orchestra at the Franciscan Concert Hall in Villingen-Schwenningen. The video, titled *Brahms Sinfonie Nr. 2:1 – Allegro non troppo*, opts for an elevated camera position. From this position the perspective is unnaturally raised above the audience but occupies the eye-line of the conductor. The orchestra occupies a core 135˚ of our perspective, meaning that our attention is clearly directed to the front of the stage. The camera is placed high above the ground, and when directing the frame downwards we are clearly not embodying a position that can be occupied by a human body. At this height, not only are we afforded a clearer view of the orchestra, but by being elevated above the audience we are able to get a far better perspective of the hall itself, with the full size and structure of the space clearly visible, unencumbered by objects or bodies. The result creates a clearer understanding of the geography of the scene and of the environment in which it is set. Due to the reduced sense of occupying a human space, the shot again feels unreal, and through a clear mediation of technology again feels as similar to some sort of surveillance apparatus. However, unlike the ground level camera placements

sensation of secretive surveillance, an elevated camera position feels more public, and in that way an elevated camera placement feels more natural. While a high-angle camera shot in fixed frame media contrasts the subject with the environment, making the subject appear smaller, in using an elevated camera position the emotional connection to this perspective is lessened through the interaction with the media. Instead, the viewer is able to gain a clear impression of the surrounding scene, particularly when there are multiple elements of a scene to which attention can be directed.

2.3.2 Camera movement and editing

The language of audiovisual media has largely been constructed from a history of development in fixed frame media. This in turn means that a bulk of this audiovisual language naturally relates to communicating and representing a single point of view. A.L. Rees states:

> Narrative cinema is the archetype of point of view at work in film. The classical tropes or figures of film narrative – varied distance from the camera, cutting at an angle for reverse field matching, not crossing the line – aim to preserve and locate the viewer's stability across dissolves, edits and jumpcuts. (Rees 2011, 8)

In fixed frame media, the movement of the scene across the frame dynamically activates the space the creative is seeking to represent. As described by Ewin Panofsky in 'Style and Medium in the Motion Pictures':

> In a theatre, space is static, that is, the space represented on the stage, as well as the spatial relation of the beholder of the spectacle, is unalterably fixed. … With the movies the situation is reversed. Here, too, the spectator occupies a fixed seat, but only physically, not as the subject of an aesthetic experience. Aesthetically, he is in permanent motion as his eye identifies itself with the lens of the camera, which permanently shifts in distance and direction, And, as movable as the spectator is, as movable is, for the same reason, the space presented to him. Not only bodies move in space, but space itself does, approaching, receding, turning, dissolving and recrystallizing as it appears through the controlled locomotion and focusing of the camera and through the cutting and editing of the various shots. (Panofsky 1934, 18-19)

In the case of mobile frame media, many of these core elements are unavailable to the creative practitioner, either made redundant, made problematic, or handed over to the viewer themselves. Any discussion of an emerging film grammar for CVR must necessarily address how this language fundamentally differs and address the changing role for camera movement and editing in representing a VR space.

Fixed frame media has a long tradition of creative camera movements to lead the viewer and create understanding via editing methods. Moving shots can supply a greater amount of detail and cover a greater amount of area, while also allowing the camera to explore a location in real-time or facilitate the observation

of a subject from multiple perspectives. Camera movement can also directly involve the viewer in a scene, rather than relegating them to being a neutral observer (Dick 2005, 54-56). However, camera movement is often a more troublesome issue in CVR. These range from the technical (the need for lengthy and expensive post-production solutions to remove rigging and dollies) to the practical (the tendency for camera movement to quickly generate motion sickness). When dolly shots are used in CVR they are often minimal, allowing for a gradual change in perspective. However, there remains something fundamentally unnatural about a shifting perspective of a scene that the viewer is not in charge of navigating. For example, Adam Cosco's *Knives* exhibits many different tracking shots across the duration of the production, from the opening, where the camera appears as if tied to the back of a car while being chased by the film's protagonist, to a long dolly shot at 4m27s, circling the subjects in the garage so as to change perspective for the action in the scene. Problematically, this implied on-rails movement ultimately reinforces the powerlessness of the viewer. In such instances, rather than being navigators of a scene, the entire interaction of the viewer is in fact framed by the decisions of another, thereby highlighting the mechanics of the virtual experience.

This can be contrasted to the lack of camera movement in Hugo Keijzer's *The Invisible Man*. Here, a game of Russian roulette plays out from a fixed camera position at eye-level with the protagonists. The scene plays out in real time, without visible edits, creating a singular, unbroken experience. The scene is carefully constructed to allow the action to play out in a way that does not appear to accommodate the viewer specifically, but where no other camera position immediately presents itself as more desirable. In this way, the viewer's choice, were they to be given one, would likely be to situate themselves exactly where they are. As such, the mechanism of the VR experience remains hidden, and the viewer is free to invest themselves in the action of the film within the virtual construction of a real space.

There are of course ways to move the camera in a way that does not draw attention to the underlying technology. In Janicza Bravo's *Hard World for Small Things*, the camera occupies the back seat of a car, inherently tying the movement of the camera to the experience of the subjects of the film. In this way, the viewer's experience is rooted to that of the protagonists they are seeing interact with the world, and the movement of the camera is in turn tied to the mechanics of the real world.

Similarly, it is not uncommon for creators of CVR to utilise a more freehand camera movement, whereby the camera is placed on the end of a stick that allows the holder to vary and move the camera as desired dynamically. As a necessary by-product of this, the holder is necessarily a part of the scene, and because of the presence of the camera operator in the scene, the camera necessarily becomes an extension of their own perspective – a sort of personal periscope, dynamically manipulating the perspective but in a way that is clearly tied to the subject in a scene. Anthony Powell's *Scott Base 360 VR Walkthrough* is a good example of this, where the viewer's perspective of the base is inherently tied to Powell's manipulation of the camera.

The appeal to this is self-evident, the stick provides a degree of mobility that monopods do not allow, enabling the camera to be active dynamically in a scene. However, there are problems. Firstly, motion sickness can set in far more immediately than with more artificial and controlled camera movements. Secondly, use of a freehand camera perspective only makes sense when incorporated into a scene where the subject acknowledges the technology. Powell's use of freehand camera speaks to a wider technological mediation that we are already familiar with, and which acknowledges the presence of the technology as an element of the video.

Of course, it is not necessarily realistic to fix the viewer in a single space for the duration of an experience. When the viewer is 'relocated' to another space, the effect is similar to that of a change in scene in a theatrical production. To rework Panofsky's summary of space in a theatrical context, in mobile frame media, a shift in scene see the represented space on the stage change and the spatial relation of the beholder of the spectacle reset to a new unalterably fixed location. As such this shift operates best when taking place at natural junctions. *Policing Flint*, a documentary exploring how austerity has affected law enforcement in Flint Michigan, effectively packages one key take away from each scene, from the run down, near empty police briefing room, to police patrols of dark, cold, empty streets, to officers preparing and transporting weapons from evidence to disposal. Each scene offers a new perspective on the situation facing Flint, taking place against a constant backdrop of visibly decaying infrastructure, closed shops, and empty streets. In this case, the perspective of each scene is given time to play out, with the visible interactions between subjects and the environments they occupy allowed to develop before moving to another scene. In his way, each edit is itself a scene, which allows for the experience created to be fleshed out so that multiple, significant, and memorable representative spaces contribute to a total impression of the setting and the problems faced by Flint law enforcement.

While editing is one of the central techniques for communication in fixed frame media, edits on a smaller time scale become far more problematic in mobile frame media. We can consider Eisenstein's thoughts on the role of editing:

> The film-frame can never be an inflexible letter of the alphabet, but must always remain a multiple meaning ideogram. And it can be read only in juxtaposition, just as an ideogram acquires its specific significance, meaning, and even pronunciation (occasionally in diametric opposition to one another) only when combined with a separately indicated reading or tiny meaning – an indicator for the exact reading – placed alongside the basic hieroglyph. (Eisenstein 1977, 65-66)

As such, fixed frame media relies upon the juxtaposition of shots to evoke and construct meaning and affect its audience. While it is tempting to edit 360˚ video in a similar manner to regular digital video, in reality,

editing full spatial scenes has the effect of merely juxtaposing spaces, not shots that construct the impression of a space. With each change in space requiring time for the viewer to adjust to the change and orient themselves accordingly, rapid changes in space can have the effect of disorienting the viewer, of making no perspective feel stable enough to ground their experience of a particular space or place. Perhaps for this reason, I have not yet found a useful example of what Eisenstein would call a montage in CVR. My own work, *infinitely gentle, infinitely suffering* does utilise relatively fast crossfades between different spaces which approximates such an effect, however, the utilisation of this technique in this case was not to represent spaces accurately, or to juxtapose them as per common editing conventions, but rather to use multiple recordings of space concurrently to create an entirely new, artificial environmental experience. Yet again the application of fixed media idea to a mobile frame environment results in a significantly different outcome.

2.4.1 Audiovisual relationships

This interaction of the mobile frame ties the audiovisual experience to that of direct perception by the viewer. While much of this chapter has detailed how conventional audiovisual language, inherited from fixed frame media, is ineffective in a mobile frame context, conventional ways of pairing sight and sound similarly start to function differently. While sounds connection to space will be discussed more in Chapter 3, it is worth considering the implications of the mobile frame has on audiovisual relationships.

The first point that can be noted is that the mobile frame creates a spatial experience of sound tied to the perspective of the viewer. The mobile frame opens up the potential for spatial audio formats such as ambisonics or Dolby Atmos such that the audible scene can be dynamically decoded to match the perspective of the viewer. By comparison, fixed frame media often relies upon a fixed perspective of audio. While cinema may utilise a stereo, 5.1, or 7.2 speaker configuration for audio playback, the construction of sound is always created within the perspective of the frame. As such, for motion image media, the mobile frame results in a drastically different set of relationships by which to construct an audiovisual interaction. The construction of audio in mobile frame media is not so much on a direct relationship between a frame and a sonic outcome, as it is about constructing an environment of sonic potentials that can be dynamically responsive to changes in the viewer's perspective. This idea of composing for space is one that forms the basis of Chapter 3. However, in this section it is worth considering the unique implications of the mobile frame in constructing an audiovisual relationship. In doing so, it becomes clear that conventional ideas of the audiovisual relationship derived from fixed frame formats are insufficient to conceive of an effective CVR practice. Instead, I propose that it is more relevant instead to focus on other forms of sonic arts practice that are more suited for a mobile frame perspective of audio.

The practice of spatial music itself is one that has become fundamental to contemporary music practice in the 20th and 21st century. It is unnecessary to delve deeply into the specifics of particular practices, however, as Emma-Kate Matthews points out:

> Spatial music reminds the listening audience that they are implicit in the act of listening. The audience are occupying the space and they are occupying the sound. They are not mere passive receivers as might be the typical role of the listener in the conventional experience of going to a concert, where the action takes place frontally and on a dedicated platform, or the stage, at a dimensional and social distance from the audience. (Matthews 2019, 299)

A sonic experience of CVR is inherently spatial. The viewer is placed within a space and occupies the sound world. The mobile frame of CVR becomes the functional tool through which the viewer is able to navigate their surroundings and the degree to which this dynamic change in sound environment feels real or authentic determines the effectiveness of the VR illusion as discussed in Chapter 1.

Pockets of Space (2018) is a CVR collaboration between video collective OpenEndedGroup (Marc Downie and Paul Kaiser) and composer Natasha Barrett, whose soundwork increasingly incorporates ambisonic audio. The film matches interactive binaural sound with immersive imagery comprising of up to 30,000 separately controlled points generated in real-time. An installation version of the work comprises 3D ambisonic sound presented over a 64-channel loudspeaker hemisphere, accompanied by 3D video projection (OpenEndedGroup, 2018). The seemingly abstract visual material is all derived from movement to or away from a 3D image of a tree, a frequent visual material for OpenEndedGroup. Barrett's compositional process in turn was focused on the three-dimensional movement of this visual material into a field of sound:

> And so, I had to start […] a decomposition process from an abstract point of view, and then find out how we would then coalesce into something that might have some visual symbolic reference or actually is a connection through systems and how things move, how they behave, how they perturb in a three-dimensional world that makes sense in both sound and in visual media. So, then that coming together, that has many levels and as we can see in the work there's some very tight synchronisation of actual events and dynamics. But there are other kinds of synchronisation that is more to do with behaviour and taking behavioural systems that connect to real world phenomena rather than actually connecting to, let's say, real world visual symbols that we understand. (IRCAM 2018)

The focus here in building an audiovisual relationship is therefore in creating a soundfield that reflects the behaviours and phenomena of the visual materials. The role of ambisonics in this approach is to give the sound a feeling of dimensionality. As noted by Seth Colter Walls, in experiencing *Pockets of Space* live in a VR experience, the viewer can choose where to gaze in the 3D space, and the audio is synchronised accordingly

to head movements. More importantly, Barrett uses ambisonic audio to give the audiovisual relationship a greater sense of tangibility:

> It places the listener, Ms Barrett said, "more 'into' the space of the sound," instead of being merely sandwiched between left and right channels […] Adding the full dimensionality of the sound is that last phase of making it beautiful, making it real. It's all about being there, and about getting closer to our perceptual limitation […] And space is a very important part of that." (Walls 2019)

The use of audio in this way is designed to replicate the experience of listening on a large multichannel speaker system, of having a physical sound space that the viewer can feel surrounding them. Pierre Alexandre Tremblay's *Bucolic & Broken* (2018) utilises ambisonic audio alongside cinematic 7.1 and acousmatic loudspeaker approaches to mixing musical materials. An anxious love song to the north of England, reflecting on the bucolic beauty of the landscape alongside the broken echoes of a once prosperous industrial past. Ambisonic audio recordings of real spaces, of birds in trees, of locals walking their dogs, of children playing on park equipment, are fused with real and abstracted sound images; the sound of a pencil scribbling on paper and the sound of a kettle boiling are mixed with modular synthesis clicks and bleeps, sometimes echoing real world phenomena, sometimes hanging in the air as an auditory allusion to the sunlight through trees or the slow peeling of paint from a wall in an abandoned property. The ambisonic audio here presents a backdrop, a familiar lived auditory space, while the sound objects focus the viewer's attention, creating a sense of a close-up on a particular scene, of an environmental detail being brought into focus. As Tremblay states:

> Whereas the precision of point-sources of the classic cinema setup is used to allow full-range, articulated protagonists to dialogue, the more mobile and diffuse sound of the TOA [Third Order Ambisonics] is used to give breadth to these elements, as well as auditory context and fluidity. (Martin 2020)

In this way, *Bucolic & Broken* demonstrates how different kinds of audio can be paired with ambisonic audio to help add detail and depth. In this case, point-source sounds create a framed auditory image, a zoomed-in detail, against a backdrop of environmental space. This combination of spatial materials represents a fusion of spatial approaches, a hybrid approach to sound practice that furthers the construction of spatial music and which, as I demonstrate in my creative portfolio, highlights an approach that can be used to create a meaningful audiovisual interaction in CVR.

In considering an audiovisual language between that of spatial audio and the new spatial video format that CVR represents, one important point of reference is that of expanded cinema and its 20th century precursors. Artists working in this field,

> […] expanded their work outside the rectangular film frame and beyond traditional screens, using multiple cinematic projections far surpassing anything previously attempted. They covered rooms and domes and planetariums with abstract imagery, creating sophisticated illusions and combining cinema with other art forms to create a greater experience. (Keefer 2008, 1)

As a part of this practice, expanded cinema relocates the moving image from the frame to the environment, or dynamically involves the viewer in the experience and relationship to the moving image. This expansion of the moving image from outside the limits of the frame demonstrates a similar spatial element as CVR, and the open or installation nature of many works of live cinema demonstrate a structural engagement with the 'mobile frame' (in this case a viewer in a projection space) that underpins the core functionality of their work.

Lis Rhodes *Light Music* (1975) a foundational work of expanded cinema in which two projectors project differing images onto either side of the exhibition space. The projected images of flickering abstract black and white lines are accompanied by thick digital shards of sound. Rhodes describes her intentions as such:

> What I wanted to do was a very different framing of cinema as it were where actually it is the audience that engage with the film rather than being outside of it. The other thing that is very critical to it is the actual spacing of the screens, the two screens. It was in a sense an opposition to commercial cinema where the screen is very dominant and the audience sits. (Tate Modern)

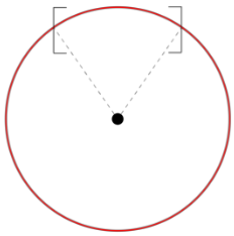
While the imagery itself is still located inside a frame of projection, the presence of two opposing frames mobilises the viewer's perspective and the experience of the work in exhibition becomes that of a mobile frame experience, and the viewer must navigate the space in a self-derived, yet meaningful way. The audio itself is tied to the environment, with audio generated from the fluctuations of the image, as well as the sound of the projection equipment creating an emergent and spatial environmental soundscape fit to the experience of the moving image.

To look at a more recent example of an audiovisual work that utilises a mobile frame, we can consider Ryoji Ikeda's *data.tron* (2007-11) audiovisual exhibition. Like much of Ikeda's work the piece focuses on the visualisation of data. In the advanced iteration of the work however, the flickering black and white imagery is placed on a huge three-dimensional canvas measuring 18m x 13.5m x30 m. The audience stands within the projection, immersed in data and the clicks, beeps and noise bursts of Ikeda's music, matched to changes and developments in the data visualisations (Ikeda 2010). The viewers stand or sit within the work itself, their perspective mobilised by being surrounded but the image, the frame removed through the scale of the work.

There are many more examples that could be listed in terms of CVR's non-cinematic approaches to work that address and utilise the idea of the mobile frame. However, the examples cited demonstrate a cross-section

of ideas that can be drawn upon in considering useful approaches to the audiovisual language of the mobile frame for CVR. That these questions are addressed by practices that are either separate to, or critical of, cinematic tradition, I believe, demonstrates that CVR is not a technology that benefits from a traditionally cinematic approach or analysis. Rather, throughout this commentary I have engaged with the mobile frame through concepts and ideas of non-CVR creatives, and through my creative portfolio demonstrate how these components can be integrated in a coherent aesthetic practice.

CHAPTER 3: SPACES



The second distinctive element of CVR is the medium's innate representation of physical space. This representation of physical space is tied to the viewer's impression that the experience is representative of a particular reality. However, this chapter will posit that there are several different kinds of reality that CVR can engage with as a factor of its representation of environmental space. Whether representative or abstract the viewer is necessarily placed in a location and surrounded by a field of visual possibilities. This represents a significant departure from the audiovisual language that has conventionally been constructed for fixed frame media. This chapter will examine the relationship between virtual space and audio in a mobile frame context, and highlight other areas of thought in musical practice that may help to inform how audio can effectively function in CVR.

3.1.1 Audible spaces

In 'Audio-Vision: Sound on Screen' Michel Chion poses this question when discussing sound in film:

> What do sounds do when put together with a film image? They dispose themselves in relation to the frame and its content. (Chion 1994, 68)

The relationship between sound and the mobile frame is somewhat different due to the mobile frame not acting as an image in and of itself, rather it is a particular perspective of a larger, freely navigable scene. As such, we could well propose a rewording of this excerpt to fit this new context: 'what do sounds do when put together with a mobile frame perspective? They dispose themselves in relation to the space in which they are set.' Certainly, CVR has an inherent spatial quality as a visual medium, built on a literal positioning of perspective within a space that can only ever be suggested in fixed frame media. As such, the creation of an effectively immersive VR experience relies on the creation of a field of sound that: 1) is reflective of the space in which the perspective is set; and 2) dynamically responds to changes in the viewer's perspective of the space. The first point reflects the creative decision making and selection of audio materials for a scene. These may be obtained through field recordings or created abstractly and separately to the capture of video, and later paired with the video. The second point is more technical, and more a question of implementation than creative decision making.

Ambisonic audio has established itself to be the dominant audio format for CVR, allowing for 3D sound relationships to be created or recorded and encoded to a single multichannel audio file, and then later decoded in response to changes in viewer perspective. Outside of bespoke experiences in concert or exhibition settings, YouTube has supported positional audio for first order ambisonics since April 2016 (Wiggins 2016), while the feature is still promised (at the time of writing) by the alternative video sharing platform Vimeo. As such, while dynamically changing audio feedback is an essential element of CVR, its

generation and implementation are not insignificantly complicated. Stephan and Anna-Irwin Schütze point out that, within a headphone experience, the use of head-related transfer functions (HRTF) to create a binaural experience of a scene that tracks with the viewer's movement can provide depth and locational information for sound in a mix, creating a clear three-dimensional quality of the sound to fit within a virtual space. They stop short of describing how this 3D audio can effectively be used in any given example however. They also discuss the use of setting stereo mixed audio files within a virtual space. When stereo audio files are simply paired with CVR media such that the left and right channels of audio map directly to the left and right output channels, the result is an omni-directional experience that does not place the stereo audio within the reality of the virtual space (Schütze 2018, 251-254).

