

# Videogame Ecologies: Interaction, Aesthetics, Affect



Conor Mckeown  
MA, MPhil

Submitted in fulfilment of the requirements for the Degree of PhD

School of Film and Television Studies  
College of Culture and Creative Arts  
University of Glasgow

## Abstract

This project is driven by omissions at the intersection of ecological game studies and media-ecology. Although authors have studied videogames from a variety of ecological approaches, few have attempted to develop a holistic methodology, embracing videogames' specific attributes while recognising their role within larger physical systems. This thesis is an attempt to address this, reading videogames as simultaneously about and functioning as ecologies. My methodology draws on the agential-realist philosophy of Karen Barad whose theory of 'intra-activity' is abundant with ecological ramifications. Adapting Barad's 'intra-active' framework for use with contemporary videogames, I read them as assemblages of hardware, software and their human players. I explore three significant aspects of game studies: interaction, aesthetics and affect. Focusing on interaction, I analyse the game *Shelter*.<sup>1</sup>

Emphasising the role of hardware and software, I read these processes in conjunction with an understanding of gameplay. This encourages a shift away from seeing gameplay as 'interaction' as it is defined within human-computer-interaction, and instead promotes a view that is 'intra-active'. Siding with Barad, play is radically reframed as a phenomenon that produces the apparent objects of its inception. In the second study I approach a series of more experimental games illustrating how an agential-realist worldview influences aesthetics. Analysing high-concept puzzle games *Superhot*,<sup>2</sup> *Antichamber*,<sup>3</sup> and *Manifold Garden*,<sup>4</sup> I suggest that these games place a focus on aspects of ecology often over-shadowed in so-called 'natural' imaginings of our world, such as time, space and their entanglement.

Finally, bringing my focus to the role of the player in my ecological understanding of games I analyse a number of short, human-centred or biographical games. Seeing the role of the player in an ecological manner, designers deviate from traditional methods of generating pathos and affect. Rather than developing empathetic relationships between player and avatar through immersion, viewing the player as only a part of an ecological system demands a posthuman response from players. These designers ask players to empathise while

---

<sup>1</sup> Johannes Wadin, *Shelter* [PC Videogame] (Sweden: Might and Delight, 2013).

<sup>2</sup> Piotr Iwanicki, *Superhot* [PC Videogame] (Poland: Team Superhot, 2016).

<sup>3</sup> Alexander Bruce, *Antichamber* [PC Videogame] (Australia: Demruth, 2013).

<sup>4</sup> William Chyr, *Manifold Garden* [PC Videogame] (USA: William Chyr Studio, 2017).

acknowledging their role is small and not central. This thesis presents a novel point of view that draws attention to the ambitious design practices of artists while suggesting new avenues in the future.

## Introduction

This thesis is a contribution to the field of ecological game studies, providing a posthuman/new materialist/agential realist approach to the relationships between human players, technological systems through a focus on the fundamental forces that allow material connections. It is, however, based on a realisation I had while playing a videogame.<sup>5</sup> My hands connected to a mouse and keyboard, I was busily engaged with *Shelter*, the game pictured on the cover of this thesis and the subject of Chapter Three. To play the game is to take control of a family of badgers, with the objective of surviving their harsh world until such time that the young can look after themselves. A detail that initially caught my attention was that the mother and her kits are connected to one another algorithmically. If they stray too far, they eventually come running back to the mother. If the kits all die, so too does the mother and so the player must start again. This mechanical entanglement amidst a representation of the stereotypically ‘ecological’, so-called ‘natural’ world, struck me as important. In playing the game, a tension is created between the representation of ecologies through narrative and image, and the performative construction of ecological connections through the bio-technological processes of contemporary play.

I was reminded of the increasingly prevalent eco-games criticism, such as the work of Bainbridge and Chang (discussed in detail in Chapter One) whose work in particular highlights how game mechanics, the systems through which players interact with games, coincide with the ecological messages they may impart. In her study of virtual farm games, for instance, the lack of need to let fields go fallow, has a potential to portray rural landscapes as nothing more than endless sources of income (an idea uncomfortably instilled in the ‘mega-farming’ practices of North America).<sup>6</sup> In this regard, *Shelter* fared well but said nothing particularly new. Nature is depicted simplistically as a dog-eat-dog idyll. The aforementioned entanglement of mother and kits comes to shape your perception of your digital surroundings. The deaths of other creatures serve to further your survival; the deaths of your young are to be avoided at all costs. The natural world it represented through gameplay was, I felt, lacking in complexity.

---

<sup>5</sup> The spelling ‘videogame’ as opposed ‘video game’ is used throughout this thesis in accordance with the long running Game Studies journal. I sometimes use ‘digital game’ or ‘game’, when contextually appropriate, interchangeably with ‘videogame’. This is only to avoid repetition. No difference in meaning is intended.

<sup>6</sup> Alenda Chang, “Back to the Virtual Farm: Gleaning the Agricultural Management Game”, *ISLE* (Vol. 1, No. 1, 2012) pp. 237-252.

**Commented [CM1]:** I have added a number of paragraphs at the introduction to address the concerns of point 1. Making clear the role that entanglement played in my thesis and make the critical project more explicit. I have also made minor adjustments throughout to aid this.

After a while, a technical fault caused me to rethink my initial assumption. Although the game employs an origami inspired, 'low-poly' visual style (one that is extremely efficient as it limits the number of vertex calculations required by a system), it was still placing extreme demands on the relatively rudimentary laptop I had at my disposal. The machine's fans, designed to cool down the excess heat created by the high and low voltages (the means by which we currently enact 'binary code') coursing through the silicon CPU and GPU, were functioning at their full capacity. After an hour or so, the screen suddenly went blank. Service quickly returned with the message that there had been a 'critical error' and, as a result, my graphics processor had ceased to function. However, the computer continued on, just as intended by the programmers, reverting to a much lower resolution, utilising the built-in graphics from the motherboard. Without the GPU's assistance, however, the game began to warp and distort. It glitched and shuddered, producing weird visual artefacts and a bizarre play experience, I was forcefully reminded of how this artwork, this digital 'text', was entirely dependent upon the hardware that underpins it.

Although the game was certainly not functioning as intended, I continued to play. My play style had to change to accommodate the jerking movements of the on-screen characters. My fingers, muscles, my eyes, began to flow into a different rhythm. The broken version of this game was being produced in front of my eyes. Janet Murray's *Hamlet on the Holodeck*, and her ideas of multiform stories and plots were foremost on my mind. It certainly would have been possible to read this iteration of the game as simply a new retelling, analogous to a differences in the recitation of a folktale in keeping with the oral tradition.<sup>7</sup> This, however, did not satisfy me entirely as the game I was playing now seemed to be so fractured that to argue for its connection to the play experience as intended would have been an exercise in futility.

I was reminded of studies of glitches, of German media archaeology and some aspect of new materialism. I felt I was looking directly into the execution of the code of the game, seeing the functions laid bare, without any accommodation for my human comprehension. At the same time, however, it was clear that this was a material function of a machine dealing with

---

<sup>7</sup> Janet Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (London: MIT Press, 2017 [originally 1997]).

the restrictions of the material world. It was the properties of iron and silicon, their ability to conduct heat and influence electro-magnetic fields that determined this play experience I was becoming a part of.

Yet, there remained something specific in this experience worth discussing. Something that I felt brought together many of the elements of computer science, philosophy and critical theory that I had read. It was something about how what was being performed on screen was not a representation (or perhaps not solely), but was a manifestation of the digital, electrical pulses failing to keep up with the demands of their programming. The images of the badger family, shaded pixels, flickering at wildly varying rates of 10-60 frames per second, were still being rendered; groups of volts in RAM and CPU, connections of lights on the LED screen, remained entangled. But now, as their entanglement was being affected so clearly by their materiality, it became clear that their initial, idyllic entanglement was only ever possible through the same processes. A new, more engaging entanglement came into view. From the unfathomably complex activities of my brain and body to my fingers connecting with the keyboard to the processors to the electricity coursing through them, each element of this extended body was playing its part in an ecological process; a process that, in turn, was possible only because of the conditions of this world. I will come to discuss the notion of entanglement more throughout this thesis but let me state here that what began as an initial observation about proximity and shared activities, let's call it circumstantial entanglement, gave way to the realisation of physical connections between various worldly scales, similar to the meaningful entanglement that binds particles across space at the quantum level.

