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Exploring Representations of Interactive Space

A thesis
submitted in fulfilment of
the requirements for the degree of

**Master of Arts at
The University of Waikato**

by

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Abstract

Space has been conceived in many different ways by as many different disciplines. Lefebvre and Harvey suggest conceptions of space as approaches to understanding human interactions within our world. These same conceptions can be employed in a discussion of interactive space and how it is experienced and engaged with. Additionally, the very nature of interactivity facilitates other ideas that can be used to understand its landscape such as recursive space and the notion of how a person's perception of a space impacts their engagement with it.

This research explores representations of interactive space within screen mediated environments. The work uses existing conceptions of space to understand interactivity as well as to inform new ways of challenging the stability of these spaces both theoretically and practically. The project takes a practice-led approach involving the creation and conceptualisation of my own work to theorise some of the possibilities of interactive media. The intent of this study is not so much to define interactive space in its entirety but rather to explore some of the potential ways that it can be theorised using a practice-led approach through the theoretical frameworks of assemblage and affect which, for me, are deeply embedded in the constructions of these spaces.

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Preface

This research includes practical explorations in interactive space that I have created. These experimentations are located on the disc at the back of the thesis and include:

I Remember The Rain (Browne, 2012)

Experiments In Space And Frame (Browne, 2012)

Fall Up (Browne, 2012)

Invisible Cities (Browne, 2013)

These creations are essential to this research and it is highly recommended that they be explored as they appear in the text.

These spaces require a Windows computer to run. Any difficulty opening the projects may be alleviated by copying them onto the computer's hard drive. Additionally, the disc also includes recorded playthroughs in .mp4 format so that the entirety of these experiments can be demonstrated in case of technical issues.

Chapter 1 - Introduction

Rain falls from a blackened sky as crows rise up from the road, their screeches piercing the sound of the thunder as they silhouette themselves against a crescent moon. A car pulls up and out steps a man, vacant and pale under the light of the night and the yellow glow of the street lamps. He approaches the wreckage and falls to the ground: “I had to find you but when I did, I almost wished that I hadn’t”.

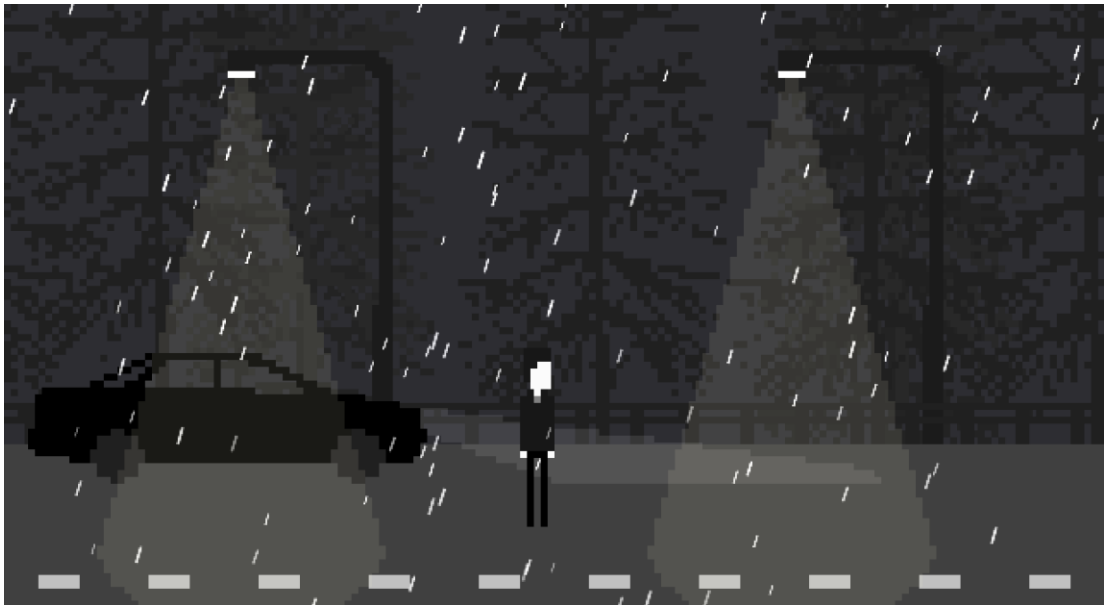


Figure 1.1 *I Remember The Rain* (Browne, 2012)

I Remember The Rain (Browne, 2012) (see disc in back cover) (Figure 1.1) is an interactive story which I created as a way of thinking about interactive space through practice, allowing me to develop a stronger experience of the nature of the space I want to explore in this thesis. It is a series of short vignettes into the life of a man who loses a loved one in a motor accident. The work is an interactive short story where the participant controls a protagonist moving between different scenes which are overlaid with monologue and extracts of conversation. The interactive elements of this space are limited in terms of mechanics with the player being able to move only left and right in addition to being able to influence a few select objects and initiate

dialogue with characters. At the time of its creation my research was still evolving and although I had conceptual and theoretical thoughts which were beginning to unfold, the process of the project's development was emerging intuitively rather than being driven by conceptual motivations. I wanted to jump headfirst into an exploration of interactive space hoping that the result of this foray would reveal possibilities in creation as well as drive theoretical engagement in new and exciting directions. In this sense, my definition of success for this project was simply to create a work that would initiate my research while providing the opportunity to experience the process of creation – ultimately *I Remember The Rain* delivered on both of these fronts to an extent that I certainly hadn't imagined initially.

I uploaded *I Remember The Rain* to Game Jolt, an independent distribution platform for video games (though this description certainly extends to most forms of interactive work). The website can be thought of as a 'YouTube for games' the main difference being a *significantly* smaller user base. I felt that *I Remember The Rain* was a work that would have appeal to a wider audience and so was interested in showing it to people, primarily out of personal interest. I had thought that I would receive some feedback for the work but I didn't expect the level of reception which it received. The project was featured on Game Jolt's front page and on countless blogs such as Indie Games who wrote: "an excellently told, stunningly illustrated and touchingly narrated story and I do believe most people will savour the experience it provides" (2012). In addition to websites I found acclaim came from YouTube reviews and playthroughs where people record themselves playing the story and sharing their thoughts and experiences of the media online. For me the most unexpected element of the online exposure was the impact *I Remember The Rain* had on foreign audiences with its Russian following in particular seeming to exceed even that of English speaking audiences. Besides online press I also received coverage in local newspapers. Although not the focus of my research, the acclaim that *I Remember The Rain* received made me realise that there was an energy about this work. There was something about *I Remember The Rain* that was impacting people in ways that not only compelled them to download and play the story but to tell others

about it from forum posts all the way to creating their own audiovisual content exploring it. The cause of this impact could be broken down into a myriad of specificities such as aesthetics, writing, tone and mechanics, but whatever the cause, the result has been one of *affect*. This experience became a catalyst for my research into the nature of interactive spaces and a driving force for my on-going conceptualisation.

The audiovisual is assembled from elements which are shot, recorded, fabricated and edited into a modality that can be experienced by an audience. We can discuss aesthetics or constructional elements such as the way material has been composed or the way an image has been drawn empirically – there are physical, observable elements that exist pragmatically above any prescribed meaning. Images do indeed hold meaning, meanings constructed from social convention and aesthetics that are realised when engaged with by someone interacting with them. A sad film isn't sad because of any one element, it's sad because of an assemblage of elements that make the viewer feel a certain way. It is these sensations that evoke emotion; sensations that influence an audience long before they have had the opportunity to interpret narrative or attempt to ask questions of where, why or how. It is these sensations that I want to consider as affect.

Affect

Affect and emotion are not the same although mistaking one for the other is an understandable misapprehension as the two are closely tied. Affect is the physical response of the body, sensations often going unnoticed - subconscious reactions to images, sounds and the world around us. At times, these affects are of high enough intensity for us to register them on a conscious, emotional level. Images, objects, music and characters are carriers of affect as are elements which have no necessarily prescribed sense of signification such as colour, noise and rhythm. Massumi describes this nature of affect:

Intensity is embodied in purely autonomic reactions most directly manifested in the skin – at the surface of the body ...It is outside expectation and adaptation, as disconnected from meaningful sequencing, from narration, as it is from vital function (2002 p.25).

It is in this way that affect is relieved of meaning, operating on a visceral level. However, Massumi also acknowledges that although affect can be seen as an embodiment of intensities, it can also be impacted by social constructions:

More importantly ‘the relationship between the levels of intensity and qualification is not one of conformity or correspondence but rather of resonance or interference, amplification or dampening’ (Massumi, 2002 p.25).

Emotion and affect are not disconnected; they are just not the same. Although affect operates on a level beyond conscious cognition, the kind of bodily reaction as well as the intensity of these reactions is informed by past experiences both physiological as well as emotional. The body “infolds contexts” into its memory, it “includes social elements, but mixes them with elements belonging to other levels of functioning and combines them according to different logic.” (Massumi, 2002 p.8) What this means in terms of interactivity is that while “social elements” such as people’s experience of life, language and society are factors that inform engagement with a space, there are other elements that also impact this interaction. Affect is delivered through images and sounds, shapes, mechanics and intensities constantly acting upon us whether or not we are aware of it. Affect is how we sense.

My background in research up until this point of my education has been grounded in the study of film and animation and so the way in which I am approaching this topic is certainly informed by ideas situated in this field. One concept which I found particularly interesting was the notion of agency – the potential held by a film, as well as its audience, to act upon the other, making each individual’s experience of

engagement decidedly unique. A film actively affects the viewer through shapes, images, sounds and intensities. The audience, however, is by no means a passive entity; their own reactions and awareness altering their perception of the experience. The motivation for this research for me was the consideration of these concepts in an interactive environment and what could be learned from this configuration both theoretically and practically. If an audience watching a 90 minute film can be considered 'active', then surely their sense of agency would be that much more intensified when playing a video game? This kind of participant is both a viewer as well as a *player* - an active agent with a new sense of agency actually affecting the time/space of an interactive space.

Interactive space is further defined throughout this research but, on a basic level, it can be seen as a screen mediated space that a participant can engage with. Of these spaces, video games, interactive stories and spatial experiments are the focus of this research (see Chapter 3). The ultimate inspiration for me was seeing the potential in interactive media after the success of *I Remember The Rain*. After all, if a space that only takes 5 to 10 minutes to experience can have such affect and consequential impact, what other possibilities might exist in other spaces that are not so much designed to be entertaining but rather provoking and experimental? *I Remember The Rain* is a space of affect and what is interesting about this space is that the actual agency of human interaction is mechanically quite limited. The space itself affects the player even if their own direct interactions are limited to moving left and right along a linear path of static 2D and scrolling 2D spaces (see page 37). If within these mechanical limitations the potency of affect can be delivered in an interactive sense, think of the possibilities that might unfold through the deconstruction of this space.

In thinking about the spatial construction of the project it seems like a logical step to think of the work as a narrative space. Indeed, *I Remember The Rain* is intently focused on narrative – in fact, it doesn't seem wrong to say that the experience is driven by the story line: The player controls the protagonist, moving between different scenes and sets of dialogue which are told largely through monologue and

extracts of conversation. There is very little ‘gameplay’ to speak off or even much opportunity for ‘meaningful’ influence on the part of the player. The basis of the work rests in its narrative - even from the beginning I have referred to the project as an interactive story as opposed to a video game. Irrespective of these dynamics, however, the impact of the work cannot be pinned purely on its narrative merit. *I Remember The Rain* is an assemblage, the creation of which involved not only writing but composing, sound recording, programming, drawing and design. It is clear that there is so much more to *the work* than its narrative; if that weren’t the case I would have written a book rather than designing an interactive story and it is this sense of not only interactivity, but audio visual digitisation, which demands deeper discussion.

So then, how can we discuss interactive works in ways which acknowledge all of their elements, both together and in parts, as they operate in an audio visual assemblage? There is an attraction to approach this dialogue from the perspectives of narratology and ludology and while such discourse may offer certain insights, ultimately I find these framings to be decidedly rigid, inadequate in depth and rather pretentious in that it is obvious that neither one of these approaches is empirically more correct than the other – the scope of each is simply too narrow for the magnitude of interactivity as a whole. This is not to say that either of these frameworks is completely irrelevant, on the contrary, there are many ideas which are irrefutably significant - it’s just that I feel there are better ways to discuss the same topics that they consider (the interaction between humans and computers).

Ludology is a school of thought that considers interactivity to be an experience driven by agency, the belief that “games are uniquely agency-rich experiences, and while games can include narrative, explicit in-game narrative can at best only play a superficial role” (Mateas & Stern, 2005, p.2). The existence of narrative is in no way denied; rather it is argued that narrative is superseded by ludic elements of gameplay. From this view narrative then is only a shallow part of interaction, fundamentally insignificant in comparison to gameplay. John Carmack, the lead programmer of

Doom (id Software, 1993), candidly surmised this ideology: “Story in a game is like a story in a porn movie. It's expected to be there, but it's not that important.” (Kushner, 2003, p.120) Interactivity is a feedback loop of human and non-human agents, this sense of recursive space is what sets interactive media apart from all other media and so, surely gameplay is then the element of paramount importance? The issue which I have with this perspective is that it is too narrow in scope to provide a comprehensive enough understanding of the nature of interactivity on its own. The very basis of interaction is that it is informed by prior experience and the continued experience of engagement – both of which become forms of narrative. In this way, narrative advises gameplay and becomes an integral part of many game play experiences. Another limitation of ludology is that it fails to account for the affective nature of a game as a whole – even without direct engagement a game still possesses a sense of agency which can affect audiences who may or may not be directly interacting.

A film has the power to uplift an audience as well as the power to reduce that same audience to tears. The spaces which a director constructs, the spaces that we as viewers perceive on screen, and through a set of headphones or speakers, are spaces of affect. By making these spaces interactive, transforming the viewer to become an active agent, what new potentials in spatial agency might be evoked? This idea extends beyond content and narrative to how the construction, treatment, physics, geometries and dynamics of these spaces shape the player's experience. This shaping of experience can be deconstructed and by challenging the preconceptions we may have about this kind of media, I believe that new possibilities of engaging with and understanding these spaces will emerge. There is no reason that a character in a video game should be affected by the laws of gravity, yet often gravity is assumed.

Video Games

Independent developer Pietro Righi Riva poignantly states:

Games happen. They happen largely in the minds of players and not in the things we give them, so you kind of have to let go and stop worrying... We don't really design the games, we design these *things*, and we hope games will take place in the way we expect them to.

(2012)

These 'things' that Riva speaks of are spaces of possibility – spaces of affect. It is the potentials of these spaces that I am interested in exploring – not what gameplay challenges can be devised or what stories can be told (although these elements are certainly part of it) but how and why our engagement with these spaces is driven by affect.

Videogames are an interactive media but not all interactive media can be considered a game. That being said, there is a definite overlap of both convention and aesthetic between other poles of interactivity such as visual novels and interactive music videos which operate in a sense similar to the shared characteristics of film and animation. Additionally, works which are widely considered 'games' often exist beyond the bounds of traditional definition or at least harness energies which aren't always expressed by conventional exposition. *Dear Esther* (thechineseroom, 2012) for example is a piece of visual story telling that is often miscategorised as a game because it looks and plays similarly. In the same sense, *I Remember The Rain* can also be considered as a game depending on how one chooses to define the term.

The meaning of the word 'game' is a highly contentious classification which has been interpreted and defined in a multiplicity of different ways. In terms of architecture, a game can be described as “a system in which players engage in an artificial conflict, defined by rules, that result in a quantifiable outcome” (Salen & Zimmerman 2004).

This definition is rudimentary and absent of any consideration for the emotional, contextual and affective natures amongst other characteristics which are unquestionably embodied in a video game. More arbitrary approaches such as those outlined by Callois terming games as “make believe”, “uncertain” and “free” (1961, pp.10-11) are more useful in my mind but suffer from the same lack of recognition towards the agency afforded by interactivity in more conventional definitions.

I am interested in the notion that interactive spaces are energy spaces, generative, evocative, atmospheric and affective. It is important to remember that video games in fact are interactive spaces and that the goals, rules and outcomes of such are contextual, secondary to the wider concepts which encompass them because without the inherent energies of interactivity, all of these contextual elements would be meaningless (see page 17).

We continue to use the word ‘game’ to describe an array of interactive media which for all intents and purposes exists beyond the dimensions of this concept. The term is somewhat defunct but we continue to use it because, for general purposes, it describes the basis of interactive media in a way that separates the medium from comparable forms such as programs, operating systems or even films which in different ways, are equally interactive. Given these considerations, I feel that it is important not to become entangled in the specifics of language and to take interpretations of ‘games’ as exactly that – *interpretations*. We use the word in different contexts because it has become an umbrella term for interactive spaces reminiscent of, as well as abstracted from, this traditional classification. I find it inhibiting to think about interactive space in a single way because there is no one absolute meaning or prescribed definition that can cover all that these spaces entail. Different approaches offer insight into different facets of space. We can look at examples as games, stories, art or experiments, the common trait between each of these being that they are all virtual spaces of affect. The adoption of this perspective is extremely liberating as it enables us to be much more fluid in the ways in which we discuss interactive space instead of attempting to

pigeon-hole concepts into an uncompromising and quite obviously inadequate set of frameworks.

Outline

In the next chapter I discuss the methodology and theory behind this research which embodies a practice-led approach. This sense of the practice-led has embedded the creation of my own games and practical spatial explorations as part of the research itself, allowing feedback and facilitation between the written and the visual to unlock new potentials. This is an important characteristic of this research because it was through the initial creation of *I Remember The Rain* that has stimulated the direction of this study. As part of this same chapter I situate my work in existing theoretical frameworks such as assemblage theory while providing an overview of other key concepts such as affect. Ultimately, this chapter provides the necessary background to understanding concepts of interactivity as well as being a theoretical point of entry to where my own ideas have developed.

The following chapter titled ‘Understanding Space’ discusses fundamentals of what space means within the context of this research. This section builds upon the theory discussed in the methodology but was given its own chapter in order for the scope of this dialogue to be extended. This chapter discusses conceptions of space presented by Lefebvre and Harvey and considers what these ideas may mean for interactive space. These concepts can be distilled into terms more directly applicable to interactivity such as recursive space, indexicality and understanding virtual and non-virtual worlds as primary and secondary realities.

The next chapter ‘Deconstructing Space’ applies the ideas discussed in the previous chapter directly to examples of interactive media and attempts to challenge the ways we understand these spaces. In particular, this section considers how interactive media can subvert the expectations of participants through the way it has been designed. A large part of this chapter is devoted to the idea of virtual perspectives,

how space is perceived and how this perception can alter the affective nature of a space.

The final chapter, 'Reconceptualising Space', takes a momentary step back from prior discussion which has followed the basic premise of discussing ideas of space and applying them to virtual, interactive settings. This section instead focuses on the notion of interaction itself and considers ways we can conceptualise space based upon the fundamental recursiveness that defines the modality. This discussion focuses on different approaches to thinking about interactive space such as interaction as performance and the advantages that this perspective may offer.

Each of these chapters make use of specific case studies, many of which I have created myself as part of this research. *I Remember The Rain, Fall Up* (Browne, 2012), *Experiments In Space And Frame* (Browne, 2012) and *Invisible Cities* (Browne, 2013) are some examples of the content which has been created to demonstrate and facilitate the theoretical engagements made throughout this study. All of this content is assessable from a Windows PC and is included on the accompanying disc in the back of the thesis.

I have had an interest in developing video games from an early age and as soon as I realised it was possible I learnt all that I could about the art. Over my intermediate and high school years I worked on dozens of different projects, most of which were unrefined learning experiences which never saw the light of day. Coming back to the realm of interactivity now has been an exciting process. It has been enlightening to look at projects less as 'games' and more as 'interactive spaces' - a change in perspective that has enabled new directions in how I think about this kind of development. Interactive space doesn't need to be a 'game', it doesn't need to have a purpose or a challenge - It doesn't even need to be enjoyable. These capacities of interactivity have been played out time and time again and while I don't in anyway mean to disinherit the value of traditional approaches within this media, I feel that there are many possibilities in interactive spaces that are yet to be explored. The

power of interactive space is in its potential to affect – a potential that exists in all forms of this space, experiments, art pieces and games. It is by thinking about the ways we construct these spaces that innovation, intrigue and ultimately affect itself is produced.

Chapter 2 - Theory And Methodology

The focus of this chapter is to outline existing literature and theoretical perspectives that will help to situate my own ideas presented in later chapters. Additionally, I also aim to describe my motivation for employing a practice-led approach in this research, why this method is beneficial for my research and the reasons I have conducted practical engagement as a way of thinking, throughout the project.

Affect

As discussed in the introductory chapter, affect can be seen as the result of experience and engagement. In terms of this research, I am approaching affect as an energy that is an outcome of, as well as facilitation for, interaction. The use of this concept can be met with a greater understanding by exploring ways it has been described by contemporary theorists and the aspects of these descriptions that I have chosen to focus on.

Thrift discusses what he calls four different approaches towards affect and while it is the approach offered by Massumi that I have found most relevant to this study, I feel as though it is important to discuss a wider heritage of perspectives in order to situate my own work within existing theory.

Thrift's first approach talks about affect as a way to describe emotion, the behavioural, bodily occurrences that are expressed by humans every day:

The first translation of affect that I want to address conceives of affect as a set of embodied practices that produce visible conduct as an outer lining. Its chief concern is to develop descriptions of how emotions occur in everyday life, understood as the richly expressive/aesthetic feeling-cum-behaviour of continual becoming that is chiefly provided by bodily states and processes (2008, p.175).

The limitation of this point of view is that in treating affect as a subsidiary of emotion, the whole process becomes over simplified. Affect is not a property which can be discussed entirely subjectively in relation to an individual as a body. Although the expression itself can be considered a bodily process, the true nature of affect is the relationship between multiple agents and how they respond to one another. Additionally, there is a clear difference between affect and emotion because emotion is a result of affect. Descriptors of emotion such as fear, sadness, joy or anger are outward expressions, which can be identified and articulated, but affect is rich with potentials that cannot be described by single words or necessarily even understood or articulated by people. For example we could conceive of affect as a range of intensities, senses and motivations which may go unnoticed. It is perfectly plausible to tell a sad story, but to tell an affective story, while a possible motivation, is tautological because everything is in some way affective, outwardly, subconsciously and even unintentionally. Affect is an emergent energy not bound by an author or designer but an energy which is realised between those interacting within a spatial assemblage.