3.2.1 Kinds of reality

In 'A Philosophy of Cinematic Art', Berys Gaut dismisses the idea that film is a language, claiming that since film is a pictorial medium it necessarily exhibits a 'natural generativity', explained by the fact that we as viewers use the same faculties to perceive an image of an object as we do the object itself (Gaut 2010, 60). With this is mind he presents seven distinct notions of reality that can be applied to cinema, and which I believe serve as a useful foundation for discussing my own proposed CVR reality spaces – documentation, representative reality, abstract reality, and the unreal:

1. Content Realism: The kinds of events, people or objects represented are those that tend occur in the real world. That is, it is what is represented not how it is represented.
2. Illusionism: Gaut identifies two kinds of illusions in cinema that create a sense of reality, cognitive illusion (the sense that the viewer feels present in the film itself) and perceptual illusion (the illusion of the moving image).
3. Photorealism: Where the filmed object is indistinguishable from that of a photograph of the same object.
4. Ontological Realism: Realism born from the fact that a photographed object must have existed in reality for a photograph to be taken of it. This makes traditional film ontologically realistic but digital video possible of expressing objects that are not real.
5. Epistemic Realism. A sense of reality whereby the image provides strong (though defeasible) evidence that the object or event that it apparently depicts really was like that or really happened.
6. Perceptual Realism. That realist images look more like their objects (what they depict) than do non-realist images. This holds in regard to not only the presentation of an object but also with regards to cinematic constructs such as the perspective of the object and the way the object exists in time is edited.
7. Transparency: Or rather, opacity. Gaut counters claims that photographic images let us literally see an object, rather claiming that this is not the case, that 'all pictures are opaque. It follows that both traditional and digital cinematic images are opaque'. Thus, regardless of the reality of the moving image it is not in any way a replacement for the depicted object itself (Gaut 2010, 61-97).

This final point may not be the most helpful for the purposes of drawing definitions between different kinds of spaces in a CVR practice, however, the first six ideas of what constitutes reality in cinema presented by Gaut undeniably feed into our discussion. In particular, the notions of content realism and ontological realism are highly related to a feeling of reality in CVR works. As such, these two points will be the primary foundations by which we will consider the impression of reality in CVR in this chapter, however, I am not discounting the presence of these other points in CVR. Rather, it can be expected that since CVR is a cinematic media form, all of these elements would be factors in varying ways. Nonetheless, in constructing a meaningful framework to discuss the kinds of spaces encountered in CVR and the creative portfolio, ideas of realism will primarily be founded on the notions of content and ontological realism. With this in mind, I propose that these ideas of realism inherently feed into our perception of a CVR space, and the way that materials are utilised ultimately results in different kinds of reality-space relationships within the media.

3.2.2 [CVR] Reality spaces

In assessing the function of space in the context of CVR, I propose four key categories of space relationships. These relationships are founded by thematic relationships previously developed in both film and music theory and history, and explained in detail in the rest of the chapter, however, these relationships take on a new significance or function when implemented in CVR. The four categories are as follows:

1. Documentation: focused on the representation and reflection of space;
2. Representative Reality: engagement with space with regards to distinctive characteristics of a real space;
3. Abstract Reality: engagement with space in a way that is not real but refers to real space;
4. Unreal: focused on the creation of a completely unreal space, not shaped with regards to a sense of reality.

It is worth pointing out that these relationships do not necessarily exhibit firm boundaries, rather, a work of CVR may exhibit traits of multiple space relationships, but overall tend towards or aesthetically place itself within a specific reality. For example, while an animated feature may exhibit aspects of an abstract reality, in that it utilises no photographed ‘real’ elements in it, it may act to build a relationship between materials that seeks to represent reality rather than operate in its own constructed, abstract reality. The defining characteristics of these relationships will now be discussed.

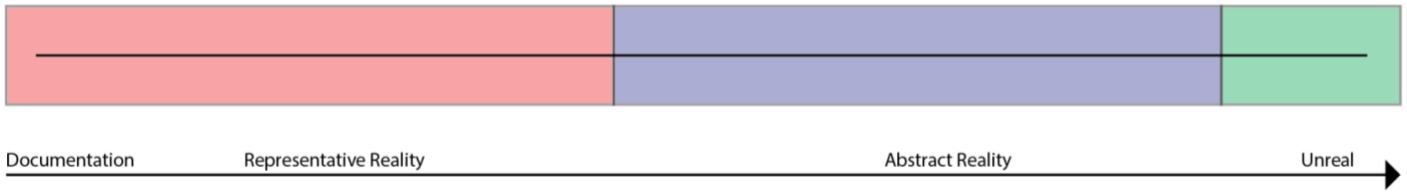


Figure 3: CVR Reality spaces

3.3.1 Reality Space #1: Documentation

In its most literal form, CVR concerns itself with the accurate documentation and representation of real, physical space – the camera accurately documents the environment surrounding it and the actions that take place within it. While fixed frame media may hide the seams of production, allowing sets to be presented as real spaces and the camera to focus on a particular representation of a given subject, achieving the same in mobile frame media is far more difficult by virtue of the very nature of the medium. As such, the most elemental implementation of CVR is to place a 360˚ camera in a space and to record what happens in that space. As Grant and Sloniowski state in their introduction to 'Documenting the Documentary':

> In fiction films, no matter how realistic they may be, some form of "suspension of disbelief" is always operative. By contrast, documentary appeals to us precisely because of its truth claims, whether at the level of fact or image. (Grant & Sloniowski 2014, xxiv)

This intimate connection to the real, physical world in which we live claims a degree of truth, which in turn grants CVR some of the properties associated with documentary film. It is perhaps because of this connection to reality that CVR has been significantly used for journalism. In *Scenes at Place de la République*, BBC journalist Matthew Price walks around one of the main memorials for the victims of the Paris attacks four days after 131 people were killed by Islamic extremists. CVR presents the viewer with an understanding of the size of the memorial and the gathered crowd, creating a literal space in which Price delivers his brief report on the mood in Paris (BBC News 2015).

In 'Representing Reality: Issues and Concepts in Documentary', Bill Nichols identifies several different modes of documentary film making. These modes categorise different approaches to the conceptualisation and representation of reality in documentary film making. The four modes identified by Nichols – expository, observational, interactive, reflexive – are not irrelevant to CVR per se, but rather Nichols discussion raises core issues of documentary language which are relevant equally to fixed frame and mobile frame media reflecting reality. However, what is of interest in discussing CVR's relationship to space is Nichols' discussion of the observational mode of documentary, one that represents a certain style which is an innate element of CVR itself. Observational documentary – embodied in cinematic approaches such as direct cinema and cinéma vérité – stresses the non-intervention by the filmmaker, highlighting that such works are characterised by indirect address, overheard speech rather than direct address, resulting in synchronous speech and audio with long takes of a given scene, exhaustively depicting the everyday. Nichols writes:

> These techniques anchor speech to images of observation that locate dialogue, and sound, in a specific moment and historical space. Each scene, like that of classic narrative fiction, displays a three-dimensional

> fullness and unity in which the observer's location is readily determined. Each shot supports the same overall system of orientation, rather than proposing unrelated or incommensurate spaces. And the space gives every indication of having been carved from the historical world rather than fabricated as a fictional mise en scène. (Nichols 1991, 39)

One excellent example of CVR's ability to document real spaces accurately for both a narrative and documentary purpose is *Send Me Home*. *Send Me Home* documents the story of Rickey Jackson, who was wrongfully imprisoned for murder at age 18 and spent almost four decades in prison before being exonerated and released in 2014. Throughout the documentary we are presented with contrasting spaces, from the close confines of Jackson's death row cell and prison hallways to the wide-open spaces of the home and property where Jackson now raises a family. The emotionally affective visual language of this documentary is constructed through CVR's ability to convey the real experience of these physical spaces.

3.4.1 Reality Space #2: Representative Reality

CVR works that illustrate a representative reality of space separate themselves from documentation in that, while they may utilise aspects of reality, or act to construct some idea of a recognisable impression of a real space, the materials and elements utilised are not necessarily tied to the literal embodied experience of time and place exhibited by documentary CVR. While we may be seeing and hearing a particular space, the materials that contribute to it may be reconstructed, or manipulated in some way so as to create a suitable illusion or representation of place. That is, while the materials may be drawn from an observed reality, distinguishing characteristics may be repurposed for creative goals. A painted landscape may recognisably resemble a real space, but is identifiably different to it in the kind of reality it conjures up in the viewer; in the same way works of CVR directly engage with recognisable elements of a real space but are not bound by a purely documentary approach to the presentation of these spaces. I have identified several key ideas that exist in other artistic practices – landscape, space, place, site, and field – that can help us to construct an idea of how a representation of a space can be thought of, and how materials can be identified as important, and connected to a particular scene.

3.4.2 Representation: Landscape

Since a CVR scene necessarily deals with a panorama of some kind, the idea of the landscape as a system of information organisation is a useful starting point for discussion. We can consider the idea of the landscape as it might relate broadly to the world of CVR. We can start by considering Alex Waterman's definition of landscape:

> We begin by breaking the word into two parts: Land as a defined space, one with boundaries, not necessarily with walls or fences; and scape as an instance, a shape, a collection, an organisation or system. (Waterman 2014)

Tim Ingold defines landscape as separate from environment as:

> The concept of a landscape, by contrast [to environment], puts the emphasis on form, in just the same ways that the concept of the body emphasises the form rather than the function of a living creature. (Ingold 1993, 157)

In the context of a CVR experience these ideas of a landscape works well as a starting point as the notion of a landscape, of an experience being located within a space that is defined by key features or organised systems. Of key importance is the notion of boundaries, of limits that define the form of the scene rather than identifiable aspects within it.

Simon Emmerson uses the idea of a landscape as largest macro-perspective for the frame of reference a listener brings to a work, identifying the landscape as the space of potentiality where our sound universe exists, bounded by the 'acoustic horizon'. From this landscape, the listener then identifies subsequent, more focused frames of interest – the arena, the stage and the event, each a subset of the last (Emmerson 2007, 97-98). Landscape and arena frames are grouped and labelled as 'Field' frames, defined by Emmerson as, "any activity not localisable to the performer as a source and which gives us a picture of what goes on around the instrument to establish a sense of wider location." (Emmerson 2007, 94) While Emmerson's conception of musical interaction is perhaps easiest to see in the interaction between acoustic and electronic elements in concert music, the metaphor of the landscape and its subsequent divisions of perception is of particular interest in creating a representational sense of reality in CVR. Emmerson's model outlines an interplay between different elements in a uniquely spatial way, with different elements of focus acting to create a larger holistic impression on the listener, an idea that can be applied to both audio and visual components.

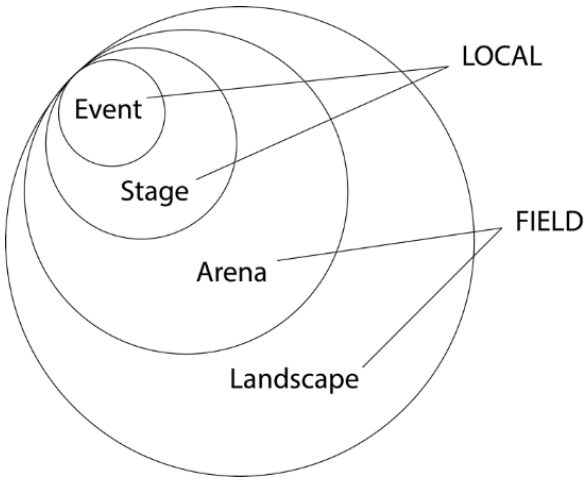


Figure 4: Emmerson's local and field frames (Emmerson 2007, 98)

Here we can consider the event to be the action occurring in CVR. The action is contextualised by its immediate environment. For example, in *Becoming Iron Woman* (Minal 2018), an unnamed young woman discusses her experience requiring a pacemaker. Her presence, sitting on a bench gradually popping balloons, and overdubbed dialogue provides the local activity of the piece, while the other elements of the work – the council estate, the subject's minority ethnic background, the overdubbed heart beat sound effect – provide broader contextual frames that orient the work within a particular experience of reality. There is a noticeable lack of environmental sound, making the selected sound effects and dialogue both more impactful and heightening a sense of isolation. What emerges is a picture not of a documented reality but of a composite picture of elements that create a landscape to contextualise the subject's actions, in this case her monologue and occasional bursting of a balloon, fusing real and unreal elements to create a representation of the reality the subject is located within.

The idea of a landscape also appears in the writing of Trevor Wishart. In *On Sonic Art*, Wishart proposes we, "place all various characteristics of the sound experience related to our recognition [or imagined recognition] of the source of the sounds under the general heading of landscape." (Wishart 1996, 130) In doing so, he creates a construction of the idea of landscape in a resolutely literal way, separating the idea from any programmatic association that may come with a work, and proposing the acousmatic method of listening as a reaction to the use of sounds with unknown origins (Wishart 1996, 139). In defining a landscape, Wishart identifies three aspects: 1) the nature of the perceived acoustic space; 2) the disposition of sound-objects within the space; and 3) the recognition of individual sound objects.

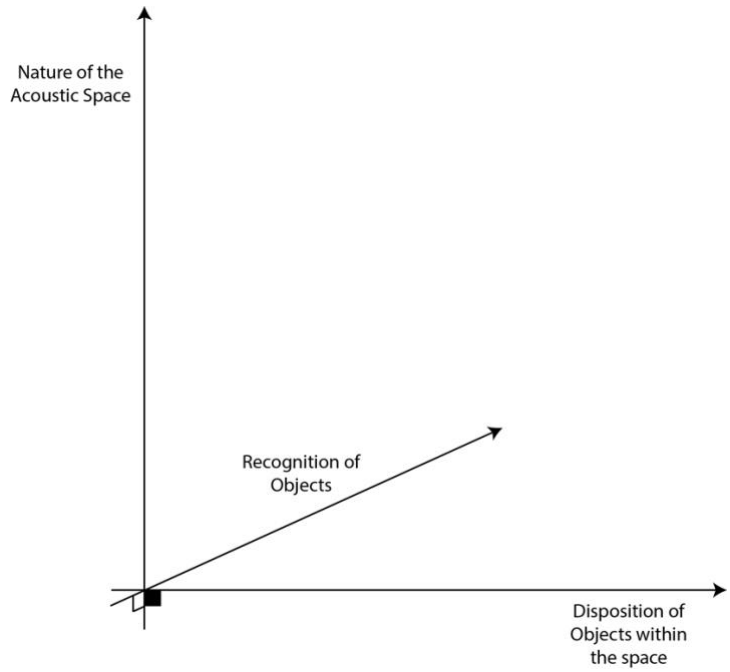


Figure 5: Wishart's defining characteristics of a landscape (Wishart 1996, 140)

These three elements point towards the necessities for a sound to function in a sonic landscape (that is, it should have a particular acoustic property, to be audibly located in a recognisable location, and for it to be discernible from other sound objects) (Wishart 1996, 140). Wishart addresses what happens when these elements are treated in such a way that they gradually break away from reality, introducing the ideas of real and un-real objects and spaces as they pertain to an increasingly surreal – here defined through the existence of a seemingly impossible relationship between elements and dimensions – experience of the material (Wishart 1996, 146-150).

We can consider Wishart's model of an acoustic landscape as a useful one for constructing a sense of representative reality in CVR, considering a CVR landscape as consisting of the product of the nature of the space in which we are set, the ability to recognise landmarks or objects, and the meaningful dispersal of these objects around the virtual space. An illustration of such a 'landscape' can be found in IOU Theatre's production *Rear View* which was filmed as a 360˚ video product for presentation online and as an installation (IOU Theatre 2019). The original theatrical work took place with the audience on a specially converted bus with rear-facing seats. The audience wore positional sound headphones, which broadcast real audio captured in real-time and a pre-recorded soundtrack (IOU Theatre 2018). For the film version many of these ideas are collapsed into the visual product, and key set pieces seen from the bus in the theatrical version are instead filmed closer to the main actress, placing the viewer between the speaker and the audience located in the bus. The action takes places in the recognisably real spaces in which the various monologues are set. In this case, we have a recognisable acoustic space – the speaker has been mixed binaurally and so the

position of the voice in the speakers moves based on the viewer's perspective. Thus, we have both the acoustic properties of spatial narration set against a more static recordings of environmental sounds and a gentle atmospheric soundtrack. The work utilises a single figure against a background of relevant objects, in this case large environmental objects, buildings and structures, streets, and other large-scale divisions that distinguish one space from another. Finally, the key points of action are recognisably distinguished from one another, the speaker and bus, the two focal points of the action, are separate from the wider environment which frames the significance of the dialogue.

Wishart's notion of sonic landscapes is one that is rooted in an understanding of what we are listening to. This idea, while resistant to a more acousmatic practice, lends itself well to that of audiovisual composition, where a relationship between the mixed media elements of sound and visuals is always constructed and connected. Wishart's discussion of the different dimensions of a landscape present a model of understanding the interaction between sonic elements through their relationship to a constructed and recognisable reality, which in turn is a helpful way to consider the various elements of a landscape that create a sense of activity and meaning, and which can be manipulated creatively, to create a representative reality.

We can compare this to *Sights & Sounds of a Coffee Plantation* by Shivakumar Lakshminarayana, a one-minute field recording of a space in a coffee plantation accompanied by audio recorded from the same location. It is the clearest example of a site-specific audiovisual field recording, situating the viewer within a VR representation of the space as accurately as possible, and an experience that is bound directly to the site itself.

3.4.3 Representation: Space and place, site and field

While the idea of a landscape helps govern the nature of behaviour and audiovisual expectation within a given experience, ideas of space, place, site and field specify the nature of the sounds, and the relationship of the viewer to those sounds, that occupy a given landscape. Since CVR, even in its most abstract forms, relate the experience of a physical space to the viewer, it follows that these experiences can be thought of as site-specific in some way.

In 'The Fate of Place: a Philosophical History', Edward Casey charts the historical development of philosophical approaches to space and place. The discussion is understandably vast, spanning much of recorded history, but from this a few points can be distilled for use in this chapter. Casey highlights the early modern period as the point in which the ideas of space and place stopped being compounded in philosophical thought, and differentiates space from place at the earliest point in recorded thought as such:

> While place solicits questions of limit and boundary, and of location and surrounding, space sets these questions aside in favour of a concern with the absolute and the infinite, the immense and the indefinitely extended. If place bears on what lies *in* – in a container, dwelling, or vessel – space characteristically moves out, so far out as to explode the closely confining parameters within which Aristotle attempted to ensconce material things. (Casey 2013, 102)

Further, he specifies that:

> The limit of a place is specified by what a body can do in that place, that is, by its sensory activity, its legwork its history there. The universe is mapped in physics and projected in theology: it is the transcendent geography of infinite space. The cosmos is sensed in concrete landscapes as lived, remembered, or painted: it is the immanent scene of finite place as felt by an equally finite body. (Casey 2013, 103)

Casey presents a history that views the notion of space as that of a potentiality upon which identifiable features can be drawn from to construct further ideas of what that space constitutes in an experiential or phenomenological context.

As Casey highlights, place is shaped by drawing out boundaries and limitations from the theoretical infinity of space. Lawrence English defines the idea of place as, "an affective atmosphere, a lived-in zone that is framed within both space and location." Defining place against space, place is, "not simply a locator or container, but rather, it is the zone where embodied experience of listening can occur and other affective conditions can be experienced." (English 2017, 132) English also acknowledges the role atmosphere plays in the notion of place:

> Place is an atmosphere, which is responsive to changes and constant movements of the objects and things within it. This enveloping and affective atmosphere creates a condition for qualitative investigation within which the richness and individuation of place in opposition to location can be recognized. (English 2017, 134)

I assert that the idea that the virtual nature of VR means that the technology must necessarily deal with the idea of space as its foundation, that is, an infinite possibility on which a sense of place can be constructed. CVR, through its digital video medium, also deals with the idea of place as its foundation. That is, to borrow an observation previously made by Gaut with regards to the moving image, there is a sense of place that is necessarily born from the fact that the photographed scene in CVR must have existed in reality for there to be an image of it. While abstract and unreal constructions of reality in CVR work to strip out the sense of place from a CVR scene, documentary and representational realities are rooted in this sense of place, the former attempting to keep the distinctive qualities of a place intact as much as possible, and the latter identifying these distinctive qualities as materials suitable for compositional and audiovisual manipulation.

Joanna Demers defines the idea of site as not only involving the, "environments in which sound propagates but also those that listeners physically and metaphorically occupy." (Demers 2010, 113) Nick Kaye discusses site-specificity as the process whereby the situation in a work is presented affects its ability to 'be', while a site-specific work might articulate and define itself through properties, qualities or meanings produced in specific relationships between an object or event, and a position it occupies (Kaye 2006, 1). Miwon Kwon highlights that site-specific work necessarily takes the 'site' as,

> […] an actual location, a tangible reality, its identity composed of a unique combination of constitutive physical elements: length, depth, height, texture, and shape of walls and rooms; scale and proportion of plazas, buildings or parks; existing conditions of lighting, ventilation, traffic patterns; distinctive topographical features. (Kwon 1997, 85).

As such, the experience of a work is necessarily affected by its situational context, and site-specific composition seeks to use a site to influence the existence of the work, be it acoustically, aesthetically or thematically.

Fiona Wilke's assessment of site-specific composition in England, 'Out of Place: Negotiation of Space in Site-Specific Performance', highlights five degrees of site-specificity, each a step further removed from a traditional performance context: inside the theatre building; outside the theatre building; site-sympathetic; site-generic; and site-specific. Site-generic and site-specific are the two elements most strongly relevant to this creative project. Site-generic refers to performances generated for a series of like sites (i.e. stair wells, carparks, etc.), while site-specific refers to a performance specifically generated from/for one selected site. According to Wilke, site-specific work reveals layers of this place through reference to historical documentation, site usage, sound objects/text/sounds, personal association, and various other factors (Wilke 2004, 54).

Using Kwon's and Wilke's ideas as a framework, as well the ideas of space and place already established, we can consider all CVR works that function as a representation of reality to be at the very least site-generic. That is, they utilise the space they are set in for a creative purpose, but that the specific site itself is not of relevance. In *A Hard World for Small Things*, the sites in which the action has been filmed in are relevant only to create a sense of narrative authenticity. The specific street and location of the film is not in itself relevant to the function or understanding of the work. Set in South Central Los Angeles, the majority of the action takes place on the street outside a corner store, allowing the viewer to watch the different interactions between characters unfold. While utilising actors, the exchanges feel rooted in the communities in which they are set, and the absence of filmmaking accoutrement or production reduces any barriers to immersion.