Understanding games as entangled, material phenomena, to be experienced more than read allows us to expand upon ideas of interaction, videogame aesthetics and affect established in game studies scholarship. This ecological quality stems partly from videogames, regardless of their content, being networks of hardware, software and human activity. Partly to this, videogames can also enact ecosystems. Through a complex web of entangled background processes, code 'if loops' and hardware clock cycles, 'God games', such as *Populous*, task players with managing the welfare of an entire planet.<sup>8</sup> Through expertly designed algorithms that were, in turn, stored as voltage on Amiga floppy-diskettes, *Populous*' familiar but fictional planet thrives and decays in real time. The human user, in their unimaginable

**Commented [CM2]:** Changed from 'represent' for clarity. I initially meant 'represent' only in a visual sense. However, given the anti-representationalist nature of my thesis, this was far too confusing.

---

<sup>8</sup> Peter Molyneux, *Populous* [PC Videogame] (Guildford: Bullfrog Productions, 1989).

complexity, comes to contribute to these otherwise cybernetic processes, their intentions transformed into voltage through keyboards and controllers. Taking the entangled qualities of games such as *Populous* together, videogames can be understood as simultaneously enacting ecologies while functioning ecologically in their own right. I propose that it is, therefore, this multiple, simultaneous quality that characterises their unique eco-characteristics.

Understanding videogames, media objects often radically distinct from commonly acknowledged 'green' texts requires an adjustment in thought. Timothy Morton has clearly defined 'thinking ecologically'. He writes, "the ecological thought is the thinking of interconnectedness. The ecological thought is a thought about ecology but it's also a thinking that is ecological".<sup>9</sup> Ecological thinking is not just thinking *about* ecologies (as when considering the state of the environment or deliberating recycling practices), it is a thinking that is acknowledged to happen within the vast interconnections that guide our daily lives. From an analytical perspective, videogames can embody this duality of the ecological thought. They can be *about* ecologies in their visual and narratological mediations of virtual environments. At the same time, they *are* ecologies, in that they combine a vast array of processes, both organic and inorganic.

An issue that videogame ecologies poses, one that will be addressed throughout this thesis, is that of scale. When playing a videogame, there are forces at work at the most minute scale, and, often, interconnections traversing the entire planet. At the same time, humans interact with games in complex, sensitive ways, investing emotions and forming cultural norms around play. Yet their input into the cyborg, hybrid apparatus of the computer/human videogame is relatively limited when compared to the rapid, global, machines providing the means for their experiences. Jaime Banks suggests that we should work across scales when studying videogames, to "examine phenomenal assemblages of play at micro-, meso- and macro -levels".<sup>10</sup> I will return to this idea time and again, but it is at the core of my ecological approach to games analysis: we must understand that the micro world of electrical hardware activity is entangled with the processing of software code, which, in turn, is entangled with the moment to moment actions of the player, which, in turn, are entangled with the larger, abstract human notions of excitement, exhilaration, pain and loss of

---

<sup>9</sup> Timothy Morton, *The Ecological Thought* (London: Harvard University Press, 2010), p.7.

<sup>10</sup> Jaime Banks, "Object-relation Mapping: A Method for Analysing Phenomenal Assemblages of Play", in *Journal of Virtual and Gaming Worlds*, vol. 6, no. 3 (2014), p. 235.

gameplay. My framework attempts, as best possible, to account for this web of activity.

This introductory chapter will unpick some important terms and present my observations about the specific ecological nature of videogames in the simplest possible way. Drawing on a number of independent games, I make observations on the current state of videogames and ecologies; how games represent, mediate and function as ecologies. Following from this, chapter one is dedicated to surveying relevant existing criticism from the overlapping areas of game studies, media ecology and code studies. Although this unique ecological quality of videogames is so definitive, I reveal that it is currently underexplored in game studies and relevant areas of media studies. In chapter two, therefore, I develop a methodology that serves as the backbone for the rest of this work. Rather than analyse videogames as other game studies or media scholars have, I, instead, use the writing of Karen Barad, using elements of her radically posthuman ‘onto-epistemology’ as a base for this thesis. Although not an explicitly ‘eco’ philosophy, her new materialist, ‘agential realist’ philosophy, is founded on a discussion on the interconnections of matter. Though vast in scope, it provides an invaluable lexicon and is the cornerstone of my ecological understanding of videogames. As I understand games as hardware, software and biological action simultaneously, Barad’s writing allows me to discuss these seemingly disparate properties as an interlinked whole. Chapters three, four and five are each dedicated to examining a different implication of exploring videogames through my ecological method. Focusing on the specific relationships highlighted through my close analysis, I argue that the specific games I have chosen challenge established theories of interaction, aesthetics and affect.

My reason for using Barad’s philosophy is born out of the current state of ecological game studies. At present theorists suggest the ecological nature of videogames but do so in a way that opens up avenues for further exploration. As will be suggested in my review of relevant literature, theorists’ tendencies to focus on elements of the videogame ecology comes at the expense of understanding the whole. For instance, Thomas Apperley’s study of ecological gameplay focuses on players, perhaps overshadowing the games themselves.<sup>11</sup> Jesper Juul discusses the complicated relationship between rules, players and games coming to the conclusion that they exist as only “half-real”, potentially softening conceptions of the very

---

<sup>11</sup> Thomas Apperley, *Gaming Rhythms: Play and Counterplay from the Situated to the Global* (Amsterdam: Institute of Network Cultures, 2010).



real impact videogames have on society.<sup>12</sup> Similarly, Ian Bogost's posthuman, 'object-oriented' assertion that while videogames take on multiple roles, their noumenal, 'real' existence is beyond the reach of conscious beings, can be read as devaluing the visceral immediacy of the gameplay experience. Adopting Barad's broad-ranging, posthuman, new materialist framework allows me to bring these ideas together. The new materialist nature of her philosophy highlights the entangled impact of videogames and players together on the 'real' world, discarding notions of videogames as in some way 'virtual' or 'vaporous'.<sup>13</sup>

Barad's writing accommodates for the wide range of current modes in game studies and can, therefore, fill a current blind-spot in that discourse. Rooted in new materialism it demonstrates a realism influenced by scientific discoveries and writing on science. The ontology explained in her work places a focus on phenomena over objects. She suggests that while phenomena cannot be viewed as 'things in themselves' they should still not be understood as existing in a Kantian paradigm of noumenally/phenomenally real. She writes, "crucially, then, we should understand phenomena not as objects-in-themselves, or as perceived objects (in the Kantian or phenomenological sense), but as specific intra-actions".<sup>14</sup> Her coined term 'intra-activity' will be explained in detail in chapter two. Put simply, for now, it issues forth from her agential-realist worldview as the means through which apparent objects, though the result of phenomena, appear to 'be'. Adopting Barad's view, we are forced to engage with the reality that videogames are an active part of forming everyday existence. This new materialist, posthuman approach is precisely what is missing from the current game studies discourse and so serves as a useful complement to established views.

It is imperative to note that, throughout, 'ecology' will be understood in a media-ecological sense, referring to the complex networked relationships between multiple human and non-human entities. Although the term may resonate with contemporary popular ideas of a so-called 'natural', my understanding of videogames as ecological is distinct from those rooted in 'green' ecocriticism. Matthew Fuller writes that 'ecology' is the term "most expressive language currently has to indicate the massive and dynamic interrelation of processes and

---

<sup>12</sup> Jesper Juul, *Half-Real: Videogames Between Real Rules and Fictional Worlds* (London: MIT Press, 2005).

<sup>13</sup> I am influenced here by the discussion of the 'vaporous' qualities of media in Wendy Hui Kyong Chun, *Programmed Visions: Software and Memory* (London: MIT Press, 2011), p. 21.