The second approach discussed by Thrift considers affect as a way to measure a system of needs and desires governing human behaviour. This perspective revolves around “psychoanalytical frames and is based around the notion of drive” (Thrift, 2008, p.176), treating emotions “primarily [as] vehicles or manifestations of the underlying libidinal drive; variations on the theme of ‘desire’” (Thrift, 2008, p.177). This stance factors in a sense of emotion but considers it to be a result of a deeper drive system embedded in the human psyche and biology. Like the first approach, these drives are certainly associated with affect but are more outcomes of affect rather than affect itself. For instance, human desires have very direct goals; if someone is hungry they need to eat to satisfy that desire by eating. Affect on the other hand is not necessarily about satisfying itself but a constant, evolving energy that is embedded in all that we do, even if we are doing perceivably nothing.

The third approach which Thrift speaks of follows a Deleuzian perspective where affect is treated as “the property of the active outcome of an encounter” (2006, p.178). In this way affect can be seen as not merely a response to a situation but an emergent capacity for interaction. Following Deleuze, Massumi describes affect as being autonomous, open and emergent. Results of affect may be emotional or physical action but the affect itself is a subliminal energy that isn’t confined by bounds of consciousness or human understanding that the first two approaches appear to suppose. As a society we have very specific, universal conceptions of emotions. If someone is jealous we know what that means and while there may be different degrees of jealousy, it is a feeling which we can understand, define and relate to. The difference with affect is that it is more singular because it acts differently on each individual and is not bound by the limitations of a conscious, identifiable feeling. While the other approaches to affect focus primarily on affect within the individual, this third approach places emphasis on the relational elements of affect: an outcome of encounter where by the properties of all agents, human and nonhuman, physical and abstract are taken into account – “capacities through interaction in a world which is constantly becoming... the form of an increase or decrease in the ability of the body and mind alike to act.” (Thrift, 2008, pp.177-178) It is for this reason that I find this view of affect to be the most useful to my own study: interactive spaces themselves are occupied by multiple agents which are in a constant loop of affect with the player. This view of affect focuses on not only what affect is but what affect *does*.

Thrift also discusses affect from a Darwinian perspective, an angle that considers it to be a universal expression attributed to evolution. This view proposes that there are genetic, innate qualities possessed and expressed by all people of different cultures. In this way affect can be seen as a pre-coded, response mechanism embedded in our very beings. While this makes sense to me, I am not concerned with affect on a genetic level. A Darwinian view of affect is useful in trying to explain affect itself as a chemical occurrence but ultimately this is not a scientific study of affect but a study

of how we can use the notion of affect as a way to explain our interactions within a virtual space.

In many ways it is interesting that Thrift separates these approaches to affect into four distinct notions because in my own mind, the first two are simply facets of the third. It is not that the first two approaches are necessarily wrong, it is just that working solely from their definitions is too narrow in scope. The affect Massumi writes about is equally concerned with drive and emotion it is just that these elements are described as results of affect, not affect itself. What we may identify as emotions or actions are merely observable outcomes of affect. These elements cannot be taken as affect in its entirety because we are constantly being acted upon by outside agents and so the potentials of affect are endless, often unobservable and emergent.

Affect itself can't be programmed – it is ever present. It is impossible to create a space void of affect. Imagine a 'game' which consists of nothing more than a blank screen. It could be argued that there is nothing there to affect the player but on the contrary, the emptiness will cause reactions that will manifest never the less. Perhaps the player will feel confused or frustrated. Will these affects cause them to think something has gone wrong, maybe the computer has crashed and they'll try to reset it, resulting in not only the generation of affect but driving them to take action facilitated by it? Thrift states that "affect will present differently to body and mind in each encounter" (2008, pp.179) – that means it is singular. Indeed, the circumstances that generate a particular affect will never be repeated in the exact same way or experienced identically by different individuals. Affect is a bodily response, it is indexical and ever present yet, something which cannot be programmed to exist. This is in no way saying that designers cannot shape space with intended affects but that ultimately, the nature of these embodiments are not decided by a creator but by the player as an active phenomenological agent. In a sense a designer may predict the resulting affect from a particular space just as I have done with the 'blank screen' example but these predictions are no indication that all or even the majority of people will interpret the space in the same way. While certain emotions could aim to be

triggered within target demographics, the complexity of affect is considerably greater than feeling 'happy' or 'sad'. It is impossible to say that even if 'sadness' was guaranteed to be expressed, that it will be the same sadness that is experienced between different people.

In realisation that this is stating the obvious, interactive space is unique from other forms of virtual space because it requires the constant input of a participant. This means that the space itself requires or at least embodies some sense of interaction for it to be actualised in its intended state. This highlights the importance of affect because input itself is driven by it (see page 9) – affect is present in all spaces and every interaction within these space is shaped by it.

Assemblage Theory

For the theoretical framework of my research I have also chosen to employ De Landa's theory of assemblage, developed from Deleuze and Guatari's *A Thousand Plateaus* (1998) and Deleuze and Parnet's *Dialogues II* (2007), as a guiding platform for my own discussion of interactive spaces:

Assemblages are composed of heterogeneous elements or objects that enter into relations with one another. These objects are not all of the same type. Thus you have physical objects, happenings, events, and so on, but you also have signs, utterances, and so on. While there are assemblages that are composed entirely of bodies, there are no assemblages composed entirely of signs and utterances (Bryant, 2009).

According to the implications of this quote assemblage theory conceptualises the notion that structures are formed from an array of parts which constitute a greater whole. This construction is dynamic with individual components being interchangeable and replaceable. The core concept of assemblage theory is not only that parts are replaceable but that these same parts can be 'plugged into' a different

assemblage and serve an entirely different purpose – a purpose which may be close to or far removed from how a part might function on its own. It is in this way that “properties of the component parts can never explain the relations which constitute a whole.” (De Landa, 2006, p.11) These components can be material (images, objects) as well as immaterial (expressions, significations) and extend across multiple temporal and spatial degrees in transitory, heterogeneous configurations. In this sense it is not the individual properties of parts that are of greatest significance to a space but how they relate and interact with one another. For example a computer in an office building may be facilitate work while that same computer in someone’s home could be seen as a means of entertainment. Assemblages are simply collections of these elements existing in a certain context or territory.

This concept is useful as a tool for discussing social and political geographies because it offers an escape from more rigid, scientific methods that attempt to pigeon-hole fluid components into fixed states. A good metaphor for understanding assemblage theory is that of a city - a city is made up of many entities: buildings, cars, people, places, and events. These parts can be broken down into further assemblages. A building is part of the assemblage of a city but is also an assemblage in itself, made up of steel, concrete and glass which can be divided further to contain the individual rooms of the structure to those inhabiting them. Aspects of this city can be altered, removed or added to - as a resident I am not fixed to living in one place, I could join the assemblage of a different city and the one I came from would continue to function, but no doubt in different ways. There are also many immaterial aspects which formulate this assemblage. Local politics, race and religion are all influencing factors. Perhaps a higher percentage of the population drive than in other areas because public transport is less accessible. The city might have a high level of education which in turn would have its own effects on employment and the local economy. With this metaphor alone it is easy to see exactly how extensive assemblages can become – a change in a single part could alter the configuration of the entire assemblage. For this reason it is important to note that I am taking

assemblage theory not as a means to explain my research object but as a tool for generating ideas as I focus on the notion of interactive space.

How does this way of thinking benefit our understanding of interactive space? The first advantage of this approach is that it explains the connection between the written and practice-led components of my work. It is important to realise that practical elements are in themselves research, ways of thinking which are part of a greater assemblage. These parts, the different experiments that I have conducted, are not intended to be judged as individual works (though they can certainly function in this role) but are to be taken as facets of a greater body of work. It is through assemblage theory that practice-led research can be justified and the role of these components defined.

Assemblage theory relates not only to my way of conceptualising but also to my approach to the practice of my research; it serves as mechanism to think about space as a wider concept while the notion of assemblages is also apparent in the process of creation – a means of describing spaces as well as constructing them. Empirically, interactive spaces themselves are assemblages of digital assets such as graphics, sound and code which constitute a playable, virtual world. Seeing space in this way enables us to think about case studies as assemblages made up of these elements. Finally, as a creator of content for this project, I myself as the researcher am also an ‘assembler’, generating assets written, visual, coded and aural. Again, this role can be better understood through component configurations of space – I can create an image or sound effect which on its own has certain properties, aesthetics and affective energies, all of which are recontextualised when placed into a different space.

A particular advantage of assemblage theory is that it synthesises extremely well with the idea of affect – a notion which has most certainly become the conceptual basis of my work. Affect space is a construction of audio visual elements which form assemblages made up of component parts, each with multiple agencies both individual and collective. This concept of assemblage is not singular or limited by a

sense of linearity; agents belong to multiple assemblages simultaneously as well as an overarching assemblage which, in the context of my research, we may term an interactive space. The extent of assemblage models could be theoretically limitless in that they can be utilised to include the desk which a player may be sitting at to how their own social upbringings and dispositions may influence their interactions. For the purposes of my own research when I am talking about assemblages in interactive space I am referring to the coded, digital world of a space extended to include the player as an active agent with a focus on the feedback loop between the two. I am not suggesting that there aren't other factors which may influence different energies of experience but given the limitless possibilities of such speculation I feel that this close interaction between player and game is one of the most manageable, as well as most influential, levels of interaction to approach for research purposes.

Components of an interactive space each have their own agency to affect. In the first scene of *I Remember The Rain*, the pixelated trees, the moon, the speeding car, the sound of the wiper blades and the rain on the tarmac are all individual elements each with their own intensities. The possibilities of these assets are immeasurable - they all could be removed from one scene and put into multiple other scenes which would completely reconfigure their affective natures in different assemblages. I am not concerned with what assets may or may not amount to in different situations but am more focused on the implications of affect generated by one particular configuration. Affect space is a way of understanding the audio visual assemblage and how it impacts or affects a participant. Agency is active within an assemblage and is emergent in terms of the constituted whole that it also affects. De Landa writes: "Properties of the component parts can never explain the relations which constitute a whole." (2006, p.10) To frame this idea, it is not any one element that generates the affective energies of *I Remember The Rain*, but the constitution of them all – audio, visual, narrative and interactivity. It is the latter being of greatest interest to me as it is the interactivity which takes into account the agency of a player – an 'uncontrolled' variable which is both a receiver and generator of affect.

Practice-led Method

I want to establish that for me, digital worlds, be they video games or interactive artworks are spaces of affect. Composed of texture, shapes, sights, sounds and intensities, such realms cannot be adequately described on the page. No matter how eloquent the wording, one can never evoke the experience of the perfect sunset as seen by those standing before it (at least not in its entirety). In the same way, I feel that to fully comprehend the nature of interactive space it must be experienced and for me, part of this experience is immersing myself as not only a player but as a *maker*. In this way concepts can be explored, enabling a greater understanding of not only an assembled world but the assembling behind it.

I wanted to employ a methodology that reflected the experiential, recursive nature of interactive space. One which would afford me the freedom to experiment as a creator in a way that would enable interactive modules of my study to function as valuable, component parts of my research. As a result of these requirements I discovered and have chosen to employ a practice-led methodology.

Gray describes practice-led research as:

Firstly, research which is initiated in practice, where questions, problems, challenges are identified and formed by the needs of practice and practitioners; and secondly, that the research strategy is carried out through practice, using predominantly methodologies and specific methods familiar to us as practitioners (1996, p.3).

What is of particular importance in Gray's definition is the notion of research being undertaken not as an instigator or result of practice, but that the research is conducted "through practice" itself. This is an important distinction to make because it is the embodiment of practical components that define this methodology - all parts: written, visualised and performed, become influential on one another. Practice-led research is a methodology which incorporates the creation of work within a theoretical context

where the researcher takes on the role of the practitioner as well as theorist. This kind of research doesn't necessarily have to (although it can) result in a final, definitive work – the intention of this device being the utilisation of practice based elements to contribute to a greater piece of research providing insights unique to this method of investigation.

I am not so much posing a definite question but aiming to explore virtual, screen mediated space and what interactivity brings to this configuration. My practice-led elements are explorations into this field and it is the conceptualisation of these explorations that work to establish my own theoretical discussions. This kind of explorative research demands a practice-led approach because otherwise all I would be doing is documenting that which other practitioners have already achieved. The creation of my own interactive spaces, my own virtual assemblages, is a tool for thinking and so by bypassing the creation of original content the researcher has lost the opportunity to 'think' in a way that will bare fruit decidedly different to that of a purely theoretical approach. Learning through production enables innovation in thinking as well innovation in the work that is created. The practice-led researcher is working from a place of true possibility because from the outset of the project, they themselves have little idea of the directions or evolutions that will stem from the work which they create – a contiguous, emergent process of multiple modalities feeding into a greater body of work.

One of the difficulties in defining practice-led research is that it is inherently unpredictable in nature, with outcomes that are not always clear. This, however, is not at all to the method's detriment – innovation after all, demands “methods that cannot always be predetermined, and ‘outcomes’ of artistic research are necessarily unpredictable” (Barrett, 2005, p.2). It is by embracing this unpredictability as an asset that delivers liberation from the rigidity of purely qualitative or quantitative approaches. Just as there was a shift in directive with the emergence of qualitative research, I see practice-led research as a new form of theoretical engagement that demands equal reform from existing academic structures.

Quantitative Research	Qualitative Research	Practice-led Research
“The activity or operation of expressing something as a quantity or amount – for example, in numbers, graphs or formulas” (Schwandt 2001 p.215).	“All forms of social inquiry that rely primarily on qualitative data ... ie, nonnumeric data in the form of words (Schwandt 2001 p.213).	Expressed in non-numeric data, but in forms of symbolic data other than words in discursive text. These include material forms of practice, of still and moving images, of music and sound, of live action and digital code.
The scientific method	Multi-method	Multi-method led by practice

(Haseman, 2007, p.151)

Qualitative research utilises social means to provide insight supported by an array of different approaches as well as quantitative data. What makes this method a powerful tool is that it is multi-dimensional, engaging with several avenues of information gathering. In the same way, practice-led research operates on multiple levels as the work is constantly re-informing itself both practically and theoretically through a process that is both reflexive and emergent.

Practice-led research is an emergent process, the specific direction is self-facilitating and to an extent, void of preconceived outcomes. The potency of this methodology lies in the reflexive nature of the entire process – work is created and reflected upon; such reflection provides theoretical understanding which is then used to inform continued production that will be folded back into the same cycle.

The way in which I have employed this method has been by studying examples of interactive space, which I have found to be interesting or unique, while also researching and applying theory to these case studies in a conceptual sense. From this

vantage point I have been creating and evaluating my own spatial experiments which, have in turn, driven the direction of my reading and research. In this way my own creations become case studies, developed from the experience of research, as responses to previous findings or as seeds for new directions (see Figure 2.1). It is this constant phase of practice informing theory and theory informing practice that legitimises the form as both a valid and highly valuable methodology. Work created is not a passive, standalone entity but a component in a greater process of engagement that situates the researcher as an active participant in their work. Such a project is not research of practice but research *through* practice.

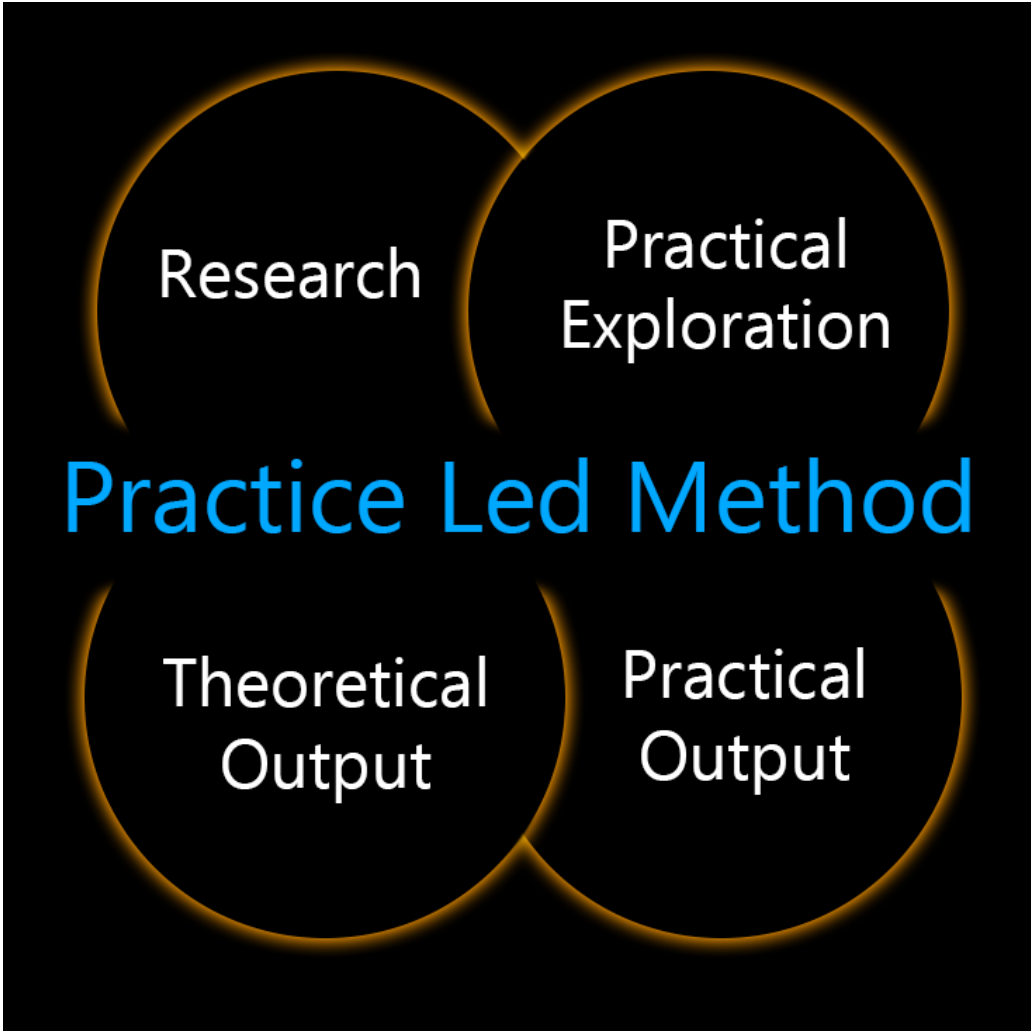


Figure 2.1: Elements of practice-led research

Vincs describes:

We are no longer in the area of positivist, objectively verifiable research outcomes, at least in significant areas of arts and humanities. Understandings of knowledge have shifted from positivist to subjective perspectives (2007, p.99).

If then, we are researching from “subjective perspectives”, how can one take the role of researcher and practitioner while being critical and impartial as well as remaining faithful to their practice? Some projects are structured in a way where the final practice itself is considered to be the site of research. The strength that I see in practice-led research is the combination of both theory (articulated in the written work) and practical exploration. I certainly subscribe to the mind-set that the interactive pieces I have created are, in themselves research, but such artefacts on their own are not substantial enough to afford understanding of the concepts which have facilitated them. Additionally, none of my works have been designed to be looked upon as a ‘final product’; each of these demonstrations are meant to be experienced in tandem with the entire assemblage of work. Writing a thesis involves the translation of ideas to print, similarly, practice-led research offers this same translation of thought to other media such as live performance, canvas or screen. Creation becomes a tool for thinking and a means of theorising.

Why I Chose Practice-led

The practice-led methodology designates weight to relevant practice as well as what is written about it and so in terms of my own study, why has this been my method of choice? I could have conducted research on the same topic without any practice based elements whatsoever. There are an abundance of case studies that could be examined in place of my own work, even those exploring similar possibilities to those which I have approached: VVVVVV (Cavanagh, 2010) explores mechanics of gravity manipulation like my own work *Fall Up* and there are several examples of interactive

stories embedded in video game aesthetics such as *Dear Esther* or *Every Day The Same Dream* (Pedercini, 2009) in ways conceptually akin to *I Remember The Rain*. Relying solely on existing works would have been considerably less time consuming than creating my own demonstrations of interactive spaces. This additional investment of practice, however, offers advantages which are integral to my own understanding as well as the possibilities of this research as a whole – one of these being able to focus on the developmental stages of project as well as their outcomes.

Something unique, which I am bringing to this field, is that I myself am an artist with the ability to create interactive works of my own. Some of these resemble games, others are more experimental in approach, but ultimately I see these creations as tools for thinking, potentials to explore space in ways which words alone are unable to. The practical aspects of this approach are not created in isolation to theoretical engagement – both are constructed in tandem so that the two are informing one another in a constant feedback loop. Additionally, most of the projects were not started and finished as a single process; rather, they have been updated and revisited throughout the research to explore new ideas and possibilities that have emerged. This reveals the explorative nature of this study – the notion that the specific direction of the research as well as the associated questions will be generated throughout the progression of the study. Such an approach is what makes this project exciting for me, not necessarily knowing what the final outcomes will be. This is also a facet beneficial to future readers as the work is participatory – they themselves can experience the works which I have created, which in turn feeds back to a greater understanding of my written work. The generation of ideas through practice is a shared experience that situates theoretical concepts both in this final document as well throughout the entire development process.

Game Maker

The software which I am using to develop practical work is a program called *Game Maker*. Why the name perhaps makes it sound simpler than it is, the software is in fact quite versatile. Although since purchased by YoYo Games, *Game Maker* was

originally developed by Professor Mark Overmars at The University of Utrecht as a tool for teaching game design and development. The software is a potent device for learning as it provides a drag and drop interface which is comparatively simple compared to other development tools, as well as a more advanced scripting language with similarities rooted in C based languages.

Game Maker is certainly setup to be a tool for creating video games however the framework which it presents is very much without limit as to what designers use it for. Indeed, *Game Maker* can be used to create other applications such as a word processor or web browser, a calculator or clock, even a computer virus. What drew me to the program in the context of this research was not so much that I could create games within it, but *spaces*.