Although staged, the film presents its characters within a real setting, a common, almost banal setting. When the film does finally finish on an act of violence, it is handled naturalistically, without fanfare, maintaining the illusion of reality established by the generic space itself.

Get Wanderlust! (2018) by Thore Soneson is an example of a CVR site-specific work. The piece was one part of a larger artistic work that consisted of ten different 'portals' to explore the Swedish city of Kristianstad, including an app, interactive walks, photo exhibitions, soundscape exhibitions, and more (mxsichael 2017). *Get Wanderlust!* combines different spaces of Kristianstad with spoken text. The changing perspectives of the city and its environs are presented alongside Soneson's monologues, as well as a collection of thoughts and reflections by a group of guides who act as facilitating performers during the project. The exhibition of the video originally took place in an exhibition space, with participants viewing the work through VR headsets with the audio component played back over loudspeakers. The exhibition enabled the audience to explore non-places[5] in a locale that was already known to them – in this instance the city centre. The aim of the work was to inspire citizens to see beyond the familiar and discover new environments in familiar settings (Thore Soneson, email to author, 20 April 2020). As such, we can see that *Get Wanderlust!* is highly site-specific, integrally reliant and shaped by the location in which it is filmed. The intention to highlight lost or undiscovered spaces within the familiar is a direct dialogue with the location, while the way these elements are packaged, edited and presented, suggests that the intention is not to document these experiences, but rather to draw on the reality of these spaces to represent a kind of heightened reality.

3.4.4 Weakened effects of documentary and representative reality

As has been established, CVR is deeply concerned with the relationship of the viewer to physical space. Many of the examples explored so far are clear in what they are attempting to express and utilise a language which attempts to create a film that projects a sense of reality. However, it is worth discussing why some works of CVR do not work effectively within the medium as a way of further refining how these reality spaces operate. Indeed, it is my observation that when CVR works are attempting to subvert a sense of reality, elements of the real remains a tether that they cannot break away from.

Let us compare the two films *Knives* (Cosco 2018) with *How to Pass Your Flight Test* (GoFly360 2018). The first film is a work of narrative cinema, whilst the other is an educational film walking the viewer through the various sections of a flight test in real-time. Whilst the latter is clearly attempting to document reality, the former creates a constructed reality in the context of a film. The issue here is that *Knives* never effectively

[5] A non-place is defined by Marc Augé in 'Non-Places: Introduction to the Anthropology of Supermodernity' as, "a space which cannot be defined as relational, or historical, or concerned with identity" (Augé 1995, 77-78).

builds a sense of reality. The narrative film elements – the staging, the dialogue, the acting, the plot, the camera positioning, the use of additional dialogue recording (ADR) and overdubbed music – blends awkwardly with what are clearly real-world locations – a neighbourhood, garage, kitchen, and so forth – and ultimately the film stops operating as a piece of a narrative cinema, instead documenting the reality of the scene, documenting actors reciting their lines in a house.

Alex T. Hwang's *Home Invasion*, is a short narrative film about a family subjected to a violent assault by gangsters. The titular home appears to be a real home – in the grand tradition of low budget film making it would not be surprising to find that it was owned by a relation of someone in the film crew. As such, the setting is effective enough to create a real space to set the action of a scene. However, the film is never able to create a sense of reality – the unnatural dialogue, overdubbed music, awkward blocking and poorly established motivations all work to undo any construction of a sense of reality. Instead, the viewer is constantly reminded that they are watching people attempting to make a film within a real space. The film has a large number of issues quite aside from its inability to communicate effectively within CVR, but through this failure we can see some core truths of the media. CVR will accurately capture action within the context of the space in which it is set. If artificial elements are to be introduced, then they should be included in a way that effectively works within the reality of the scene itself.

This seems to be the risky element of CVR, in that, more than in fixed frame media, the camera in CVR is far more objective in what it sees and how its subject is presented to the viewer. If the default perspective of cinema is that of a framed image, the default of CVR is a real space which naturally aligns it with a sense of being real or unreal. However, this is not to say that some sort of departure from documentary or representative reality is not possible. It is just that constructing these relationships must be done primarily with an awareness of space.

3.5.1 Unreality

As we have established, Gaut's proposed points of reality in cinema reflect some of the key ways in which material can be handled in CVR to generate a feeling that a particular space the viewer is located within is real. It stands to reason that the further materials depart from these points, in particular, the more materials do not match the expected characteristics of the surroundings or the more it becomes clear that they do not represent a real physical space, the less these spaces reflect reality. As such, this represents a gradual drift that a work may undergo as it transitions from being identifiably real, to less real, and finally unreal.

This discussion of a reality spectrum is in part influenced by some conceptualisations of contemporary sound art practice. In particular Denis Smalley's different orders of surrogacy in describing the

spectromorphological behaviours of sound objects is of particular interest. Here, Smalley identifies four orders of surrogacy to indicate the degree to which a sound object is remote to that of a recognisable sound source for a musical gesture. The orders can be summarised as:

1. First-order surrogacy: Primary, unmusical sound materials, clear in source and origin but unmusical in execution.
2. Second-order surrogacy: Traditional instrumental gesture, where recognisable performance skill is exhibited and musical articulation takes place.
3. Third-order surrogacy: Wherein a gesture is inferred or imagined in the music, where there is an uncertainty in the reality of the source of the sound, the cause of the sound, or both.
4. Remote surrogacy: Source and cause become unknown and unknowable as any human action behind the sound disappears. (Smalley 1997, 111-112)

These ideas were reconceptualised by Sam Pluta and applied to his live laptop performance project. Pluta (CeReNeM 2018) conceptualises the manipulation of audio across what he terms the source bonding grey-scale (see Figure 6).

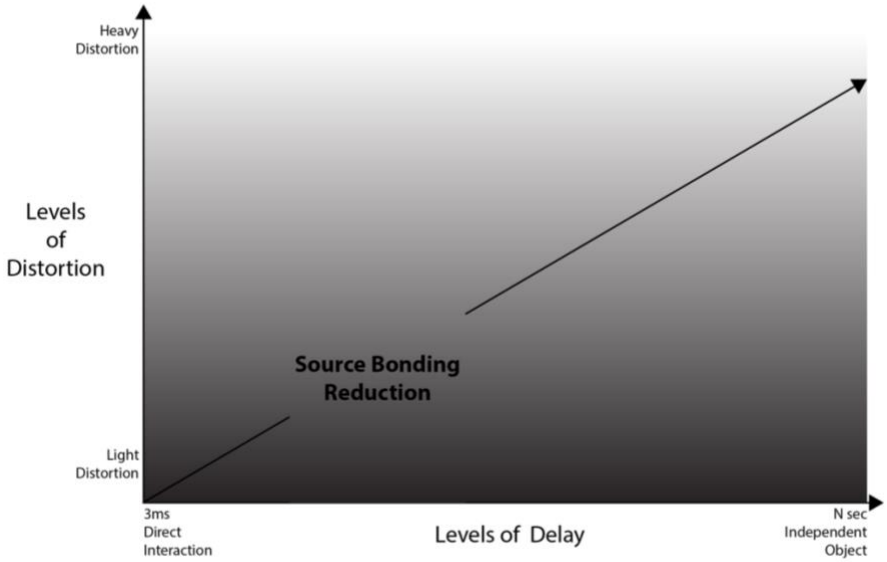


Figure 6: Sam Pluta's Source Bonding Grey-Scale

Here Pluta identifies that as a sound is increasingly distorted or delayed (or both) it increasingly becomes a separate distinct object. The gradual transformative nature of this practice is reflected in the greyscale.

What can be drawn from these conceptualisations of source bonding is that as material is transformed, there is a clear separation between the source and subsequent manipulation, transforming between recognisable

common spaces and eventually, with enough manipulation into a recognisably unique object. I propose that CVR has the potential to undergo a similar transformation in the perception of the reality of the space presented. As materials and recordings of spaces are manipulated to greater degrees they no longer exhibit either documentary or representational reality space characteristics, but rather exhibit new characteristics. I propose that these new states can be thought of in two ways, most immediately as abstract reality spaces and finally as unreal spaces.

Much like Pluta's grey-scale, I do not believe that there is necessarily an identifiable point at which a work crosses over from being mostly real to mostly unreal, however, I do believe that the quality of this reality is discernible. That said, it is entirely feasible that some debate may be had over the relative reality of a particular work, but such debate would necessarily need to be addressed by the points raised in this chapter.

3.5.2 Atmosphere

As a work of CVR increasingly removes itself from focusing on a construction and reflection of reality, it follows that the sensation of real space must be replaced with a different kind of appreciation. I propose that the aesthetic experience of unreality in CVR shifts from a predominant focus on the semiotic in documentary and representative reality spaces, and the use of reality signifiers to create a sense of presence in the world, towards an appreciation of aesthetic atmosphere in abstract and unreal CVR spaces. Gernot Böhme discusses atmospheres as such:

> Atmospheres fill spaces; they emanate from things, constellations of things, and persons. The individual as a recipient can happen upon them, be assailed by them; we experience them, in other words, as something quasi-objective, whose existence we can also communicate with others. Yet they cannot be defined independently from the persons emotionally affected by them; they are subjective facts. Atmospheres can be produced consciously through objective arrangements, light, and music – here the art of the stage set is paradigmatic. But what they are, their character, must always be felt: by exposing oneself to them, one experiences the impression that they make. Atmospheres are in fact characteristic manifestations of the co-presence of subject and object. (Böhme 2017, 25-26)

Böhme's idea of atmosphere signifies a shift away from what something represents to a focus on how it is made present to the viewer. This corresponds with the shift in audiovisual representation of space in CVR from that of a reality created through content or ontological realism to that of a space constructed from abstracted objects of reality, or spaces with no connection to reality whatsoever. As such, abstract and unreal spaces can be thought of less as what the space represents or depicts, but rather what these spaces make the viewer feel or experience. Support for this notion of an aesthetic of atmosphere lending itself to a more abstract experience in CVR is inspired by Tonino Griffero's discussion of art as beautiful and atmospheric:

> […] perhaps there is a more suggestive hypothesis: namely that artistic expressions are atmospheres when they are so self-referential that they induce us to ask what they show (or what their mise-en-scène is) rather than what they are, what their actual fact is (what the work irradiates) and not their factual fact (what the work is made of). (Griffero 2010, 83)

While reality spaces focus on how a real space is presented to the viewer, the expressive element is intensely focused on the materials. Griffero identifies a level of abstraction in art that refocuses the attention from the material to the immaterial; the aesthetic of the work over the construction of the work. As demonstrated by the examples that follow, this creative abstraction of reality is well suited to a consideration driven by an understanding of aesthetic atmosphere.

In discussing atmosphere with regards to music and architecture, Böhme conceives of music as an art of space, highlighting a development of musical language in contemporary music that rely on space as a core creative element.

> Meanwhile, there are compositions in which the musical event consists in the manifestation of individual notes, noises, or configurations against an atmospheric background or silence; pieces that fill the space in such a way that the listener can experience different sequences by moving through the space; and finally pieces whose open-endedness is essential. (Böhme 2017, 177)

I would also posit that the inherent spatiality of audio in a CVR context by its very nature seems to align the experience of sound and audio composition within this experience, and that CVR necessarily positions the viewer both visually and acoustically within a specific space. It is the resulting atmosphere of these elements that Böhme identifies as being the source of affectation in the viewer (Böhme 2017, 181). As such, as these experiences become more abstracted from reality we can in turn expect our experience to shift from an atmospheric affectation based in an experience of the real to that of more abstract emotional and poetical affectation outlined by Böhme.

While Böhme cautions against the use of artistic metaphor to describe architecture, his identification of the close relationship between architecture and space in the evocation of atmosphere is a useful observation to bring into a discussion of abstract CVR reality spaces:

> While spaces marked by location and distance are essentially determined by things, the space of bodily presence is initially nothing more than a perceptible indeterminate expanse, out of which diverse spaces can emerge through articulation. Orientations, movement impressions and markings are such forms of articulation. They create spatial concentrations, directions, and constellations. Since these articulations do no presuppose

> concrete space, but effectively inscribe themselves into the void, they remain reliant on the experiencing subject, that is, human beings in their bodily presence. The space of bodily sensing – a sensing that reaches out into the indeterminate expanse – takes shape through such articulations. (Böhme 2018, 75)

Accepting an atmospheric construction of architecture, Böhme further identifies non-objective means of constructing space, highlighting the potential for light and sound to articulate space:

> The light that fills a space can make it serene, buoyant or gloomy, festive or homely. The music that pervades a space can make it oppressive, energizing, compact or fragmented. One experiences the character of such spaces through the disposition they impart. And with that, we have come back to atmosphere. (Böhme 2018, 76)

The discussion revolving around an aesthetic appreciation for atmosphere is dense and varied and by no means limited to the experience of a single field of artistic practice or aesthetic appreciation. However, the discussion provides a way of approaching more abstracted CVR experiences that remove themselves from a realistic appreciation of a space. Such CVR experiences retain the ability to generate a sensation of presence in the viewer and so one explanation for the effectiveness of this experience is that the viewer shifts from an appreciation of a virtualised reality to an appreciation of an alternative virtualised reality, an experience of an unreality mediated primarily through the experience of a virtual space's atmosphere.

3.6.1 Reality Space #3: Abstract reality

An abstract reality space is a degree of further abstraction of a space such that it retains a clear set of spatial relationships, but these relationships are not presented in a way that simulates a real experience of a space. Fundamentally, CVR works that engage with an abstracted reality utilise signifiers but focus these elements on an aesthetic level over an authentic reconstruction of reality. The language of visual abstraction is potentially incredibly varied. However, the result is the same, that the presented environment creates an experience of space that constructs significance and definition through the process of reworking materials in an unreal way.

McArthur and Kalonaris discuss the contemporary interest in modelling 'diagetic' or 'environmental' sound in a VR context as merely a requisite first step for moving beyond sound-image relationships modelled on a sense of reality to ones that can be more satisfyingly driven by aesthetic decisions (McArthur & Kalonaris 2017, 97). McArthur and Kalonaris highlight that the language of fixed frame media relies on interactions beyond an objective simulation of real-world acoustic and environments, citing Rick Altman's paper 'Moving Lips: Cinema as Ventriloquism' where he posits that sound, rather than passively accompanying the image

instead engages in a dialectical relationship with sound, with each defining and reinforcing the another (Altman 1980, 70).

One CVR example McArthur and Kalonaris point to that exhibits this behaviour is James Spinney and Peter Middleton's *Notes on Blindness – Into Darkness* (2016), a CVR experience that builds a visual representation of the sensory and psychological experience of losing one's sight and based on the audio diaries of John Hull. In *Notes on Blindness*, the experience is not of a true representative reality because the perspective the viewer is inhabiting is not representative of a common experience. Rather, visual stimuli are constructed as representations of sound sources in a sea of darkness, driven by the broader sound world. McArthur and Kalonaris point out that this example refutes the necessity for VR audio to be reflective of a natural environment, and that instead the viewer's ability to suspend disbelief in what they are seeing and hearing must be considered.

Indeed, the atmosphere constructed in this piece is not one of a realistic depiction but that of a visual metaphor, an abstraction of reality used to approximate a different perceptual experience by drastically altering the viewer's perspective of space. The overall atmosphere highlights the role of sound, and the of viewer's placement within a dark and uncertain space, allowing each flash of visual feedback to act as something of a relief while highlighting the reduced perceptual faculties of the viewer. The result of this abstraction is to make the viewer embody the same perceptual space as John Hull and to elicit an emotional reaction through this abstraction.

Pockets of Sound (2018) again provides another useful example of an abstracted reality. The material of the film is constructed from captured imagery of a single tree. However, the abstraction of this source image is so great that entire arrays of complex visual relationships are able to be constructed from focusing on component parts, resulting in branching textures that fold in on themselves, occasionally bringing the original source into focus before again collapsing into abstraction. The visual treatment of the original materials is further abstracted by manipulating the source materials with various filters and augmentations. The sonic interactions utilise similarly abstracted source materials, taking sound samples and recordings and processing them into a state of pure sound in reaction to the visual momentum. As such, the importance becomes less about the recognition of the source materials themselves than the constantly evolving manipulation of these materials, in turn placing the viewer within, and external to, the materials, and changing the atmosphere of the work from that of the original materials, to create an entirely new aesthetic output.

It is also worth discussing the use of animation in CVR. Animation is perhaps the most clearly unreal space, since by its own nature it is an original creation of an artist but it can still refer to a sense of reality in the language of the film. More often animation is used to abstract reality in some way, creating its own sense of

internal reality to the film. Gorillaz's *Saturnz Barz (Spirit House)* does this effectively, bending time and space in a way that feels not of the real world, and instead utilising a familiar setting (the titular spirit house) and using the potential of animation to abstract the conventional rules of the universe, bending the activities of the various characters and fantastical locations in a way that creates a seamless narrative within what feels like a physical space that remains wholly unreal. That the film still relies on the reality of a space to give it a sense of gravity however, and seeks to subvert clear physical structures designed to elicit an (at least initially) feeling of familiarity, indicates that the focus is not of creating a sense of unreality but rather a broader abstracted version of a familiar reality in order to elicit an aesthetic response from the viewer.

3.7.1 Reality Space #4: Unreal

The fourth kind of space that I propose is evident in CVR is that of an unreal space, wherein the space the viewer is placed within holds no connection to a sense of reality, even in a more abstracted state. These unreal spaces are defined by a rejection of reality and explores the dissolution of relationships that otherwise define an environment. The communication of an atmosphere is usually embodied completely through the appearance of materials operating on a purely aesthetic level without greater semiotic significance.

Mike Celona's 360˚ video experiences operate in an unreal space. In *Remorse Code* (2017) the viewer is located at the centre of the activity, however, the space itself is really just a formless and unstructured void for Celona to fill with colour and shape. Celona maps his fixed frame AV productions to a sphere so as to surround the viewer, fusing textures and shapes with stock film footage stretched to occupy the viewer's frame, stretching it so as to distort the fixed frame convention. Celona creates reworkings of recognisable images and forms, remapping them to a new virtual space. This creates the sense that a realistic space is sometimes almost emerging out of the video synthesis patterns, potentially creating a sense of a structured depth and tangibility which is quickly subsumed back into the texture. The changes in shape, colour and light match activities in the music including changes to the clicking hi-hats and sweeps of a high-pass filter. The overall result is an atmosphere of harmonious interaction but constant uncertainty.

Theodore Ushev's video for the track *Ni Lah* by Kotterashky, Milentia & The Rain Dogs (Ushev 2019) utilises a similar approach to creating an unreal space. Effectively a 360˚ animation, the work creates a sense of depth through a clear interplay of foreground and background figures, but the spaces that are constructed are similarly unstable, almost stream of consciousness. When the virtual space does eventually transform into a clear three-dimensional space the depiction of that space remains unreal, with shapes, patterns and text skittering across the surfaces and walls. In this case, space simply becomes a container for unreal visual activity to take place in rather than using space as a signifier for a real, lived experience, either realistically or abstractly.

3.8.1 The role of space in the creative portfolio

The manner in which CVR engages with space grew into one of the central concerns of this creative portfolio. Over the course of experimenting with different thematic and material ideas for audio and visual work, it became clear that this spectrum of reality spaces was a unique framework with which to approach an understanding of the creative intentions of CVR works. As such, the creative works of this portfolio developed to naturally align themselves along the spectrum of more to less realistic virtual spaces.

Figure 7 places all pieces and studies from the creative portfolio on a spectrum reflective of their engagement with space based upon exhibiting traits reflective of documentary, representative, abstract and unreal realities. It is my view that these ways of thinking about the approach to space and its use in CVR is a beneficial way of considering the differences in different CVR products. As such, the creative portfolio is largely oriented around these reality spaces as a way of discussing the creative intentions of the pieces and how these are reflected in the respective reality space categorisation.

The depiction of these creative works on the proposed reality spectrum is somewhat subjective, though their relationship within this spectrum is fundamental to the discussion of my portfolio in Chapter 4. As part of the creative process many works were realised in different forms, often working with the same materials or the same compositional idea realised in a different way. As such, not only the materials themselves but the function of these materials has been considered in the alignment of works along this spectrum. For example, *a sound world for small things* (2019) was created for two different contexts: the first a fixed media 360˚ CVR product and the second a live performance piece. While both occupy a representative reality space (for reasons that will be discussed in Chapter 4), the first iteration is closer to documentation and further from abstraction than the second. This is because, while representative, the CVR video is inherently based in a virtualisation of the space itself through the source video footage, while the live performance represents the physical space through a level of abstraction in removing the capturing of sound in the space to the generation of space in a concert environment.