<sup>14</sup> Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (London: Duke University Press, 2007) p. 128.

objects, beings and things, patterns and matter”.<sup>15</sup> At the same time, Fuller is careful to note that ‘ecology’ (like ‘economy’) has a history: from the Greek ‘oikos’, it suggests ideas of households, families and order. Ecologies are attempts at making some sense of order out of potentially chaotic, vast interrelations. Unlike similar terms, with shared history, the nature/culture divide is absent from ‘ecology’. Whereas ‘physis’, ‘polis’ and ‘techne’, suggest the division between the human and the wild, ‘oikos’ does not innately suggest such a distinction.<sup>16</sup> My use of ecology, therefore, promotes a posthuman, materialist idea of videogames as combined biological and technological activity. ‘Ecology’ highlights this material point of view and suggests the complicated entanglement of the natural and technological in videogame play.

Although Barad’s work is not explicitly ecological, in that she does not use that phrase, in many senses it is a sublimely ecological theory. To be clear, Barad’s work does invoke some elements of eco-criticism and, in the latter stages, shows a preoccupation with the environment and environmental practices. She discusses ‘biomimickry’ and the extent to which it can be seen as an answer to the problems of human impacts upon the planet. However, this eco-critical project does not persist for long as Barad works hard to break down the distinctions between so-called ‘things’ and their so-called ‘environments’. She writes, “‘environments’ and ‘bodies’ are intra-actively co-constituted. Bodies (‘human’, ‘environmental’, or otherwise) are integral ‘parts’ of, or dynamic reconfigurings of, what is.”<sup>17</sup> In breaking down these distinctions, her theory is forged through a preoccupation with the same ‘massive and dynamic interrelation of processes’ mentioned by Fuller, with the exception that, for Barad, it is these processes that go on to continuously reconfigure and reproduce the apparent ‘things’ of the universe. While Barad may simply refer to what I call ‘ecology’ as ‘the universe’ or inevitable outcomes of the universe, I am content to use the term in order to assist my project of foregrounding the connections between the apparent objects of videogame play.

While my terminology is intentionally provocative, so too are the videogames I have chosen to analyse. My work is predominantly focused on independent videogames with some small

**Commented [CM3]:** Inserted this paragraph to clarify the applicability of Barad’s theory to an ecological thesis.

<sup>15</sup> Matthew Fuller, *Media Ecologies: Materialist Energies in Art and Technoculture* (London: MIT Press, 2005), p. 2.

<sup>16</sup> Sean Cubitt, *Eco Media* (New York: Rodopi, 2005), p. 18.

<sup>17</sup> Karen Barad, *Meeting the Universe Halfway*, p. 170.

examples drawn from more popular titles. This choice was made for two reasons: firstly, for better or worse, videogames from the independent sphere simply resonated more with the qualities I wished to highlight. Although the arguments I present in chapters three, four and five could be fruitfully applied to games created by large studios, they are particularly apt to the chosen videogames. Secondly, the independent game designers were forthcoming with information about their games that would have been impossible to legally obtain or reproduce had their games been the intellectual property of a larger company. This included insights into the games themselves but also working builds of games not yet finished.

**Commented [CM4]:** Removed unnecessary 'text' word

The games I explore in this thesis are not exclusive to any platform but have all been played on a Windows PC. The reason being that the majority of independent games produced today appear on the PC. I am not attempting to dig deeply into a specific game system, as in the school of platform studies. It should be understood then that my analysis of these games is unique to my particular experience, due to the relative lack of uniformity symptomatic of PC gaming. Two different PC's, even if both run the same operating system, can have different motherboards, running different BIOS' and have different levels of efficacy when using the same hardware. As such, when I am examining some of the shared tools for independent game design throughout the work that follows, such as the Unity game engine and development software package that allows rapid game development, it must be understood that the particulars of my experience may vary to another user on a different computer. This was unavoidable as the Unity engine forms a part of the shared ecosystem of contemporary independent games; its stability, accessibility and ease of use are important contributing factors to the rise of independent games in recent years.<sup>18</sup> At the same time, it is testament to the agential realist underpinnings of my work. Although we have a tendency to think in terms of objects and subjects, I am urging a focus towards a phenomenal ontology that places performance before things. While it is tempting to think of a game as a uniform object it is, in keeping with Barad and Judith Butler's concepts of performance, produced uniquely by phenomena.

As many of the videogames in each chapter were developed using the Unity engine this allows me to make certain, necessary assumptions about their construction. For instance, given the characteristics of Unity, I can surmise that the functional logic of these games

---

<sup>18</sup> Unity 3D, "Public Relations" (online resource), <unity3d.com/public-relations> [last accessed 19/07/2016].

follows certain protocols, enabling me to comment on their ecological properties. The three languages that can be used to construct scripts in Unity are C#, Javascript and BOO. Of those three, C# and Javascript are the most widely used today with more frequent support offered for Javascript. These languages both function using similar, object oriented logic. As such, when analysing games in depth, it is possible to construct similar scripts following the syntax permitted by those languages. Analysing games with the knowledge that they follow the patterns of object-oriented programming allows me more acutely engage with their micro-ecological properties. I can determine how data is shared or restricted between game objects, given the properties of Javascript and C#. In turn, taking my lead from Banks, I can acknowledge that these micro-properties impact how I view the meso-scale world of gameplay, and the macro-scale dimension of human emotions and online global networking.

A further aim of this thesis is to side with existing ‘ecocritical’ discourse surrounding the depictions of landscapes or biomes in fine art, literature and cinema. Videogames can make us aware of qualities of the natural world we seldom consider. In part, this is a technological achievement as high-definition graphics have the potential to bring us close to the awe-inspiring quality of nature cinema with added apparent control and time for reflection. At the same time, increasingly intricate interactive narratives allow us to get lost in the romance of an imagined ‘wild’. Most importantly, however, when playing a videogame, we are constantly reminded of our place within a ‘system’ of some kind. Whether through a glitch or a gameplay ‘mechanic’ we can become aware that we are acting within an expansive web of databases, clock cycles and computational loops.<sup>19</sup> Although a far cry from the complexity of the biological, videogames, when considered as ecologies, prompt us to consider our place within the systems of everyday existence.

Given that I take systems and ecologies as almost synonymous it is important to clarify that although the way I theorise exchanges between players and machines in videogame play resonates with complex systems theory, I do not intend to utilise this approach in my methodology. It is possible that an approach founded on complex systems may have produced similar outcomes. As one of the aims of this thesis is to understand this unique

---

<sup>19</sup> Game mechanics are combinations of rules and actions that allow players to interact with videogames. For example, the ‘jump’ mechanic of most games is the combination of the player pressing a button and the rules that govern how that button-press affects the game world - how high and far will the jump be; do you pass through objects or not, etc. All games have mechanics, but every game will not have the same. They are often the heart of a game but are more or less reflected in the narrative depending on the game.

ecological facets of independent videogames and to explore the implications therein. Just as I intend to see videogames as ecological systems, in that tradition, simple actions are seen to have vast implications on a global scale, with this holding true for biological and non-biological activity alike. Norbert Wiener sought to blur the boundary between animal and machine in his mathematically grounded work on cybernetics: “the synapse is nothing but a mechanism for determining whether a certain combination of outputs from other selected elements will or will not act as an adequate stimulus for the discharge of the next element and must have its precise analogue in the computing machine”.<sup>20</sup> Friedrich Hayek and Stephen Wolfram, work in a similar vein, finding the mathematical patterns behind the functions of nature. Complex systems theory presents a fascinating method with which to approach questions of the foundations of the natural world. Although I aim to show that games expose their own and other complex systems, complex systems theory was not the most appropriate choice to explore this point. In part this is because, as my argument progresses through this thesis, my work becomes less focused on the functioning of systems themselves and more on how videogames can be read as drawing attention to and commenting on accepted ontological theories. I become less concerned with the impact of the workings of a system and more interested in the outcomes of these complex systems.