My experience with this program stems from a personal interest as a teenager to a more comprehensive understanding in recent years which has led to my tutoring the use of this software. My prior experiences with this software have been invaluable as they have enabled me to use *Game Maker* as a tool for learning without having to spend research time understanding the program's architecture or code syntax. In addition to this technical understanding I am also an artist and musician and that reflects in the fact that all of the assets associated with these projects are entirely my own, created specifically for the purposes of this research.

In a completely qualitative setting I would be discussing theoretical concepts and applying them to finished works and while I am certainly still doing this, the practice-led approach empowers the application of these ideas at an earlier stage of development; an embodiment of theory at a work's point of conception as opposed to trying to mould it to fit later. There is also a practical advantage to this methodology in that by creating my own content, I own the rights to all of the work and this means that I can deconstruct, distribute and present these creations without worrying about the possible restrictions of copyright law. This advantage extends to the fact that I have access to the source code of all of my works and that I can dissect any elements

with ease. This makes it possible to do things such as taking a character from one world and placing them in an entirely different environment, or extracting different pieces of a space to illustrate its construction. The opportunity to discuss these components in their ‘raw’ pre-contextualised forms is analogous to the notion of assemblage theory. Normally one would be dismantling the components of an audiovisual assemblage to understand how such has been fashioned when I in fact am quite literally constructing one. This makes for an interesting shift in tradition as the idea of component parts becomes far more explicit and easily assessable both in terms of conceptualisation as well as the literal possibility to take apart a ‘finished’, constructed space (see Figure 2.2).

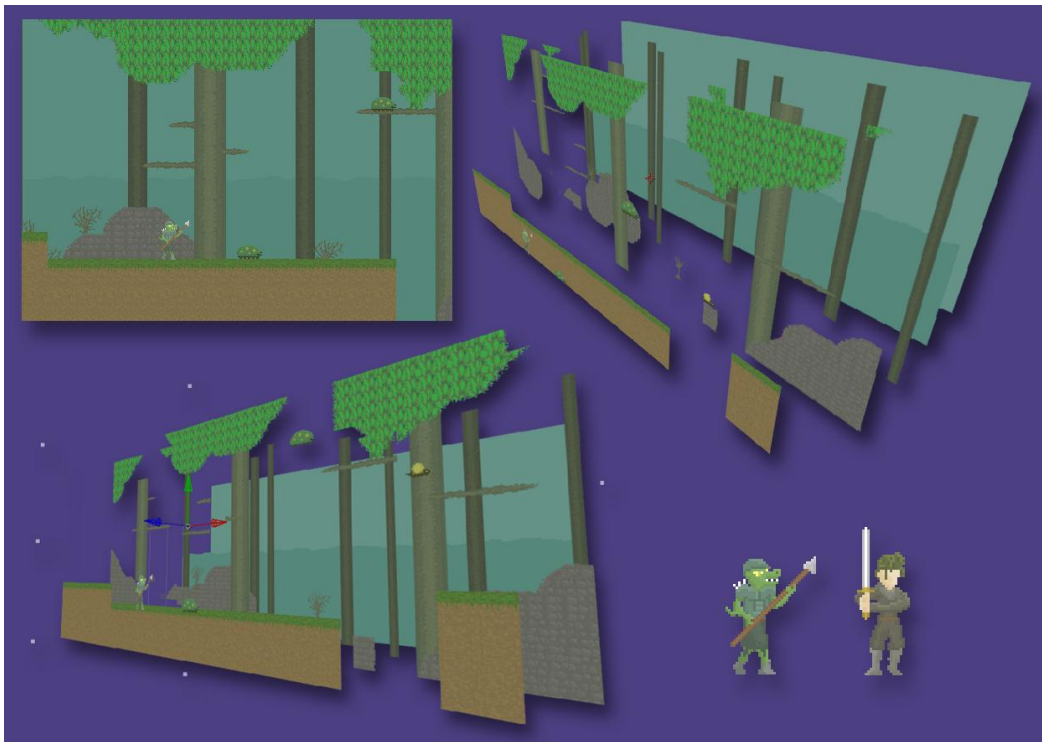


Figure 2.2 A breakdown of Land Of The Lizards (Browne, 2009) demonstrating the layered, component parts which make up the design of an interactive space.

In addition to the ways that the practice-led approach benefits me as a researcher, there are also benefits to others. As work which is intended to be received by readers, it cannot be taken for granted that they are familiar with the case studies and examples that are given - description can only take this experience so far. The

practice-led paradigm extends well beyond the research itself (see appendix for the practice-led experiments relating to this research). If others are to understand what I am writing about interactivity then what better way to convey my ideas, not only through text but through audiovisual means articulated by theoretical engagement, presented as a unified whole. In an environment which isn't practice-led, readers would have to experience works external to this paper spanning different decades, and devices, to fully engage with the research. While external examples have certainly been employed in my work, the focus remains on interactive spaces created specifically for this project. Having everything 'under one roof' so to speak, significantly improves the capacity for my work to be conveyed to others not only through description but also engagement.

Issues

The relationship between interactive space and practice is unequivocal – these spaces are not to be read about but *experienced*. The sentiment of this statement is irrefutable, it is only when the need for assessment is introduced that the practice-led model begins to cause issues. How does one grade a performance or artwork when presented in a humanities master's thesis that has no specific prerequisite of technical or artistic competency? Part of embracing practice-led research is letting go of rigid conventions which serve only to inhibit a process which is inherently emergent. A significant component of this is understanding that the expectations and outcomes of practice-led research are not the same as traditional methods and given this dissimilarity of attainment, how does one determine if a practice-led project is successful or not? The outcomes of such are not always quantifiable and, due to their emergent nature, this process cannot be arbitrated empirically against an initial proposal or intention. My answer to this is that there are multiple levels of success. Work that is created as part of a practice-led programme can be successful in itself, independent of the research which has facilitated it. *I Remember The Rain*, for example, stands as a success in my mind due to the positive reception that it has received, but this reception itself doesn't make it any more or less successful in terms of the focus of this research. Additionally there are many aspects of interactivity that

can be essential to a space in terms of functionality that aren't necessarily relevant to the focus of my study. In making a video game for example, I could spend hours coding a menu screen or animating a character – components which are undoubtedly important for the game itself but aspects not necessarily pertinent to concepts of interactivity or relevant theoretical engagement. The success of a practice-led project remains reliant on the amalgamation of both practice and theory and the ways in which these two elements have informed one another.

If practice-led research offers so much more than traditional methods, then wouldn't everyone be using it? This is an interesting question because the answer is highly dependent on the field of research being discussed, but in terms of my own work, I think that the practice model proposes a perspective not necessarily better, but different, than what is offered by other methodologies. My own experience in the production of digital media has afforded me the opportunity to study in this way but being able to code, draw artwork and create music is certainly not a necessary requirement in media studies. New kinds of approaches demand different skills from the researcher and it is the realisation of this that in many ways validates my own work in that I have both an interest in and ability to develop interactive media – a perspective which justifies my choice of practice-led research.

Online Interactions

My written work informs and is informed by the practical components of my research so by presenting them as one, the reader can share in the experience of this dynamic method of reading, interacting and ultimately, learning. Part of this learning has been through the use of a blog over the course of my research (www.constructinginteractivespace.blogspot.com). This has been extremely useful, especially in the early stages of my work because it has functioned as a place to record ideas while being able to link to source material and embed images and video. This format is also advantageous in that it is public, allowing others to read what I have written and give feedback if desired. Given that this project is constructed of both written and practical components I have found the use of the blog site to be a

happy medium between the two – I can approach theory while at the same time provide screenshots and links to experiments and games that have been created. The accessible, online nature of the blog offers a significant contribution to the shared experience of practice-led research whereby the reader can follow work even before its completion as well as reflect back later on posts and see how they have progressed into ideas both practical and theoretical.

The blog, like my practical projects is another mechanism which situates theory beyond the context of one final written document once again reflecting the nature of practice-led research: an approach through multiple methods that all contribute to a greater assemblage of work. The use of online media is a powerful device to have in the toolkit of the researcher and despite not being a focus of my study; I feel that what I have gained from it is enough to prove its worth. There is a sense of connectivity in that I am investigating interactive spaces while working within an interactive medium. People have read the blog and commented or emailed me links or suggestions based on what they had read themselves. This dialogue has been highly valuable as readers themselves have possible influence over what is written – a way of research which is in itself, interactive.

In addition to the blog, I have also uploaded and distributed some of the projects online to show people what I have been doing and get feedback as a developer. This was mostly a personal pursuit but soon revealed that audience response would be a possible way to strengthen future research of this kind through methods such as interviews, surveys, the collation and analysis of comments and forum posts made online. Given the digital nature of this media, distribution is made fairly straight forward and a dialogue between creator and player is well facilitated. Although this was not a focus of my study it has certainly been a side effect. I found with the release of *I Remember The Rain* in particular, that it managed to garner publicity through local newspapers, television stations as well as reaching a wider audience across blogs, forums and YouTube reviews. It is interesting that this work has been riding off its own merit; I didn't invest any promotion for the interactive story - it

seemed to take off on its own. Needless to say, there is no way of guaranteeing the success of a project like this. The level of reception of any creative work put out to the public is highly dependent on the content and quality of the project itself as well as an equal amount of luck in terms of who sees it and who doesn't. A publication by a prominent website or blog could be the difference between ten and ten thousand people downloading your creation. In a sense, however, a lack of exposure or reception could be of equal interest to a researcher. These insights are very much secondary to the intent of my work and to adequately undertake a comprehensive analysis of such is well beyond the scope of this thesis. What this experience has shown, however, is the potential of further research into this area and the possibility of this study acting as a foundation for this kind of work in the future.

Benefits Of This Approach To Research

In my mind the benefits of this research are quite extensive. Firstly, there is a benefit of this work to myself. Both personally and academically, this research has provided me with the opportunity to explore a field I am interested in while working to attain my master's degree. My practical abilities have been greatly improved over the course of this project as has my theoretical understanding and competency as a writer. Beyond my own self-improvement however, I do believe that this research contributes knowledge to the greater body of work in the field of interactivity. The ideas which I am discussing are very much on the forefront of the study of interactive media in their own right, but to have these ideas presented in a practice-led format is an approach less travelled. Finally, this project stands as a testament to the practice-led methodology, its usefulness for generating ideas and the possibility of thinking through creation.

Conclusion

There is a strong sense of synthesis between this methodology and my theoretical framework. The relationship between theory and practice is strangely similar to that

between an interactive space and the player. There is a sense of cohesiveness in that recursive space and the feedback loop between the player and the virtual space which I am theorising is reflected in the overarching process of my research itself. Assemblage theory is akin to the multi-method approach utilising both practical and theoretical elements to contribute to the totality of the research – research, which in itself, is an assemblage. This is highlighted further by the fact that different parts of this research exist independently from one another. My practical explorations themselves are separate applications, separate spaces, but become interconnected once contextualised by the overarching assemblage of the research. I feel that this connection between theory and method is important for this project particularly because the nature of interactive space is, at its core, concerned with the recursive loop between virtual space and the player – an assemblage of component parts both physical and digital. It was my intention to engage with this process in an active practical way and so to segregate method and theory would be entirely contradictory to this project. Assemblage theory accounts for the shared experience of interactive media as the readers of this research themselves become active agents in the exploration both through participation in practical components and the way these interactions situate theoretical perspectives.

Ultimately, the practice-led approach is a methodology suited to my research because it facilitates my basic purpose: *to explore constructions and conceptions of interactive space*. Creating my own work has allowed me to immerse myself in the topic and explore the potentials of interactivity as they emerge. In fact, I find it incomprehensible that this topic could be explored in the same way if conducted purely from the ‘outside looking in’. Interactive spaces are about the feedback loop between the player and virtual space and so it is only to the advantage of the researcher to be as deeply immersed as possible in this space. To put it simply, it makes perfect sense that if you are exploring an interactive medium, you should do so *interactively*.

Chapter 3 - Understanding Space

Virtual space exists in code. It is not a place which humans have access to without the assistance of technology. Our experience of these worlds is forever mediated by the devices we use to experience them: sight is provided by the screen, sound through speakers or headphones and a kinaesthetic link established through devices such as a keyboard, mouse or gamepad. For the purposes of this research I have chosen to focus specifically on screen-mediated spaces - spaces through which interaction occurs on a screen, television or computer monitor. This allows my theoretical work, as well as practice-led experiments, to be more focused and approachable within the scope of this study. To further define this intention it is important to note that I am not so much concerned with software applications such as word processors or web browsers. While these kinds of programs do possess interactive elements I find them to be conceptually distant from the spaces of virtual worlds which I am focused on exploring. Without drowning in definition, I am tentatively drawing the distinction between a word processor or a calculator being a 'tool' and the interactive spaces being those of games, artworks and spaces experienced as a player (as opposed to a viewer).

In terms of my own content development I am working within the platform of the Windows computer, however, examples which I will draw from extend to other screen-mediated environments such as gaming consoles which, for all intents and purposes, share similar enough properties to be theorised in the same way. This allows for a theoretical approach relevant across all of my case studies and streamlines the research process as resources can be concentrated on a single medium. Additionally, it is made easier to compare media which are interactive to those which are not if they are presented in similar ways (watching a film and playing a video game share many of the same interfaces such as the screen and speakers). The usefulness of this is that it facilitates discussion in determining exactly what interactivity brings to an onscreen space - the screen is certainly the physical means

that enables our perception of virtual space but what makes this space interactive extends beyond our perception to our engagement.

To understand what is meant by interactive space, let us first examine what interactivity in itself entails. The key part of this definition is that interaction is a two way process – it cannot be one sided and is always mutually or reciprocally active. As a continuation of this understanding in relation to my work, interactive space is the space which is produced through *interaction* between two agents (they act on one another), either human or non-human (the player, the computer and software). Although physical elements are involved, this space is not one of physicality but is rather the conceptualisation of the processes which occur through interaction – a unique, multi-layered space encompassing all that occurs within this spatiotemporal frame: the audiovisual, the mechanical, the different intensities of action and reaction and the affect generated through this configuration. Space for me then, is a concept, a means of explaining interaction.

A school playground for example is a *space* that is undoubtedly *interactive*. Like a coded world there are certain rules both social and empirical, moreover, an engagement with this world is generative; a person's interactions altering the nature of the space itself. All the same, the classification of a playground under the same umbrella as video games, interactive stories or any sort of digital media seems like a stretch - a mutation of terminology, after all, they *are* inherently very different. We are talking about the 'real' verses the digital, Euclidean verses non-Euclidean spaces – apples to oranges. It is however, in spite of these fundamental disparities that the conceptualisation of space beyond the screen remains integral to the discussion of virtuality, interactive or otherwise, because the space from which any media is perceived is highly experiential - an active agent of affect in itself.

Configurations of Virtual Space

Interactive media make use of the screen to display virtual space. While the true capacities of this are reliant on a feedback loop of interaction between space and the player, it is useful to also examine how space, in itself, is presented as it is this presentation which informs and ultimately drives interaction. Supplemented by existing examples, this section demonstrates some of my own explorations into configurations of space and how space can be presented in both two and three dimensional settings. It is important to note that this segment is in no way intended to be a conclusive, all-encompassing list of every possible form of virtual space but rather an overview of some of the common modes that are employed in their presentation across screen mediated media.

The usefulness of this section is that it explores some of the traditional representations in screen mediated environments, helping to situate my own experiments in a wider context of interactive works. Additionally, discussing these approaches helps to inform the following chapters ‘Deconstructing Space’ and ‘Reconceptualising Space’ where ways to subvert, or at least think outside traditional spatial construction, are considered.

2D Space

Static 2D Space

Static two dimensional spaces are spaces with a fixed view where the player and computer controlled objects are contained by what is on screen at any one time. This kind of space is common in environments that don't need to extend beyond what is seen on screen at any one time. Figure 3.1 demonstrates this kind of space. If the player moves to the edge of the room they will be met with an invisible boundary unable to leave the space of the screen. *Fall Up* also employs this approach to space and is an example of how this approach can be embedded in a more comprehensive setting (dozens of different stages using this style).

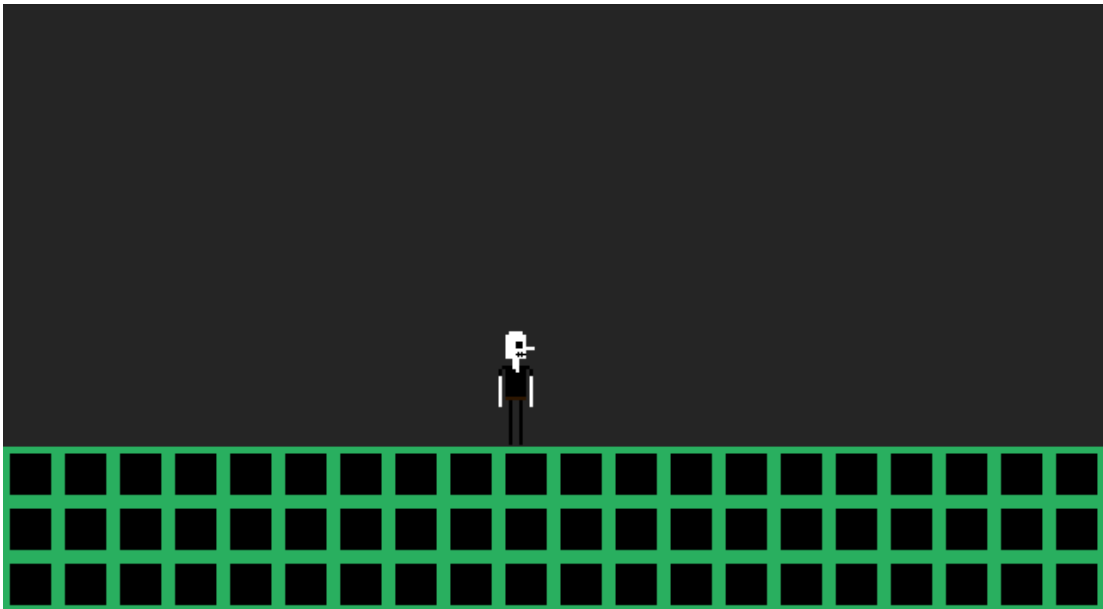


Figure 3.1 A static space in *Experiments In Space And Frame*

Scrolling Space

Scrolling space is one where the view can be scrolled along an axis vertical and/or horizontal. In this kind of configuration a space can easily extend beyond the view of the player meaning that what is displayed on screen is only ever a portion of an expanded virtual world. In the example below (Figure 3.2), the view scrolls as the player moves to either side of the screen. This level of control, however, is not always

afforded by a space; the view could equally scroll on its own without the input of the player.

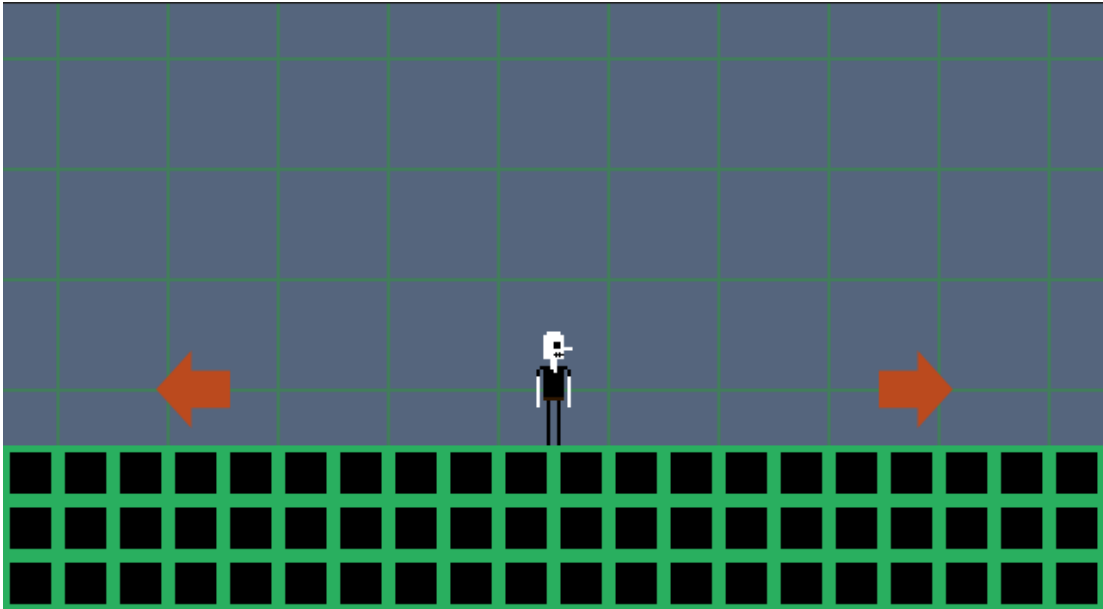


Figure 3.2 Scrolling space in *Experiments In Space And Frame*

Adjacent Space

Adjacent spaces can be considered a compromise between static and scrolling space. Like static space, adjacent spaces are contained by what is seen on screen. The key difference is that the space extends beyond the containment of a single screen. Instead, upon meeting the boundaries of one screen, the view will move to encapsulate another adjacent to the first. Figure 3.3 shows two separate views of the same space where the action of the player moving across the edge of the first screen will shift to reveal the second.