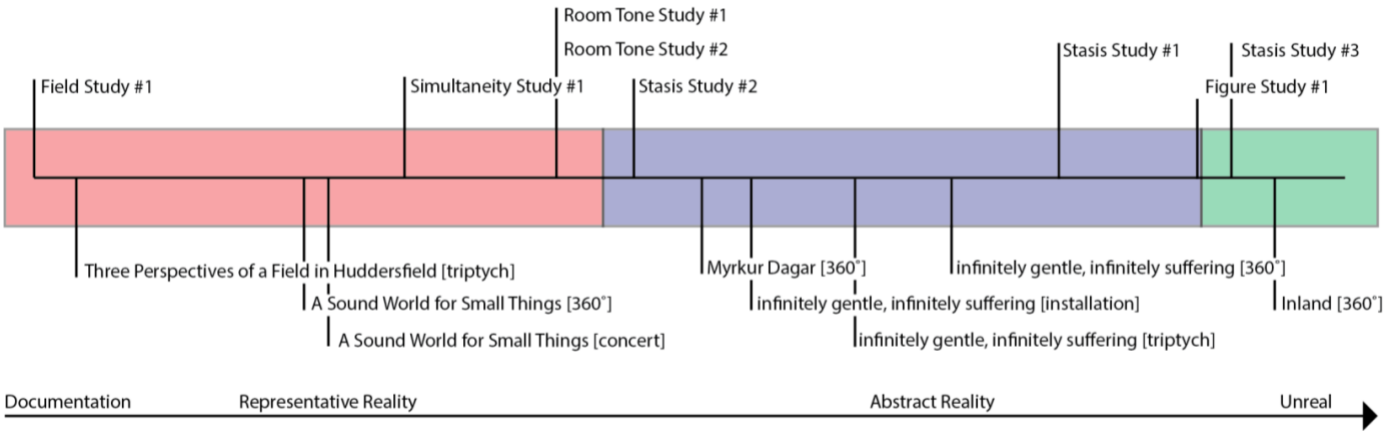
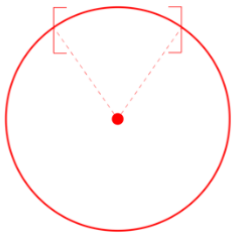


Figure 7: Creative work space relationships

Similarly, *infinitely gentle, infinitely suffering* (2017) exists in three iterations, a 360˚ CVR video, a fixed frame triptych video, and an installation work. All three iterations function abstractly, however, they have been ordered based on their proximity to being representative or totally unreal. The installation version is considered to be the least unreal of the three, since the material is abstracted and made manifest in some way in a physical space as a video object. This level of sculptural engagement adds an element of physical representation to the work. The triptych version, in turn, translates a mobile frame media into a fixed frame experience through the framed representation of different mobile perspectives. I consider this approach to be less functionally unreal than the CVR experience, where the viewer is placed within an abstract space created through multiple layers of different environments, yet more unreal than that of the installation.

For the reader (and creator) the important element here is the relative organisation itself as a way to explore and discuss the creative function of the works themselves, which I will elaborate further on in Chapter 4.

CHAPTER 4: PORTFOLIO



This chapter discusses the portfolio component of this PhD. The portfolio consists of five major works: *Three Perspectives of a Field in Huddersfield* (2019), *a sound world for small things* (2019), *Myrkur Dagar* (2017-19), *infinitely gentle, infinitely suffering* (2018), and *Inland* (2018). The development of these works was supported through numerous individual studies - small singular ideas explored through CVR. These studies have also been included in the portfolio and provide some context to the working process, illustrating the experimentation with, and development of, different ideas of CVR on a smaller scale before being expanded or adopted to major works.

The aim of this PhD was to address two research questions:

1. What are the aesthetic considerations that must be accounted for by practitioners using 360˚ video and CVR technologies for audiovisual work, and how do these differ from existing media formats?
2. What creative opportunities are afforded the audiovisual composer in CVR?

As has been demonstrated in previous chapters, the aesthetic considerations are shaped by an understanding of the mobile frame and the conceptualisation of space in a virtualised reality. This portfolio is the practical exploration of these ideas, using the conceptualisations previously established to shape the direction and understanding of the creative work produced. These creative preoccupations are inherently nebulous, and as such the discussion of the portfolio has been organised according to the reality space spectrum outlined in Chapter 3, Figure 7, rather than, chronologically. This allows me to outline the development of a linear conceptual thought process from one extreme to another and provides a clearer means of addressing the research questions. As such, each of the five major works will be discussed with regards to their thematic intention, the process of their creation, and how they address the act of composing with frames and spaces.

It is worth highlighting a few overarching creative elements from the outset. While significant discussion was given over to the issue of camera height in CVR in Chapter 2, all of the creative works in this portfolio utilise a camera height of ~170cm. This was because no creative project I undertook benefitted from anything other than an eye-level camera position or worked with an exploration of space through a height-based exploration of the mobile frame. Another point worth noting is that, from the outset it was clear that the image resolution would be a factor I would need to contend with. While CVR videos were made in 4K resolution, the final product is a subset of that resolution, meaning that a perspective of the CVR video would often have a resolution approximating SD video, a visual downgrade from what we are used to in contemporary high definition fixed frame media. As such, a less-than-high definition visual aesthetic was embraced and adopted for this portfolio, using this technical aspect of CVR to create works that would still be aesthetically striking with this lower resolution. In this respect, films such as Harmony Korine's *Gummo* (1998) and David Lynch's *Inland Empire* (2006), films which deliberately utilise a digital low-resolution aesthetic, were a particular

inspiration for me in how they were able to integrate a technical characteristic into the aesthetic of their stories and imagery.

It should also be noted that, whilst the development of audio tools in MAX is important for a number of the creative outcomes in this project, the patches used to realise these pieces are not provided as a part of this portfolio. The patches and code that were used to create these works demonstrate my creative methodology, but I do not consider them to address my research questions in and of themselves. Therefore, whilst I discuss their conceptualisation and implementation in the context of this portfolio it is the way in which the final works address 'frames' and 'spaces' that I consider most important to the research. Many patches utilised very simple or straightforward structures that are idiomatic only of my own creative process and do not represent a significant development of new ideas in and of themselves. As such they are used only as a means to be creative, a way to achieve a desired outcome quickly.

4.1 Documentation Spaces

Studies: *Field Study #1*
Work: *Three Perspectives of a Field in Huddersfield*

4.1.1 Field Study #1 (2017)

Field Study #1 was my first and most literal experiment with CVR, and falls in line aesthetically with the vast majority of content that has been made publicly available – that is, a singular field recording in a fixed location. This first field study attempts to record and present space as authentically as possible. As a first experiment the effect was poor, but it was a necessary learning step for developing more competent work. The recording takes place in my backyard at the time, utilising sound captured from binaural microphones. This study encodes the left and right binaural recordings as a mono audio signal in an ambisonic context, intending to place this audio in the direction in which it was captured, but which ultimately (and unsurprisingly) failed to create an effective 3D image. While binaural microphones were effective at capturing the broad sound of the environment, the omnidirectional nature of the microphones did not allow for any dynamic changes to the sound to correspond with the listener's head movement. As such, this study confirmed my earlier notion, based on my reading, that omnidirectional binaural microphones alone would not be enough to create a satisfyingly dynamic sound space and prompted me to pursue ambisonic audio formats, either through the use of dedicated ambisonic microphones or the construction of software patches to spatialise audio in an ambisonic format. The other striking observation of this study is in how dull the resulting work is. While this might be a result of the space itself not being particularly interesting, it became very clear to me how different the experience is between sitting in a space and listening, and doing the same

through CVR. It became clear that the use of CVR needed to add something, that although the frame was mobile, CVR needed to be mediating the space in some way and that relying on a purist field recording approach would not necessarily yield the most satisfying work. As such, much of the work that followed centred around finding ways to activate or engage with space in different ways. As a result, the influence of this early study can be felt in some degree in almost every creative work undertaken as each one sought to find a solution to the relative passivity of this initial study.

4.1.2 Three Perspectives of a Field in Huddersfield (2019)

Three Perspectives of a Field in Huddersfield was created later in the PhD after I had spent time exploring abstract and unreal spaces and wanted to return to my initial explorations of field recording in CVR. *Three Perspectives of a Field in Huddersfield* explores the audiovisual relationships of a single site as navigated through the medium of CVR.

The work takes three separate audio-visual field recordings of the same site and contrasts these, creating a varied series of representations of the same location built upon these different perspectives. Audio was captured ambisonically from each location in the field to create a 3D audio image of the space from the location of each perspective. The work began with the three audio recordings. I took each perspective in audio and began to compose with the field recordings, playing with different combinations of perspectives to create a work that I felt was the most compelling audio composition. There was no rearrangement of audio from a temporal perspective - all events take place linearly as they occurred in the original recording. Some elements were removed or faded in and out to create contrast and movement to each recording.

At 11m30s, the otherwise purist field recording experience is altered. While the field recordings continue to play within the structure that has been established – entering and leaving according to the presence or absence of their corresponding perspectives – a subtle electronic component is introduced utilising filtering, delay and reverb on the summed input of the three different field recording channels. This processing was deliberately kept very subtle and is used to change the framing of the field recordings in the final third of the piece. This processing gently adds a sense of depth to the work, creating an aura of higher frequencies sourced from the composition and blurring the relationship between the different perspectives in the later part of the piece. By taking the sonic commonalities of each perspective and blending these elements together, a heightened experience of the space is created, leading to an increase in musical tension as the piece develops but without undoing the complex interaction of field recordings and spatial perspectives that the piece is focused on.

The video was edited to match the audio, so that a perspective was only visually present when the audio from that perspective formed part of the composition. When audio was faded in or out the video of that perspective was also correspondingly faded in or out. I was unsure however, how much of my own decision-making process I wanted to involve in choosing what each perspective should show. I wanted to be open to finding unique perspectives of the video at different points in the work. I designed the point-gen patch to achieve this (see Figure 8).

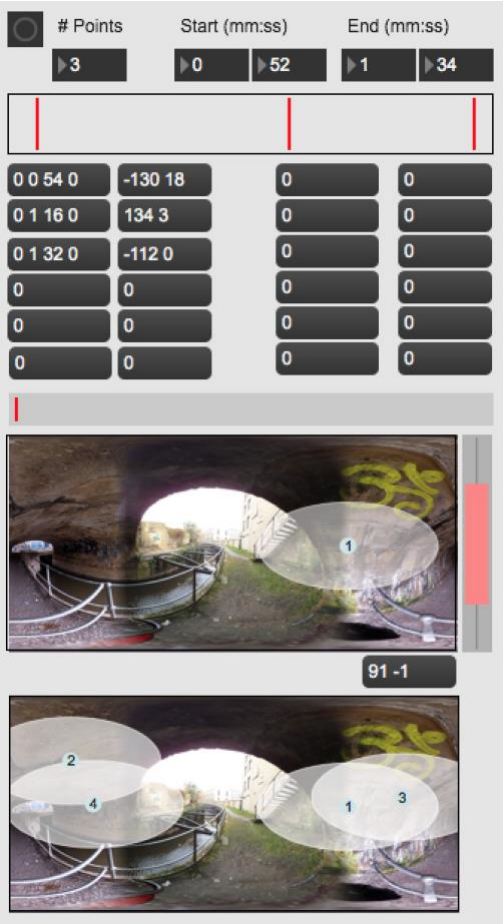


Figure 8: The point-gen patch interface

The point-gen MAX patch has a simple interface that generates a series of perspectives set by the user (# Points, up to a maximum of 12), a time-point for each perspective to take place, and the values needed to be entered in the VR rotation tool in Premiere Pro to centre the equirectangular video at this point in the frame. The two preview frames take a frame of video and demonstrate the total field of perspectives generated and let the user audition each position marker sequentially. Deliberately, it is not possible to edit one particular marker, rather a whole new series of perspective points must be generated if one set of data is not satisfying. The point-gen patch was used to determine the perspective changes for each sequence of video in the work, resulting in a far more emergent audiovisual relationship between the materials, and some satisfying juxtapositions of visual perspectives that I believe are more difficult to achieve intuitively.

After creating the three different CVR videos with the desired rotations, each perspective was exported as a 1080 x 640 image frame using the perspective exporter in Processing and assembled in Premiere Pro as a video triptych. This work is unique in the portfolio as it exists only as a video triptych and not as a CVR video product.

Early experiments with the materials trialled rotating the ambisonic audio to match the rotations of the perspective. However, rather than helping to reorient the viewer with each perspective change, this experience quickly became disorienting and senseless. It was a case where a greater pursuit of accuracy actually lessened the impact of the work, and so it was decided to keep the audio as a fixed spatial ambisonic audio file. This refocused the work from the initial idea of the viewer being the centre of each experience, to the film itself leading the viewer through an acoustic space and showing them various perspectives from each recording site.

Three Perspectives of a Field in Huddersfield exists within the documentary reality space because its primary manipulation of materials is towards a truthful and accurate documentation of an experience of space, albeit one that is mediated by the creative process. It tends towards representational reality through the clear and apparent mediation of technology and organising of space that shapes the work, however, the materials are never used to represent the space. Rather, the experience is of the space itself. Any representative element in the work is further lessened through the use of an automatic process for selecting perspectives, which helps to remove a stage in the decision-making process from me, recasting my role not as a director of material presentation but as an editor of potential outcomes presented to me.

Three Perspectives of a Field in Huddersfield attempts to use CVR as a site for developing a plurality of perspectives through its mobile frame. This piece differs from others in this portfolio in that there is no 360˚ version of the video. Rather, after developing many works that revolved around creating a wide array of potential spaces for the viewer to navigate, *Three Perspectives of a Field in Huddersfield* reflected an interest in exploring CVR as a means for generating original fixed frame video works. The approach used in *Three Perspectives of a Field in Huddersfield* was influenced by the Automavision system developed by Lars Von Trier. Automavision is a system wherein the coordinates of a cameras shot are selected at random by a computer program. The process was developed for Von Trier's 2006 film *The Boss of it All*:

> The camera was placed in the best possible position for a shot - and then, before shooting, a computer program was run to give the co-ordinates for a new, random position (the sound recording was subjected to a similar process). (Johnston 2008)

This approach was not a great success in the context of trying to generate a narrative film. However, it is an interesting and creatively valuable way to approach the navigation of the mobile frame in CVR, particularly in a field recording-oriented project where I was dealing with omnidirectional materials. The same process as the Automavision system was generated through the use of the point-gen patch. Automavision was an attempt by Von Trier to break free of his habit and aesthetic decisions. For me, using a similar system was a way of addressing the seemingly infinite number of potential ways to orient the frame in mobile frame media.

Importantly, the frame was always positioned according to an actual realizable perspective; there were no instances of the frame being rotated or inverted in a way that was foreign to the source material. As such, *Three Perspectives of a Field in Huddersfield* explores the mobile frame of CVR not as a way for the viewer to embody a space but as a tool for organizing the many different visualisations of a CVR space in a fixed frame.

In *Three Perspectives of a Field in Huddersfield* I am interested in creating a sense of heightened realism. While it is clear that there is a creative mediation of a space, the mechanics of the piece are clearly exposed for the viewer. The mechanics of the piece is the piece itself, as each creative decision translates to a direct action in the audiovisual experience. The piece relies on two key elements of Gaut's ideas of reality in the moving image. Firstly, the piece contains a strong sense of content realism, the settings appear naturalistic and unstaged, and coupled with the field recordings, appear to create a reliably realistic sense of the space in which the viewer is placed. Secondly, a sense of ontological realism is invoked by the clear photorealism of the scene. Since the scene is clearly depicting real space it must then follow that the scene presented is one that actually took place in front of the camera. This sense of realism is similarly evident in the audio component of the work.

Fundamentally, *Three Perspectives of a Field in Huddersfield* is a work that is focused on observation, of observing the field in which the viewer is situated. While editorial elements are implemented these take place in terms of a large-scale structuring of materials over the duration of the piece. As Nichols states, the distinguishing factor of an observational mode of a documentary film is that it creates a sense of being, "carved from the historical world rather than being fabricated as a fictional mise-en-scéne." (Nichols 1991, 39) The space of *Three Perspectives of a Field in Huddersfield* is fundamentally preoccupied with perception on the level of the landscape. By focusing on an empty field, the scene is defined by the elements that surround and frame the viewer. The atmospheric experience of the scene is shaped by the elements that bound the perspective of the camera rather than the objects that exist within it; and the sonic characteristics of the space are sounds that do not necessarily have an easily discernible physical presence at this macroscopic view of the space. As such, *Three Perspectives of a Field in Huddersfield* is focused on the large-scale experience of a space and of the representation of this space through perspective, engaging with the common experience of listening to a field recording where the sonic and visual space is related by not necessarily correlative. It was this engagement with space that led to an exploration of the inversion of these relationships in the next piece a *sound world for small things* (2019).

4.2 Representative Reality

Studies: *Simultaneity Study #1*
Room Tone Study #1

Room Tone Study #2

Work: *a sound world for small things*

4.2.1 Simultaneity Study #1 (2017)

After working on the first field recording study, the idea of simultaneous spaces became interesting to me, and I considered ways to bring field recordings taken at the same time into a singular space. *Simultaneity Study #1* takes two field recordings, the first an audiovisual recording of myself on the front step of my house, and the second, recorded at the same time by a friend in Michigan at an anti-Donald Trump rally. The combination of these two elements interested me, fusing the relatively peaceful surrounds of Birkby, Huddersfield with the sounds of political protest on the other side of the world, given greater weight through the two events occurring concurrently.

The locational sound of the Birkby street was captured by condenser microphones spaced 180° apart, one pointing towards the house and the other towards the road. These were then encoded to an ambisonic format, creating a limited but somewhat responsive 3D image. The sounds from the anti-Trump rally were then used to fill the negative space of the field. The scene itself is mostly actionless, contrasting to the fervour heard from the anti-Trump protest, allowing the scene to act as a backdrop for the comparison of the two spaces rather than overpowering the significance of the two sound worlds. As such the study seeks to represent a space not as a document of what it is, but what it is in relation to.

This was the only simultaneity study that worked out successfully. Other planned events did not work either due to a lack of reliable partners in other locations or the audio materials recorded were not sufficiently different from one another. However, the idea of presenting simultaneous events or spaces recurs throughout much of my work in this portfolio, most evidently in *Three Perspectives of a Field in Huddersfield* and *infinitely gentle, infinitely suffering*.

4.2.2 Room Tone Study #1 and #2 (2017)

Early on in this project I started to try to conceptualise alternative approaches to field recordings. Having always appreciated the expressive and sonic richness of acoustic feedback and the Larsen effect as explored by artists such as Nicholas Collins, Alvin Lucier, and Malcolm Riddoch. I started to consider the use of feedback as a way to map a physical space audibly. I developed a feedback patch based on the flow of Nicholas Collins' *Pea Soup* and implemented it in Max4Live to allow me to tune, filter, and manipulate the feedback dynamically. The resulting resonance tones are an abstract representation of the physicality of the space,

documenting and recording the field in which they were captured and an alternative depiction of physical space.

Room Tone Study #1 was recorded in the spare room of my house in Birkby, Huddersfield. The video was recorded in a dark room with an open window to the street outside. The majority of the frame is black, and with the light so low the camera struggles to focus. As a result, the space is largely a black void with some detail from the bed at the base of the shot and the outside lights, resulting in only one point of interest on which to focus. The scene is not clear, but it creates a setting that fits the ghostly resonant tones that accompany it; in a scene where so much is hidden through a lack of light it is fitting that the audio revels in sound that ordinarily exists only as a potentiality, given voice through technological mediation. The resonance tones were dispersed in editing, spatialising different frequencies around the ambisonic space.

Room Tone Study #2 explores the same ideas in a different setting, this time in the hallway of my house in Birkby. Here there is more of an emphasis on the architecture of the house, with light shining into the hallway from one room and the stairways, and in opposition, the more dimly lit door leading out onto the street. Over the duration of the study the resonance tones migrate across this 180˚ divide, from the well-lit area of the hallway to the low light of the door, creating noticeably distinctive spatial evolutions of sound. A dramatic element is injected at 5m15s as a shadow appears in the hallway and stands there for the remainder of the work, recontextualising what was originally thought to be a solitary experience as one shared with a hidden presence all along.

Both *Room Tone* studies explore an alternative idea of field recording, creating unique audio records of a space from the architecture that accentuates it. Both place the viewer within a space and give them limited visual materials to respond too, evoking a sense of space and otherness. While elements of these pieces are somewhat abstracted the function remains highly representational, seeking to use key features of a space to depict it. This room feedback system was utilised fully in *Myrkur Dagar*.

4.2.3 a sound world for small things (2019)

a sound world for small things came from an idea to invert the field recording processes undertaken in *Three Perspectives of a Field in Huddersfield*. While this earlier work was interested in observing the world at the level of the landscape, *a sound world for small things* builds a representation of the space by articulating the sonic outcomes of its constituent objects. The piece investigates three different audiovisual structures to create a representative sense of the space.

The work is, at its core, a collaborative effort between myself and Colin Frank, a post-percussionist with a practice built around exploring found objects and sounding space-defining structures. As a part of this process we developed two different versions of the piece, the first a CVR audiovisual work and the second a version for concert performance. Both versions utilise the same materials and musical structures but in different ways, to articulate related musical products.

We started by going to Gledholt Woods in Huddersfield, a space that we were both familiar with and an area that was both visually interesting and had a number of interesting objects for Colin to perform with. We spent a day in the space, determining objects in the space for Colin to perform on, and recording his performances. Each object was recorded by attaching microphones to Colin's hands, allowing for the sound of the object to be captured at the point of contact, creating a very satisfying stereo image. We also recorded the space ambisonically at the location of the camera and set up a Go Pro camera close to each performance point to record different perspectives of Colin's performance. Eight different recordings were made: 1) big tree; 2) bushes; 3) wooden post (recorded twice); 4) two stone pillars; and 5) stream (recorded at three different locations). After recording this material, I spent some time editing and considering what could be done with them. I finally settled on three ideas which would become the three movements of the piece.

The first movement focused purely on editing the materials to create a quasi-musique concrète piece. Phrases and articulations were edited, combined and recombined with one another to create a musical sense of interaction. The visuals were, in turn, edited to reflect this interplay, with Colin appearing to sound an object in accordance with its presence in the sound world. This movement makes it clear early on that this piece is not attempting to document the experience of a space, but rather to draw on the realities of the space and articulate a representation of the space. The main recordings used here are of a big tree, bushes, wooden post and stone pillars.