A further point for clarification is that I do not wish to suggest games should be understood as ecologies *metaphorically*. Rather, I am suggesting there is a *material* basis to games; each has roots in electronic computer processes, a materiality that is often overlooked in game studies. Engaging with games in close detail, paying close attention to source-code as actions prompted in computer hardware, highlights a web of interconnected physical processes often viewed as vaporous. I ultimately argue that videogame ecologies are an important part of a much wider whole. Although they are active mechanical systems in themselves, games also involve human players who, it should be understood, through play, become active parts of a wider apparatus. To explore these claims, I look to an array of contemporary ecological philosophy and cutting-edge humanities research, rigorously taking apart the concept of an ‘ecology’ and examining how videogames fit into it. This is undertaken with reference to a small number of independently developed videogames, released within the last ten years. Each of the games mentioned in this work has been chosen because it displays an interesting

---

<sup>20</sup> Norbert Wiener, *Cybernetics or Control and Communication in the Animal and the Machine* (London: MIT Press, 1956), p. 14.

depiction of some form of entwined system; these games are worth exploring because they draw attention to aspects of how we think about ecology in general or else because of how they challenge our concept of videogames as part of worldly systems. In all, this thesis aims to present a new view of independent games within the context of the complex biotechnological network of contemporary western society; one provides an engaging insight into how this specific form of leisure technology plays a part in and simultaneously shapes everyday culture.

## VIDEOGAME ECOLOGIES

In certain circles, a romance surrounds the independent game designer. Assisted by the 2012, Sundance award-winning documentary *Indie Game: The Movie*, the phrase ‘independent developer’ can conjure images of a lone visionary, struggling against the demands of powerful industry.<sup>21</sup> Likewise, in gaming magazines that attempt to broadcast an alternative idea of videogame culture, the independent designer does not merely create games; they are attempting to make art.<sup>22</sup> However, ‘indie’ games have also come to suggest a genre rather than the financial situation of their creators. In recent years, ‘indie’ games have been released with suspicious levels of support from larger distributors, challenging the idea that these games are produced outside of conventional channels. Whether working alone in a bedroom or within a relatively large company, regardless of budget, platform, with or without support from a major publisher or distributor, games seem, nevertheless, to earn the title ‘independent’.

Without recourse to the romantic idea of an independent, struggling artist ideal, however, we can still confirm that in the last decade, ‘indie’ games – whatever they might be – have been innovative and challenging compared to their mainstream relatives.<sup>23</sup> Amidst this varied landscape, a number of games have distinguished themselves as ‘eco-games’ through a focus on contemplation, reflection and exploration. Games that place an explicit emphasis on the environment, *Firewatch*<sup>24</sup>, *Walden, a Game*<sup>25</sup> and *Nature Treks: Healing with Colour*<sup>26</sup> set

---

<sup>21</sup> Lisanne Pajot and James Swirsky, *Indie Game: The Movie* (film), (USA: Blinkworks Media, 2012).

<sup>22</sup> Dan Solberg, “The Beginners Guide to the Art of Videogames”, *Killscreen* (online resource) <<https://killscreen.com/articles/beginners-guide-art-videogames>> [last accessed: 26/07/2016].

<sup>23</sup> Mike Diver, *Indie Games: The Complete Guide to Indie Gaming* (London: LOM Art, 2016).

<sup>24</sup> Jake Rodkin, *Firewatch* [Videogame Multiple Platforms] (USA: Panis, 2016).

<sup>25</sup> Tracy Fullerton, *Walden, a Game* [PC Videogame] (USA: USC Game Lab, 2016).

<sup>26</sup> John Carline, *Nature Treks* [PC Videogame] (Published online, 2011) <[www.greenergames.net](http://www.greenergames.net)> [last accessed, 26/07/2016].

the player the task of exploring environments and little else.

There is an attempt, within this independent scene, to capture the beauty of the so-called 'natural' world; that 'thing', in Timothy Morton's words, "'over there' that surrounds us and contains us".<sup>27</sup> Through the use of striking graphics and elaborately detailed three dimensional environments these games represent the perceived natural in painstaking detail. These creations resonate with the writings of Lawrence Buell and other literary eco-critics who seek to foreground the environment within our readings of classical texts. Buell asserts that a text is 'ecocritical' when it adheres to certain criteria. He suggests that in a text that is ecocritical "the nonhuman environment is present not merely as a framing device but as a presence that begins to suggest that human history is implicated in natural history".<sup>28</sup>

*Nature Treks* and similar titles make a game out of appreciating the environment. Throughout play, we do nothing but move through an extraordinarily well rendered 3D environment (figure 1). There are no explicit rewards but seeing rare bursts of wildlife such as birds or butterflies, though entirely random, begins to feel like a reward in itself. Spending time in the calming, peaceful game world is a zen-like experience, limited only to the player's patience. The game's focus is clear; to generate an appreciation for the so-called natural world. In this, the newest era of humanity's technological history, that of ubiquitous computing, is beginning to find its place in natural history as Buell suggests.

---

<sup>27</sup> Timothy Morton, *Ecology Without Nature*, p. 1.

<sup>28</sup> Lawrence Buell, *The Environmental Imagination: Thoreau, Nature Writing and the Formation of American Culture* (London: Harvard University Press, 1995), p. 7.



Figure 1. *Nature Treks: Healing with Colour*

In a similar, perhaps even more explicit vein, David O'Reilly's *Everything*, provides the user with a protracted, abstract and often surreal interaction with the titular 'everything'.<sup>29</sup> From microbes and plankton to cows, pigs, all the way to air-balloons, the game gives the user the chance to play with simple representations of these familiar objects in a manner reminiscent of an overstuffed child's playset (figure 2). The entire experience is set to the backdrop of the philosophy of Alan Watts, making the point clear that this is intended as a thought-provoking, but very playful, experience, beyond a traditional 'videogame'. O'Reilly's previous game, *Mountain* provided the user with a similarly absurd, thought provoking experience of what it was to be a mountain – in essence, an opportunity to do nothing but stare, in awe, of the procedurally generated graphical monument.<sup>30</sup>

<sup>29</sup> David O'Reilly, *Everything* [Playstation 4 Videogame] (USA: Double Fine Productions, 2017).

<sup>30</sup> David O'Reilly, *Mountain* [iOS Videogame] (USA: Double Fine Productions, 2014).



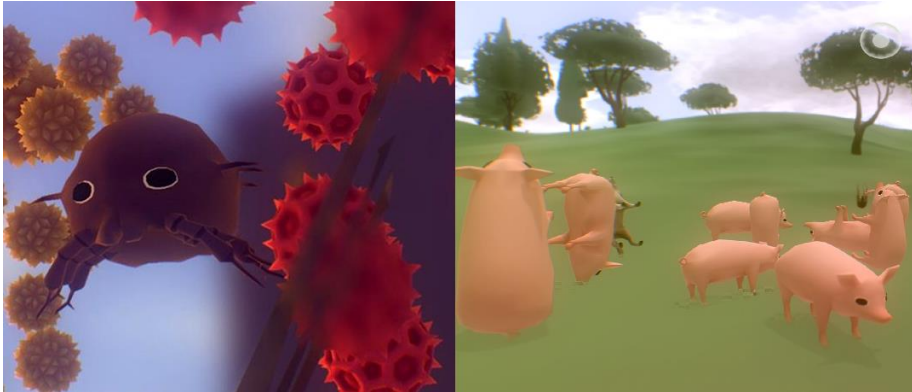


Figure 2. David O'Reilly's *Everything*

There is, however, something unfulfilling in the current mediations of natural environments. Something stands out as almost uncanny in the level of beauty of these rendered worlds. Morton suggests the potential of a 'dark ecology' writing, "with dark ecology, we can explore all kinds of art forms as ecological: not just ones that are about lions and mountains, not just journal writing and sublimity. The ecological thought includes negativity and irony, ugliness and horror".<sup>31</sup> Although there is a concerted attempt to represent nature in games like *Nature Treks* and *Everything*, there is an element of Morton's 'dark side' of ecology that is missing. Although we walk on mediated soil in each of the games, there is never the possibility of becoming dirty or hungry; our digital bodies will never perish or decompose in any meaningful way. There is no opportunity for our energy to become part of the same system that brought about the objects we see. In each game, there is never any sign of the necessary decomposition of matter that is required to sustain the landscape. There is an unavoidable distance created in these photorealistic but nevertheless shallow representations of reality. Playing these games, one quickly becomes discontent with such idealised portrayals of reality. It is difficult not to recall a short sequence from *The Matrix*.<sup>32</sup> Late in the movie, 'Agent Smith' (Hugo Weaving) reveals that 'The Matrix' was originally designed as a paradise. Smith elucidates, however, that the cybernetic overlords had to abandon this design because humans 'rejected it'. Like a utopia created by machines, there is something almost parodic about these games' attempts at mediating a perceived 'natural' world. Without the 'dark ecology' that is so essential to our biological existence, games can appear lifeless while

<sup>31</sup> Timothy Morton, *The Ecological Thought* (London: Harvard University Press, 2010), p. 17.