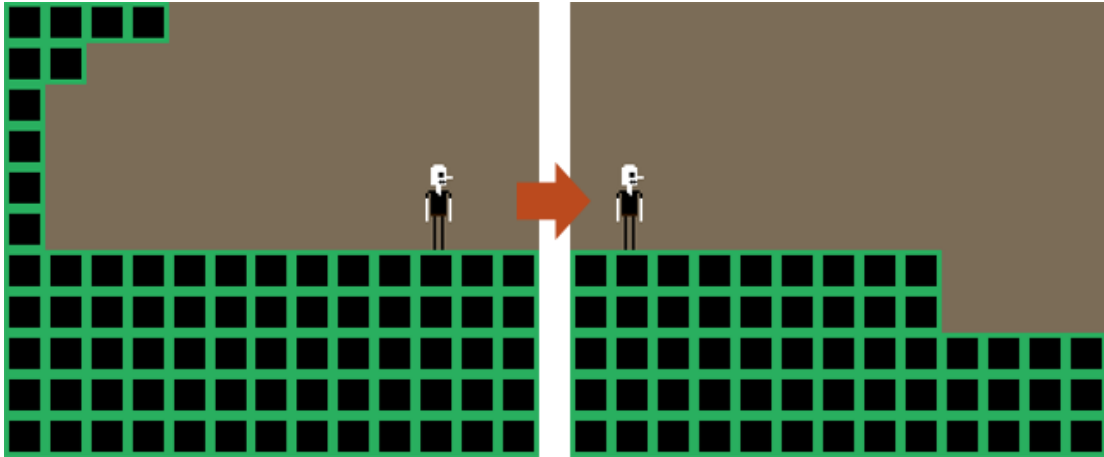


Figure 3.3 Adjacent space in *Experiments In Space And Frame*

Wrapped Space

Wrapped space is a space that can be two or three dimensional, static or scrolling, which is defined by the characteristic of allowing the player to ‘wrap’ around from one side to the other side upon reaching the boundary of this space. In the example below (Figure 3.4) as the character walks out of the right side of the screen they will appear on the left. Similarly, if they fall through the gap in the floor they will wrap around to the top of the room.

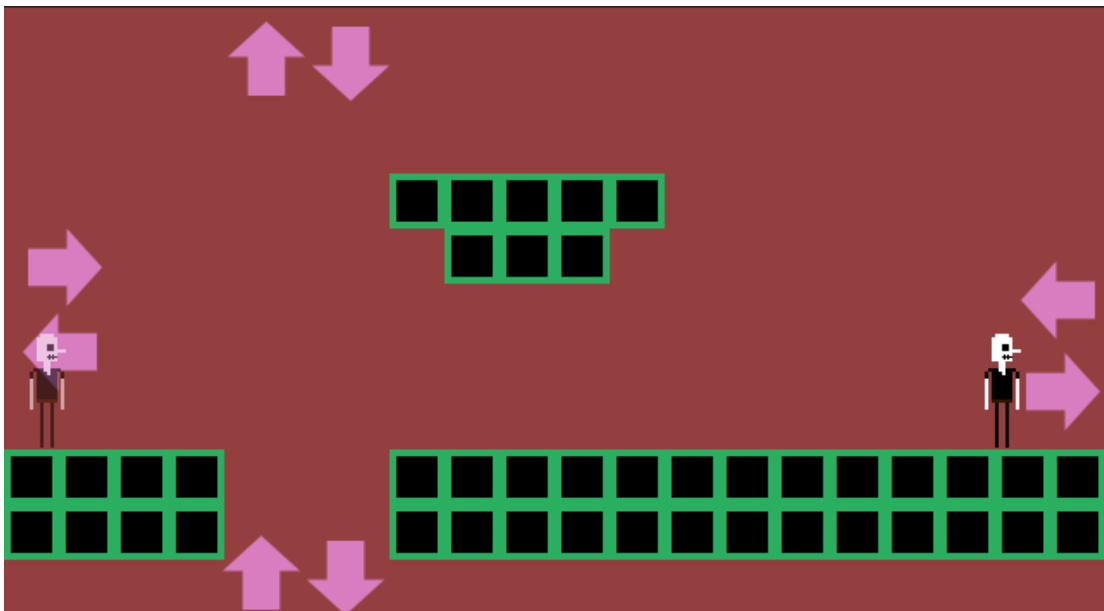


Figure 3.4 Wrapped space in *Experiments In Space And Frame*

Multiple Screens

A space is not always viewed from a single perspective. Split screen games, for example, allow two people to play in the same virtual space but are afforded their own perspectives by dividing the screen off into multiple views. In this same way, spaces intended for only one person can still be divided into different frames.

3D Space

The majority of my own practice-led explorations have been focused on two dimensional spaces and while for the most part, these spaces can be used to conceptualise the theoretical elements of this research I have found at times for it to be useful to explore three dimensional spaces as well. All of the configurations previously mentioned regarding two dimensional space can also be applied to a three dimensional environment and so the way that we think about the differences between the two are not as different as they may first appear.

Implied 3D

Three dimensional spaces can be implied in many ways without actually using any 3D functionality within a space. Two dimensional games with layered backgrounds are in a sense three dimensional because they give the illusion of depth through multiple layers. There is a technique known as ‘parallax scrolling’ which is achieved by having background images scroll with the view at different speeds to fabricate an illusion of depth. This can be seen in *I Remember The Rain* where the layer of trees in the background scroll slower than those nearby to indicate a sense of distance.

Additionally, scenes can be rendered in 3D, captured as a still and imported into a 2D space to give the impression of a 3D world when in fact the image itself is completely flat. Examples of this are the games *Myst* (Cyan, 1991) and *Final Fantasy 7* (Square,

1997). This approach was especially common during the 90's as limitations of technology prevented scenes with such detail being rendered live in the game's code.

Early 3D – Single Plane

3D space restricted to a single plane was common in early 3D games. In *Wolfenstein 3D* (id Software, 1992), for example, the player could only direct the camera along a horizontal axis unable to pivot the view upwards. This can be seen as a technological limitation but also as a design decision.

Full 3D

Full 3D space as the title suggests is a space which is entirely three dimensional introducing a Z value to the X and Y axis of a two dimensional space.

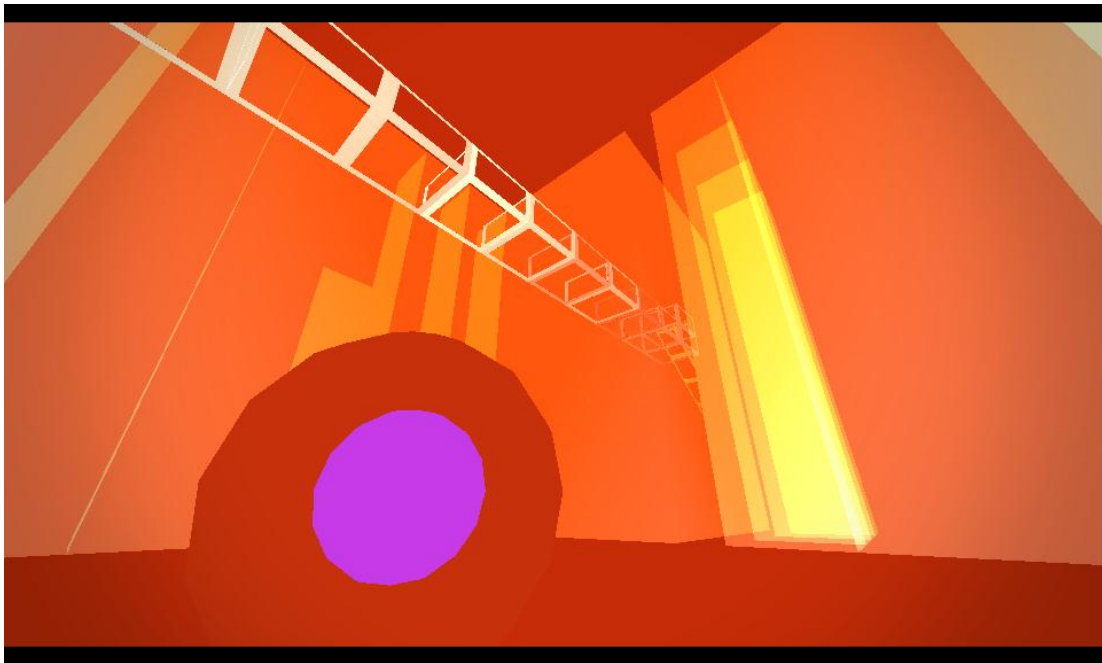


Figure 3.5 The three dimensional world of *Invisible Cities*

Perspectives

In a first person perspective the player can be said to 'see' through the 'eyes' of a character or camera. In this kind of spatial configuration the player is not an observer

of an onscreen avatar but becomes the character themselves. *Invisible Cities* is an example of this kind of space (Figure 3.5).

A third person perspective is one in which the player engages with a space from a view point disconnected from the vision of a particular character. This perspective can take many forms such as the basic view afforded in a two dimensional game or any number of angles such as an over the shoulder shot as found in three dimensional environments. A perspective of this kind can involve the view following the player throughout the space or can equally be disconnected from a particular avatar. This is demonstrated in *Experiments in Space And Frame* where the view of the space is not attached to a character but controlled by the mouse. This kind of interaction is commonly seen in strategy games where the player takes an ‘eye of god’ view from which they can navigate an entire space, overseeing multiple character and processes.

What I find most interesting about these configurations of space is that for all of their differences, they share a considerable amount of similarities. Two or three dimensional, these spaces are still presented on the flat surface of a screen mediated environment. The difference within these approaches themselves is even more negligible. What I have framed as static 2D space and scrolling or adjacent space for example are all very similar, the biggest variance not so much in these spaces themselves but how they will be engaged with by a player. In this way, interactive space can be seen to be embedded very much within its own context.

Conceptions Of Space

In addition to the ways which virtual space can be represented aesthetically, it is useful to consider theories of space from a wider field in order to build a stable foundation to establish ideas. Furthermore, theories of space not pertaining directly to interactive technology serve to reinforce shared characteristics as well as highlight those which are different or unique.

Lefebvre

Lefebvre, for example, talks about space using three distinct descriptors:

Perceived Space	Conceived Space	Lived Space
"The spatial practice of a society secretes that society's space; it propounds and presupposes it, in a dialectical interaction; it produces it slowly and surely as it masters and appropriates it."	"Conceptualized space, the space of scientists, planners, urbanists, technocratic subdividers and social engineers, as of a certain type of artist with a scientific bent -- all of whom identify what is lived and what is perceived with what is conceived."	"Space as directly lived through its associated images and symbols."
A physical space	Representations of space	A social, representational and in turn subjective space

Figure 3.6 Lefebvre's conceptions of space (Lefebvre, 1991, pp.38-39)

These conceptions of space are not separate spaces in themselves. Lefebvre's ontology offers three different lenses to examine space, each unique in their insights. Additionally, these concepts are not detachable from one another; it is the interwoven relationships between each of these spaces that leads to a greater understanding of wider spatial configurations. Space is not solely perceived, conceived or lived – these are simply concepts, abstract forms of understanding a space, each with their own advantages. Describing the space of *I Remember The Rain* for example within Lefebvre's model, we could consider the pixels on screen, shapes and colours to be part of a perceived space but it is the sense of lived space that tells us what these shapes and colours represent (trees, characters, furniture etc).

Lefebvre takes multiple approaches in his description of space and it is this perspective of the multiple that is imperative to understanding interactivity – assemblage spaces of many elements human and non-human, coded and temporal. To try and explain space in one, definitive statement is impossible. It is through thinking

about this space in different ways that we can to begin to comprehend the complexities of all it entails, enabling versatility in approaches.

In regards to interactive spaces, these ideas can be transposed to explain the relationship between virtuality and the player. The perceived space of this configuration is the empirical, coded nature of a game – the architecture of the virtual without the presupposition of player interaction. Lefebvre’s other two spaces are closely tied in the sense that it is the player’s subjectivity and prior experience which informs their interactions - lived space gives meaning to pixels on a screen while conceived space accounts for the imagined world which extends beyond it.

Harvey

Interactive space is primarily about the feedback of agency between the player and the game - how these two entities affect one another. While a wider discussion of space certainly helps inform this dialogue, Lefebvre’s ideas ultimately lack specificity to this feedback loop. This is supplemented by the geographer David Harvey, who supplements these ideas with an additional triad of classification:

If we regard space as absolute it becomes a “thing in itself” with an existence independent of matter. It then possesses a structure which we can use to pigeon-hole or individuate phenomena. The view of relative space proposes that it be understood as a relationship between objects which exists only because objects exist and relate to each other. There is another sense in which space can be viewed as relative and I choose to call this relational space - space regarded in the manner of Leibniz, as being contained in objects in the sense that an object can be said to exist only insofar as it contains and represents within itself relationships to other objects. (Harvey, 2004, p.2)

Harvey’s conceptions of space are based on those of Lefebvre with absolute and relative spaces being comparable to the perceived and lived. The biggest deviation

which Harvey suggests is that of relational space. Relational space is a subspace of the relative which describes the relationship between two objects or energies and their interactions.

The relational view of space holds there is no such thing as space outside of the processes that define it. Processes do not occur in space but define their own spatial frame. This very formulation implies that, as in the case of relative space, it is impossible to disentangle space from time (Harvey, 2004, p.273).

The conception of relational space is significant in the discussion of interaction as it accounts for relationships between the virtual and the player that Lefebvre's configuration is lacking. Virtual spaces define their own sense of spatiality relative to themselves and are experienced through a mediated sense of interactivity - in other words our engagement with interactive space is, at least, mechanically defined by these spaces themselves.

Additionally Harvey states that it is "impossible to disentangle space from time" (2004, p.273). This is certainly the case for interactivity as interaction itself is a process which cannot exist without a sense of temporal progression; virtual spaces are created in time and equally take time to be experienced. This of course can be said for any form of media from print to film as time is an absolute requirement for mediated consumption. It is this treatment of time that explains the fundamental dissonance between virtual spaces that are interactive from those that aren't. When watching a film, the agency of the imagery affects the viewer, altering the ways in which they perceive the media. Interactivity has an enormous impact on the agency of virtual space because it enables not only the audience's perception to be affected but transforms the viewer into a player - an active as opposed to passive participant with an agency of their own within the time-space of a virtual world. It is tempting to then define traditional film as being linear and interactive spaces as being non-linear. However, I feel that such a definition is inaccurate as a film itself can be paused, fast

forwarded and restarted at any time. Equally, interactive spaces can be extremely linear in the choices and directions which the player can take within the world of action – the confines of code make the concept of interactivity immediately equating to a sense of non-linearity an uncomfortable suggestion.

Lithochronology

Media itself is neither linear nor non-linear in terms of our interactions with it. The division which I would instead make is that film is inherently lithochronic¹, the internal time space of such being ‘set in stone’. Viewers may experience lithochronic media quite differently through their own social overlays but the time space of such media remains indifferent to these experiences and will play out the same way regardless. Alternatively, interactive spaces can be described as non-lithochronic, as they can be played at different speeds, in different ways by each person who engages with them. Affected by both the player’s own social space as well as the agency of a virtual world, there is no inherent, absolute form of temporal existence which can be attributed to non-lithochronic space. This notion of lithochronology synthesises well with a definition of interactivity given by Peter Bøgh Andersen who writes that:

An interactive work is a work where the interaction of the reader is an integrated part of the work's signification, meaning that the interaction functions as an object-sign that refers to the same subject as the other signs, not as a meta-sign referring to the signs of the discourse (1992, as cited in Juul, 2001).

This definition is useful because it explains that in order for something to be considered interactive, interactivity must have relevance to the work itself, in other

¹ The term ‘lithochronic’ was first coined in 1942 by surrealist sculptor Oscar Dominguez to describe surfaces in art existing at different points in time (Fisher, 2000, pp.116-117). I appropriated the word within the context of this research to help define the temporally dynamic nature of interactive space.

words, have influence over the lithochronology of a space. As stated by Juul: “there has to be some kind of signifying processing of the user’s input. An on/off button is thus not interactive.” (1992, pp.16-17) To illustrate this, we can say that a particular film may have an intended running time of 90 minutes – to experience this media in the way it was intended, the viewer will have to spend 90 minutes watching the film. A video game on the other hand may have an estimated length but ultimately, the temporality of the game is paced by the interactions of the user. To extend this idea further, simulators, sand box games or interactive installations may not have any kind of lithochronic ending, the point of conclusion decided by the player themselves. This is significant because it empowers the player as an active agent where they can affect configurations of space based on the mechanisms which this world itself creates.

Space is not uniquely relative, relational or absolute – it can be any or all of these things at once. These conceptions of space have been produced as a means of explaining the social geographies of a society. Harvey and Lefebvre are both geographers by discipline. Writing from perspectives removed from human/computer interaction, their ideas still offer insight to the discussion of interactivity. I would extend this to say that in many ways, interactive space holds more in common with ‘real’ spaces than other mediated spaces such as film because of their non-lithochronic nature. They are concerned with people, places, cities and societies which exist in the real world across real times. Interactive space is not as distant to these places as it may first seem, the difference being that these spaces are virtual, accessed through technological interfaces. This raises an interesting take on the meaning of virtuality: virtual spaces may be constructed from code but in a sense, are they any less real than spaces found in our own world?

Primary Reality

Heim (1998) uses the term ‘primary reality’ to distinguish between space which exists in our own physical, tangible world and virtual space which we experience through a secondary means (such as a computer or television). This notion of primary

reality is useful because it provides distinction between virtual and non-virtual spaces while allowing the ‘realness’ of interactive spaces to be maintained. Playing a video game is an activity that exists in a *real* place and time and while interaction certainly occurs across a virtual space, it exists equally in primary space. Even the code of a virtual space is real in a physical sense, for example, electronics have mass, every kilobyte of data although incredibly miniscule, adds atomic weight to the circuits which hold them. Of greater importance, is the fact that interactivity is a temporal engagement. Like interactions in primary reality, interactive spaces are non-lithochronic, confined yet unpredictable, spontaneous and full of possibility. It is this understanding that interaction, space and time are all interlinked that facilitates the translation of Harvey’s ideas from spaces of land, buildings, people and infrastructures to virtual spaces of pixels and code because, in terms of the ways we conceptualise our interactions, they are not so different between primary and virtual realities. The significance in these conceptions is not in the ‘realness’ of a space but its temporality.

It is not that I see any real weaknesses with the ideas presented by Harvey and Lefebvre – on the contrary, they do exactly what they have been designed to do: provide us with a framework to explain the geography of space. It is important to remember, however, that these theorists were not writing with virtual, let alone interactive spaces, in mind and while their ideas remain relevant to the discussion of interactive space, in some areas they simply lack specificity. What these conceptions do succeed in is painting a panorama from which further ideas can be established – an image which can be completed by the rendering of additional details – one of these details is *recursive space*.

Indexicality

Another way of describing lived and relative spaces is using the notion of indexicalities. This concept considers that past experiences with spaces virtual and primary build indexicalities within an individual, or more specifically in this case, a

player. Effectively this is just another way to describe what Lefebvre meant by lived space but is useful to this research because of a greater sense of specificity. It could be said that a player for example, holds an indexicality that informs them how to play a certain genre of video game even if they have never played the specific one that they are engaging with at present. This idea of player expectation is discussed further in the next chapter under ‘Destabilising Expectations’.

Recursive Space

A game’s world is in a state of constant reconfiguration, driven both by the agency of objects on and off screen as well as by the agency of the player. This agency is the inherent potential held by these entities to *affect*. This process, this loop of feedback can be described as recursive space: a way to describe the interactions between both human and non-human agents across a virtual space – a space “actively created when a gamer becomes entangled with the game world and the possibilities of the game’s code” (Wood, 2012, p.2).

An important consideration to make about recursive space is that, as a spatial assemblage, the player is interacting with multiple virtual agents with affective natures contextualised by the space which they inhabit. In this way recursive space is not simply a feedback loop between the player and a space but also the properties of each as a unified body. A spatial assemblage consists of images, sounds and code while the player themselves is equally assembled from their own lived space, indexicalities and backgrounds. It is the engagement of these two identities that generates interactivity, actualising the potentials of greater interactive assemblage extending beyond the screen to encapsulate the player themselves.

If affect didn’t exist there would be no need or desire for a player to interact. Recursive space is a process which, driven by affect, suggests the ways in which interaction occurs between both human and non-human agents in a virtual setting. This space cannot be explained in a physical sense; it is a lived space that occurs

across virtual and primary spaces – virtual space being the coded, mediated space of a computer or console and primary space being the space of our homes, offices and buildings - the ‘real’, absolute world which we inhabit (Heim, 1998). Recursive space is simply a way of explaining the interactions and engagements between agents both human and non-human (Wood, 2012).

A virtual world or game space is an audiovisual configuration made up of multiple objects each with the varying levels of agency to influence one another. Interaction occurs not only between the space and a player but intrinsically within each of these. There is a sense of relational space between not only the player and a space but between parts of a space itself. Being that virtual space is an assemblage of component parts these component parts can have capacities to interact with one another irrespective of human engagement. For example in *Fall Up* there are enemies that move left and right patrolling the stage and, although confined by the layout of the level, there is emergence in their simple behaviour in that they are affected by obstacles such as walls, swayed by gravity and destroyed by dangers such as spikes. Even without the player’s input these objects have a sense of agency; the potential to affect one another and, in turn, the overall state of the game. The player also has agency over these objects channelled through the avatar which they control. While it is only the active components of a game (such as objects that move like traps or characters) that have agency within the game world all objects, images and sounds have a sense of agency outside of this world because of their effects on the player. Music, sound effects, background images and ‘set pieces’ may be kinetically passive but are imbued with a sense of agency towards the player even if their agency, within the virtual space, is inconsequential.

For example inhabitants of a game world are affected in mechanical rule based instances; the range of this affect is limited only by the code of each object. The player on the other hand can be influenced in an infinite number of ways which affect, consciously and subconsciously, their disposition, mood and feelings, in turn, affecting how they engage in their interaction. While a distant pillar, tree or set piece

may have no virtual agency against other objects in a game, its agency, towards a human participant, can potentially be just as, or even more, potent than an ‘active’ game object. Perhaps the tree is dark and harrowing, building a sense of eeriness and apprehension, or it may be cartoonish, bright and full of life setting an entirely different, more playful, mood. An object such as this may not be able to be interacted with by the player within the context of a space but has a sense of agency nonetheless.

This notion of agency extends beyond the empirical, coded identity, of an object; its configuration in virtual space. In *Fall Up*, for example, the affective nature of a deadly spike pit, which the player must traverse, will be considerably different if it is only two blocks in length (Figure 3.7) compared to a pit which extends across most of the screen (Figure 3.8). These worlds are assemblages of assets each with their own properties coded by the game designer. In light of this it is important to remember that affect is not a coded property but an emergent, yet configurable, energy. Interactive space is an assemblage of audio, visual and coded elements – a composition of different agents each with their own affective potentials. What is exciting about this realisation is that whatever affective properties we might prescribe to a certain object, those properties are inherently fluid. The way in which we interact with an object will always be dependent on the configuration that it is placed in, recontextualised by its placement in a space, while equally recontextualising the space around it. Through this sense of space as an assemblage a new sense of agency is generated; the agency of an interactive space.