The second movement works with the idea of looping and is shaped entirely from material recorded at different points along the stream. At these three different recording sites along the stream, Colin did not activate any physical objects, rather he moved the microphones around the sound source, filtering the sound captured from each site in different, subtle ways. In contrast to the first movement's high-energy articulation of space through action, the second movement presents a slow exploration of different perspectives of the same material source and allowing moments of this activity to be captured and looped. Although each loop was of a variable size, each loop was repeated twelve times. This seemed to be the perfect balance to allow the loop to have an effect on the listener/viewer but not impede the overall forward direction of the movement. The loops were intended to focus the ear on a particular sonic quality or interaction Colin had with the material. The third movement focuses entirely on the stone pillar recordings and uses spectral processing to transform noise sounds into flourishes of pitch derived from the original materials. These materials are accompanied by granulated versions of the same audio in the second half, which introduces a level of musical activity at a far slower timescale, adding rhythmic counterpoint to the spectral flourishes.

As a part of this collaboration it was decided to create a live version that could be performed by Colin Frank. The live version of *a sound world for small things* has been performed twice now, the first at Trotsky's Pink Bowls in Phipps Hall, Huddersfield using the Huddersfield Immersive Sound System on August 17, 2019, and the second by DRIFT Ensemble in St Pauls, Huddersfield on September 21, 2019. This required a reconceptualization of how this piece would work in a live context. I decided that it made sense to invert the focus of the work - to move from working in the space to attempting to bring the space into a concert hall. We gathered materials from the original site – stones, leaves, grass, bark, sticks – and decided to replicate the kinds of material performances in the concert space, allowing objects to stand in for the physical structures in the original location. Colin would improvise with the materials in a similar way that he did in the original space to a similar effect as the CVR video. Colin developed strategies and ways of focus on materials that we would expand into an instructional score (see Appendix B). I also developed electronic processing for the live space that could generate the effect of the structural behaviours I created in the original CVR version. Most importantly, the live processing was a way to shape Colin's performance in some way, with many of his

actions being determined by actions in the electronics, and the electronics in turn being triggered by his actions.

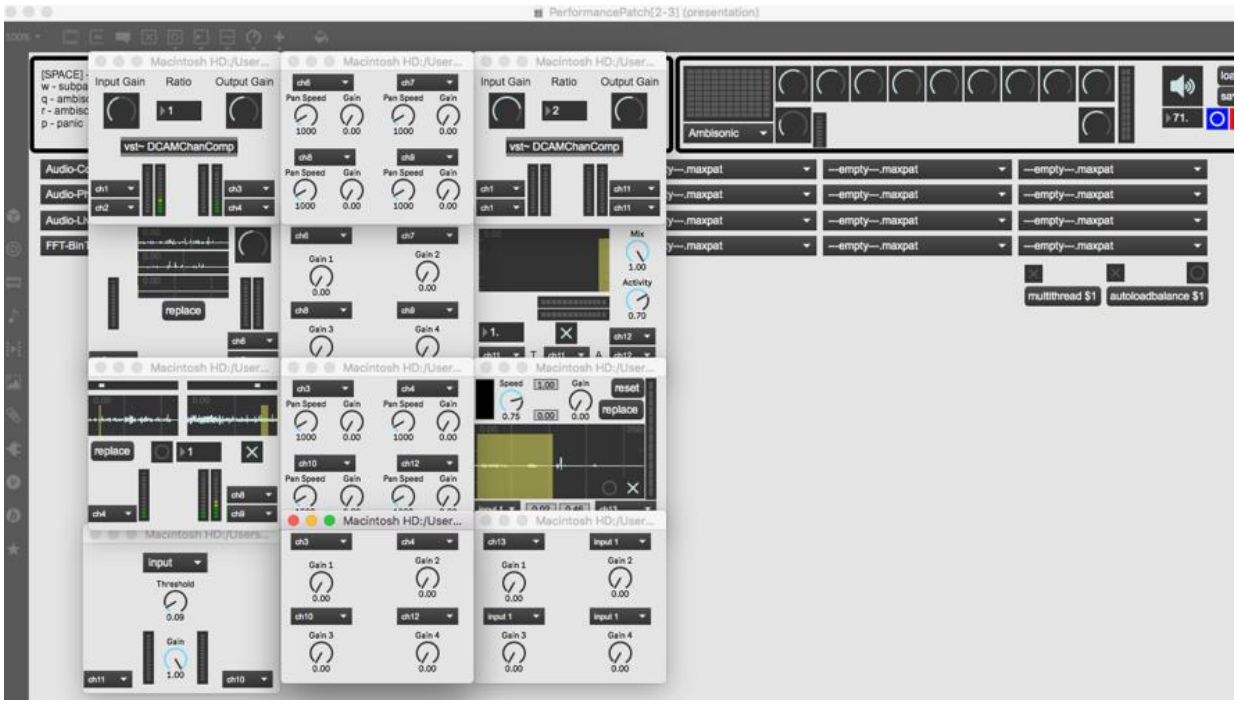


Figure 9: Live performance electronics patch for *a sound world for small things* (2019)

The first movement utilised some descriptor analysis to segment the different audio recordings into phrases based on amplitude. These phrases would be triggered to play back based on Colin's performance reaching a dynamic threshold. In turn, Colin was instructed to move on to another object or combination of objects when the electronics were triggered. The second movement utilised a live looper module that would play back both a delayed live capture of Colin's performance and a pre-recorded stream recording. One or both recordings would hold and loop when an amplitude threshold was reached, and release when it was reached a second time. Colin's performance focus was on alternating between playing with this electronic looping and on different kinds of sounding of the body of water. The third movement utilised the same processing as was used for the CVR version, processing the live sound both spectrally and granularly, again triggered by the dynamic volume of Colin's performance.

a sound world for small things is an example of a work that engages with a representative sense of reality, in that it utilises materials specific to a space to reconstruct a representation of that space audibly and visually. The narrative that takes place in this space (Colin's performance on various objects) is not presented realistically. Jump-cuts between different sites are triggered by Colin's movements, however, they remain sonically tied to the physical space the work is engaging with. As such, the manipulation of this material evokes the acoustic potential of the space, and Colin's performance transforms this space from a latent site

of potential sound to an activation of the unique sound potential of the space itself. As such, the imagery is not necessarily realistic but it is clear that it belongs to the real, that the recordings were made at a specific time and in a specific place, and are edited and represented in a way to create an experience of the space not otherwise achievable.

a sound world for small things exists primarily as a CVR video experience. The mobile frame of the CVR experience places the viewer within the titular sound world, but does so in such a way as to address one of the central tensions of CVR. The visual language of the piece is deliberately straightforward. The main element in the piece - Colin performing on different items in the space - is introduced in the first phrase of the first movement, which places two different site activations (Colin playing the big tree, and Colin playing the wooden post) in opposition to one another, forcing the viewer to navigate between these two sites. At the same time the information from both sites is clearly audible in the mix, and while the spatialisation will change based with perspective, all elements are available to the viewer. Much like the real world, there is no focal point, there is no 'front' and the omnidirectional language of the work is made clear almost immediately.

It is also apparent very early on that the gestures Colin is making are not necessarily particularly distinguishable from the perspective of the viewer, and that they will not necessarily change in content over the course of the piece. Colin's performance of the wooden post is linked to the same recurring physicality, and his gestures are likely to remain either indistinctive or indistinguishable for the duration of the performance. Similarly, depending on the site Colin's specific actions may be harder to see, while his body remains visible. Colin's visible performance becomes more about his body occupying space and signifying the activity of a particular site than it does about the specific small manipulations he makes in that one location.

There is an inherent conflict at work here in the media, where the piece is communicating almost entirely through small sounds and the viewer is only able to view these at a macro-perspective. This was done in acknowledgement of the unique audiovisual properties of CVR, and the primary difference between CVR and fixed frame media. *a sound world for small things* seeks to adopt an omnidirectional visual language, one that uses sound to provide the microscopic details of the scene that the camera itself is not capable of providing. To reinforce the role the sound world is playing further, the visual activity is treated in such a way that it follows the musical activity, creating a virtual space that the viewer can exist within and where the hidden sonic possibilities are manifested performatively.

As an experience of space, *a sound world for small things* engages with the idea of site-specificity, deliberately seeking out prominent characteristics of the landscape to derive a sonic outcome from. The piece identifies both prominent structural elements that can be performed on and sound producing elements than can be

enhanced, amplified and otherwise interacted with. However, unlike *Three Perspectives of a Field in Huddersfield*, which is interested primarily in a macro-perspective of a landscape, *a sound world for small things* constructs its landscape from the sound materials of its constituent elements, an organised system of elements rather than a single observable shape or experience. This interaction is initially comparable to Emmerson's notion of local and field frames, with the sound elements forming a distinctive and separate tier to the background sound of the space. However, this changes in the second movement, with the introduction of layers of looping samples taken from the steam site. That this material is a product of the landscape itself effectively blends the activity of Colin's performance with the wider space. Finally, materials are reprocessed and reconsidered as 'small things'. Colin's performance on two stone pillars is processed spectrally, taking the full-bodied noise of Colin's scrapings and reducing their frequency content to small spectral flutters, a metaphoric inversion of the sounding of a silent object in taking the sound of a sounded object and drawing out meaningful elements from it. This is similarly treated by the use of audio granulation of the same performance, reducing Colin's gestural articulations on the stone pillar into short bursts of the sound, juxtaposing different moments of the performance as freely as granulated single frames of sound.

The result of these different approaches is to reconsider how ideas of space can be articulated when engaging with a representative construction of reality. All the elements presented are the edited products of a real space, and the compositional arrangement of these elements in turn effects how we can perceive and interpret the space. Each of the three movements adopts a different approach: the first through a musique concrète-style reconstruction of different sound recordings, the second through audio looping segments and the juxtaposition of different perspectives of the same material, and the third through processing to filter and shape the sounds to allow new elements to emerge. Throughout this, the experience of CVR is used to communicate the visual space, providing a site which can be mediated via sound.

4.3 Abstract Reality

Studies: *Stasis Study #1*
Stasis Study #2
Figure Study #1
Work: *Myrkur Dagar*
infinitely gentle, infinitely suffering

4.3.1 Stasis Study #1 and #2 (2018)

One of the original ways I wanted to discuss how abstract reality spaces can be constructed was through a conceptualisation of how abstraction might manifest itself visually. Two of the ideas I had for an abstracted

representation of space was through the manipulation of space and time. This idea came from Pluta's discussion of the Source Bonding Grey-Scale (see Chapter 3.5.1, Figure 6). However, instead of basing the manipulation of a source sample around distortion and delay, I conceived of manipulating a CVR recording around the features of time and space. This conceptualisation was experimented with in *Stasis Studies #1* and *#2*, before being adopted in other larger pieces.

As the name implies, *Stasis Study #1* explores elements of visual stasis, where visual material is dependent on the manipulation of video at the frame level. There were two experiments undertaken investigating this. The first took a single perspectival frame, separating out defining features of the landscape and then applying video processing to them. The second experiment involved extending the perception of time in an unnatural way by having a short video slowly transform over a significantly longer time scale. These techniques, implemented in other fixed frame video artworks by artists such as Kurt Ralske (*Times Square Timeshare*, 2006) and Bill Viola (*The Greeting*, 1995) had not formed a basis of the language of CVR, and the action of applying these techniques to a space rather than a frame were not insignificant. The audio materials were selected to reflect this sort of visual abstraction, utilising time-stretched audio materials along with ambisonic fields generated by early iterations of the field-gen patch, discussed in detail in the discussion of *infinitely gentle, infinitely suffering*.

In *Stasis Study #2* I wanted to explore the aesthetic potential for embedding one environment into another - to explore double exposure in a mobile frame context. After some initial tests with still images resulted in some interesting effects, applying this process to video seemed like the next logical step. The results were highly effective, creating a mural like effect where moving images appeared to exist within walls and other structures. The developments here would be foundational for later work, in particular *infinitely gentle, infinitely suffering*. The audio for *Stasis Study #2* was created from a collection of field recordings and a central voice recording provided by friend and performer Aviva Neff. The monologue, which she had written and performed in 2017, was foregrounded against atmospheric recordings, creating a clear foreground and background relationship between the sonic components. This interaction would again prove to be foundational for later compositions.

4.3.2 Figure Study #1 (2018)

I dedicated significant time to capturing footage of the movement of a person in a green body suit for later experiments and works in 2017. The core idea behind developing this visual motif and capturing footage was to try to find a way to communicate space through a human figure, allowing their shape and movement to act as a window for a larger space, creating a mobile frame within the CVR environment. The use of a green-suit allowed me to treat the figure as a moving, human green screen. *Figure Study #1* was the first attempt

to explore this idea, using a green-figure recording to silhouette a more activated video of a space against the fixed space the figure is placed within in CVR. The space articulated by the silhouette is similarly placed within the physical space of the piece, on different walls and shapes, creating a very clear interaction between a real space and an unreal presence of space, creating an abstracted reality, or one where the sense of reality is mediated by the presence of clearly unreal materials.

The sonic elements of *Figure Study #1* similarly attempted to fuse real and digital elements, combining some outputs of the field-gen and ambisonic granular synthesis patches with ambisonic recordings made in St Paul's Hall with Colin Frank. This study was an important exploration of ways to combine different materials from different spaces to create a coherent audiovisual experience. In doing so this study helped to articulate my differentiation of reality spaces, formulating an idea of abstract reality comprising of different elements that are not necessarily connected but are brought into one experience, in this case two different CVR recording sessions, and audio from multiple, unconnected sources – the recordings include percussion and footsteps, for which there is no clear visual source, and the ambisonic audio recordings do not relate to the space recorded in CVR.

4.3.3 Myrkur Dagar (2017-19)

Myrkur Dagar was created originally as a piece for voice and electronics, expanding on the development of the room feedback system I developed and implemented in *Tone Studies #1* and *#2*. The goal of this feedback system was to engage with the idea of space, of creating a material drawn from the architecture of a specific location as a musical material. In doing so, I was drawn to the fragile intensity of the sound world, allowing small sounds and movements to be amplified and affect the sonic outcome of the processing. This piece was then used as the sonic counterpart for visual material I had been creating using frame differencing.

(Kamperman, 2017) This visual idea - the idea of creating a visual impression not from the space but by the activity of a space - seemed to counterpart audio created from a similarly ephemeral process.

The concert piece was written for soprano Juliet Fraser (see Appendix C) and performed in St Paul's Hall, Huddersfield on February 9, 2017. The concert work uses live vocal performance and pre-recorded electronics to excite and interact with live feedback generated by the Room Resonance Feedback patch (see Figure 10). My intention with this piece was to create a landscape of material that musical and syntactical elements could emerge procedurally from and react to.

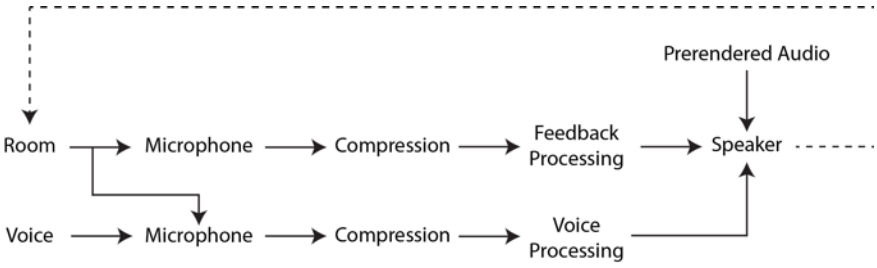


Figure 10: Signal flow of electronic processing in *Myrkur Dagar*

The score itself articulates three kinds of sound qualities: mouth noise, breath and sung pitches. The performer's vocalisations are then fed into the feedback system, modulating and effecting the sonic output (see Figure 10). Of these sound qualities, sung pitches are related directly to this sonic output. For these passages, the performer is called on to sing audible pitches generated by the live electronics, unique to the performance space. In much the same way as the patch seeks to mediate a set of possible room resonance tones, this performance instruction seeks to ensure that the progression of pitch is built from the natural acoustic resonance of the space, and not a preordained compositional structure.

This idea of navigating a landscape of material was also applied to the libretto (see Appendix D). While words are fixed and progress sequentially, the final libretto was generated by the process of deliberate destabilisation and reinterpretation of the sentence: "I will see you again when there is nothing left." This sentence was translated and re-translated into multiple languages and finally back into English multiple times, generating a 25-line libretto which was used for much of the mouth noise passages. This libretto was then further mangled by the application Argeïphontes Lyre to create a unique sequence of individual words. This was used as lyrical content for the sung material, creating contrasting passages that appear similar but disconnected. The intention of this process was to create a libretto that operated as a wash of words that could invoke an impression rather than a precise, articulated phrase with semantic meaning. In this way, the

libretto creates a general impression of idea and theme, operating in a way I find analogous to the ideas of field recording and landscape.

When constructing the CVR context for *Myrkur Dagar*, my initial impulse was to use the same space that the audio was recorded in, St Paul's Hall. However, this quickly proved to not be an option, since the amount of activity that took place in the space was minimal to none, and so would not have worked with the frame differencing process. Instead, I decided to move away from the more literal documentations of space and focus on materials that I felt evoked and supported the mood of the work instead. I returned to some material I had recorded in Perth, Australia in 2018 at the Herdsman Lake nature reserve. The visual materials comprise three different scenes, the first of the rolling water at the lake, the second of a bush scene in which four different panels gradually appear showing drone footage of the abandoned Sunset Hospital site (footage sourced for but not used for *infinitely gentle, infinitely suffering*) and finally a scene with a focus on a tree in a field. Thematically, *Myrkur Dagar* is a darkly apocalyptic piece, conceptually constructed as though from the remnants and recalled fragments of a space that no longer exists.[6] Frame differencing natural spaces of Herdsman Lake and drone footage gave seemingly static fields and sites a sense of dynamic activity and presence, with the small oscillations resulting in a dramatic change in picture content. The idea of echoes and remnants of a past dimly remembered and reconstructed imperfectly through text, sound, and visuals fitted well with this abstract collection of materials.

Myrkur Dagar is an example of an abstract reality space, in that it draws on elements of a real space but alters the CVR materials such that the space that is created is abstracted from reality, not referring to the original location but creating a new space with its own characteristics. Since the visuals ebb and flow in a way that a more representational CVR space does not, *Myrkur Dagar* is mostly built around a familiar mobile frame experience, placing the viewer within a space with a clear sense of proportional relationships between them and the world they are surrounded by. A new element is added at 3m41s when the first of four panels is introduced into the space. The other panels appear at 4m07s, 4m45s, and 5m36s respectively, each 90˚ from the location of the other until they surround the viewer. While I had previously explored masking CVR video on objects or structures in the space, the intention here was: 1) to try to fuse the two spaces together; 2) to play with the ambiguous sense of depth already afforded by the use of frame differencing; and 3) to try to have the fixed frame drone footage provide a layer of activity between the viewer and the surrounding environment. While in a literal more realistic setting this would be akin to a painting or screen on a wall, the abstracted nature of *Myrkur Dagar* makes this perspective more ambiguous, allowing the black and white elements from both videos to blend with one another in unique ways.

[6] It is worth acknowledging the piece came together in the months following Donald Trump's election to office, and so some sense of despair was no doubt drawn from this event that would foreshadow a continued cultural and political decline the following years.

Myrkur Dagar demonstrates a shift towards an interest in composing atmospheres over realistic spaces. Materials are specifically selected and abstracted, and in so doing the work exists in not what the work is made of but the mood that the work radiates. This is achieved, in part, through the use of processing to separate the spaces from a realistic depiction, and through the use of deliberately unrelated materials, sounds, and spaces, brought together to evoke an aesthetic response. Böhme conceives of architectural atmospheres emerging from a void via the bodily experience of the viewer. *Myrkur Dagar* adopts this idea of the voice quite literally, utilising a large amount of black space from which features and structures can emerge through the process of frame differencing. It is this experience with the relationship of structures in space that can evoke an atmosphere, and it was this conceptualisation of working with CVR space that drives the aesthetic experience of *Myrkur Dagar*.

4.3.4 infinitely gentle, infinitely suffering (2018)

infinitely gentle, infinitely suffering is an exploration in density, both visually and aurally. In doing so, it imposes the physical characteristics of different spaces onto another to create changing, abstract and transient landscapes, gradually destabilising the properties of the landscapes foreground, mid-ground and background. The piece was realised in three different versions: 1) a CVR video work; 2) a triptych fixed frame video work; and 3) an installation. The work was exhibited at the Electric Spring Festival, February 2018; re-sound: Shadow of a Shadow, May 2018; and at the Huddersfield Contemporary Music Festival, November 2018 as part of the SPIRAL showcase installation series.

infinitely gentle, infinitely suffering is a highly abstracted work, creating a new sense of space from multiple other real spaces. As such, it made sense for this piece to be less focused on any field recording aspect, and instead focus on creating an abstracted sound environment. The music was largely composed through the emergent properties of the field-gen patch. The field-gen patch was initially designed to be a treatment patch for field recordings, but has been used with a wide range of different sounds, attempting to apply a sense of movement to sound samples reminiscent of real spaces by crossfading different sound sources dynamically between one another and then outputting multiple points of sound that can be spatialised. The field-gen patch itself is relatively simple, the patch loads three sound files into three buffers and the playback of each is continuously cross-faded between one another (see Figure 11). Each sound file can have its speed of playback manipulated, either speeding up or slowing down the playback, or time-stretching it to some degree. Two additional streams of each sample are created by delaying the signal by ~10 second and ~20 second intervals and subjecting these two delays to pitch shifting. In this way, nine individual points of sound are created from the three original sound files, each differentiated from its source but remaining related through the shared origins of their material.