<sup>32</sup> Lana Wachowski and Lilly Wachowski, *The Matrix* (USA: Universal Pictures, 1999).

attempting to seem full of life.

A small number of games are far better attempts at representing the natural world that, to a degree, engage with the ‘darker’ elements of our ecological existence. *Rust*, for example, places players in control of an avatar in a post-apocalyptic world.<sup>33</sup> Uniquely, however, the avatar begins the game naked, starving and alone. To gather supplies players must destroy flora and fauna and craft tools from their surroundings, fending off other players for the seemingly limited resources. The game is commendable for its featuring ‘hunger’ and even ‘hypothermia’ systems. However, there is a level of detail still missing as the local biome is still limited to a few stochastically generated objects that reappear as time passes. In spite of appearances, resources are not limited and simply regenerate over time. Even in this attempt at focusing on the darker side of humanity, there are elements of ecological complexity that are side-lined in the act of representation.

Putting aside the importance of impressive graphics for mediating the natural world, other game designers adopt alternative approaches. Taking inspiration from world-building simulators of the past such as *Sim City* a number of independent games forefront complex systems over attractive visuals, aiming to recreate a world of (re)activity.<sup>34</sup> For example, *Dwarf Fortress* stands out for its graphical simplicity but systematic complexity.<sup>35</sup> In the tradition of *Rogue!*, *Dwarf Fortress* utilises only the ‘ascii’ characters as graphics (figure 3). Various coloured letters and symbols to represent features. Amidst the features of *Dwarf Fortress* one that foregrounds its complexity is the first step required for play: to generate a world. After the player has chosen from limited parameters for a small number of options such as the number of beasts or the number of settlements, the computer pseudo-randomly or ‘procedurally’ generates a world of predetermined size. Worlds are often thousands of squares in area and each of these squares will be taken up with a forest, a mountain, a river or some form of landscape. We can then zoom into these squares and reveal their hidden complexity: a forest is mostly trees but will also contain rocks, water, birds, plants. Comparably, a desert will mostly consist of sand but will also have some percentage of vegetation. Within *Dwarf Fortress* an important aspect is ‘history’; as the world is generated, the effects of time are felt as the squares adjacent from each other affect the topology of the

---

<sup>33</sup> Garry Newman, *Rust* [PC Videogame] (USA: Facepunch Studios, 2013).

<sup>34</sup> Will Wright, *Sim City* [Macintosh Computer Game] (USA: Maxis, 1989).

<sup>35</sup> Tarn Adams, *Dwarf Fortress* [PC Videogame] (USA: Bay 12 Games, 2006).

other.

In a similar manner to John Horton Conway's *Game of Life*, the cellular automata simulation, patterns emerge in the landscape of *Dwarf Fortress*' worlds. Rivers erode mountains, verdant areas are deforested, towns are destroyed and concentrations of civilisation appear.

Eventually, in contrast to the games mentioned above, *Dwarf Fortress* achieves a staggering level of complexity ranging from the condition of the skin tissue, muscle and bone of each of the hundreds of dwarves in your control, to the level of sediment contained in nearby rivers; there appears to be a fully realised ecology at work, over which the player has some small degree of influence.

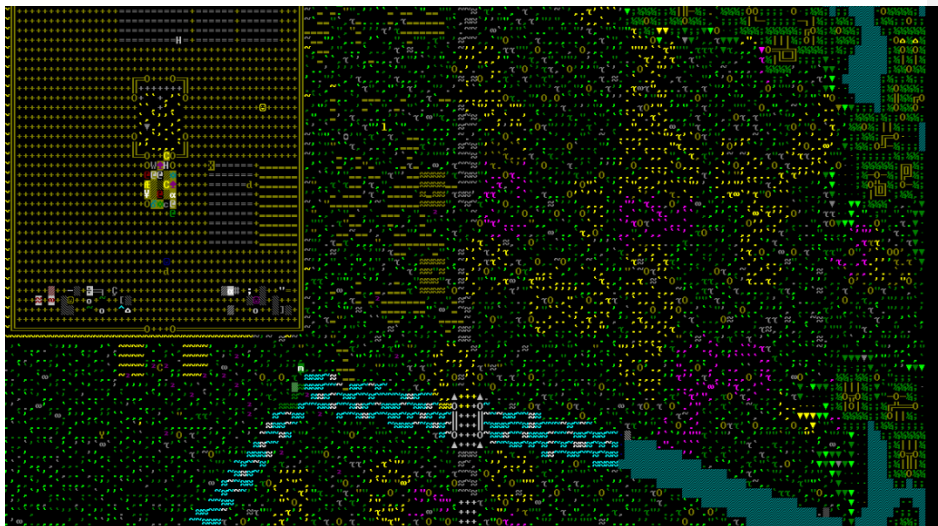


Figure 3. *Dwarf Fortress*

Although *Dwarf Fortress* is a game of staggering complexity it, nevertheless, pales in comparison to the complexity of biological entities. The working game is composed of hundreds of entangled variables, that produce thousands, if not billions, of computational interactions per second. These interactions produce the on-screen 'world' we perceive in front of us; withering trees, eroding rocks, dying heroes, giving way to new life for generations until an eventual, unavoidable defeat. This complexity, while admirable, of course, still pales in comparison to the complexity of any activity of a biological entity in our worldly biome. Eugene Thacker brings to the surface the immense level of complexity of living beings in his study of biocomputing; Thacker reminds us of yet unharnessed potential

power of DNA to function in a computational manner with the sobering thought that “for silicon-based computers, calculating all of the possibilities of such problems can be computationally taxing. However, for a molecule such as DNA, the well-understood principle of ‘base pair complementarity’ (that A always binds to T, C always binds to G) makes for something like a parallel processing computer, except that it functions not through microelectrical circuits but through enzymatic annealing of single strands of DNA”.<sup>36</sup> Thacker’s idea, that forms of code may ultimately be interchangeable, suggesting the potential for remediating the human genome, brings to mind the bewildering complexity of the human bodies we so often take for granted. Though it may seem obvious, it is important to not forget that although a game like *Dwarf Fortress* brings attention to the complexity of computation, its interconnections will never and can never hope to compete with the complexity of biological beings.

Of course the complexity of *Dwarf Fortress* in comparison to biological material is neither intention nor what is important about the game. *Dwarf Fortress* is not the one-to-one scale map of Jorge Luis Borges’ ‘On Exactitude in Science’; the map that perfectly represents a space down to individual details, asking the question, what is it that distinguishes the ‘map’ from the ‘world’. A videogame will never be a perfect simulation *of a* world because it is always already a part *of the* world. What is important is how the eco-system produced by the game can help us conceive of the complexity, disregarding what is biological or technological, of the world in which we are a part. *Dwarf Fortress* provides us with an insight into the ecological power of games; they reveal interconnected systems to us, inviting the thought that the system we are using is connected to wider systems beyond that.

The game makes a powerful statement about the position of machines and computers in our natural world. Visible through its stripped back, unrepentantly machine-like aesthetic, this ‘game’ is a host of computations with symbols representing variables, strings and arguments that each have effects on the other. In a sense, *Dwarf Fortress* is more a representation of computation than a biological environment: although the processes can be paused, there is an automation to the events that unfold. This is not a ‘natural’ ecology in any way; this is a computational construction of astounding complexity. That being said, though it may not inspire reflection on the interconnectedness of the so-called natural aspects of the world in

---

<sup>36</sup> Eugene Thacker, *Biomedica* (Minneapolis: University of Minnesota Press, 2004), p. 3.

which we live, it still prompts us to consider our ecological connections to the machines we use. The unrelenting complexity of the game challenges us to grapple with our persistent, daily reliance on machines. Though we may not initially understand the symbols and significance of each input, we quickly come to learn. In doing so, we are meeting the machine half-way, rather than controlling it. We do not dominate *Dwarf Fortress* but merely co-operate with it for as long as we can.