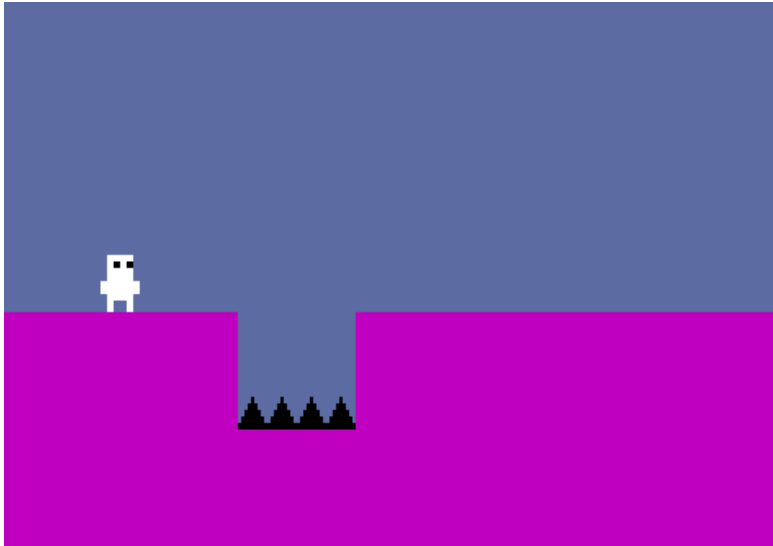


Figure 3.7 A small pit of spikes in *Fall Up*

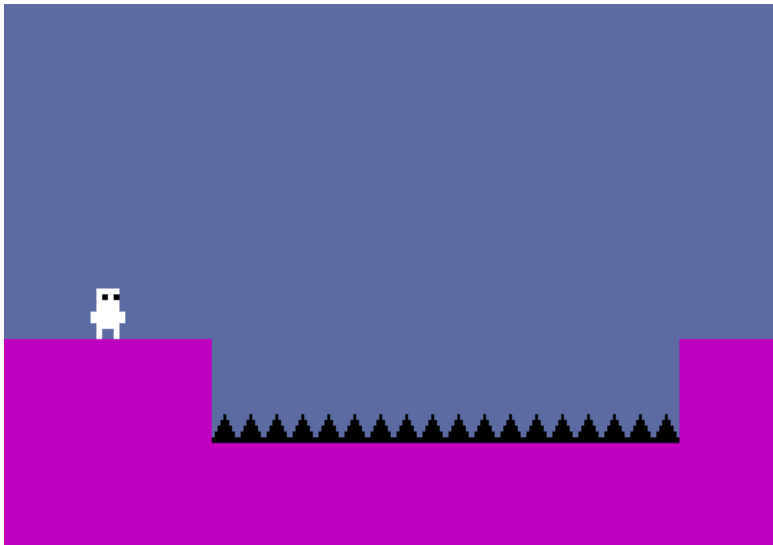


Figure 3.8 A large pit of spikes in *Fall Up*

There are no finite bounds to the affective potential of a particular game space. Certain parameters are undoubtedly confined by code but the agencies of the elements within this arena are ultimately unpredictable. Every image, sound and facet of interactive space holds a sense of agency; the potential to affect. It is this affective nature that is realised once the media engages with an audience. The player is an active element of a space/time assemblage and holds an agency beyond that which we can discuss arbitrarily as that of some kind of pseudo-individual. The term ‘player’ or ‘participant’ signifies something much more than a mandatory acknowledgement of

human interaction – while mechanically, yes, the participant is an entity who presses buttons or clicks a mouse, these interactions are entirely unique to each individual who engages with a particular space. The affectivity held by interactive space is limitless because the nature of this affect is dynamic and reconfigured based on the predispositions, knowledge and social backgrounds of the player. In this way, interactive space implies a strong element of lived space which shapes experience on levels both conscious and subconscious.

Just as the possibilities of interactive space are defined by code, the experience of the player is equally defined by the ‘code’ of that person – their genetic makeup, their experiences, indexicalities, and the ways that they think – the things that make us human, the things that make us unique. The perception of space is precisely this, a *perception*, informed by the lived space of an individual. If we look at an onscreen world in terms of what can be described as a virtual absolute space, this world becomes meaningless, characters and environments no more than pixels on a screen. It is from the constitution of our own lived space that pixels become symbols and forms become bodies of meaning. The space generated through interaction is relational, manifolds of space formed and transformed by both player and program. Recursive space may be generated through pressing buttons or touching a screen but the significance of this is that these actions are not purely mechanical but motivated by the indexicality of an individual’s experience:

The apprehension of space and the development of human consciousness are parallel. The more energy that is illuminated and redeemed from the substance of matter, the more fluid the perceptions become and the more the mind sums up into abstraction. The mind’s capacity for dimensionality and the structure of consciousness become available through experiencing one’s own action... One cannot explore a dimension unless the constellation of one’s own consciousness is prepared to apprehend it (Pereira, 1956, pp.49-50).

Pereira addresses the concepts of relative space while highlighting the bond between ‘experience’ and ‘action’. Experience is much more than aesthetic indexicality, it is how we as humans interact with our environment and, in terms of interactive space, how these interactions affect the way in which we navigate through a virtual world. A virtual space is engaged through the lens of not only the relative, social space of our own world but also through our experience of other virtual spaces, including the physical actions which are taken to drive this engagement. A gamer, for instance, who is accustomed to the mechanics of controlling an on screen character, can draw upon previous experience to inform them of the workings of an interactive space even if they have never played a particular video game before. Similarly, someone who has never played a game will engage with the media in an entirely different way as the physicality of methods of control becomes a conscious occurrence in the process of interaction. The interpretation of interactive spaces is analogous, meaning that some sense of similarity in the way in which we engage with these spaces will always be drawn upon.

This indexicality we have with interaction is firmly rooted in our everyday lives, subconscious and subliminal; we are constantly engaging with spaces both primary and virtual. Although the spaces that I am concerned with are virtual, interactive environments, software from word processors to web browsers are supplementary to our engagement with these worlds. These “practical extension(s) of human space” (Thrift, 2002, p.330) are embedded in modern society as a ‘software space’ that has become so familiar to us that our engagements with interactive spaces are that much more informed or at least mediated by past and continued experience.

In 1998 Norman wrote:

The use of the Internet [will be] so pervasive, so natural, and so commonplace that the very notion of calling something an ‘internet appliance’ will be completely unnecessary (1998, p.269).

The relevance of this statement shows just how embedded we have become in software space – as predicted, a term like ‘internet appliance’ sounds not only unnecessary but also archaic. Understanding our closeness to virtual spaces in the contemporary sphere is important because it shows that even those unfamiliar with the workings of interactive spaces such as video games are more informed, than even they themselves may realise, by an indexicality and competency afforded by contemporary society; the inescapable lived space of our lives.

Chapter 4 - Deconstructing Space

Destabilising Expectation

Recursive space is a way that we can understand the feedback loop of interaction between a player and a space. As previously discussed, a virtual space is assembled from audio, visual, and coded elements, which constitute its most basic form. Before any player engagement, the coded nature of an interactive space exists in its own right as a digital assemblage. This assemblage, however, has not been actualised as the recursive agency of a player is required to realise its full capacity. It is in this way that the player becomes the destabilising factor that reconfigures interactive space. An interactive assemblage is the result of its component parts and, while still limited by the possibilities of this space, the player is a free agent with the ability to affect the configuration of this assemblage – the foreign, destabilising element.

While the interaction of a player reconfigures space, so too does space reconfigure the player. This can be attributed to how the player's perception and understanding of this space is formed. A single onscreen space, although it may exist in a coded empirical form, is never experienced in the exact same way because it will be engaged with differently by different people (a single onscreen space can be interpreted differently even by two people in the same room depending on their understanding of it.) It is in this way that recursive space is not so much a physical state which an assemblage exists in but a way of understanding human interaction within a space.

A player's perception of space is based upon their prior experience. These indexicalities are drawn both from the experience of interactive spaces as well as from the real life, lived space that we all inhabit. Modern society is inescapably embedded within these spaces; cell phones, internet banking, DVD players and appliances are all contributing factors to awareness in this area. For someone to play a

game on a console or access an application on their computer they have already gone about a considerable amount of interaction from turning the device on and logging in to inserting a disc or downloading the software. Participants themselves are interacting from a software space educated by previous experiences of using technology. It is in this way that most people's experiences of interactive spaces are far more extensive than they themselves may even realise.

The player's perception of a space may be stabilised and it can remain so throughout interaction unless there is an occurrence to disrupt this stability. The familiarity of this space extends to the understanding of future spaces as the player is now informed by this experience – a process of normalisation and reinforcement of expectation. It is in this way that relative space, the player's experience of space, is not always a deeply embedded perspective that has been developed over years – the indexicalities of the player can be updated and meaningfully altered in a matter of seconds, not only after but also during the experience of interaction.

Fall Up

Fall Up is a short, retro platform game which demonstrates the process of changing player's perception in a contained environment of static 2D space (see page 37). The space of *Fall Up* is multifaceted in the ways in which it can be conceptualised, yet at the same time possesses a simplistic, two dimensional aesthetic which makes analysis of the work both approachable as well as concise. Unlike the other spaces I have created for this project, *Fall Up* can most certainly be termed a game. The goal is simple: traverse the place of each room making your way to the exit leading to the next stage. What makes this game unique amongst others in the genre, however, is its core mechanic of gravity manipulation. The player can move left and right across the screen but lacks the ability to climb or jump over obstacles. Instead, the player must reverse the gravity direction allowing the character to 'fall up' towards the ceiling and walk along the roof. This is an example of how space can reconfigure the player's understandings through the expectations established by both our own world (which at least in some sense *Fall Up* is a representation of) and those set out by existing spaces

within this modality (other platform games) that lead the player to anticipate that in order to navigate obstacles, they will have to jump over them in some way.

This stems from examples as traditional as *Donkey Kong* (Nintendo, 1981) and *Sonic* (Team Sonic, 1991), to more contemporary examples such as *Crash Bandicoot* (Naughty Dog, 1996) and *Braid* (Number None Inc, 2008). The release dates of these games span nearly three decades yet from a single screenshot from each of them, we can see that the similarities are remarkable (Figure 4.1). Each of these games although aesthetically different, operate within the same fundamental premise of interaction in that the player controls a single character on a flat plane which can move left and right across the screen with the additional ability to jump. The very term ‘platform game’ is derived from the understanding that these kinds of games are based upon the tradition that gameplay involves the player jumping from platform to platform. In these games, gravity is the force that the player is constantly fighting against, that which pulls towards a digital demise. In subverting this central premise in *Fall Up* the player becomes empowered with the ability to manipulate the physics of a space – a space breaking the expectations of the player.

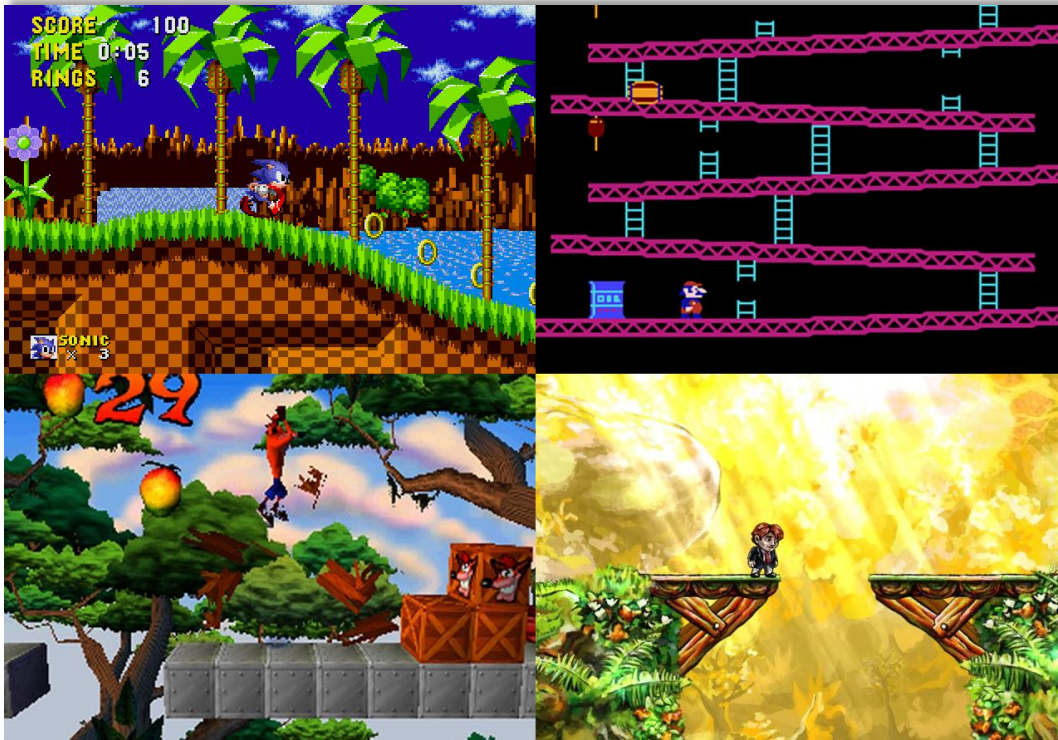


Figure 4.1 Similarities in platform games. From top left to bottom right: *Sonic The Hedgehog* (Team Sonic, 1991), *Donkey Kong* (Nintendo, 1981), *Crash Bandicoot* (Naughty Dog, 1996), *Braid* (Number Nine Inc, 2008).

Destabilising the expectations isn't a process based solely around unique mechanics or fundamental innovations in the way that a space is constructed – it's just that these examples are particularly explicit. These subversions can also be subtle processes occurring in a matter of seconds or across an immeasurable amount of time. Conscious or not, a space doesn't necessarily have to employ mechanisms as overt as giving the player control over the gravity of a space in order to destabilise their perception. In *Fall Up* for instance, rooms are made up of solid, coloured panels. These panels have little resemblance to anything of our own world (they are just flat colours) but, from the moment the player touches them, they are transformed into something else: floors, walls and the ceiling. The nature of these objects could be realised even prior to the player's interaction with them as the player's other experiences of similar configurations of the space might indicate the likely purpose of these objects. The lived space of a player can be used as a way to describe our own

learning and navigation of a space, gathering a bearing over elements, old and new, familiar and foreign. This process is constant, even once a space is familiarised this understanding can be disrupted any number of times as conditions change.

There is a constant and often subconscious process of space informing the player occurring throughout interaction. There are sections of *Fall Up* where as the player passes a wall, a giant hand extends towards the character, its touch causing immediate death and the restarting of the stage (Figure 4.2). The first time this happens is a highly affective experience, it catches the player by surprise and in a few cases, I've observed, has even given an unexpected fright.

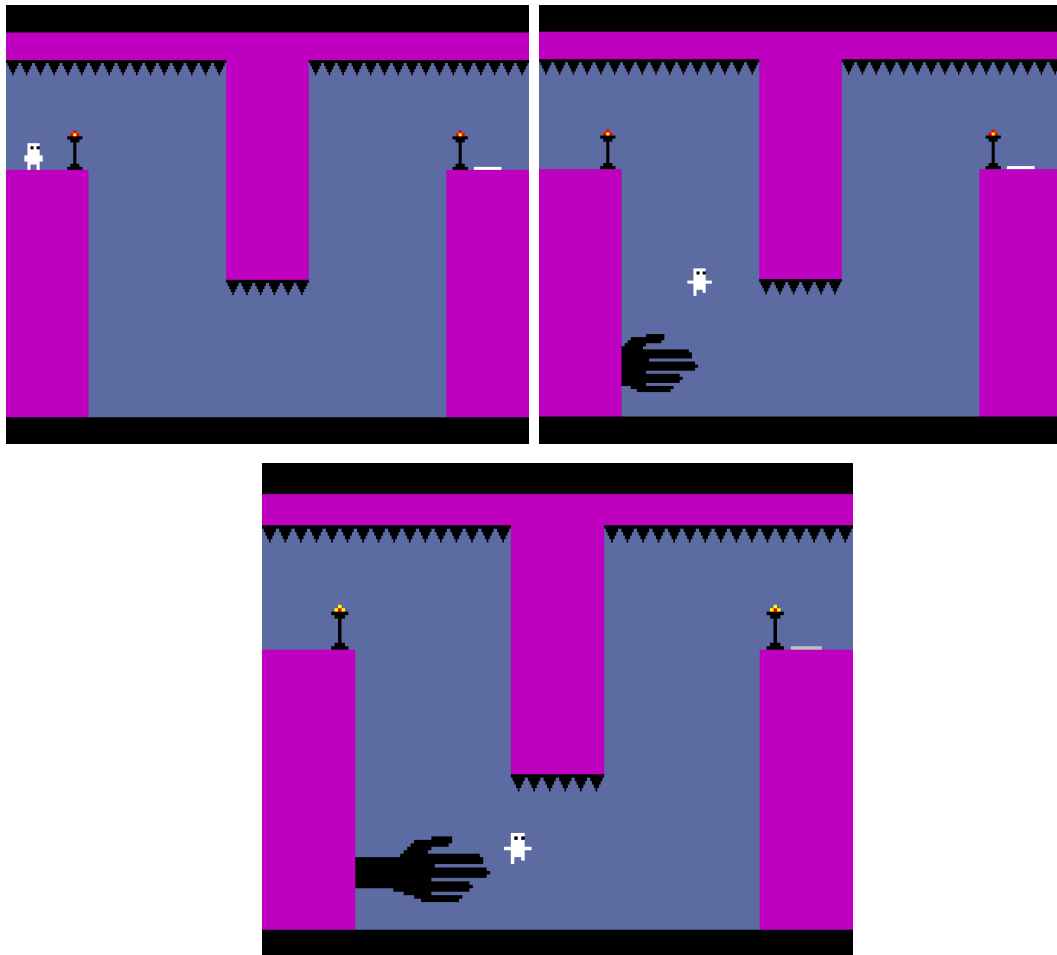


Figure 4.2 Hands reaching out at the player in *Fall Up*

A player's perception of a space can be changed even once expectations of a space have been established. Most of the challenges in *Fall Up* are to do with precision and mastering the mechanics of the space to reach the exit point. It is interesting to consider a particular level where the exit lies right in front of the player but as they approach walls materialise to block the way. The experience of game play, thus far, suggests that there must be a way to slip through before the gap closes; perhaps you need to approach the opening from a certain angle or at a particular speed? The solution is considerably simpler and involves walking to the side of the room - upon doing this, a new passage is revealed which leads the player directly to the end (Figure 4.3). This was a conscious yet subtle attempt to debase expectations that are established throughout gameplay because, by doing so, the affective energy, afforded by change to an already established space, is exploited to a greater potential.

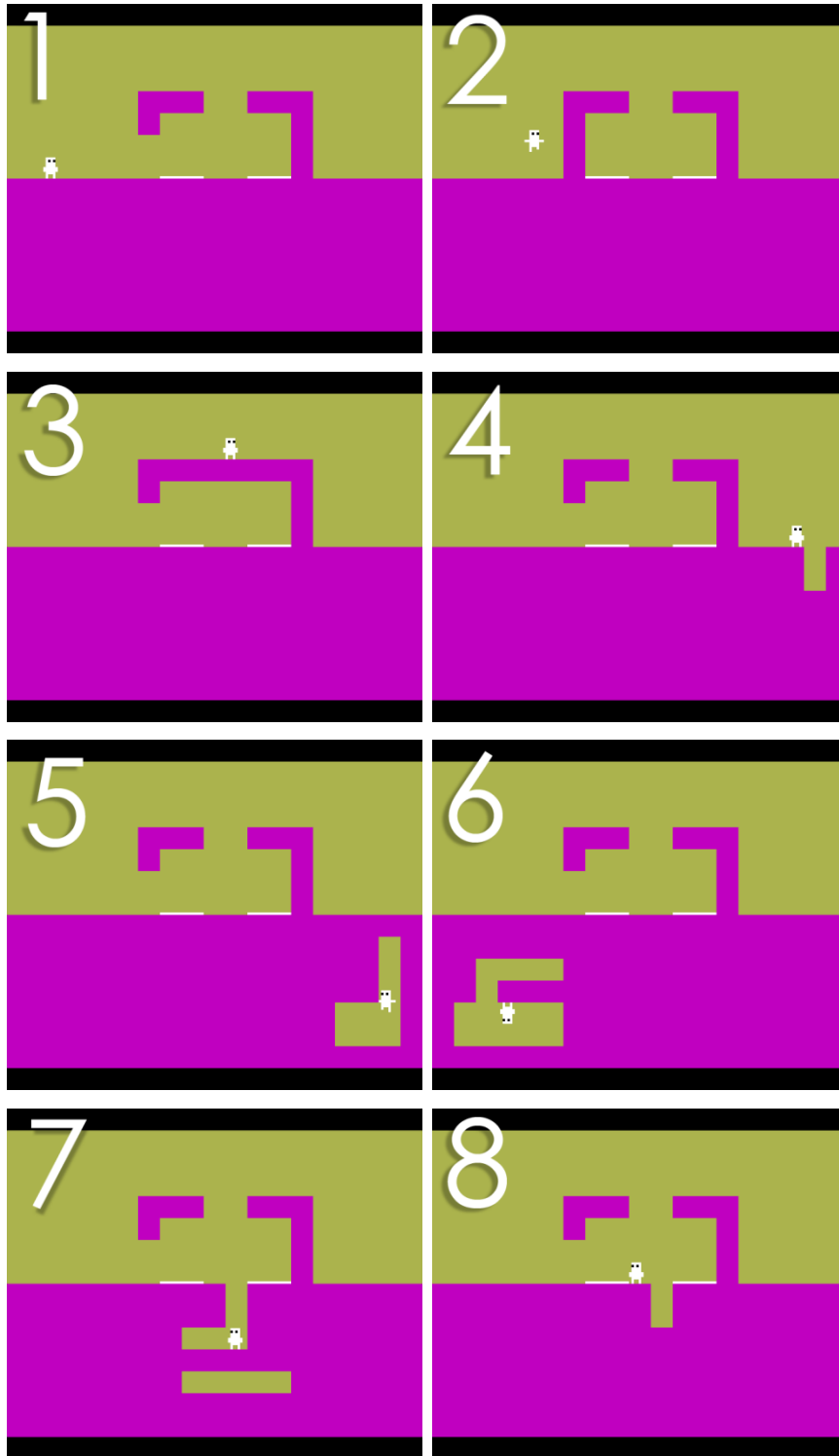


Figure 4.3 Finding the hidden path in *Fall Up*

1: Player begins the stage. 2: Player moves to the exit at their right but a block appears. 3: Player tries entering from the top but is also blocked. 4: Player discovers a hidden entrance at the right of the screen. 5-8: Player follows hidden path to the exit.