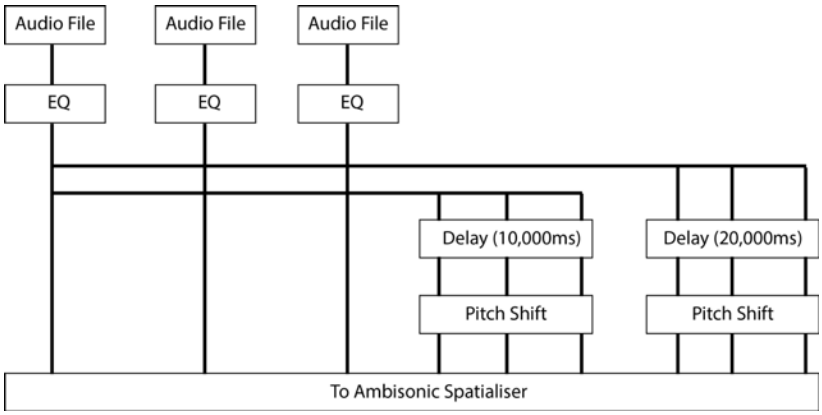


Figure 11: The field-gen patch

The spatialisation was handled by the ambi-spat patch. The ambi-spat patch was created as a way to generate spatial audio files that were compatible with the CVR video format in a case where there was no inherent spatial information to the audio itself. The patch takes nine different inputs and arranges them spatially before outputting this arrangement as an ambisonic audio file (see Figure 12).

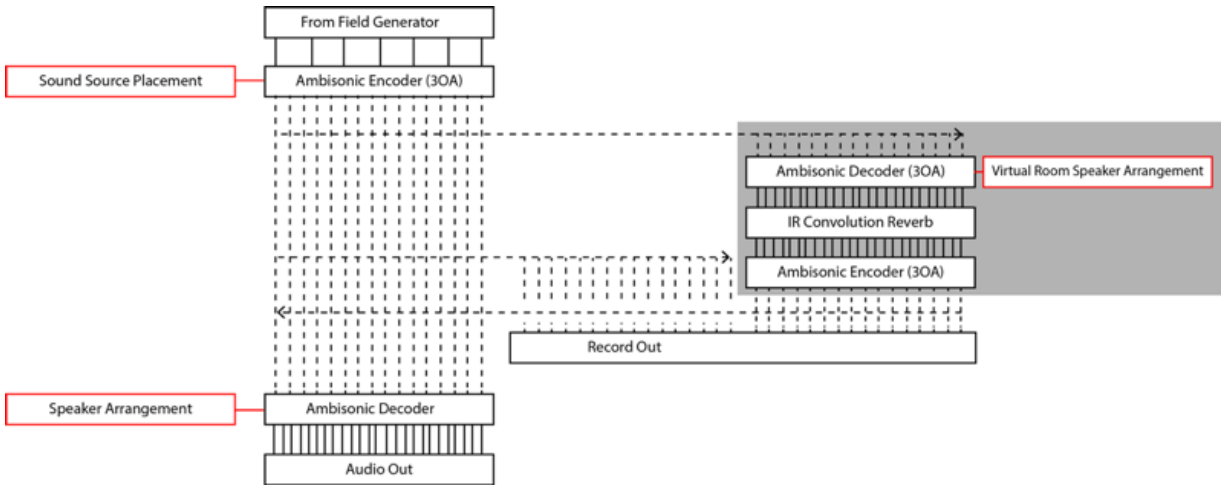


Figure 12: The ambi-spat patch

The spatiality is somewhat randomly determined according to pre-configured clustering patterns, allowing different points of sound to be arranged around the centre point, or within a subset thereof (see Figure 13). The distance from the centre point and the degree of elevation above or below the horizon can be set for each individual point or manipulated via macro control knobs.

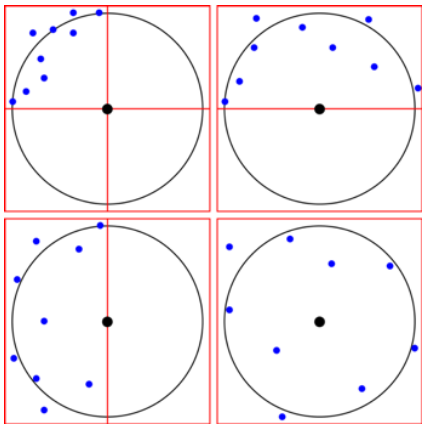


Figure 13: ambi-spat example distribution patterns (clockwise from top left)

a) quarter b) hemisphere c) hemisphere d) omni

In this way, the ambi-spat patch can quickly and easily place sounds fed to it within a three-dimensional space. An additional patch, the ambi-verb patch, was used to add some presence to the outgoing sound using the ambipan and HISSTools MAX externals. The design of the ambi-verb patch was based on the design outlines proposed by Fernando Lopez-Lezcano (2014), whereby the clean ambisonic signal is decoded into multiple virtual speaker locations, convolved using the HISSTools multiconvolve~ object, and then re-encoded into an ambisonic audio format.

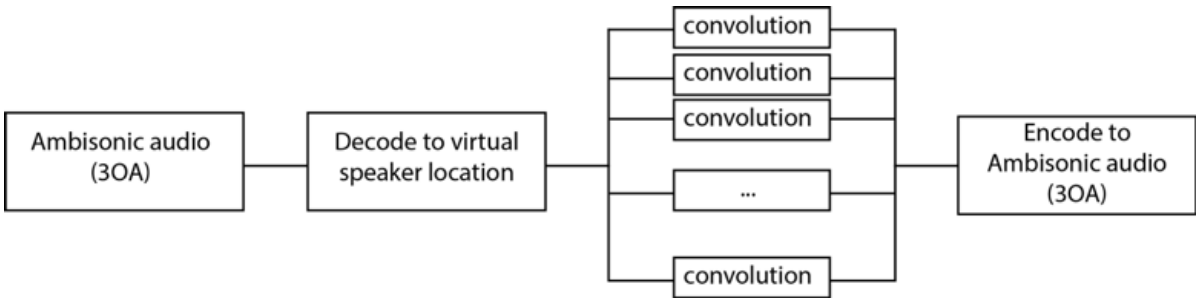


Figure 14: The ambi-verb patch

While there were decisions that went into the selection of sound recordings and the resulting arrangement of processed material, the process of creating material with which to compose with was interfered with minimally, prioritising the possibility for sound relationships to emerge from the processing structures as much as possible. The resulting output of the processing was recorded directly as a single spatialized multitrack ambisonic audio file, giving the material generation process an important temporal aspect. The materials generated were manipulated and contrasted with one another in real-time, meaning that the ability to reproduce an audio file was difficult. This meant that I was forced to work with the resulting audio 'landscapes' as they were recorded, in a process akin to working with a field recording made at a specific time and place.

The source materials chosen ranged in content from field recordings to instrumental samples. Long sound files (greater than a few minutes) were prioritised as this allowed for the greatest amount of manipulation, and for the most identifiably unique sonic materials to be created. Much of the material was created by playing these recordings back at very high (more than 30x) or very low speeds, to create a variety of timbrally diverse textures that have properties tying them to their original source, but which through this processing, are not immediately discernible as belonging to a particular object or landscape.

Structurally, the composition is a form of continuous variation. Musically, the intention was to move between materials in such a way that a consistent sonority was clearly audible throughout, but that the passing of time within the composition was evident. Similar to the way the sonic qualities of a landscape may change over the course of a day, with elements becoming more prominent in some parts of the day and less in others, but clear sound marks or defining environmental qualities remain or exert their influence on these changes. This results in a timbrally light first half of the piece, with music box melodies, and whirring field recordings, which gradually transition into a darker second half incorporating processed drums, glitch electronics, and ambisonic tamtam recordings. The libretto from *Myrkur Dagar* was reimplemented here, in this case the words being clearly recorded, by Aviva Neff, and slowed down slightly to fit the ethereal aesthetic of the visuals and sound.

The visual materials reflect this transition. The first half of the work is relatively sparse, presenting two spaces embedded within one another sequentially, a field within a room, and the top of a tall building within a hall. These two composite frames are related in that they take open spaces and recontextualising them inside of closed spaces, clearly defining boundaries where there are none in reality. There is a significant amount of time spent in these spaces which helps to establish both a visual tone for the rest of the piece, and to give the viewer time to adjust to what they are seeing. As the music transitions, so too does the video. Between the two vocal parts, there is a slow tracking shot down a long hallway. The space beyond the doors and windows has been replaced with an abstract texture. As the end of the hallway is reached there is a fade to the image of the field presented previously, uninterrupted. However, before we can truly focus on this, multiple other spaces are superimposed onto the frame, strobing and shifting of their own accord. This continues for the second half of the piece, with multiple different spaces being presented and imposed upon one another in more rapid succession, continuously shifting to blur the boundaries between different spaces, boundaries presented of each landscape continuously redrawn by one another.

The CVR version of *infinitely gentle, infinitely suffering* uses a conventional mobile frame perspective. Similar to *a sound world for small things*, *infinitely gentle, infinitely suffering* attempts to build an omnidirectional experience of the space, with the wide diffusion of sound objects and no clear point to focus on. This ensures that the viewer can always remain oriented within the space but is not directed to any specific point of focus. Instead, the piece is constructed to allow the viewer to navigate the space freely and to focus on visual elements that capture their interest. A fixed frame version was necessary when the piece was to be exhibited as part of the Electric Spring Festival 2018, and after many experiments a triptych version was made for a single screen. The triptych takes three perspectives of the CVR video at 120˚ intervals, reducing three potential viewpoints into a single frame experience. This is different to the use of a triptych in *Three Perspectives of a Field in Huddersfield* – in this case, rather than taking three different perspectives and presenting them simultaneously, *infinitely gentle, infinitely suffering* provides three perspectives from the same location. In this way, this implementation of the triptych attempts to present an approximation of the experience of CVR's mobile frame in a fixed frame medium, allowing the viewer to switch their focus between the three panels at will.

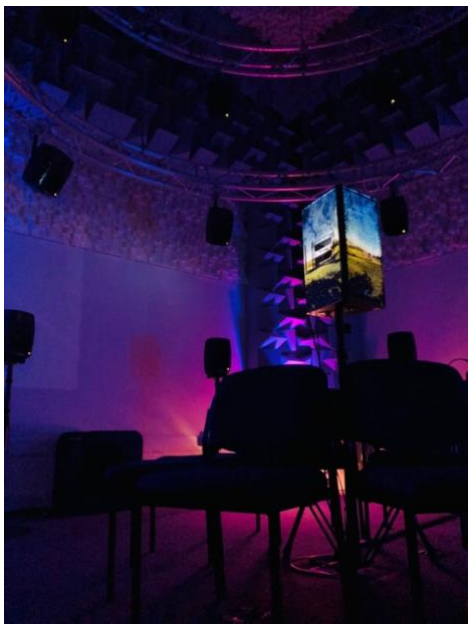


Figure 15: Photo of the installation version of *infinitely gentle, infinitely suffering* from the SPIRAL showcase at hcmf// 2018

The installation version of *infinitely gentle, infinitely suffering* inverts the relationship of the audience to the frame. In this case, rather than taking a space and placing the viewer within it, the video materials are projection-mapped onto a speaker in the centre of the room, necessitating the viewer to walk around the stationary object to see all aspects of the video environment (see Figure 15). This embodies the central speaker – from which the central monologue is emitted – with a changing physical property, as it captures and holds a potentially infinite space. While the video and vocal monologue remained the same, the musical materials were significantly transformed for the installation version, time-stretching the original twelve minutes of audio to a new duration of an hour. This process was in keeping with the compositional ideas in the field-gen patch, where sounds were transformed temporally in order to allow new emergent relationships to occur. In this case, by time-stretching the original music, the installation allowed for new emergent properties to occur between the visuals, the monologue and the transformed spatial audio environment.

infinitely gentle, infinitely suffering is primarily concerned with the landscape as a defining element of space, of how the foreground, mid-ground, and background can structure an experience of place and how the experience of real space can be abstracted and dissolved. Here, the landscape is unreal, but is clearly based on the real shapes and boundaries of real environments, an emphasis on visual form and structure that emerged from reading the work of Tim Ingold. The shift in atmosphere this can evoke is of a central preoccupation, utilising the shifting boundaries of the landscape, the colour, the lighting, the abstract sonic

environment, the use of text and monologue, and the rate of change and transition between spaces to evoke a unique atmosphere that uniquely defines the space of *infinitely gentle, infinitely suffering*.

4.4 Unreal

Studies: *Stasis Study #3*
Work: *Inland*

4.4.1 Stasis Study #3 (2018)

Stasis Study #3 was an attempt to explore CVR from a different perspective. In so doing it proved to be the first articulation of a completely unreal space. The stasis element comes from taking a single frame of video that I then proceeded to energise and manipulate as dramatically as possible. These manipulations were made in response to a more aggressive granular synthesis composition I had made, inspired by the audio-visual collaborations between Curtis Roads and Brian O'Rielly – in particular *Half Life pt 1. Sonal Atoms*. The result was rewarding. I was able to find a satisfying visual context for the various arcs and transitions of the audio, and the approach to treating the material as a substance to be bent around the activity of the audio was effective. In particular, an interesting push-pull dynamic was established, where the video would transition between having recognisable environmental and spatial properties, and a more abstract visual texture. This would prove to be the foundation for my conceptualisation of an unreal CVR space, and this study helped solidify, in my mind, the implications of an unreal space. I noted that there was an ability to be lost in the unreal CVR world, to start with an idea of a space and quickly surrender to the notion that the experience is not constructed with a specific space in mind, instead focusing on a wash of texture and activity. While this experiment resulted in a number of interesting observations, the end result was too recognisably close to the original inspiration in aesthetic for me, and so this study also forced me to evaluate where my own aesthetic sat within the experience of an unreal CVR experience.

4.4.2 Inland (2018)

Inland is a CVR work that explored numerous ideas concerning abstract and abstracted space. The piece seeks to chart the boundaries between a recognisable CVR reality and an unreal subsumption into texture, and to play with these limits as an audiovisual interaction. The audio in turn, is highly abstracted, blending field recordings with acoustic instrument recordings, but always with an intention to place these sounds within the space as a part of a broader soundscape. In stark juxtaposition to *Stasis Study #3*, *Inland* evolves slowly over the course of 17 minutes. In response to the stylised kinetic activity of this previous study, I decided to take my time with the materials of *Inland*, and see how my slower, more emergent compositional practice would fit within an unreal space.

Inland slowly builds a dense block of activity that comes to the fore, before this is subsumed by new material that itself comes to dominate the surface activity. Sonic material moves wave-like to occupy different levels of foreground, mid-ground and background activity. It is a form that draws upon Simon Emmerson's notion of local and field frames, with the first half attempting to push the extent to which this dense block of activity can function as a landscape field frame, before transitioning to more pronounced local and field relationships between materials.

Musically, the piece pairs ambisonic field and instrumental recordings with sound generated by the field-gen patch (see Figure 11). The piece explores different manipulations of audio density, while still retaining the properties of an auditory landscape as described by Simon Emmerson. The piece develops during the first nine minutes, starting with field recordings of a city street before introducing material derived from ensemble recordings of an earlier piece of mine, *Apologies, I Am Here Now* (2016). This material grows

increasingly active and dense; however, no specific element or motif comes to the foreground for more than a moment. The effect, for me, is somewhat analogous to the experience I had when I returned to Australia in 2018. While sitting in a local park close to home, the cacophony of birdsong that surrounded me was overwhelming. I was struck with an awareness of the intense spatiality and density of sound, which was fascinating in its interaction, and yet each element operated on the same dimensional plane. As such, this section of *Inland*, concerned with the growing electroacoustic instrumental activity strikes me as operating in a similar way, with the block of sound never separating into a dialogue of foreground and background.

The video materials undergo a similar change over time, with the arch seemingly emerging from nothing, before the city street fades in to fill the negative space. The construction of the scene is designed so that all changes and activity occur behind the mid-ground space defined by the archway. This ensures that while there may be activity in the landscape itself (the panning texture fused with the scene, the movements of cars and pedestrians, and finally the emergence of trees breaking up the skyline) they never cross over the boundary established by the archway.

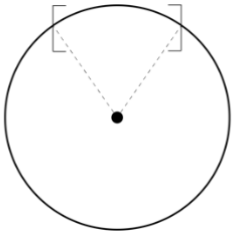
From here, the instrumentation grows increasingly distorted, a change paired with the gradual distortion of the scene. The first entrance of a human figure comes out of this distortion, the boundaries of the body blending and sharing material with the distorted scenes behind it. It is important to note, that the figure is the first visual object to transgress beyond the archway, but by this point, with the scene so significantly distorted, these previously firm boundaries have dissolved. As the scene changes, human figures emerge that claim a more rigid boundary with the background, their shapes defining a space in the video through which we can see the surrounding source material clearly. In a similar way, the musical elements being to stratify, with piano samples, glitching clicks, granular synthesis and percussion recordings slowly starting to occupy different positions in the landscape. Eventually, the visual landscape becomes redefined by the boundaries of these bodies, with the distortion forming a background to the larger figures occupying a different distorted space in the mid-ground, and the smaller figures providing the clearest material in the foreground.

Inland utilises a somewhat different implementation of the mobile frame perspective, in that it places a large amount of the visual information within a 130˚ segment of the landscape instead of the decidedly omnidirectional structure of space in other works. In this way, the viewer's attention is directed towards a clear focus point within a landscape. One of the biggest issues with an unreal space is that the viewer can become disoriented much easier as their grounding in the space is less analogous to a real spatial experience. As such, the viewer occupies a static position and the space changes and develops around them rather than attempting to move them through it in any way. The arch is used as an anchor throughout the changes in space to help ensure the viewer remains oriented, and is able to look around as the space becomes more

disconnected from reality. This is in contrast to *Stasis Study #3* where there is no clear way to anchor the viewer's perspective, and as such it is possible to have the viewer feel in control of where they are facing.

In *Inland* the primary concern is in creating an atmosphere from materials divorced from a sense of reality. While the video is still clearly a product of recorded space it increasingly becomes less rooted in the atmosphere of that recorded space and begins to evoke a sensation that is entirely a product of its constituent elements – colour, light, shade, shape, sound, and so forth. This evocation is best exemplified by the use of human figures. The figures are used as a container for space before becoming a contributing element of structures that shape the wider landscape. *Inland* thereby reflects the most extreme engagement with space in CVR, an experience of space not articulated by recognisable structures or perspectives, but of a landscape increasingly constructed by distorting and manipulating the elements that tether a CVR space to reality.

CONCLUSION



5.1 Conclusion

This PhD set out to address two fundamental questions:

1. What are the aesthetic considerations that must be accounted for by practitioners using 360˚ video and CVR technologies for audiovisual work and how do these differ from existing media formats?
2. What creative opportunities are afforded the audiovisual composer in CVR?

These questions were reflective of a lack of academic discourse surrounding CVR in 2016 when I started this research. Although there is a growing awareness of CVR in commercial and experimental work, the academic discourse has not been significantly developed or theorised in the intervening years. Although 'frames' and 'spaces' were not the original focus for this PhD, these concepts quickly emerged as focal points for both creative activity and differential points from my previous work with fixed frame media. Whilst it is simplistic to say that the only difference between fixed frame media and mobile frame media is in their use of the 'frame' and the subsequent relationship to either a constructed or mediated 'space', it quickly became clear these concepts were the most notable yet broadly underdiscussed elements of CVR. I realised that the lack of discussion about the conceptual differences between the fixed and mobile frame was limiting the use of CVR for communicating ideas it was more naturally suited to. As such, I consider the theorising of audiovisual compositional practice that centred around frames and spaces in CVR was clearly needed as a way to categorically assemble a number of related ideas and focus these thoughts towards an original creative practice.

In addressing these questions, I have considered a wide range of creative responses, and sought to reappropriate ideological frameworks from other sound and visual media as a means of developing a creative methodology for my own CVR practice. The aesthetic considerations are shaped by an understanding of the mobile frame and the relationship between the viewer and the space around them. As has been demonstrated, what is possible from both a technical and creative perspective is shaped by these characteristics. It is these differences that separate CVR from fixed frame media, and which necessitates a deeply considered exploration of a CVR practice. Most notably, my creative response to the questions posed by working with CVR have also had ramifications for my compositional work, specifically addressing notions of 'landscape' composition rather than composing with specific events and gestures, and a consideration of ambisonic space.

It was my opinion in 2016, as it is now, that the use of CVR was limited if only used as a replacement for fixed frame media. Rather, the media itself presents the opportunity to recognise and develop a new expressive language outside of narrative films. My claim then was that only by approaching CVR from a varied range of

artistic pursuits – music, theatre, documentary, visual art, and so forth – could we begin to understand the screen grammar and communicative potential of CVR. As such, my creative works approach CVR as a medium for audiovisual composition in a decidedly musical fashion, exploring the audiovisual language of CVR through musical decision making, processes, and structures. In defining the aesthetic considerations for practitioners of CVR – that is, a consideration of the impact of frames and spaces on the media – the creative opportunities afforded the composer have been demonstrated to be varied. These range from field recording to musique concrète montage; from room feedback recordings to processed audio; from concert pieces, to fixed media pieces, to installation works. These different approaches have resulted in considering the audiovisual as a graduated scale moving from: 1) the real; 2) the representational; to 3) the unreal. This diversity established the breadth of creative potential in CVR while demonstrating noticeably different experiences than found in any fixed frame counterparts.

When starting this research, it quickly became clear that a number of my initial technical and aesthetic ideas for creating work would be unviable. This highlighted the importance of creating studies before attempting larger works. With a small repertoire of influential work to draw on, many ideas were simply unexplored in CVR, and so necessitated small-scale experimentation before larger works could be created. However, this project's musical approach to exploring CVR has resulted in several unexpected observations. A common feature throughout the work in this portfolio is an emphasis on emergent phenomena. This approach is evident from the randomness of a field recording or the construction of tools to populate a sonic field, to the navigation of the field or the combination of visual elements to create an entirely new visual object. Admittedly, this is in part a product of my own creative interests, however, that CVR has proven to be such a natural medium in which to explore this interest is reflective of a core element of its expressivity. Because of this, my portfolio developed a far greater emphasis on emergent compositional processes than I originally intended. Similarly, the musical orientation of this project has afforded the development of CVR pieces that develop far more slowly than is normally possible in narrative film making. Initially I was expecting to be able to approach the pacing of materials in a similar way as I had in previous fixed frame media works. However, the different experience of CVR soon necessitated a slower pace with a resulting greater focus on being in a place and deeply immersed in the material. As my work developed, it became clear that the focal point of my PhD research would be on how the two distinguishing characteristics of CVR – frames and spaces – had come to shape my creative thinking and methodology, particularly in terms of thematic content and the aesthetic experience of my CVR work.