The ecosystem of *Dwarf Fortress* foregrounds an entirely different type of ecology to that mentioned by Buell; present here is a technical ecology following a biological logic. This is the type of ecology theorised by Matthew Fuller's 'media ecology', wherein objects are "understood to mean processes embodied as objects, as elements in a composition. Every element is an explosion, a passion or capacity settled temporarily into what passes for a stable state".<sup>37</sup> The world is abundant with systems and each of these is bursting with novel interactions; videogames are a relatively new form of worldly ecology, but are ecologies nevertheless.

It is tempting, when analysing videogames, to consider the world of the text as distinct from the world we inhabit. This thinking is prevalent within writing about games and has its roots in the 'possible worlds' theories of Thomas Pavel. The idea of a possible world can be understood as "abstract collections of states of affairs, distinct from the statements describing those states, distinct thereby from the complete list".<sup>38</sup> If we consider all the various possible ways in which a world *could* be, understanding that the world we have come to know as the 'real world' is just one possibility, it becomes difficult to discount for certain the potential existence of fictional worlds. Though Sherlock Holmes did not exist in this world "due to an unpleasant natural incident", he could have existed in another "state of affairs".<sup>39</sup> Videogame worlds are taken by many game scholars to function in a similar manner. What's more, the incompleteness of these virtual worlds - such as those factors left undetermined in *Dwarf Fortress* - actually add to the level with which the user engages with fictional worlds. The undetermined gaps in the virtual provide a space in which the user can imagine details and make personal decisions on how they picture the world.<sup>40</sup> This space for our imaginative

---

<sup>37</sup> Matthew Fuller, *Media Ecology*, p. 1.

<sup>38</sup> Thomas G. Pavel, *Fictional Worlds* (London: Harvard University Press, 1986), p. 50.

<sup>39</sup> Thomas G. Pavel, "'Possible Worlds' in Literary Semantics", *The Journal of Aesthetics and Art Criticism*, Vol. 34, No. 2 (1975), pp. 165-176, p. 167.

<sup>40</sup> Marie-Laure Ryan, *Possible Worlds: Artificial Intelligence and Narrative Theory* (Bloomington: University

interventions may be one of the many reasons why videogame worlds have such a strong pull and increasingly draw users away from the ‘real’ and towards the ‘virtual’ space.<sup>41</sup>

In spite of the lure of conceptual worlds following Pavel and narratological game studies, there is good reason to think on simpler ontological terms. If we choose to discount the potential existence of virtual worlds we can focus clearly on their functioning as part of the world. Rather than viewing the worlds of videogames as fictions, we can view them as the outcome of activity in a singular material plane. We can cease to view games as representational ‘texts’ and instead attempt to view them as performances. Judith Butler urges us to consider the discursive practices through which ‘matter’ comes to ‘materialise’. From her distinct social-realist perspective the social practices that label matter also come to shape it. She provides the example of gender construction which, as an action, must presume an ‘I’ or a ‘we’ to enact it. However, Butler suggests that “the ‘I’ neither precedes nor follows the process of this gendering, but emerges only within and as the matrix of gender relations themselves”.<sup>42</sup> In a similar fashion, N. Katherine Hayles has suggested a focus on materiality for understanding humanity arguing, “the posthuman subject is an amalgam, a collection of heterogeneous components, a material-informational entity whose boundaries undergo continuous construction and reconstruction”.<sup>43</sup> The time has come to bring this frame to videogames, perceiving them as ‘material-informational amalgam’ to embrace the implications of their processes. Although a game like *Dwarf Fortress* tells the story of a number of fictional creatures attempting to cultivate a fictional land, it is also a fascinating dynamic system of mechanical actions.

Thinking back to Thacker’s *Biomedica*, wherein DNA can be represented in a computer or can itself, do the computing, we can begin to shift focus from what computer programs *represent* towards what it is they *do*. I have asserted that the simple aesthetic style of the game encourages this reflection: the use of individual symbols, rendered anew in each CPU cycle, constantly liable to change, resulting in a computational ecology following biological logic. Flipping how I have applied Thacker’s approach, however, focusing instead on how

**Commented [CM5]:** Added several nods to the idea of performance and materiality to emphasise the project aims.

---

of Indiana Press), p. 32.

<sup>41</sup> Edward Castronova, *Exodus to the Virtual World: How Online Fun is Changing Reality* (New York: St Martin’s Press, 2007).

<sup>42</sup> Judith Butler, *Bodies that Matter: On the Discursive Limits of ‘Sex’* (London: Routledge, 1993), p. 7.

<sup>43</sup> N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (London: University of Chicago Press, 1999), p. 3.

biological material can complete technological functions, videogames like *Dwarf Fortress* enact a technological form of ecology similar to that found in biological entities; rather than functioning through DNA, the machine creates an ecology through the microelectrical circuitry mentioned by Thacker. Pushing past distinctions of microelectricity vs aneles and enzyme, we should instead seek to find the complementary interlinking functions of any system. Hayles urges “in the posthuman, there are no essential differences or absolute demarcations between bodily existence and computer simulation, cybernetic mechanism and biological organism”.<sup>44</sup> A game like *Dwarf Fortress*, so inescapably constructed of overlapping activity, does not have to be relegated to the realms of the ‘technological’; regarding it simply as material allows us to focus on its ecological properties.

That videogames may not just represent but may *be* material ecologies has specific ramifications. I explore these throughout this thesis but it is important to give an indication of what these are before we proceed. If you will allow a brief shift in narrative voice, I want to share a personal anecdote to illustrate the impact of independent videogame ecologies. In 2008, volunteering with a youth group on a foreign exchange trip, I found myself on a ferry surrounded by a number of adolescent students. There was no wireless internet on board and no cellular signal. Nevertheless, each of the children had some form of electronic device in their hand; these devices were predominantly Apple-branded but a few were clearly Android-powered devices, designed by numerous hardware manufacturers. The children discussed strategies for a building project. The most extrovert of the children issued commands: she told the others where bricks should be placed, who should receive what resource and how they should be utilised. One child, quiet and on the outskirts of the group was clearly also playing the same game though was not being directly included. After a time, the majority of the children began to scream and panic; simultaneously, the quiet child began to smirk. The group shouted protests that their hard work had been pointless and that the lone child wasn’t ‘supposed to be on their server’ anyway.

If it is not obvious by now, the children were playing *Minecraft*.<sup>45</sup> Specifically, they were playing *Minecraft* in its networked form, in the ‘creative’ mode where players are free to build as much as they want without penalty. Created over a number of years by designer

---

<sup>44</sup> N. Katherine Hayles, *How We Became Posthuman*, p. 3.

<sup>45</sup> Marcus ‘Notch’ Persson, *Minecraft* [videogame] (Mojang: Multiple Platforms, 2011).

Marcus 'Notch' Persson, *Minecraft* is the nearest answer that videogames have to the freedom of play and design that characterises interlocking block toy systems such as Lego. Characteristically, the game is composed entirely of three-dimensional 'blocks', procedurally generated into a landscape in a similar manner to *Dwarf Fortress*. The game has a number of different modes, some of which are more 'videogame' like than others, with goals and challenges to overcome. In 'survival mode' for example, players must use the land around them to create a shelter in order to survive against an onslaught of exploding creatures dubbed 'creepers' when night falls. To build a shelter, players must find wood by chopping down trees, must create fire by rubbing together rock and flint, must construct tools of increasing complexity from the materials available. In contrast, 'creative' mode allows players to roam and construct endlessly. Although the game was created without a singular intention it has been commercially successful and even integrated into teaching curriculums around the world, helping to create a dialogue between pupils, children and the computers they use.

While *Minecraft* presents an interesting story of technical innovation in itself, it also has the power to create ecological relationships that spans through a range of materials. In the example I provided above, the ostracized child took it upon herself to use the freedom of 'creative' mode to destroy what the other children were working on. Though the majority of the children complained and told the isolated one that she wasn't allowed on their 'server' anymore, in time they began to laugh. There was a shift in power and the group descended from organised work into anarchic play. The one-time leader had used their voice and physical stature to issue commands to the others; however, the rules she has attempted to enforce were interrupted by the freedom of the digital system.