A side on scene of a platform game is a familiar setting for players, within a second of seeing the layout of a stage in *Fall Up*, expectations are raised concerning both what and, what not, the game may ask players to do. There might be a necessity for moving left and right towards some kind of goal and, because of the layout of the space, jumping will likely be involved. It is in this way that a mechanic, such as gravity manipulation, becomes a mode of both affect, as well as intrigue, as these operate within a familiar framework, while offering something fresh and unexpected. Lived space is a concept of multiplicity, there is no one, right or wrong, way that this space is established. Like *Fall Up*, *I Remember The Rain* uses the past experience of other spaces to subvert the expectations of the player but does so to very different effects.

I Remember The Rain

I Remember The Rain is a space of affect - an affective nature delivered through the agencies of an interactive assemblage. As much as *I Remember The Rain* is a space of affect, it is equally a space that is concerned with breaking expectations of the player. Experience drawn from realities both primary and virtual impact the way a player interacts, making each person's interaction with a space decidedly singular. In realising this, it is clear that there is a significant amount of shared experience between people. While players have different pasts, skills, cultures and backgrounds the commonality between people, especially in a target audience, is great enough that designers of space can make reasonable assumptions that while, perhaps not all players have experienced a particular space before, they are informed by experiences with those similar in nature.

When a player is presented with a selection of icons and a pointer these days it is usually safe to assume that they can move the mouse and select an option. Equally, experience tells that in moving a player's avatar, the left key will usually move the character left and the right key usually move them to the right.

I see *I Remember The Rain* as a space which is made affective through the player's past experiences with interactive space. *I Remember The Rain*, by definition, is a space better termed an interactive story rather than what might be traditionally defined as a 'game'. Never the less, the story is deeply embedded in video game conventions and it is this embodiment that constitutes the affectiveness of the work. In many ways the narrative of *I Remember The Rain* is quite clichéd and contrived, or at least a little self-indulgent in terms of trying to create a mood and emotion. What makes this work impacting is that it challenges the player's expectations. Someone playing through *I Remember The Rain* for the first time is not prepared for the experience of this space based upon their preconceived ideas of how it should function. *I Remember The Rain* certainly appears to be a video game and so it is the disconnection between the work's presentation and its function that destabilises the expectations of those engaging with it.

Visually, the space takes on a pixelated aesthetic reminiscent of video games of a much earlier era, an era which holds a considerable amount of nostalgia for some people. These kinds of graphics herald a time where screen mediated interactive media was in its infancy. Games existed in forms much closer to traditional definitions of play where interactive spaces were about challenge and entertainment, getting that high score or making it to the next stage – a mentality which is somewhat the polar opposite of *I Remember The Rain*. It is through this dissonance that preconceptions are broken as the player discovers a space of affective natures foreign to the aesthetics which harbour them. To reiterate, the narrative of *I Remember The Rain*, is about a man who loses a loved one in a car accident. This premise in itself is unexpected as love, loss, suicide and regret are not themes often approached in this modality, especially not within the period of five or ten minutes. Speaking of the length of the work, its short length also plays an important role in that, by keeping the play concise, any normalisation of the space is minimised and the affectiveness of the space is intensified.

An additional element in the effectiveness of *I Remember The Rain* is the consideration of audience and accessibility. The project is hosted primarily on Game Jolt and most of the online press, which it has received, has been across the indie and art gaming sphere. With these factors in mind, it seems fair to make the assumption that the audiences engaging with the work are primarily gamers or at least people familiar with the conventions and functions of more conventional game spaces. While I certainly do believe that the space of *I Remember The Rain*, and all it entails, is a space of affect in its own right, I am also certain that its agency is intensified by nostalgia and expectation. As a point of further research, it would be interesting to investigate exactly how differently the experience of the work is between gamers and non-gamers though I imagine that there would be difficulty separating the two since even those who don't play video games still hold conceptions about what these games might entail and these might equally be challenged. Whether a space is familiar or not doesn't diminish its existence as a space of affect. Affect is ever present and it is by considering expectations and indexicalities of the player that we are able to discuss some of the ways affect can be shaped.

Non-Euclidean Space

I see *I Remember The Rain* and *Fall Up* both as appropriate, yet very different examples, of ways in which the player's perception of a space can be disrupted. While both of these projects certainly break expectations within their respective genres, I find that they remain grounded in conventional treatments of spatiality. There is a sense that the geometric spaces of these environments are reasonably stable Cartesian spaces that, although aesthetically stylised, are in many ways still representational of our own primary space. In extension of this notion is the desire to push the boundaries of not just what is contained within a virtual space, but the nature of these spaces themselves. One possible way which this concept can be traversed is through the exploration of non-Euclidean dimensionality.

Euclidean space is a space defined by geometries bound by Euclid's axioms and his definitions of spatial construction. For the purposes of this research it is not necessary to go into significantly greater detail than this except to say that Euclidean space is a metric space that is finite in dimension and defined by an equally spaced co-ordinate system. Ultimately this idea of a linear, geometric construction can be used to represent the traditional treatment of dimensionality in virtual environments. So then with this working definition in mind, we can stipulate the meaning of a non-Euclidian construction within a virtual space – a space which is beyond the bounds of Cartesian geometry and arrays of regulated coordinates.

I find non-Euclidean geometry to be an exciting concept in relation to interactivity because it allows us to engage with possibilities which are affective, destabilising and dimensionally unachievable within our real world experience. While this could be said for both *Fall Up* and *I Remember The Rain*, these games are two dimensional, breaking Cartesian laws in the sense that they are abstract representations of a space disconnected from reality. There are certain expectations set up by two dimensional environments; they operate on a representational flat plane. Three dimensional spaces on the other hand operate dimensionally within the same supposed laws as our own world. Be it a fantasy RPG like *Skyrim* (Bethesda Game Studios, 2011), or a sci-fi shooter such as *Halo: Combat Evolved* (Bungie, 2001), the player can safely expect that if they walk down a corridor and turn around that the corridor will still be there – it is this expectation which can be completely shattered by non-Euclidean constructions.

Portal

As time progresses more games exploring these alternative geometries are emerging with one of the most well-known of these being *Portal* (Valve Corporation, 2007), a 3D game which demonstrates innovative ways Cartesian space can be disrupted. In *Portal*, the player is trapped inside different test chambers with the goal being to reach an elevator at the end, which will take the player to the next stage. There are different obstacles preventing this escape which the player must navigate by use of their portal gun a device that deconstructs traditional spatial configurations by

allowing the player to create portals, passages through space, which allow for the navigation of space in entirely new ways. Upon creating a single portal, another can be formed and these become both entrances and exits to a non-Euclidean dimensional door. This mechanic is the basis for interaction in *Portal* as each chamber becomes a test of the player's capacity to use the device. For example, there may be an impassable drop, a gap too great to jump across, compelling the player to place portals on either side allowing them to safely traverse the gap. As the game progresses the intricacy of these tasks becomes increasingly greater by presenting more difficult puzzles as well as an increased demand for the player to explore the game's physics. For instance, the player can propel themselves across space by carrying their momentum through portals enabling 'sling-shot' type effects (as well as the possibility of becoming stuck in eternal loops).

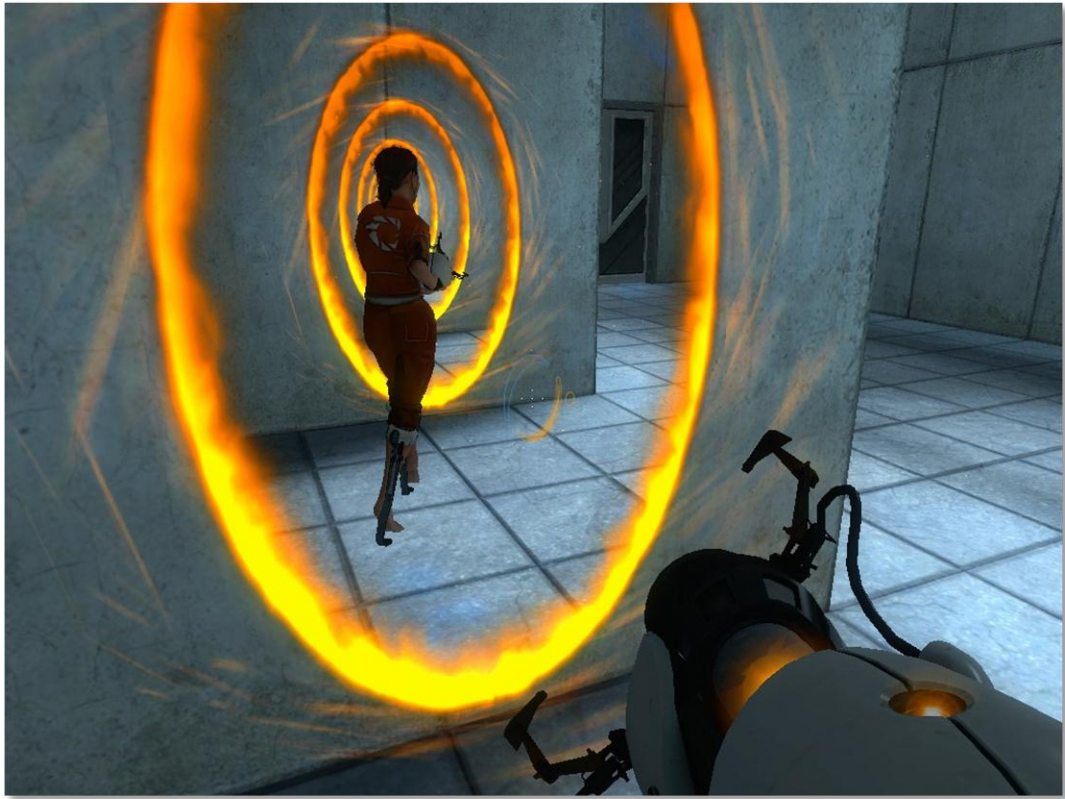


Figure 4.4 Staring down an infinite loop of portals.

As an interactive space, the space of *Portal* is one of potential; a space of confinement that is strangely unlimited. The chambers of this space are restricted and claustrophobic but, by use of portals, become indefinitely extended. There is a certain irony that the player is trapped, attempting escape from a space that is geometrically infinite. The mechanics of *Portal* offer more than the simple teleportation of the player from one location to another: this process is not a matter of disappearing and reappearing at the press of a button. If this were the case the space of *Portal* would be considerably more straightforward as it would be the player and their coordinates being reconfigured not the space itself. Instead we can stand before a portal, staring down the barrel of its potential, viewing repeating manifolds of space before us; a magic mirror of space infinitely extended. Confinement becomes illusionary and the size and scope of space purely perceptive. It is in this way that the player has agency over not only the nameless protagonist but agency over an unexpected spatial geometry.

What I have found most interesting and even inspiring about *Portal* is how it treats space as more than a platform for interaction to occur. While this capacity is certainly fulfilled, there is a sense that space is not merely a compositional element of an interactive mise-en-scene. Mechanically, the vast majority of interactive spaces, which the player navigates through the eyes of an avatar, are representationally akin to our own world. Devices such as the virtual camera, lighting, perspective, and the behaviour of the space itself, are deeply embedded in our own habitual understandings of the world. Not only do we experience these spaces through our own indexicalities but these spaces are also designed, programmed, and effectively created, from the same relative orientations. Traditionally, elements such as the camera, framing and lighting can be said to be compositional tools that are used to capture a film. Similarly, I find that the same can be said for the role of space in interactivity; a stage for characters, stories and gameplay to develop and unfold, an agent for interaction. *Portal* offers new ways in which space can be considered – it innovates not so much what occurs in this space but the space itself is innovating.

My Own Explorations

As part of my own explorations into spatial manipulation I wanted to create a short game experimenting with non-Euclidean geometry and the possibilities to subvert player expectations associated with this spatiality. All the works I had created up to this point in the research had been developed in two dimensional environments because of the limitations of time as well as the belief that my theoretical ideas could be manifested in these projects as effectively as they could in three dimensional examples. When it came to thinking about ways to manipulate non-Euclidean space, however, I began to consider the best way to explore this concept. In a sense, couldn't a lot of two dimensional worlds be considered non-Euclidean? In *Experiments in Space And Frame*, there is a screen made up of several multiple frames connected in an illogical manner for the player to navigate (Figure 4.5). The screenshot below shows the four frames of the screen with coloured arrow overlaid to indicate where the edge of each frame leads. For example if the player were to move from the middle frame to the right, they would appear on the left side of the top left frame).

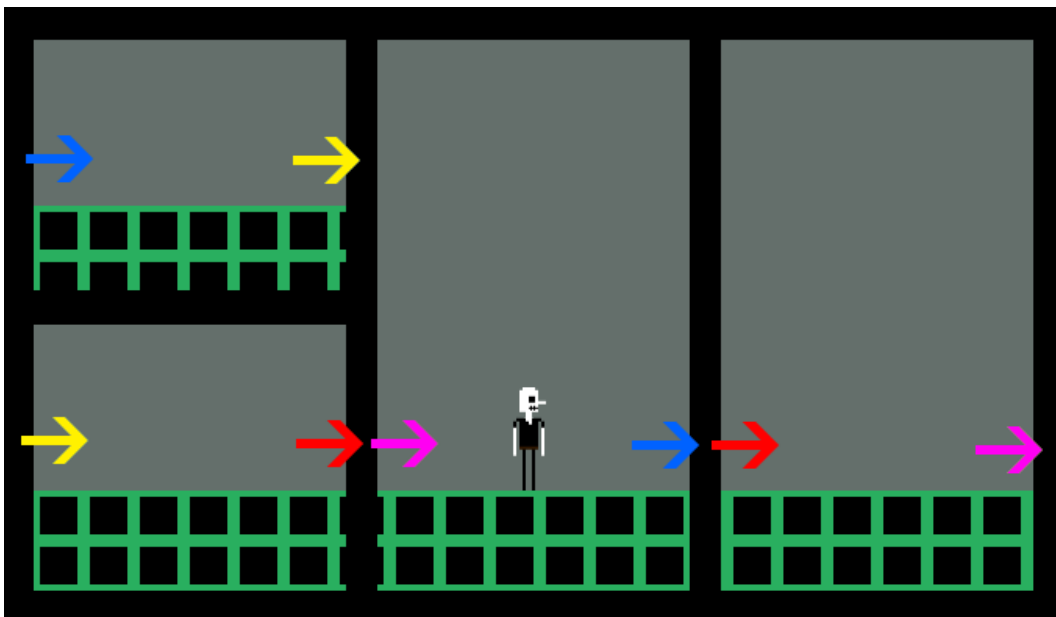


Figure 4.5 Non-linear Multiple frames in *Experiments In Space And Frame*

This configuration in itself certainly isn't linear, metric or finite in dimension. Indeed, manifestations of non-Euclidian structuring, it seems, can certainly be expressed in two dimensional environments. Despite this I felt that, although this example is certainly valid, to fully explore the depth of non-Euclidean space and its possibilities these explorations would have to be extended to a three dimensional realm.

Invisible Cities has a basic goal: collect the orb on each stage. This apparent simplicity was designed to put an emphasis on exploration. There are no real dangers, or reflex based action sequences with the challenge of the game being to navigate the space of this non-Euclidean environment and, therefore, any other aspects of gameplay become inconsequential. This premise offers the opportunity to explore elements such as overlapping locations, otherworldly geometry and rooms, which behave like wardrobes into Narnia, in ways that would have greater affective potential than if presented in a two dimensional space.

One of the unique elements of this project is the experimentation with the possibilities of the virtual camera and this turned up some interesting and, at times, accidental results. Human vision is said to be somewhere between 160 and 206 degrees (only around 140 of this being binocular vision, the rest being peripheral). What this means for game designers is that in order to make a virtual world seem real (or at least authentically representational), the field of vision of the virtual camera must be set to imitate human sight (Figure 4.6). By inputting the 'wrong' values into the code for the camera object I quite accidentally discovered that by manipulating this configuration the virtual perspective can be adjusted narrower or wider than what the human eye is physically capable of experiencing. The effect of this is like looking through a 'fish eye' lens which can be dynamically altered to the point of 360 degrees and beyond – causing vision of this virtual world to 'implode' upon itself (Figure 4.7). This mistake, this happy accident, completely destabilised the virtual space for me both from the perspective of a player as well as a designer. A space once geometric, Cartesian and familiar, transformed into something distorted, foreign and multi-dimensional.

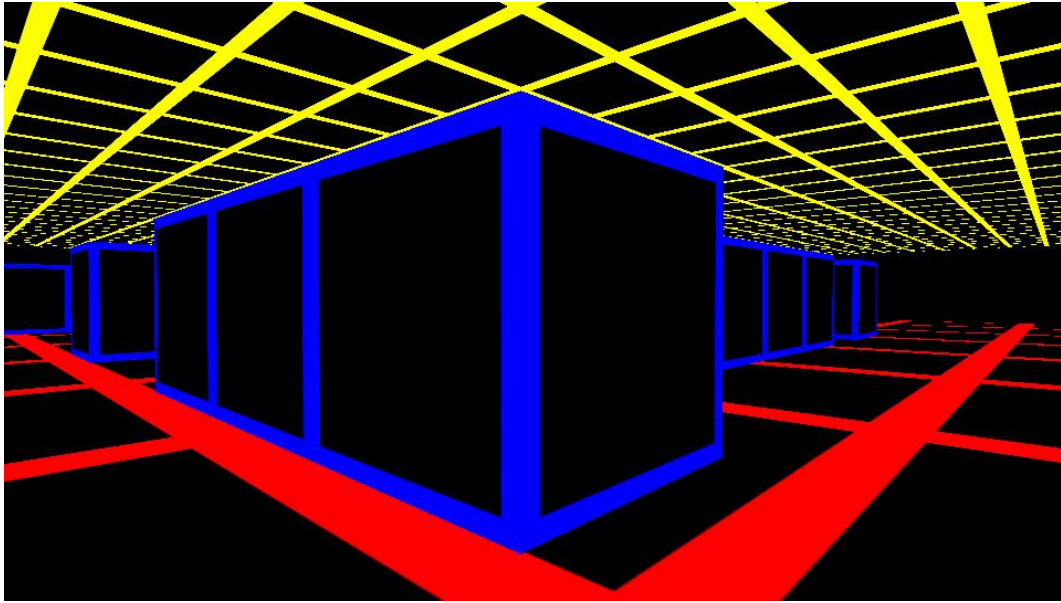


Figure 4.6 *Invisible Cities* from a 'normal', human perspective.

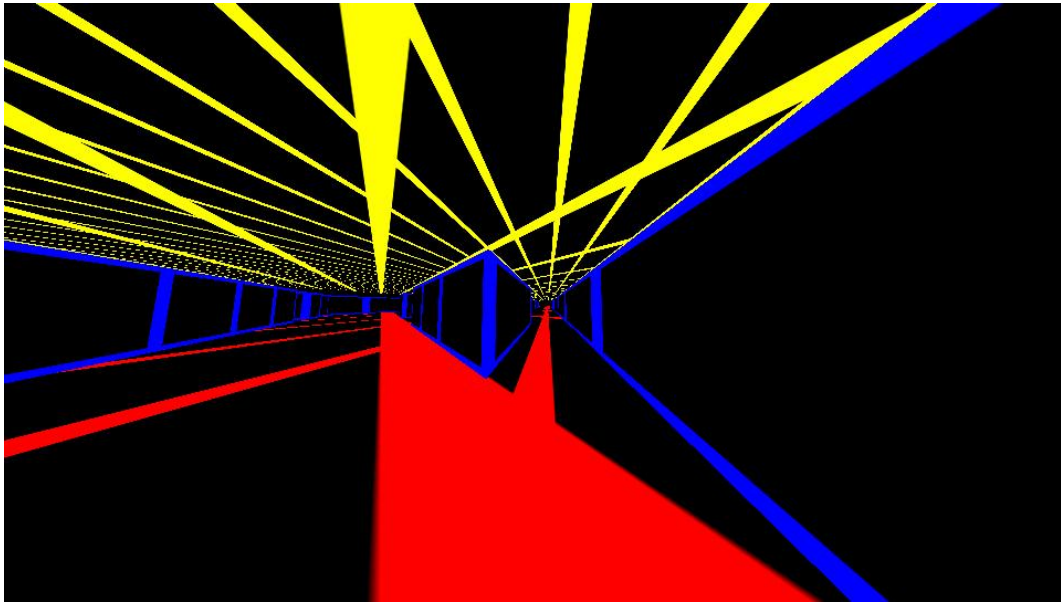


Figure 4.7 The Same scene and position shown in Figure 4.6, with a distorted camera.

Deterritorialisation

A way which we can discuss this anomaly in virtual space is through De Landa's notion of deterritorialisation:

The other dimension defines variable processes in which these components become involved and that either stabilise the identity of an assemblage, by increasing its degree of internal homogeneity or the degree of sharpness of its boundaries, or destabilise it. The former are referred to as processes of territorialisation and the latter as processes of deterritorialisation. One and the same assemblage can have components working to stabilise its identity as well as components forcing it to change or even transforming it into a different assemblage. In fact, one and the same component may participate in both processes by exercising different sets of capacities (De Landa, 2006, p.12).