Chapters 1-3 of this commentary seek to outline and critique a number of disparate ideas put forth by CVR practitioners. In doing so, this allowed me to reflect on the work that has been done so far and identify original and unexplored areas in both the theory and creative application of CVR. The portfolio in turn engages with these original insights through studies and works that not only examine different themes and

contexts offered by CVR but which comment and reflect upon the worlds they evoke in a creative and aesthetically engaging way.

5.2 Further research

This PhD is only a starting point for a wider appreciation for CVR as a creative and communicative tool. This commentary outlines some central ideas behind CVR's most unique aspects – frames and spaces – from the perspective of this creative practice. However, this is still only a small aspect of CVR's potential contribution to the visual medium. Other important points of difference between fixed frame media and CVR – the development of scene, the perception of time, the language of editing, the reconceptualization of montage, and so forth – are all elements of CVR that remain underexamined and which will need to be discussed and explored more fully in order to contribute to a meaningful understanding of a comprehensive CVR screen grammar, and to elicit strong, coherent creative outcomes. Beyond this, the ideas and mechanisms of CVR that have been explored thus far, and which are outlined in this commentary, require further refinement through creative practice. Different perspectives and different creative intentions need to be applied to CVR in order to develop a more refined understanding of what does and does not work, and why. The technology for VR environments, while still in development, is technically sound and capable. The big question going forward is 'what can be done with this?' This PhD goes some way towards opening up these possibilities, in outlining theoretical concepts and how they can be creatively explored in CVR works. However, this necessarily requires further thought and consideration from creatives. Nonetheless, this PhD demonstrates that a wide range of creative ideas are possible through CVR, and it is my hope that it will provide the resources necessary for other creatives to work with CVR and create new and interesting works for the medium.

After this period of working with essentially fixed media works, I am interested in returning to composing for chamber ensembles, and developing larger scale mixed media experiences. Areas I wish to explore include developing works that place performers and ensembles into a CVR environment that communicates this space effectively; and works that explore the negotiation between CVR as a container for space and the translation of this material to a physical space for audience experience. Beyond the experience of VR environments, I am interested in CVR's inherent nonlinearity. My previous compositions have utilised graphic, nonlinear and video scores. CVR's openness offers a new way for performers to engage with nonlinear scores and for composers to organise musical information visually in an open and unique way.

My sustained work with CVR has reminded me how fixed the conventions of fixed frame media are for the audiovisual composer. In addition, I have also become aware of the shared approach to materials and the resulting expressive language of so many composers. After spending four years attempting to develop an

understanding of a completely unique visual medium, I am encouraged to return that focus towards fixed frame media, to question some of our underlying understandings of how we communicate in a fixed frame audiovisual composition. In particular, the development of corpus-based visual processing tools to classify and retrieve visual elements is the locus of my current thinking and proposed research, potentially opening the door towards unique methods of expression that develop beyond the established norms.

In its current state, CVR has no established wisdom outside of a few observed technical considerations. This is part of what makes it so fascinating, both creatively and its current moment in history. I do not know if CVR will become a unique force for expressivity in our culture, or if it will be forgotten as a fad. But I do know that it has the potential to provide creatives another tool for expressivity, to say something new or reflect on our world with a fresh perspective - and this must always be worth exploring.

REFERENCES

Books, articles, journals, other publications

Altman, Rick. 1980. “Moving Lips: Cinema as Ventriloquism.” *Yale French Studies*, 60, Cinema/Sound: 67-79.

Anderson, Grant. 2016. “The Cinematic VR Field Guide. A Guide to Best Practices for Shooting 360˚.” PDF. First edition. Jaunt, Inc. https://www.jauntvr.com/cdn/uploads/jaunt-vr-field-guide.pdf

Augé, Marc. 1995. *Non-Places: Introduction to an Anthropology of Supermodernity*. London: Verso

Bartle, Richard A. 2004. *Designing Virtual Worlds*. Indiana: New Riders Publishing.

Belton, John. 2004. “The curved screen.” *Film History* Vol 16: 277-285.

Böhme, Gernot. 2017. *The Aesthetics of Atmospheres*. Oxford: Routledge.

Böhme, Gernot. 2018. *Atmospheric Architectures: The Aesthetics of Felt Spaces*. London: Bloomsbury Visual Arts.

Brown, Emily and Cairnes, Paul. 2004. “A Grounded Investigation of Game Immersion.” In *CHI EA ’04 Extended Abstracts on Human Factors in Computing Systems*, 1297-1300. New York: Association for Computing Machinery.

Butler, Rebecca. 2007. “Are the stereoscope, stereopticon, and stereo viewer one and the same?” *TechTrends*, Vol. 51, No. 5 (September/October): 17.

Casey, Edward. 2013. *The Fate of Place: A Philosophical History*. USA: University of California Press.

CeReNeM | Centre for Research in New Music. 2018. “Sam Pluta: Information as beauty in musical software design [25.11.2016]”. Accessed April 22 2020. https://www.youtube.com/watch?v=tweKuk6HZVg

Chion, Michel. 1994. *Audio-Vision: Sound on Screen*. New York: Columbia University Press.

Csikszentmihalyi, Mihaly. 1975. *Beyond Boredom and Anxiety: The Experience of Play in Work and Games*. San Francisco: Jossey-Bass Inc., Publishers.

Csikszentmihalyi, Mihaly. 1990. *Flow*. New York: Harper & Row, Publishers, Inc.

Cutting, James and Vishton, Peter. 1995. “Perceiving Layout and knowing distances: The integration, relative potency, and contextual use of different information about depth.” In *Handbook of perception and cognition, Vol 5; Perception of Space and Motion*, edited by William Epstein and Sheena Rogers, 69-117. San Diego CA: Academic Press.

Demers, Joanna. 2010. *Listening Through the Noise: The Aesthetics of Experimental Electronic Music*. New York: Oxford University Press.

Dick, Bernard F. 2005. *Anatomy of Film*. 5th Edition. Boston: Bedford/St Martins.

Dooley, Kath. 2017. “Storytelling with virtual reality in 360-degrees: a new screen grammar.” In *Studies in Australasian Cinema* 11.3: 161-171.

Eisenstein, Sergei. 1977. “The Filmic Fourth Dimension”. In *Film Form: Essays in Film Theory*, translated by Jay Leyda. 64-71. USA: Harvest/Harcourt Brace Jovanovich.

Emmerson, Simon. 2007. *Living Electronic Music*. England: Ashgate Publishing Ltd.

English, Lawrence. 2017. “Relational Listening: A Politics of Perception.” *Contemporary Music Review* 36.3: 127-142.

Fisher, Mark. 2014. *Ghosts of My Life: Writings on Depression, Hauntology and Lost Futures*. London: zer0 books.

Fuchs, Philippe, Arnaldi, Bruno, and Tisseau, Jacques. 2006. “La Réalité Virtuelle Et Ses Applications.” In *Le traité de la réalité virtuelle, Volume 1*. 2nd Edition. Edited by Philippe Fuchs and Guillaume Moreau, 3-52. Paris: les Presses de l’Ecole des mines.

Gaut, Berys. 2010. *A Philosophy of Cinematic Art*. UK: Cambridge University Press.

Gillies, Sam. 2020. “Screen grammar for mobile frame media: the audiovisual language of cinematic virtual reality, case studies and analysis.” In *Sound and Image: Aesthetics and Practices*, edited by Andrew Knight-Hill. Abingdon: Routledge. VitalSource.

Grant, Barry K. and Sloniowski, Jeannette. 2014. “Introduction.” In *Documentary on Documentary*, edited by Barry K. Grant and Jeannette Sloniowski. xxiii-xxvii. Detroit, USA: Wayne State University Press

Griffero, Torino. 2010. *Atmospheres: Aesthetics of Emotional Spaces*. Oxford: Routledge.

Holmes, Oliver W. 1859. "The Stereoscope and the Stereograph." *The Atlantic*, [n.d.] https://www.theatlantic.com/magazine/archive/1859/06/the-stereoscope-and-the-stereograph/303361/

Hullfish, Steve. 2020. "Art of the Cut – Walter Murch, ACE with clarifications on his books." Accessed 28 August 2020. https://www.provideocoalition.com/aotc-murch-books/

Ikeda, Ryoji. 2010. "Datamatics". Accessed 6 April 2020. http://www.ryojiikeda.com/project/datamatics/#datatron_advanced_version

Ingold, Tim. 1993. "The Temporality of Landscape." *World Archeology* Vol 25. 2: 152-174.

IOU Theatre. 2018. "Project: Summer 2018, Rear View, Touring in 2017/18". Accessed April 14 2020. https://www.ioutheatre.org/projects/rear-view-484

Ircam. December 2018. "Pockets of Space: report." Accessed 1 April 2020 https://www.youtube.com/watch?v=T9CTa4BiK4Y

Jarenski, Shelly. 2015. *Immersive Words: Mass Media, Visuality and American Literature, 1839–1893*. Tuscaloosa: The University of Alabama Press.

Jerald, Jason. 2016. *The VR Book*. Illinois: Association for Computing Machinery / Morgan & Claypool Publishers.

Johnston, Sheila. 2008. "Lars Von Trier's funny turn." *The Telegraph*, February 22, 2008. https://www.telegraph.co.uk/culture/film/starsandstories/3671331/Lars-Von-Triers-funny-turn.html

Kamperman, Kasper. 2017. "Computer Vision: Frame differencing". Published 31 March, 2017 [Online] Accessed 20 May 2020. https://www.kasperkamperman.com/blog/computer-vision/computervision-framedifferencing/

Kaye, Nick. 2006. *Site-Specific Art: Performance, Place and Documentation*. New York: Taylor and Francis.

Keefer, Cindy. 2008. "'Raumlichtmusik' – Early 20th Century Abstract Cinema Immersive Environments." *Leonardo Electronic Almanac* 16,6-7: 1-5.

Kelman, Ken. 1967. “Anticipations of the Light.” In *The New American Cinema: A Critical Anthology*, edited by Gregory Battock, 22-33. New York: Dutton.

Krukones, James H. 2010. “Peacefully coexisting on a wide screen: Kinopanorama vs. Cinerama, 1952-66.” *Studies in Russian and Soviet Cinema* Vol. 4, 3. 283-305.

Kwon, Miwon. 1997. “One Place after Another: Notes on Site-Specificity.” *October* 80: 85-110.

Lambert, Nick & Phillips, Mike. 2012. “Introduction: Fulldome.” *Digital Creativity* 23:1, 1-4.

LaValle, Stephen. 2019. *Virtual Reality*. Cambridge University Press [publication pending, PDF] http://vr.cs.uiuc.edu/

Lopez-Lezcano, Fernando. 2014. “An Architecture for Reverberation in High Order Ambisonics”. Presented at the Audio Engineering Society’s 137th convention, Los Angeles, October 9-12.

Martin, Brona. 2020. “Spatial Audio: Poetics and Workflows: An interview with composer, Pierre Alexandre Tremblay, February 2020 about his piece Bucolic and Broken.” Accessed 6 April 2020. https://www.bronamartin.org/spatialaudiointerview1_pat.html

Matthews, Emma-Kate. 2019. “Activating Audiences: How spatial music can help us to listen”. *Organised Sound* 24,3: 297-306.

McArthur, Angela. & Kalonaris, Stefano. 2017. “Foregrounding Expectation: Spatial Sound-image Composition in Virtual Environments.” *The New Soundtrack* 7.2: 95-110.

Meyer, David. 2019. “A big supporter of virtual reality content just backed away. Here’s why consumer VR still isn’t a sure thing.” *Fortune*, 17 October 2019. https://fortune.com/2019/10/17/bbc-vr-hub-virtual-reality-closure/

Moore, Matthew. 2019. “Reality check for VR as projects scrapped.” *The Times*, 17 October 2019. https://www.thetimes.co.uk/article/reality-check-for-vr-as-projects-scrapped-frsqktxcw#

Murch, Walter. 1995. *In The Blink Of An Eye*. Los Angeles: Silman-James Press.

mxsichael. 2017. “Get Wanderlost”. April 7 2017. https://wanderlost.abadyl.com/2017/04/07/get-wanderlost-2/

Neafus, Dan. 2014. “The Language of Immersive Cinema”. PDF. Academia.edu. https://www.academia.edu/35156897/The_Language_of_Immersive_Cinema

Nichols, Bill. 1991. *Representing Reality: Issues and Concepts in Documentary*. USA: Indiana University Press.

OpenEndedGroup. 2018. “Pockets of Space (2018 Downie Kaiser + Natasha Barrett)”. Accessed 1 April 2020. http://openendedgroup.com/artworks/pockets.html

Panofsky, Erwin. 1934/1966. “Style and Medium in the Motion Pictures.” In *Film: An Anthology*, edited by Daniel Talbot, 15-32. USA: University of California Press.

Perroud, Benoit, Régnier, Stéphane, Kemeny, Andras, and Mérienne, Frédéric. 2019. “Model of realism score for immersive VR systems.” *Transportation Research Part F: Traffic Psychology and Behaviour* 61: 238-251.

Phillips, William H. 1999. *Film: An Introduction*. Boston: Bedford/St. Martins.

Plunkett, John. 2013. “Feeling, Seeing: Touch, Vision and the Stereoscope.” *History of Photography* Vol. 37, No. 4 (November): 389-396.

Poyet, Louis. 1900. “Cinéorama – Exposition Universelle (1900).” *Scientific American Supplement #1287*. Accessed 22 January 2020. https://en.wikipedia.org/wiki/Exposition_Universelle_(1900)#/media/File:Cineorama.jpg

Rees, Alan L. 2011. *A History of Experimental Film and Video*. 2nd Edition. London: Palgrave Macmillan.

Rusu, Radu B. 2015. “360-Degree Video is a Fad not the Future”. November 8, 2015. https://venturebeat.com/2015/11/08/360-degree-video-is-a-fad-not-the-future/

Schütze, Stephan and Irwin-Schütze, Anna. 2018. *New Realities in Audio – A practical guide for VR, AR, MR and 360 Video*. Boca Raton, Florida: CRC Press, Taylor and Francis Group.

Smalley, Dennis. 1997. “Spectromorphology: explaining sound shapes.” *Organised Sound* 2:2: 107-126.

Sutherland, Ivan E. 1965/2009. “Augmented Reality: ‘The Ultimate Display’ by Ivan Sutherland, 1965”. *WIRED*, September 20, 2009. https://www.wired.com/2009/09/augmented-reality-the-ultimate-display-by-ivan-sutherland-1965/

Tate Modern. 2012. “Lis Rhodes: Light Music” Accessed 6 April 2020 https://www.tate.org.uk/whats-on/tate-modern-tanks/display/lis-rhodes-light-music

The London Journal. 1860. “Sir David Brewster and the Stereoscope”. *The London Journal, and weekly record of literature, science, and art* October 20, 1860: 664.

Uricchio, William. 2011. “A ‘proper point of view’: The panorama and some of its early media iterations.” *Early Popular Visual Culture* 9:3: 225-238.

Vince, John. 2004. *Introduction to Virtual Reality*. London: Springer-Verlag London Ltd.

Virtual Reality Society. 2017. “History of Virtual Reality – Virtual Reality Society”. Accessed 27 December 2019. https://www.vrs.org.uk/virtual-reality/history.html

Wainwright, Jean. 2004. “Telling Times: Revisiting The Greeting”. In *The Art of Bill Viola*, edited by Chris Townsend, 110-123. London: Thames and Hudson Ltd.

Walls, Seth C. 2019. “Tickling the ear with sounds that are almost tangible.” 23 July, 2019. https://www.nytimes.com/2019/07/23/arts/music/natasha-barrett-3d-audio-empac.html

Waterman, Alex. 2014. “Impossible Landscapes.” In *But Is It Edible?*, edited by Will Holder and Alex Waterman, 95-105. Vancouver, Canada: New Documents.

Watson, Zillah. 2019. “Insights into great virtual reality storytelling.” *BBC Blogs*, October 15, 2019. https://www.bbc.co.uk/blogs/aboutthebbc/entries/24db8384-5c79-451c-ab5c-6b1fb05e8eeb

Wiggins, Bruce. 2016. “YouTube, Ambisonics and VR.” April 25, 2016. https://www.brucewiggins.co.uk/?p=666

Wilke, Fiona. 2004. “Out of Place. The Negotiation of Space in Site-Specific Performance.” PhD diss., University of Surrey.

Wilkinson, Andrew. 2017. “Seeking Early Stereo Cards of Nuneaton and Northern Warwickshire”. February 5, 2017. http://www.stereoscopicsociety.org.uk/WordPress/seeking-early-stereo-cards-of-nuneaton-and-northern-warwickshire/

Wishart, Trevor. 1996. *On Sonic Art, new and revised edition*. Amsterdam, The Netherlands: Overseas Publishers Association.

CVR Work

Anthony Powell. March 2017. “Scott Base 360 VR Walkthrough.” Accessed 15 May 2019. https://vimeo.com/207563097

ARTE Découverte. March 2016. “Notes on Blindness VR – DEMO – ARTE.” Accessed 13 August 2019. https://www.youtube.com/watch?v=W2eTgbyiY_0

BBC News. November 2015. “Scenes at Place de la République (360 video) BBC News.” Accessed 20 August 2019. https://www.youtube.com/watch?v=2eWMIpKKc3w

Björk. June 2015. “björk: stonemilker (360 degree virtual reality).” Accessed 15 May 2019. https://www.youtube.com/watch?v=gQEyezu7G20

Celona, Mike. 2017. “Remorse Code (360).” Accessed 28 May 2019. https://www.youtube.com/watch?v=jf1kjfZcHPA

Cosco, Adam. August 2018. “Knives (360˚ Film).” Accessed 25 March 2020. https://vimeo.com/283799758

einundzwanzig. March 2017. “Führerstandsmitfahrt U44 in 360° // DSW21.” Accessed 15 May 2019. https://vimeo.com/208103595

Gary Lout. May 2018. “Policing Flint VR 360.” Accessed 27 May 2019. https://vimeo.com/270512841

GoFly360. March 2018. “How to pass your flight test 360.” Accessed 25 March 2020. https://vimeo.com/232267947

Gorillaz. March 2017. “Gorillaz – Saturnz Barz (Spirit House) 360.” Accessed 15 May 2019. https://www.youtube.com/watch?v=lVaBvyzuypw

HIDDEN. 2018. “The Gate.” Accessed 15 May 2019. https://vimeo.com/channels/360vr/239183959

Hugo Keijzer. March 2017. “The Invisible Man – 360˚ VR Short Film.” Accessed 27 May 2019. https://vimeo.com/207495856

IOU Theatre. April 2019. “Rear View 360 by IOU Theatre”. Accessed 14 April 2020. https://www.youtube.com/watch?v=CphJDF2tZ6w

LonleyLeap. October 2018. “Send Me Home | 360˚ Experience.” Accessed 3 June 2020. https://vimeo.com/295684342

Muse. October 2016. “Muse – Revolt [360˚ Music Video].” Accessed 15 May 2019. https://www.youtube.com/watch?v=91fQTXrSRZE

Ralske, Kurt. 2006. “Times Square Timeshare (2006) (documentation).” Accessed 19 May 2020. https://vimeo.com/14099970

Shah, Minal. May 2018. “Becoming Iron Woman.” Accessed 25 March 2020. https://vimeo.com/269756028

Shivakumar Lakshminarayana. November 2017. “Sights & Sounds of a Coffee Plantation.” Accessed 31 May 2019. https://vimeo.com/241473904

SkyFoxMedia. August 2017. “360: Behind the scenes: Gothenburg Symphony.” Accessed 16 May 2019. https://vimeo.com/230882785

Soneson, Thore. April 2017. “Get Wanderlost !” Accessed 15 April 2020. https://vimeo.com/214470607

The Wallace Arts Channel. May 2017. “Creep (2017).” Accessed 15 May 2019. https://vimeo.com/213898182

The Wallace Arts Channel. May 2018. “Creep 360.” Accessed 15 May 2019. https://vimeo.com/268949817

Tiberiusfilm LLC. 2017. “Home Invasion VR 360.” Accessed 15 May 2019. https://vimeo.com/207889899

Transport by Wevr. “Hard World for Small Things | 360 VR.” Accessed 27 May 2019. https://www.youtube.com/watch?v=VPTPQ_CYRsQ

Ullrich Dittler. March 2018. “Brahms Sinfonie Nr. 2: 1 – Allegro non troppo.” Accessed 16 May 2019. https://vimeo.com/260787174

Ushev, Theodore. April 2019. “NI LAH – Kottarashky, Milenita & The Rain Dogs.” Accessed 1 May 2020. https://vimeo.com/channels/360vr/331446244

VR Playhouse. February 2018. “FIRST PERSON | 360˚ Virtual Reality | Episode 1.” Accessed 16 May 2019. https://vimeo.com/255802023

APPENDIX

APPENDIX A: Complete list of works and performances from 2016-2020

NoizeMaschin!! #106. Concert live stream, Perth, AUS, April 28, 2020. *Three Perspectives of a Field in Huddersfield* [premiere]

DRIFT Ensemble. St Pauls, Huddersfield, UK, September 21, 2019. *A sound world for small things*

Colin Frank. Trotsky's Pink Bowls, Phipps Hall, Huddersfield, UK, August 17, 2019. *A sound world for small things* [premiere]