Through a fusion of technological, biological and social activity, a complex system of interactions took place for the children on that boat. Indeed, if *Minecraft* had been designed any differently, this exchange could not have taken place. Through a masterwork of computer engineering the designer has created a digital ecosystem that can maintain stable connections between devices running different operating systems with different hardware capabilities. This has been done so seamlessly that children are capable of creating games within a digital space with rules that can be maintained or destroyed. At the most visible level there are the connections between the players who interact in a real world space. Beneath that, there are the connections between the devices using a mixture of 'Bluetooth' technology and each



device's own ability to send and receive data wirelessly. A server-network is created between the children as the data that generates the world is shared in uniform fashion between them. Beneath that there is the relationship between the children's input and the game algorithm. Each action must be accepted and interpreted into meaningful activity by the game code. Beneath that still are the signals between the mobile phone's processor and video screen. Yet, none of these layers is distinct. Each level permeates into the other to form a dense and meaningful relationship. This is exactly the manner in which I propose we begin examining games; as systems of profound interconnectivity and as texts that reflect on that nature.

## LOOKING PAST THE SURFACE

Exploring videogames as ecologies is a somewhat daunting task. Videogames are capable of creating reasonably accurate or at least satisfying mediations of real-world ecologies; at the same time, they are intricate systems that ape biological processes, urging a reconsideration of current paradigms relating to divisions of the bio- and the techno-. However, these 'real', material ecologies also generate meaningful relationships between machines and players through an ecological system that permeates software, through to hardware and into the everyday of flesh and blood. From the posthuman stance of Butler and Hayles outlined above, this is a logical outcome. As the supposed distinctions between matter, meaning, bodies, biology and machinery collapse and we instead attempt to perceive matter as a productive apparatus, hitherto 'virtual' videogames, come to matter. My understanding independent videogames as ecologies is an attempt to accept systems of agential electronic interconnections as material rather than virtual; at the same time, it is exploring the potential implications of those electronic activities upon the environment that they are produced by, and play a role in producing. Accepting that *Minecraft* is a material, performative phenomenon and that its microelectrical activities, as demonstrated above, are shaping the lives of the humans that interact with it, requires a specific frame from which to view the world.

The worldview on which this thesis is founded is borrowed from Karen Barad, whose new materialist, agential realist philosophy argues for the profound interconnections in all things. Discussing how we come to consider apparatuses and the interconnections between their parts in a manner reminiscent of Fuller's media ecology, Barad writes,

If a computer interface is hooked up to a given instrument, is the computer part of the apparatus? Is the printer attached to the computer part of the apparatus? Is the paper that is fed into the printer? Is the person who feeds the paper? How about the person who reads the marks on the paper? How about the community of scientists who judge the significance of the experiment and indicate their support or lack of support for future funding? What precisely constitutes the limits of the apparatus that gives meaning to certain concepts at the exclusion of others?<sup>46</sup>

Barad's example points to the illusory nature of boundaries in our current epistemological paradigm. Adopting a posthuman stance, these perceived boundaries fall away and return us to considering Hayles' posthuman subject, the "amalgam" of "heterogenous components". Barad, by questioning the divisions between humans, machines and inanimate objects, urges us to think past amalgams, into a realm where we abandon a pretence of the subject (almost) entirely. Barad is proposing ecological thinking in a radical new sense.

Shifting away from the office spaces suggested in Barad's thought experiment, in this thesis I propose a similar question for videogames. If the ROM that stores the varying voltages of the game 'code' is part of the computer essential for running the game, is the ROM part of game? What about the player holding the controller, inputting values that impact on the electronic data, stored on that ROM? What about the millions of players with which our initial player is connected to over the satellites and fibre optic networks, servers and radio towers that compose the internet? Videogames represent our world in meaningful ways; at the same time, they are systems; novel systems that are interconnected with a variety of worldly processes. Material effects such as changes of voltage go on to affect players. At the same time, players' feedback and provide material changes that stimulate further activity within the machine. The interplay between the various interconnected activities is not teleological, building neatly from the micro to a cumulative effect on the macro. Rather, it is more complex, borne out of the dynamism of interchanges from its biological and physical parts.

The first chapter of the thesis situates this study within a broader context of game studies ecological media studies. By first examining environmental analyses of videogames I establish that the ecology I focus on has little to do with a perceived 'natural' world. Rather, it has more to do with the complicated systems of interacting parts identified in studies of

**Commented [CM6]:** Removed the word 'gedanken'

---

<sup>46</sup> Karen Barad, *Meeting the Universe Halfway*, p. 199.

machines and media forms. I champion exploring games using the techniques of ‘media ecology’, the study of complex communication systems as environments pioneered by Lance Strate and Marshall McLuhan among others. Suggesting an ecological study of games focusing on their specific formal features. This requirement leads to an engagement with software and critical code studies. Although the experience of engaging with games on different apparatuses undoubtedly shapes the experience of play, by engaging with source code we are able to find a common ground. Code analysis provides a new way of conceptualising gameplay; not as actions between distinct entities – player and machine – but instead, as algorithms to be executed unless other factors arise. I propose analysis of game code and hardware and an attempt to correlate this with the desired player experiences intended through a game’s design. For example, looking back to *Dwarf Fortress*, if we were to focus on its formal characteristics, we would acknowledge that it is composed of a web of databases or ‘look-up tables’ that continually update while the game is in operation. The game’s simplistic visual style results in it being a highly efficient program, with values crucial to the game state (whether the player wins or loses) being updated regularly and rapidly. As a result of this ‘efficient’ design – speaking from the perspective of what makes a computer program efficient – the game is notoriously difficult for first time players to understand. In this way, the microecological properties of the code can come to have larger ramifications, even affecting a player’s feelings.

Throughout the first chapter my approach to games as ecological systems is contrasted against similar methods such as Nick Montfort and Ian Bogost’s ‘platform studies’. Distinct from media ecology more broadly, platform studies aims to highlight the specific qualities of a piece of videogame hardware such as a commercial console. Although the focus on hardware yields otherwise unobtainable insights into games as processes, the specificity limits the potential for ecological enquiry. Although platform scholars view the machine as a hotbed of activity, its efficacy is viewed as ‘terminating at the video-out port’; the machine is studied as a self-contained entity while, the game that is produced by it, is understood as a ludo/visual text.

My ecological approach to independent games proposes a holistic view of this complex medium. As such, I work with various games across multiple platforms appreciating them as complex amalgamations of visual, auditory and sensory stimuli. Linking back to the idea of an eco-performative approach to the digital text-as-performance I make it clear that analysis

**Commented [CM7]:** Added for clarity

of code or hardware must always be related back to a study of the game, the player and culture. This is a somewhat unprecedented step in a study of games; although digital texts have been read as material entities, on the one hand, and the effect of games on players have been explored, on the other, rarely have these two desires been brought together. Given this new ground, the initial chapter concludes with a call for a malleable philosophical framework to facilitate the mental leaps required to jump between the material analysis of 'platform studies' and the user-centric focus of game studies.

The second chapter, my methodology, addresses the difficulty of clearly discussing the interaction of computational and biological entities, namely, players and gaming machines. This is mostly due to enormous disparity between computational and biological entities. To find some way to bridge the gap between computer and human processes, to enable a further discussion of how game systems can have meaningful impacts on their players, I aim to centre this project within posthuman philosophy. Taking inspiration from Donna Haraway I present videogames as a meeting point of biological actors and information systems, viewing them as "hybrid entities made of, first, ourselves and other organic creatures in our unchosen 'high-technological' guise as information systems, texts, and ergonomically controlled labouring, desiring, and reproducing systems" while respecting the distinct quality of software to act as "communications systems, texts, and self-acting, ergonomically designed apparatuses".<sup>47</sup>

I place an emphasis on exploring videogames systems as a whole, rather than attempting to extricate individual parts. Playing a videogame, I suggest, is becoming one part of a host of synergistic relationships between who-knows-what neurons firing just in sync with a difference in voltage, just as a particular copper memory bus meets integrated circuit micro-chip. While in the future imaging technology may make it possible to identify specific biological and technological actors (this is doubtful, though, given the near sub-atomic nature of cerebral and computational activity), for the present it is important to employ a theoretical lens that allows us to incorporate our uncertainty into our understanding. As such, it is more important to view videogame play as an act that presents potential for posthuman exploration. As N. Katherine Hayles suggests "computation can serve to deepen our understanding of what it means to be in the world rather than apart from it, co-maker rather than dominator,

---

<sup>47</sup> Donna Haraway, *Simians, Cyborgs and Women: The Reinvention of Nature* (London: Routledge, 1991), p. 1.

participants in the complex dynamics that connect ‘what we make’ and ‘what (we think) we are’”.<sup>48</sup> Videogame play provides us with an opportunity to reflect on our being entangled with a media environment.