This concept can be applied to the way we understand space as an assemblage. Each of the component parts of this assemblage can be said to either stabilise or destabilise this configuration. A 'stable' or 'territorialised' space can become deterritorialised by a single element that transforms or reterritorialises the assemblage into a different form with different capacities for interaction.

This idea is useful for discussing *Invisible Cities* because its warped geometries are very much a deterritorialisation of a conventional, three dimensional, space. Initially when I was creating this experiment there was nothing particularly unique about the space of *Invisible Cities* it was simply a way of me exploring three dimensional environments without any predisposition in mind. By altering this space through the camera code the space became deterritorialised; it had previously existed as one kind of spatial assemblage and, in an instant, transformed into another.

I find this notion interesting because in the ways it relates back to the discussion at the beginning of this chapter about player expectations constructed from past

experience. As a designer of space, with affect at the forefront of my mind, straying from what previous interactions have led the player to expect is a powerful mechanism for delivering affect (as seen in *I Remember The Rain* for example). Deterritorialisation is very much an extension of this idea as if a space can be deterritorialised in its basic nature then surely the way that we interact with that space will be affected by this change.

This discovery highlights the importance of the practice –led nature of this research as, if it were not for my own explorations into creating the space of *Invisible Cities*, the potential natures presented by thinking about perspective in new ways would not have developed as they have. Previous works being within two dimensional environments led to me wanting to explore three dimensional space. Seeing the potentials presented in *Portal* and theorising the possibilities of this space inspired the development of *Invisible Cities* and the emergence of the ‘broken’ code of the camera, an innovation, testament to the emergent nature of this research. These new possibilities presented in the construction of the virtual camera demonstrate an obvious yet often overlooked facet of interactive space: that the way we explore these spaces doesn’t have to be in a way that is human. Why should interactivity be presented within mechanisms representational of our own primary reality when possibilities of the virtual are far more extensive? Interactive space has the potential to exceed representations of human perception yet is so often conceived in a way which is bound by it. *Invisible Cities* then, is my attempt at not only deterritorialising but dehumanising space and the expectations associated with a conventional composition of space.

Non-Euclidean geometrics introduce a fourth dimension of spatiality, however, we as the player never can experience true non-Euclidean space, only a representation of it. Similarly virtual spaces, that we consider to be three dimensional, are in truth no such thing as they are bound by a two dimensional surface; no matter how deep a virtual space may appear it remains mediated by a screen or monitor. Just as what we consider to be a virtual three dimensional environment (Figure 4.8) is only a

representation, so are non-Euclidean spaces representations on the screen. In *Invisible Cities*, the environments have been designed from a top down, two dimensional perspective (Figure 4.9).

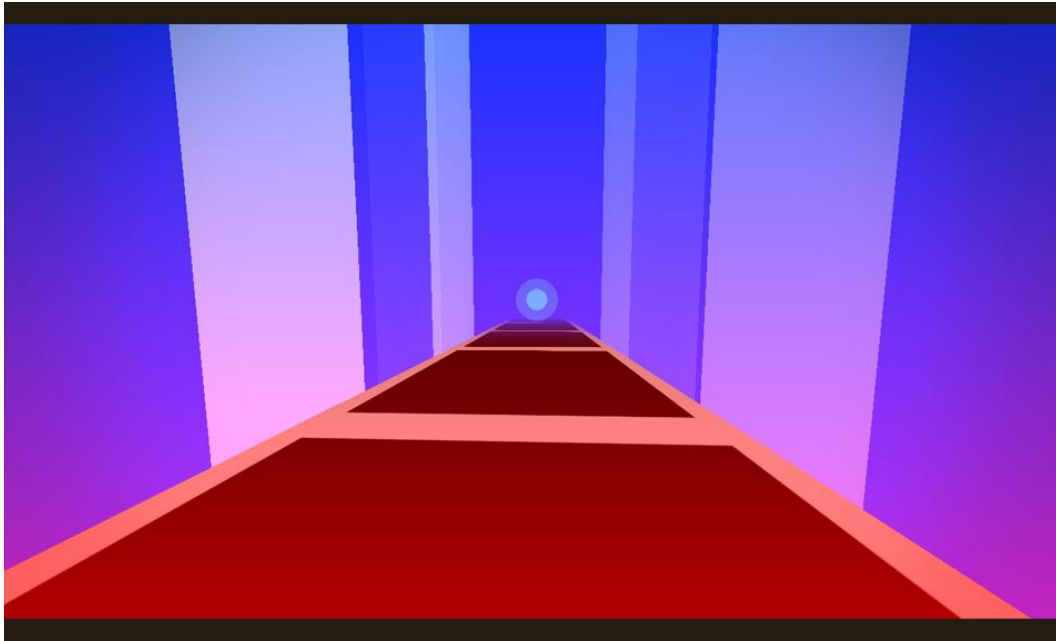


Figure 4.8 A Scene from *Invisible Cities* showing a walkway, pillars and an orb.

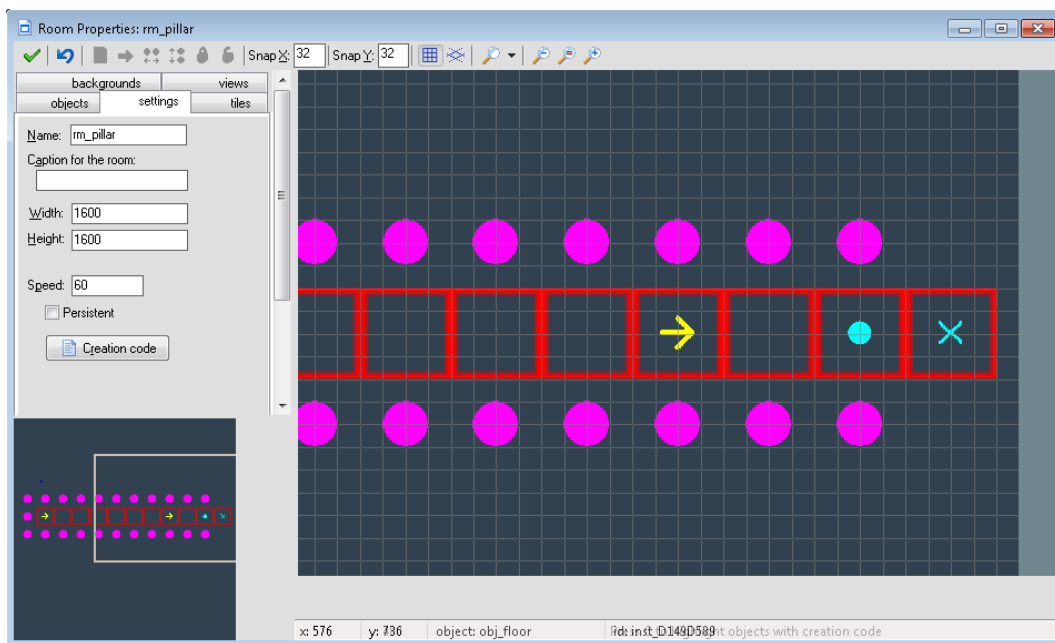


Figure 4.9 The same scene as Figure 4.8 but from the view of the level editor.

What may seem like an endless corridor or impossible room is little more than trickery achieved through code – variables, values and scripts assembled within a level editor. An example of this is a scene where the player is trapped in a corridor comprising only left turns (an apparent square shape). Upon turning the fourth corner however, the player finds themselves not where they began but are presented with a fifth turn to be taken – effectively this configuration is a room with five sides though it is not a pentagon but a 5 sided cube (Figure 4.10). This is perceived as a non-Euclidean environment but from a design perspective has been constructed by the placement of invisible triggers, which reconfigure the space dynamically, so that the walls themselves are shifting outside of the player’s vision creating the illusion that Euclid’s laws have been broken. It is in this way that endless corridors or overlapping rooms can be created; not through true non-Euclidean constructions but via the invisible touch of the designer.

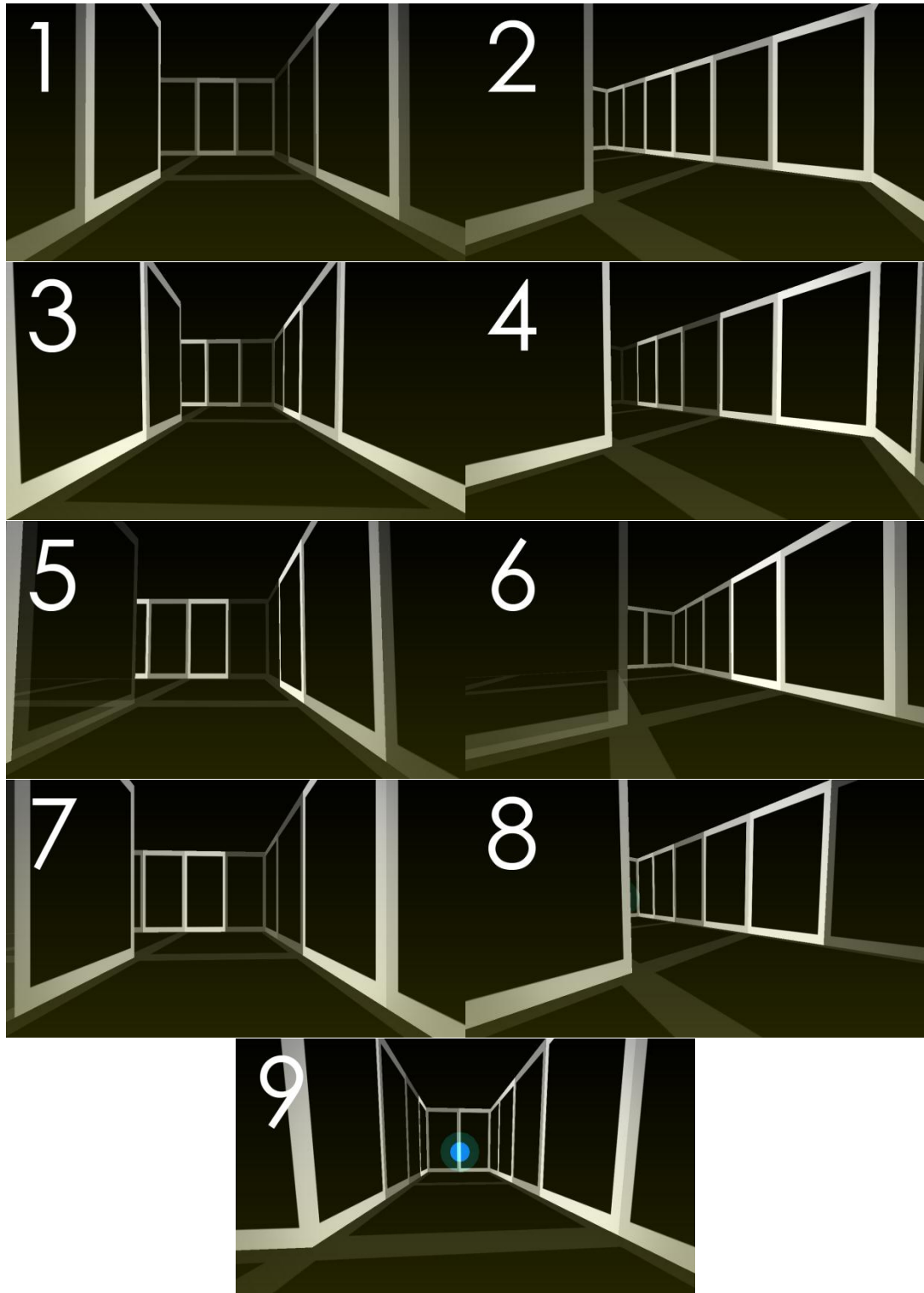


Figure 4.10 Walking around the 5 sided room in *Invisible Cities*.

The player walks through a set of corridors comprising of only left turns. Note that for the shape of the room, after four turns (1-7) the player should be back where they began but instead a fifth turn can be taken.

Like peeking behind the magician's curtain, there is the realisation that presentations of the non-Euclidean are illusionary. This awareness, however, doesn't diminish the affective nature of these spaces, on the contrary, understanding that these environments are entirely representational empowers the ways in which we can think about interactive space because, irrespective of how space is constructed, it is the way in which an audience interprets and engages with them that is of greater significance. What is important is how spaces operate within the context of a greater, virtual assemblage. The non-Euclidean space doesn't need to be a mirage, convincing to our own primary reality, in order to be affective as the strength of these spaces is that they are made possible within a virtual one.

Virtual Perspective

Non-Euclidean constructions raise an interesting point about the nature of space itself: what is space but our mediated perception of it? The coding of the camera can make things appear much closer or further than they actually are, like looking through the opposite end of a pair of binoculars. In *Invisible Cities*, the space is empirical regardless of perspective - it's still the same distance to walk to from one side of a room to the other whether the field of view that is representative of human or inhuman perception. A virtual environment can be created that resembles our own world with trees, animals, buildings, a sky and a ground but if the camera is not equally representational, this world will function in an entirely different way.

Consider the now somewhat archaic *Wolfenstein 3D*, a pioneering first person shooter embodying a single plane 3D space (see page 41). Only able to adjust their horizontal orientation, the player could never look up, and so, the game never included anything of consequence on the ceiling, an example of how the perception of a space affects the way in which it is designed. The questions then, are that in a virtual world, where the player's agency is afforded to them through the lens of a virtual camera, is it even possible to draw a distinction between the space itself and how it is perceived and how that perception is mediated? Although the camera

becomes the means of navigation, it too is a primary component of the spatial assemblage. This consideration opens up an array of implications for the design of space as it is the geography, physics, colour and structures which are most commonly manipulated in a drive for innovation. Understanding the camera as being more than a compositional tool, but an agent of space itself is inspiring. Mike Jones discusses the role of the virtual camera as an evolution of its physical predecessor:

Here we have not only a creation of space as primary compositional framework (above and beyond the cinematic frame) but the camera, as an agent of perspective, becomes a compositional ‘element’ rather than a compositional ‘tool’ (2007, p.225).

Despite its namesake it is clear that the virtual camera serves a very different role to its traditional counterpart. I would argue that the concept of non-Euclidean spaces are far more potent in their affect in an interactive environment than in one of fixed lithochronology (see page 46) and the deception of such spaces feels all the more real when the player has control over the navigation of them. As previously discussed, what we see as a non-Euclidean space is entirely illusionary, an illusion all the more convincing when experienced in an interactive sense, as although the player themselves is not physically inhabiting the dimensionality of this space, they are doing so through a virtual agent be it a first person camera or an avatar. Interactive spaces may in fact be the closest we as humans can currently come to engaging with non-Euclidean geometries other than through the notations of mathematics.

To go back to *Portal* as an example, it is interesting to consider that it certainly wasn't the first game to feature the idea of teleportation. In my mind the reason these mechanics are impacting are not because of the mechanics themselves but the perspective from which the player experiences them from, that is the ability to peer through portals and back into the room which you are standing in and experience the seemingly infinite space that extends as far the player is willing to travel. Indeed, there has been an online fan game based on *Portal* titled *Portal: The Flash Version*

(We Create Stuff, 2007). This incarnation of the game follows the same concept as the original except it is set in a two dimensional world from a side-on perspective (Figure 4.11). A comparison between the two highlights the importance of the virtual camera and the difference in affect by how this device is treated. Both games follow similar mechanics and gameplay objectives but the 2D version simply lacks the dimensionality that, to me, makes the space compelling. When presented in this way the level of aesthetic, as well as conceptual, intrigue is considerably diminished and, like the non-human camera of *Invisible Cities*, it is not always about what a space *actually does* but how we experience it and what we *perceive it to do*.

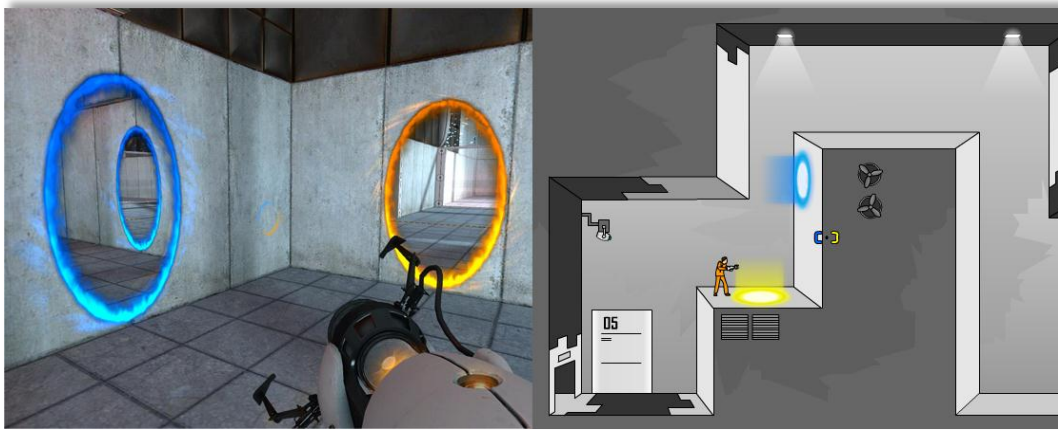


Figure 4.11 A comparison between *Portal* (left) and *Portal: The Flash Version* (right)

So ultimately, what is the purpose of these shifted perspectives and warped geometries? The virtual perspectives act as a trigger of affect by challenging the player's understanding of virtual space based upon their experiences of primary reality as well as with other virtual worlds. Although two dimensional environments can certainly be non-Euclidean, it is the fact that a three dimensional space is more akin to a primary reality that makes the deterritorialisation of geometries in this context all the more potent. The player's interactions are configured by an indexicality generated from both their experiences of the real world as well as those within other media. *Portal* disrupts expectations which are then re-informed with new sets of laws, physics and understandings and these shape the way a player interacts

with an environment. As anecdotal evidence of this, I remember playing *Portal* when it was first released. I felt that the mechanics of the space were incredible as it felt so innovative and unbelievable that such a world could be captured within the space of a videogame. It was the exploration of these mechanics that were in themselves, ‘the game’, regardless of goals or the cleverly interwoven plot, the fun was simply in making portals, moving through them, and exploring the possibilities of the space. Even if the game itself had been poorly constructed or executed in some other way the space itself would still have been quite remarkable. Forward five years and I am playing *Portal 2* (Valve Corporation, 2011) for the first time. The sequel is bigger and grander than its predecessor with shiny new graphics, an improved game engine and multiplayer support. It is in my mind a very good game and, on paper, probably a much better game than the first *Portal*. Yet despite this admission, I didn’t find the experience anywhere near as compelling as playing the original game. Regardless of what the new game may have achieved the fact that I was now accustomed to the space of the portal world meant that there was not that same deterritorialisation that occurred during the first game and so ultimately, I found the overall experience to be less affective.

Fall Up, I Remember The Rain and *Invisible Cities* each present ways that the understandings of interactive space held by the player can be challenged. The way space is perceived by the player can be destabilised in a number of ways with reference to any aspect of a spatial assemblage from style and audiovisual aesthetics, to the mechanics of interactivity, and the way in which a virtual space is constructed in relation to other environments both digital and primary. The concept of territorialisation is a powerful mechanism to think about the nature of interactive space as a space of affect as well as how these spaces are designed. Through these ideas we can discuss the experience of the player, what affects them and how the nature of this affect develops throughout interaction. This concept can also be used to describe the construction of a space itself and how this spatial assemblage can be reconfigured to explore new possibilities. As discovered, through the development of *Invisible Cities*, things are not always what they may appear to be. There is not

always one, empirical form of space because the perception of any structure is always experienced through some kind of filter or mediation, be it our own indexicalities, a virtual camera or the limitations of a program's code. With this in mind, it makes sense to say that when it comes to discussions of interactive space, there is never one right answer to anything; only different perspectives, different tools for thinking, theoretical and practical, which can be used to generate an understanding of an affective experience that is complex.

Chapter 5 - Reconceptualising Space

As discussed in the previous chapters, recursive space and the experiences which inform it are a means of understanding the interactions of a player in a virtual space. Up until this point I have seen this as something that occurs within a spatial assemblage between the agencies of component parts in this configuration. De Landa describes deterritorialisation as “any process which either destabilizes spatial boundaries or increases internal heterogeneity (of a space)” (2006, p.14). What interests me is how this concept can be adapted to discuss space in different ways. In the previous chapter I discussed ways to destabilise player expectations through a lived perspective as well as how spaces themselves can be deterritorialised. Seeing the potential of this theoretical approach, I wonder in what other senses De Landa’s notion of territorialisation could be applied.

As discussed in the chapter ‘Understanding Space’, there are a number of existing frameworks that can be used to explore constructions of space. What I would like to consider is the possibility of deterritorialising not the contents of a spatial assemblage but our understanding of space itself. Lefebvre and Harvey offer a fundamental, conceptual basis that I have used as a platform for this research. Their descriptions of space in conjunction with other theoretical perspectives such as assemblage theory, recursion, and affect, have empowered my own explorations of space both practical and theoretical.

Harvey himself wrote:

Space is neither absolute, relative or relational in itself, but it can become one or all simultaneously depending on the circumstances. The problem of the proper conceptualization of space is resolved through human practice with respect to it. In other words, there are no philosophical answers to philosophical questions that arise over the nature of space - the answers lie in human practice. The question “what is space?” is therefore replaced by the

question “how is it that different human practices create and make use of different conceptualizations of space (2004, p.5)?

Although Harvey presents a paradigm for describing spatiality, he concedes that his considerations are simply one of many possible ways that space can be depicted. Space is multiple and to theorise it is not an effort to understand what space is in its entirety but rather to approach certain aspects of it. With this understanding in mind it makes sense to constantly look for new ways to explore interactivity not to eclipse existing theories of spatial construction but to supplement them. This chapter attempts to discuss alternate ways that interactive space can be described not in ignorance of the aforementioned spatial geographies but through an insight afforded by an understanding of them. Additionally, it is also important to note that deterritorialising these philosophies of space is not the same as simply ignoring them. It is accepting that space is a concept of multiplicity and realising that there is insight to be gained by seeking different approaches. If the real question of the nature of space is: “how is it that different human practices create and make use of different conceptualizations of space?” (Harvey, 2004, p.5), then the ways that we can conceptualise interactive space are based upon our own human interactions within them and it is by exploring these interactions that a greater understanding of spaces, absolute, relational, relative, recursive and affective, can be gained.