Sarah Saviet. St Pauls Hall, University of Huddersfield, UK, March 4, 2019. *There's Fire Where We're Going* [premiere]

HISS@10, Reymer Auditorium, University of York, UK, 15 February, 2019. *Inland* [premiere]

Huddersfield Contemporary Music Festival SPIRAL Showcase, SPIRAL Studio, University of Huddersfield, UK, November 17-19, 2018. *infinitely gentle, infinitely suffering [installation version]*

Re-Sound – Shadow of a Shadow, SPIRAL Studio, University of Huddersfield, UK, May 18, 2018. *infinitely gentle, infinitely suffering [installation version]* [premiere]

Electric Spring, Phipps Hall, University of Huddersfield, UK, February 22, 2018. *infinitely gentle, infinitely suffering [concert version]* [premiere]

Loadbang. St Pauls Hall, University of Huddersfield, UK, November 2, 2017. *Then You, If* [premiere]

Greywing Ensemble. Scale Variable #2: Rio 1917 Western Australian Academy of Performing Arts, May 31, 2017. *A Door To A Place, To Something Ongoing* [premiere]

Juliet Fraser. St Pauls Hall, University of Huddersfield, UK, February 9, 2017. *Myrkur Dagar* [premiere]

Solo laptop performance. NoizeMaschin!! #66, AUS, December 20, 2016. *Myrkur Dagar* [live electronics improvisation]

APPENDIX B: ***a sound world for small things*** **score**

a sound world for small things

Sam Gillies

For environmental sound objects and electronics

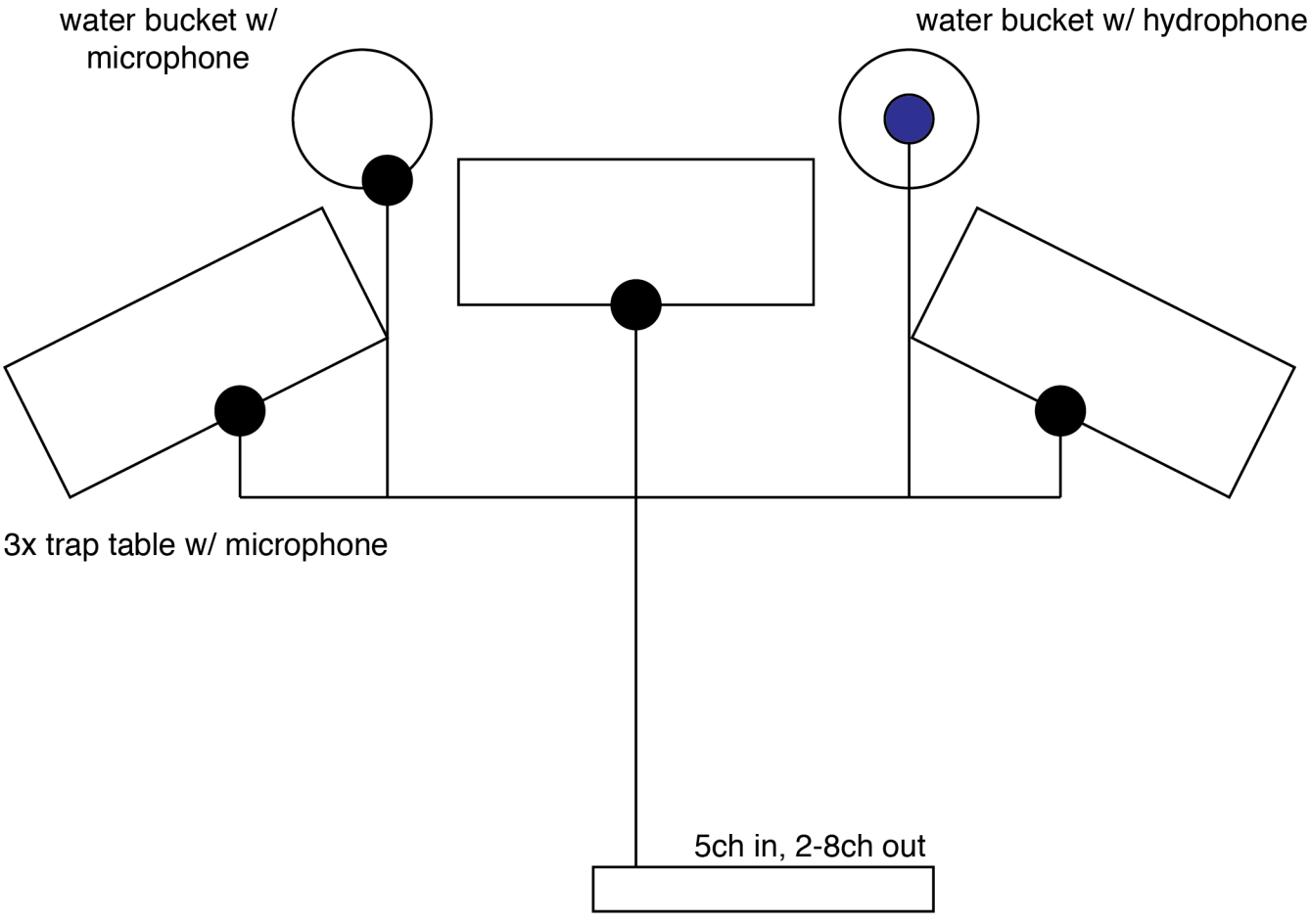
2019

a sound world for small things

for sound producing objects from natural site
[~8-16 minutes]
live concert version of original fixed media work
written for and devised with Colin Frank

Pre-performance preparation

- Find a natural site.
- Create a field recording of the site that can work as a background for the performance.
- Gather a range of different materials from the site, including rocks, bark, twigs, brush, and other objects that can be activated for unique sonic outcomes by a performer.



1/ the pairing of (un)like with (un)like

constant sound, loud and soft
when electronics are audibly triggered move to a new combination of sound items

glass	rock	bark
stone	twig	shell
shell	glass	bark

start with one item keep in hand and add another item (the same or different). when moving to a new combination keep one item and switch to another

transition from grind > impulse
transition from sparse sound > dense sound
rise and fall, three main peaks, as a group or individually

2/ the infinite space of short loops

transition to water
single points, shells in water > movement of water

focus on repetitive gestures
sharp impulse triggers
spontaneous looping electronics

2.1 single points objects enter the water
2.2 focus on objects moving in and out of water, breaking the surface
2.3 pouring and churning water

continue to trigger looping electronics of water material
as desired during transition and first half of section 3

3/ roughness as tonal scrap

transition to scraping and hitting metal beater on sound items

transition from impulse to scraping
fast movement with pauses
focus on stone and rock, perform shifting focus on different sound objects

3.1 explore the threshold of activation for the electronics
3.2 explore the sound characteristics of the electronics
3.3 explore the silence around the sound items between activation and the electronics

APPENDIX C: *Myrkur Dagar* score

Myrkur Dagar

Sam Gillies

For voice and electronics

2017

Myrkur Dagar

For voice and electronics

Written for Juliet Fraser

Premiered on 9 February 2017, St. Paul's Hall, Huddersfield

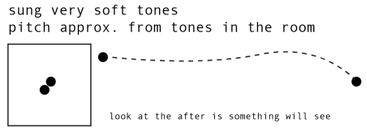
Sam Gillies (2016)

General Notes

Myrkur Dagar centres around the interaction between performer and performance space. The vocalist should blend their sound with the electronics as much as possible. The vocalist is provided with a microphone for amplification and live processing to mediate this.

The vocal part consists of three kinds of material: sung material, mouth noise material, and breath.

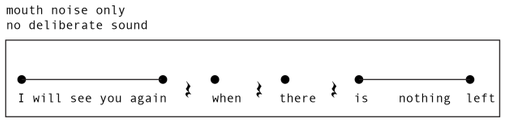
Sung material should be performed very softly, blending with the electronics as much as possible. When performing sung material, the performer should not emphasise the characteristic of any single word over another. The performer is instructed to vocalise pitches present in the space, generated by the electronics, in one of two ways: 1) The performer is instructed to listen to the space in the moment and approximate a selected pitch of their choice, or 2) to recall a pitch from a previous section and use this recollection as pitch material. Recollection of pitch materials does not have to be accurate, but should be a genuine memory of what has previously occurred.



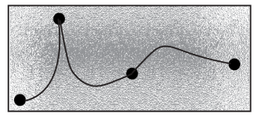
Each word should be sung as a single distinct note, not 'phrased' as a continuous stream. Notes can be repeated; it is not necessary to change pitch for every word.

Mouth noise material is sound created by the performer moving their mouth as if speaking a word, but without vocalising the word itself. The result should be a unique series of sounds created through the movement of the tongue, jaw, and lips. This material should be performed as close to the vocalists microphone as possible to ensure this sound is accurately captured for electronic processing. Mouth noise material should be as articulated and detailed as possible within the confines the the performance instruction. This material should always begin and end with the mouth closed and resting.

The performer is instructed to perform mouth noise in two ways: 1) with no deliberate sound, and 2) with some air passing through the lips. While point two should not enable the vocalisation of the words in question, it should allow the performer to accentuate more of the movement of the mouth and lips, creating an indistinct, hushed whisper.



Breath material is created, as implied, by audibly adjusting the flow of air in and out of the mouth. Breath noise occupies a kind of negative space, sound not tied to language and may be exaggerated for clarity.



Curved lines indicate a gradated variation in the speed at which an action is performed, or gradated change in the quality of an action. The start and end points are indicated by solid circles and the change in quality is indicated by the position of the line on the y-axis. A low position indicates a slow speed / softer dynamic / less breath, while a higher position indicates a faster speed / louder dynamic / more breath.

Dotted lines for **sung** material indicate the speed at which the performer should move through the material, holding individual words for a shorter duration when the curve is higher on the y-axis.

Solid lines for **mouth noise** material indicate the speed in which the performers should mouth the given words or phrases. Multiple words under a single line should be performed as a phrased gesture.

Solid lines for **breath** material indicate gestural articulation for the audible inhaling and exhaling of breath. Each solid dot indicates a single audible breath gesture.

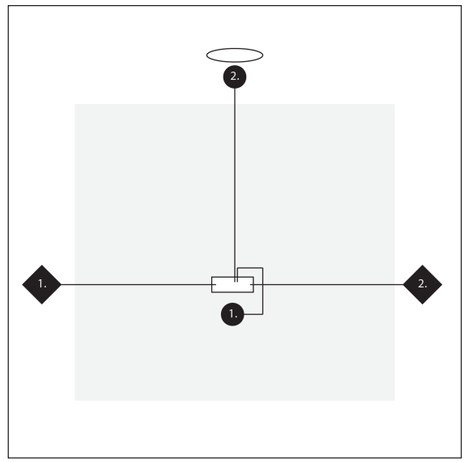
Black triangles indicate cue points. The performer should stop this point until cued by the electronics performer.

Crotchet rests indicate a small rest between material, highlighting material that should be audibly separated.

Fermatas indicate a distinct break in material and may last at the discretion of the performer.

Electronics

Instructions for the tuning and operation of the electronics are provided in patch. The patch should be configured and tuned to the performance space prior to the performance. Manipulation of the electronics should be as per the general instructions on the score itself in coordination with the performer.

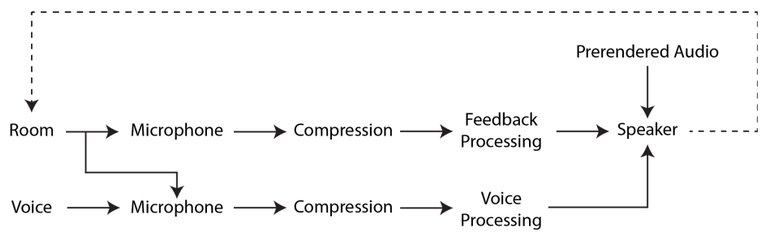


The patch can be adjusted for a number of different tech setups. The most basic tech requirements are as follows:

- Laptop running Max/MSP
- Audio interface (2in, 2out)
- 2x microphones (preferably condenser, placed as indicated above as solid black circles)
- 2x speakers (preferably active monitors, as indicated above as solid diamonds)

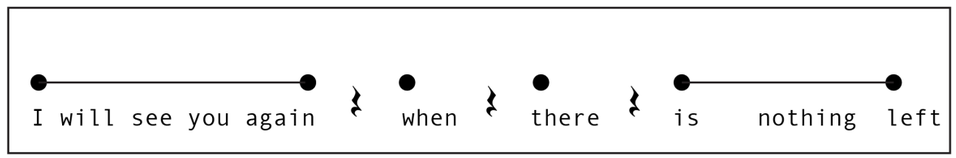
Speaker placement in the performance space should vary according to the acoustic properties of the space itself. The speakers do not need to be facing the audience, and should be positioned so as to ‘sound the space’ as effectively as possible.

Microphone 1 can be placed anywhere in the space as best to elicit audio feedback. Indeterminate and inadvertent environmental and audience noise is part of this performance. Generally, somewhere slightly closer to one speaker than another, and pointing upwards towards the ceiling, elicits good results. Microphone 2 should be placed as close to the performers mouth as possible.

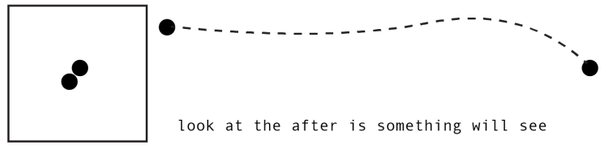


Myrkur Dagar

mouth noise only
no deliberate sound



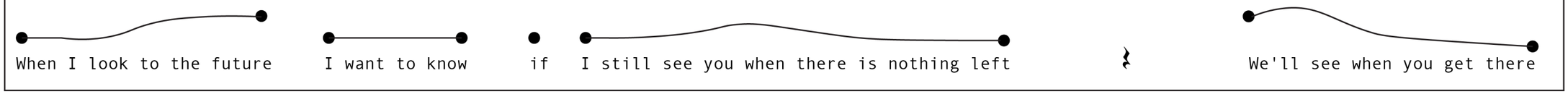
sung very soft tones
pitch approx. from tones in the room



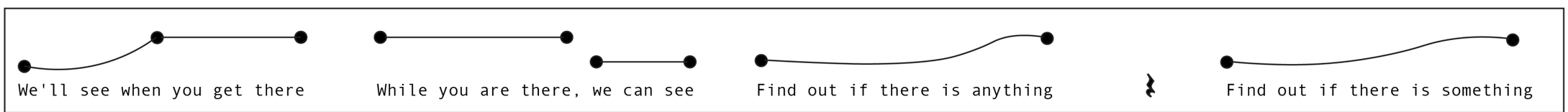
high filter room sound / gentle high pitched room feedback

slow fade up over 20 seconds

mouth noise only
no deliberate sound

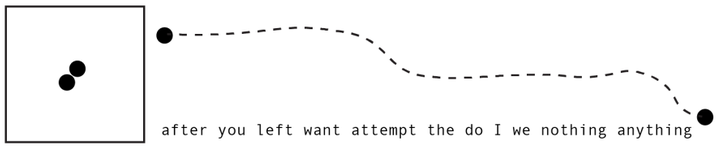


high filter room sound / gentle high pitched room feedback

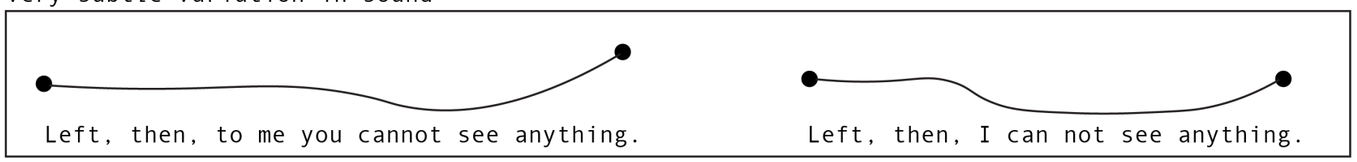


high filter room sound / gentle high pitched room feedback

sung very soft tones
pitch approx. from tones in the room



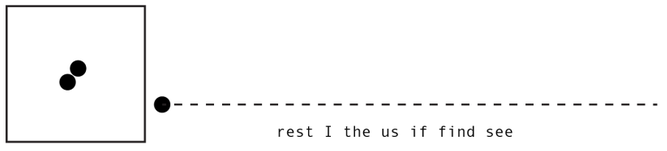
mouth noise, some air passing through lips
very subtle variation in sound



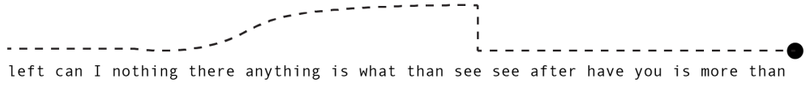
high pitched room feedback

high pitched room feedback, growing intensity

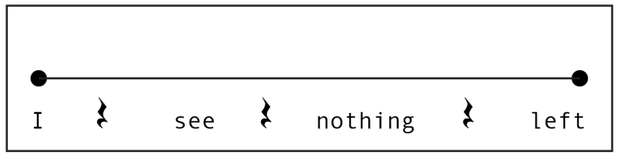
sung very soft tones
pitch approx.from tones in previous section



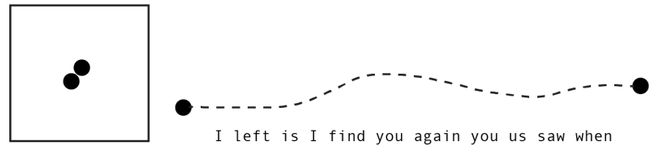
bass sample
low pitched room feedback



sung very soft tones
pitch approx. from tones in room



sung very soft tones
pitch approx. from tones in previous section



bass sample
low pitched room feedback

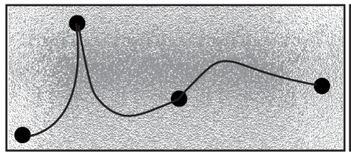
introduce distortion to voice

mouth noise, some air passing through lips
very subtle variation in sound

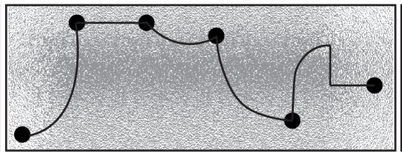
Then you, if anything is more than anything else

After you do so, is anything more than anything else?

bass sample
low pitched room feedback
distortion on voice

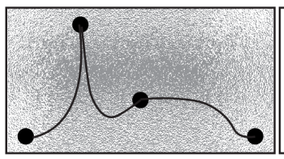


If there's anything left, I will show you again



If you need a break I'll say it again.

bass sample
low pitched room feedback
distortion on voice



If you want to rest, I will repeat.

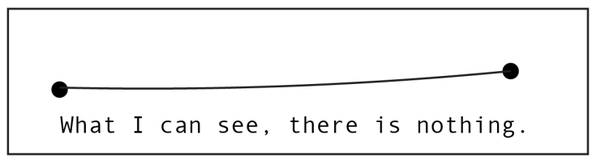
sung very soft tones
pitch approx. from tones in room

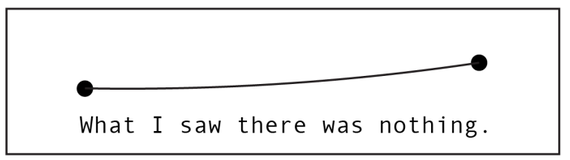
There ~ is ~ nothing when ~ I ~ see

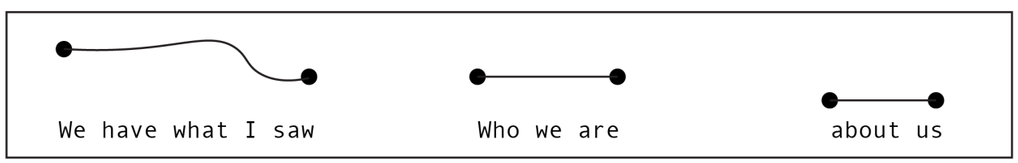
bass sample
low pitched room feedback
distortion on voice

introduce resonant feedback

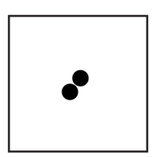
sung very soft tones
pitch approx. from tones in previous section







sung very soft tones
pitch approx. from tones in previous section

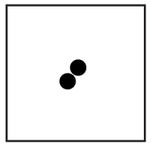


Ah...

bass filtered sound

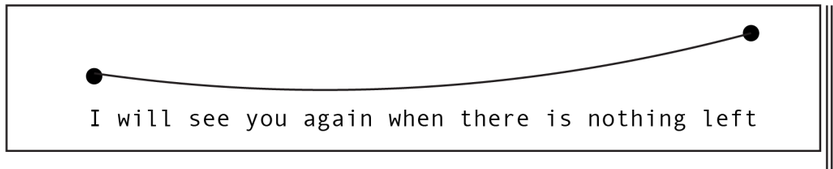
high filter room sound, high pitched room feedback

sung very soft tones
pitch approx. from tones in the room



Ah...

mouth noise, some air passing through lips
very subtle variation in sound



sharp cut

APPENDIX D: ***Myrkur Dagar/infinitely gentle, infinitely suffering*** **libretto**

I will see you again when there is nothing left

When I look to the future I want to know if I will see you when there is nothing left
We'll see when you get there

We'll see when you get there
While you are there, we can see
Find out if there is anything
Find out if there is something

Left, then, to me you can't see anything
Left, then, I cannot see anything
On the left, I don't see anything
To the left I see nothing

I see nothing left

Then you, if anything is more than anything else
After you do so, is anything more than anything else?

If there's anything left, I will show you again
If you need a break, I'll say it again
If you want to rest, I will repeat

There is nothing when I see

What I can see, there is nothing
What I saw there, was nothing
We have what I saw
Who we are
About us

I will see you again when there is nothing left