Games As Music

We have led ourselves to believe that video games are most comparable to cinema and, while many of the aesthetics and conventions of games have indeed stemmed from film, the lithochronology of each form is different and that any parallels drawn fail to equal to other cross media analysis. In my mind, if comparisons are to be made, a far more useful juxtaposition would be between games and music. In this discussion, I am not referring to the music of video games but games *as* music and music not in a sense of sound or audio but the process of interaction which engenders

these incidents; the generative, recursive nature of interactive space - a space created through *play*.

A musician reads notation, a set of instructions interpreted to perform a song. There is a predefined way in which a piece may have been written to be performed but the musician can stray from this directed path into a multiplicity of different directions, free to play as they wish but all the while limited by the constraints of their particular instrument (a guitar cannot play a part in the same way as a flute or violin might). A musical performance is a generation of space comparable to the play space of a game. The player 'reads' the audio visual elements of a game as a multidimensional score, layered and complex. They know how to interpret these elements based on their own experience with other media which operates in similar ways. Each individual player submits to a series of variations in the way in which they play a game, each time space is unique, perceptually as well as mechanically. Musicians read from a score but the performance given is subject to alterations undefined by notation such as tempo, timbre, breathing, timing and dynamics as well the acoustic of the room which they are playing in and the tone of their particular instrument. Games are bound to these same kinds of conditions and it is impossible that two players would explore a play space in entirely identical ways as the generation of this space relies empirically on the recursive emergence of individual experience. Kanaga for instance supports this idea when he states that:

Musical instruments are games, as are compositions. They are possibility spaces with boundaries implicitly or explicitly inviting certain types of play (2012).

The relationship between games and music offers insight into the ways in which we can discuss interactive space. What I find most compelling about this perspective is that it can be extended beyond mere analogy. Music and games are both non-lithochronic spaces, they are recursive, generative and thus subject to the affected input of the individual. Above all, they are *play spaces*. This paradigm relates back to

my earlier rejection of the classical definitions of games (see page 7) – music too has rules and conventions, notes ordered into scales, patterns deemed to be correct and incorrect but as a primary definition. A description is entirely eclipsed by the emotional, affective and participatory possibilities of what this space entails and in the same way, rules and objectives are elements in the makeup of games but in no way should be considered to be a requirement to validate the definition. What is important is that both music and games are performative and compositional play spaces. Music is textured, noisy, melodic and rhythmic, ordered and chaotic; so too are games and, once emancipated from the immediacy and allure of what we see and hear, it becomes clear that the significance of interactive media is not how it imitates cinema but how it stands on its own as a space of possibility, rhythm and recursion unable to be realised without the input of a player.

There are many elements that contribute what can be considered a performance of a musical instrument: experience, muscle memory, feeling and theoretical understanding are all measures of how this space is generated. In the same way a player's engagement with interactive space is based on comparable elements:

Videogame players develop procedural literacy though interacting with the abstract models of specific real or imagined processes presented in the games they play. Videogames teach biased perspectives about how things work. And the way they teach such perspectives is through procedural rhetorics, which players 'read' though direct engagement and criticism (Bogost, 2007, p.260).

Once again it is important to stipulate that we are not referring to the sonic qualities of music in this comparison but the way in which a musical performance generates space in this case through *rhythms* of play. Games too are rhythmic, not just those which are outwardly based on the audiovisual aesthetics of music like *Guitar Hero* (2006, Harmonix) or *Rock Band* (2008, Harmonix), but *all* games and *all* interactive spaces. A game has tempo, the pace of play in a constant flux driven by the player while digital agencies of shifting intensities build affect both conscious and

unconscious. This structure may be choreographed but remains improvised; even if this play is well rehearsed, these improvisations, these micro variations may go undetected yet remain ever present in this constant and unequivocally unique reconfiguration of space.

We tend to map games by their mechanics (puzzle, role playing, shooter, strategy, racing, etc.) as well by aesthetic and narrative structures appropriated by cinematic genre (horror, fantasy, action). By this precedent it is interesting to consider ways in which the recursions of games can be discussed in their relationship to music. Could rapid, repetitive rhythms of play be associated with hardcore or techno? Would the tempo of a thoughtful, explorative game like *Dear Esther* be reminiscent of ambient music and spaces of constant reconfiguration like *Dys4ia* (Auntie Pixelante, 2012) akin to the spontaneity of jazz? While I don't expect this kind of designation to actually be employed in recognised classification, entertaining the thought does seem useful in consideration of the ways in which we design games. Just as audio visual elements are crafted to convey a mood or atmosphere, the rhythm of play is an equal agent of affect.

Guitar Hero

In *Guitar Hero* (Figure 5.1), nodes move down an onscreen fret board towards the player and are triggered by the press of a button. If the player does this correctly by pressing the right buttons at the right time the song will play out successfully.



Figure 5.1 The virtual fret board of *Guitar Hero*.

The aesthetics of this virtual score signify to us as an audience that this is a ‘music game’ but in fact, *Guitar Hero* is no more rhythmic than any other game, it is just more explicit in the ways which these rhythms are made aware to us. The score of a game need not resemble the visual representations which have been assigned to formal notation; looking at this empirically it is just as plausible to accept the frame of a maze game such as *Pac-Man* as a score to be interpreted by the player. The locations of ‘dots’, which must be collected, and the arrangement of walls and ghosts, determining the frequency of button presses and mechanical, suggest *rhythmic* responses of the player.

Games which are considered ‘music games’ more often than not have their rhythms of play quantised. This means that when the player presses a button, the response (although seemingly instant) is actually delayed slightly so that the result of interaction aligns with the tempo of the game. The way games like *Guitar Hero* are designed reflect this in that the spacing and speed of incoming notes is always in keeping with the time of the song. It’s interesting to consider that in fact a simple game like *Pac-Man* offers considerably more freedom in rhythms of play than *Guitar Hero* as the tempo of the game is much more dynamic played at a speed and intensity driven by the player rather than the game. This difference in agency is somewhat ironic in that playing an instrument is very much about creating space, it is an

experience free and playful, yet games like *Guitar Hero*, which attempt to mimic an actual instrument, are ultimately more restrictive than ‘non music’ games. This level of restriction, however, should not necessarily be taken as a flaw, just a difference in engagement. The interactions in *Guitar Hero* are like a 4/4, two and a half minute, rock song whereas *Pac-Man* is more of an avant-garde electro acoustic piece. Just because a mechanism for interaction is shaped like a guitar, it doesn’t make the space any more or less performative. What makes it performative is the way in which we engage with the media as an active agent. Pressing a button is interaction but *playing* a space is *performance*.

Silent Play

The paradigm of games, as music, is useful in that it enables us to conceptualise elements of interactive space in ways that, without such a model, may be unapparent or more difficult to relate to. Beyond this a platform for discussion is established from which ideas, such as rhythm or tempo, can be applied to interactive spaces. Of these concepts the notion of silence is one which I find particularly interesting due to the immense implications it has on interactive space.

In 1952 the composer John Cage wrote a piece called 4’33 – the title derived from the length of the piece; the four minutes and thirty-three seconds of perceived silence which it entailed. The composition is divided into three movements, empty bars notated in traditional convention complete with an indication of tempo. 4’33 was not written as a lack of performance but a performance generated by an environment – the atmosphere of the room, whispers of disbelief from the audience, the faint sound of footsteps from a connected hallway. The musician on stage has no control over the content of the piece; there is a shift in agency from the perceived ‘performer’ to the audience and spatial context, a notion which ultimately extends beyond the audience to the outside world itself. Given, then, that interactive space, too, is a performative medium, it is interesting to discuss the implications of ‘silent play’ in terms of interactivity.

Kanaga wrote a blog post in which he considers Cage's ideas in relation to video games. In this discussion he includes a short video, a 'silent play' of *Super Mario Bros.* (Nintendo, 1985). The level begins and a monster begins moving towards Mario, normally the player would avoid the monster or destroy it but in this case the character is hit by the monster, falls off the screen and the level restarts. This happens two more times for each of the player's additional lives before returning to the menu screen. Exactly what this says about interactive space is really a statement open to suggestion but, given the application of other musically performed elements in interactive space, by considering what 4'33 means for music will surely shed insight on the same concept of silent play in videogames. In concert, the audience are said to become the performers but what is interesting in terms of how we engage with interactive spaces is that the player is both the audience and performer. Silent play does, however, involve a shift in agency, not from performer to listener but from player to game. Interactive space is said to become 'active' only when engaged with by a player, this is the very basis of recursive space, the feedback loop which can be identified as the characteristic that sets interactive media apart from its lithochronic counterparts. Despite this, it feels erroneous to consider silent play of a game like *Super Mario Bros.* to be inactive because so much is occurring on screen; the environment animates, monsters move, music and sound effects play and most importantly, agents of the game interact with one another (the lack of action on part of the player results in certain death for Mario). Calling unplayed games 'inactive' is completely contradictory to the fundamental existence of such a space. Channelling the mentality of 4'33, there is no such thing as true silence, only a perceived silence brought to attention by what could be considered an 'inactive performer'. Extending upon this idea, games are never inactive – in fact, the only element of recursive space, which becomes inactive in terms of engagement, is the *player*.

The greatest poignancy of 4'33 is not simply that silence doesn't exist but that what we may consider silence to be is actually the awareness of spaces, noises and atmospheres that would have otherwise gone unnoticed. It is not that the sound of the audience's breathing and the noise from a connecting corridor doesn't exist when a

piece is being performed; these elements are forever present but eclipsed by a focus of attention towards what we consider to be the performance. What is interesting about the notion of silent play to me is not only how 'non play' can be demonstrated in any form of interactive media to differing effects but how elements of silent play can be appropriated purposefully within a work. Cage's conception of 'silence' was a way to give credence to elements that may otherwise go unnoticed - a silence defined by the time space between moments of performance. In the same way, what effects do a lack of mechanical engagement with interactive media entail? As equal agents of affect, what does the player begin to think about the game world and what does the game world begin to think about us? The short, experimental game *Execution* (2D Cube, 2008) begins to demonstrate the potential powers of silent play in a different way to Cage's philosophical application as an embodiment which is very much situated in the fundamental mechanics of the game.

Through the scope of a machine gun the player is presented with a view of a prisoner gagged and bound to a stake. The scene is otherwise bare besides a weathered brick wall and the occasional tumbleweed. The only apparent interactions, which are possible, are the aiming of the crosshairs and the firing of the gun. As creatures of habit, tuned to the expected interactions of other apparently similar games, the obvious action to take is to shoot the prisoner. What is interesting about *Execution* is that this evident, instinctive action actually causes the player to lose the game. Furthermore, if the game is reloaded it opens to the same state that it was left in meaning that if the prisoner has been shot once, their death, and so the consequences of the player's actions, are permanent. The way to 'win' *Execution* is simply not to shoot the prisoner – a game where the goal can only be achieved through an absence of action that, in itself, becomes interaction.

Execution, in my mind, holds significant implications concerning the nature of interactive space. As experimental as *Execution* may be, I do believe that it is a most certainly a game - a game where success in its play space requires a certain lack of play.

Conclusion

The purpose of this research has not so much been to explain interactive space in its entirety but rather suggest some possible approaches that could be used to better understand it. In this objective I feel that the research has been successful, approaching the discussion of interactivity with a sense of originality and innovation, while using frameworks such as affect and assemblage theory as a basis for dialogue.

Findings

‘Under Standing Space’ discusses ideas of space and how they might be applied to interactivity. This section establishes traditional constructions of interactive space and some of the ways they function. Additionally, there is consideration towards existing conceptions of space, such as those presented by Lefebvre and Harvey. This chapter is important because it is about establishing an understanding of interactive space and exploring possible ways that it can be described.

Our perceptions of interactive space are inescapably informed by our prior experiences with spaces we have engaged with previously. This notion can be understood in terms of a lived space – a space that we as humans operate from experientially. Informed by the indexicalities developed from earlier interactions, engagement with virtual worlds is fuelled by the player’s understanding of primary reality as well as other virtual spaces. Interactive space can be best explained as recursive and relational, a space of feedback loops between player and the virtual. A player is affected by space and responds through interaction. This interaction, in turn, affects the virtual space, which is reconfigured according to this engagement, continuing to affect the player in a process of constant modulation between human and computer. In comparison to lithochronic spaces, the player has a much greater sense of agency (or at least a more consciously active agency) in an interactive setting. What this means is that the space which the player is being affected by is generated through their own engagement.

‘Deconstructing Space’ uses the ideas established in the previous chapter and applies them to examples in order to gain greater insight to both my own spatial experiments as well as other works. Because of the recursive nature of interactive space, the properties of this space are driven by a player or participant and, by extension, their perception of it. The expectations of the player can be destabilised, as demonstrated in *I Remember The Rain* and *Fall Up*. As well as experiencing space in a relative sense, players also experience space through how it is designed. Interactive space is so often presented in a way that is representational to our own world, a notion that this chapter challenges. Non-Euclidean structures are one possible way that space can be deterritorialised and with the associated reterritorialisation of this configuration, the understandings held by a player, of how a space should function, become destabilised. These ideas are presented in *Invisible Cities*, an experiment that challenges the representationally human qualities embedded in the tradition of interactive design. This notion of destabilisation is significant because, as found in my own experiments, it manifests as an agent of affect.

‘Reconceptualising Space’ draws comparison between interactive space, particularly video games, to performance and music. Space is multiple, fluid and dynamic and so this section is important because it shows how the same conceptions of space, which have been discussed in the previous chapters, can be applied in different ways. In breaking down the mechanical actions of a player in an interactive setting we can see similarity between playing a game and playing a musical instrument. Dynamics, timing, tempo, skill, practice and the reading of a score are just some of the many elements that the two modes can be said to share. The intensities of these interactions are also important. The ‘silences’ of play, the spaces between the inputs of a player, these become as profound as any action. An intentional lack of engagement with a space becomes a kind of engagement in itself.

Because interactive space encapsulates so many different dimensions that can be conceptualised, it is clear that there is not one ‘right’ way to think about space. This is apparent in the approach of this study and, I believe, a strength of the research, that is

realising that space can be theorised in many different ways, old and new, traditional and contemporary. Interactive space is not a singular entity that can be described in full by one approach alone. Interactive space is multiple; it is two, three and even multi-dimensional, a space embedded in the screen as well as a space that is actualised by people. Space is recursive, performative, coded, lived, relational and, at times, even silent. The purpose of this research was to explore the ways we can think about space through practical and theoretical engagement and in this, I believe it to have succeeded.

Interactive space is fluid. The experience of this space itself is dynamic and engaged with differently by different people. Additionally, this engagement is emergent as even the way a single individual interacts with a space develops throughout the entire experience. A player's perception of a space is stabilised and destabilised at varying intensities. While there is certainly a sense that the affective, experiential nature of space is recursive and dynamic, what is equally profound is the realisation that interactive space, even prior to any player engagement, is fluid and full of possibility. Each of the experiments that I made for this project started out the same way as initially blank projects in *Game Maker* without any detailed strategy. The idea of this blank slate suggests limitless potential in the possible design of spaces and, as a designer myself, it is inspiring to consider that these spaces all started off with a similar openness. The same beginnings of a project, in *Game Maker*, could become anything from a 2D or 3D space, static or scrolling, implied or multiple, a platform or strategy game, an interactive story or music video.

Game designers are not expected to create their own computers and operating systems from scratch, rather they work from existing platforms to realise their creations. In this way, I find that interactive space is not something to be filled but reconfigured. Even an apparent blank project in *Game Maker* is already made up of thousands of functions and interfaces allowing space to be designed. In a sense, there is a spatial assemblage already in place, it just hasn't been actualised yet but remains virtual. Interactive space is an escape from structure, it is free and full of possibility.

Initially I thought that assemblage theory suggested the opposite of this, after all, assemblages can be seen as structures. These structures, however, are dynamic and can be reconfigured to new potentials in an instant. The fact the player is a part of a wider assemblage within interactive space makes the possibilities of interaction perceivably limitless. Assemblage theory is not a way of discussing space as a singular structure but a method of understanding space in a particular configuration while realising that this configuration is inherently fluid.

Practice-led

To me, the greatest successes of this research have been those achieved through my own practice-led experimentations. Each of these experiments have offered insights that have not only shaped the direction of this study but have, in themselves, pushed the boundaries of interactive space for me. *I Remember The Rain* was, for me, a catalyst to realising the affective potential of interactive space as well as a highly successful project beyond the context of this research. However, I feel that although unintentional, this acclaim is in many ways connected to the purposes of this study. Firstly what it has shown is that the kind of thought and innovations I have been exploring in how space is designed are of interest to a wider group of people. *If I Remember The Rain*, a project that took me about a month to create, can be successful imagine what a similarly designed work could aspire to be if more time were invested. The avenue of the interactive story presented in *I Remember The Rain* is deeply embedded in video game convention yet at the same time draws influence from cinema and how films are presented. I see this niche in genre as having potential for interactive spaces conceptually and even commercially. The combination of retro, nostalgic, game-like aesthetics, coupled with more serious themes and filmic qualities, is an area of this modality that has yet to be fully explored – a discovery which in many ways was an inadvertent side effect of this study.

When embarking on practice-led work there is a certain sense of unknowing about how the research will progress as the emergent nature of this kind of research enables

ideas and directions to develop throughout the entire project. I am confident with how these elements have evolved and driven my work. The connectedness of theory and practical experimentation in this research is clear – a testament to the methodology in itself. Some projects like *I Remember The Rain* drove fundamental theoretical directions, such as my interest in affect, while *Invisible Cities* was created as a direct result of theory as an attempt to challenge Euclidean conventions of virtual space. The feedback between theory and practice has extended even beyond my own expectations as I found that all of these projects could be theorised in different ways, many of which I had never intended to use them for. In ‘Deconstructing Space’ I had set out to use *Invisible Cities* as my primary example but soon realised that *I Remember The Rain* and *Fall Up* also could be used to deconstruct space in their own ways, specifically the expectations of the player.

While the use of a practice-led method has been invaluable for my own learning processes, I feel that it is equally valuable for this work as a final research thesis. The ability for the reader to experience my own interactive experiments, before, after and as they read the paper, offers incredible advantages in terms of their own understanding as they can engage directly with the concepts which are being discussed. Beyond this, being able to include imagery from these works in the main body of text allows for a much clearer, more detailed depiction of ideas. Trying to describe the nature of some of *Invisible Cities*’ environments would have been incredibly difficult without the aid of practice-led elements.

Future Research

All of the works that I have created for the purposes of this project have been invaluable, emergent experiments that have become the backbone of the research. As a continuation of this study I would like to create an additional space that experiments with all of the ideas, theories and practical suggestions that have evolved over the course of the past year. A project developed with a conscious awareness of affect, the spaces of Lefebvre and Harvey, recursive space, space as performance and the ways

in which these ideas and expectations of interactive space can be subverted through methods such as non-Euclidean structures would be a very interesting experiment indeed. Creating a work that is ‘self-aware’ of its own facilitation in this background would not only serve to demonstrate these concepts but would surely reveal new ideas and directions throughout its development.

In addition to ways that this research could be extended in terms of content, I think it would also be interesting to explore the presentation of these theoretical concepts beyond purely written forms. What would it be like to present the contents of this entire thesis *interactively*? This is an exciting proposition because the theoretical and practice-led elements of this work are so closely intertwined to begin with that to separate them into interactive and written forms seems like a reductive formula. Imagine navigating research as a space where audiovisual elements could be used to convey concepts interactively while ideas could be illustrated and engaged in real time within the text. This could be actualised in multiple ways, one being an interactive document that could be displayed on a computer or tablet allowing embedded videos and spaces to be engaged with. In this example, the study could still be presented largely as text but would have interactive figures throughout that would allow a much more streamlined connection of ideas (as opposed to having to explore these experiments from a disc when the rest of the work is a physical book).

Another potential possibility that I can imagine is treating the study itself as an interactive space. The reader (or in this case it may be more apt to say ‘player’) could explore the contents of this study in a three dimensional, virtual space. The possibilities of this would be potent. In what ways could theoretical discussion manifest in an interactive sense? This suggestion of course is highly speculative and I myself am not entirely sure what form this would take but, given the success of practice-led experimentations so far in this paper, I feel as though this could be an avenue worth exploring.

I have used the notion of affect as a conceptual point of reference throughout this study as a way of explaining people's engage with a virtual space. For this purpose it has been an important element of the theoretical framework of this study. This research would be useful as a platform for future work relating to specific examples that could use affect as a way of understanding interaction within a particular space. It was not my attempt to prove the nature of affect in specific examples as it was more important to me to understand the concept as a means of explaining interaction, whatever the result. Based upon this research, further work could be undertaken using groups of participants, mapping their engagements with space and interviewing them about their experience. Audience response studies based around affect could reveal new potentials to designers. *I Remember The Rain* could easily be used for research of this kind and has already garnered a response that, although not entirely scientific, seems to indicate the affective nature of the space.

The possibilities of employing affect not only as a tool for thinking but also as a practical design consideration are, in my mind, immense. Virtual spaces created with affect at the forefront of their design would be an interesting shift from designing, video games, for example, around mechanics or narrative, instead aiming at purely affective responses.

For me, this research has ignited a sense of excitement for the potentials held in interactive space and their conceptualisations. I entered this study with the intention of exploring interactive space. What I didn't expect was how innovative and unique these explorations would become. In many ways the greatest success of this study has been the realisation that there are so many possibilities in this modality waiting to be discovered. It seems that technology is constantly striving to revolutionise itself, faster computers, more realistic graphics, virtual reality and online experiences. What I find most exciting is that even despite so many of these advancements in recent years, that there is still so much still to be explored in screen mediated spaces. The kind of space suggested by this research is not one of limitations and ridged structures. There is a sense of structure in terms of how interactive spaces are created

and we can use ideas such as assemblage and affect to understand these constructions but ultimately, even within screen mediated environments, the way interactive space is represented is ripe with potential – a true space of possibility.

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