The majority of my second chapter, however, is spent unpacking Barad’s philosophy and developing a cogent theory for use in the analysis of games. Her central premise, derived from an understanding of quantum physics, is that ‘objects’ are never ontologically separate from a whole. Troubling metaphysical notions of subjects and objects Barad suggests an engagement with what she dubs ‘intra-activity’:

The notion of intra-action is a key element of my agential realist framework. The neologism "intra-action" signifies the mutual constitution of entangled agencies. That is, in contrast to the usual "interaction," which assumes that there are separate individual agencies that precede their interaction, the notion of intra-action recognizes that distinct agencies do not precede, but rather emerge through, their intra-action. It is important to note that the ‘distinct’ agencies are only distinct in a relational, not an absolute, sense, that is, agencies are only distinct in relation to their mutual entanglement; they don't exist as individual elements.<sup>49</sup>

From this radical ontological stance common ideas of computer use from game studies are pushed. We no longer must think in terms of a ‘player’ and ‘game’. Rather, there are phenomena that emerge through intra-action and continue the process of intra-action through their emergence. As human beings continue to grow alongside computers we are witnessing the implications of the intra-active entanglement of humanity and machines. New possibilities are emerging through this relationship of flesh and digital games. Labour tools have enabled novel activity between electrical impulses in synthetic materials meeting the products of billions of years of evolution. Digital games enable new materials for imagination, recreation and experimentation. Using Barad’s theories, I suggest that games are meeting points of entangled agencies, generating emergent new agencies through intra-activity.

Each chapter from this point takes the form of a case study, and plays a role in developing the overall argument: that videogames are fantastic tools for examining specific ecological

---

<sup>48</sup> N. Katherine Hayles, *My Mother was a Computer: Digital Subjects and Literary Texts* (London: University of Chicago Press, 2005), p. 242.

<sup>49</sup> Karen Barad, *Meeting the Universe Halfway*, p. 33.

relationships. Chapter Three is the most straightforwardly ‘ecological’ of the case studies in this thesis. However, it is also where I, to a degree, ‘prove’ the effectiveness of the methodology outlined in Chapter Two. The initial case study focuses on *Shelter*, an independent production from Swedish game designers, Might and Delight. I argue the game illustrates the rich potential for games to suggest the entangled role of players within videogame ecologies. This shift, I suggest, necessitates abandoning ideas of ‘interaction’ in favour of Barad’s ‘intra-action’. The chapter opens with a brief recap of the most relevant games studies criticism, positioned in opposition to my own research. Alongside this, I provide a brief description of some current thinking on videogame interaction. From there I provide an overview of the game, in which the player is tasked with controlling a family of badgers in the wilderness, keeping kits fed and preventing attack from various predators.

*Shelter*’s innovative aesthetic and, more importantly, its gameplay mechanics draw attention to actions as occurring within an entangled environment. My analysis begins visually, drawing attention to the origami influenced aesthetics - a distinctly ‘material’ appearing digital world - and the use of colour to guide player action, to make clear the extent to which the game attempts to engage players. I then draw attention to the central game mechanics, how every action taken corresponds to the world as a whole; choosing to feed one kit results in another going hungry just as choosing to protect one against a predator results in the death of another. Entwined with these important aesthetic and mechanics, I argue, is the underworking system of the game. Using approximations of the game’s code, designed within the Unity game engine, the same as the game itself, I suggest how the interrelations between the player and the various entities on screen goes beyond the visual. The relationships we witness and interact with are hardcoded into *Shelter*. These suggest a distinct form of ecology from those analysed in previous games studies scholarship. What’s more, these hardcoded relationships shape the potential of player activity: the constant shifting of various factors at the level of code can limit or extend the range of options open to the player at any given moment. I conclude how an underlying complex system permeates through to the level of engagement.

An aspect of my posthuman stance discussed in Chapter Three is a deliberate attempt to look beyond the human when considering videogame play. In this instance, ‘the human’ is understood as that liberal humanist subject, “accompanied by notions of free will, autonomy,

rationality, consciousness as the seed of identity, and so forth”.<sup>50</sup> In Haraway’s words, the ‘human’ “depends on the myth of original unity, fullness, bliss and terror, represented by the phallic mother from whom all humans must separate, the task of individual development and of history, the twin potent myths inscribed most powerfully for us in psychoanalysis and Marxism”.<sup>51</sup> The human is that absurd figure embodied in teleological notions of progress, such as protagonist of an Ayn Rand novel, wherein the will of a human being can provide mastery over the very materiality that necessary for their existence.

Within the realms of game studies, the outdated idea of the human manifests itself within visions of computer use that position the user in a place of control or power. Lars Schmeink writes, “The question ‘What would happen if ...?’ can be answered by simply taking the other route in another round of the game. Thus, in several turns of the simulation the game, as is inherent to the medium, discloses its own governing rules and also the ideological imperative that created them, making the potency of his agency transparent to the player”.<sup>52</sup> Here, Schmeink hints that the computer and the play it allows is important for realising the limits of agency. However, he does not go far enough to acknowledge the role of the machine. While this may be implied, the moment is right to assert the fundamental role of the non-human in forming the apparatus of human agency. Adopting a posthuman mind-set we choose to understand choices as being made through the posthuman conglomeration of biology and information coming to make a more complex system that produces new possibilities. Chapter Three outlines this point in more detail, using videogames to present a new, posthuman perspective, on interaction.

In Chapter Four I set out with the goal of pushing beyond what I argued for in Chapter Three; to demonstrate that videogames not only generate intra-active ecologies that are interesting and engaging but that are unique to that medium. I focus on videogames as entangled bio-technical performances that mediate features of lived experience we do not commonly associate with ideas of ecologies or environments. The first game I examine, *Superhot*, mediates the passage of time in a specific manner, allowing it to progress only when the

Commented [CM8]: Added for clarity – removed ‘text’

---

<sup>50</sup> C Theory Live Interview, “N. Katherine Hayles in Conversation with Arthur Kroker,” (Los Angeles: C Theory Live, 2006), (online resource), <<http://pactac.net/pactacweb/web-content/videoscroll4.html#3>> [last accessed 23/08/2016].

<sup>51</sup> Haraway, *Simians, Cyborgs and Women*, p. 151.

<sup>52</sup> Lars Schmeink, “Dystopia, Alternate History and the Posthuman in Bioshock”, *Current Objectives of Postgraduate American Studies*, Vol. 10, No. 1 (2009) pp. 2003-2032.

player moves. In this analysis I aim to draw out Karen Barad's assertions of intra-activity, showing how action is an ecological experience with almost limitless connections throughout material existence. Following on from that I analyse *Antichamber* a game which does much the same thing but with space. As the user moves through the world of *Antichamber* the world seems to form around them, responding to their actions and activities. This is further in the experimental, yet to be completed *Manifold Garden* in which space appears limitless by looping around the user's activity. These games demonstrate a trend in independent videogames of attempting to visualise and make interactive alternative conceptions of lived experience. As such, I argue, these games are symbolic of what I dub the oncoming 'intra-active aesthetic' realised through interactive media such as videogames.

The final case study of this thesis seeks to explore what lies beyond connectivity in gameplay; drawing further influence from Barad's philosophy, I propose that games are capable of initiating a 'cut' between subjects and objects, distancing the interconnected apparatuses of the intra-active system of existence from one another. Although I have taken pains to suggest the extent to which apparent 'objects' are interconnected and intra-acting when playing videogames, an important aspect of intra-activity is the emergent becoming of 'apparent' objects. I argue that games are playing an increasingly common role in producing these types of becomings in the everyday. Looking at some of the most personal games in this thesis I engage with how games can shape our apparent humanity through sensory and emotional engagement. Exploring first a number of games designed to be counter intuitive to play, games that ask us to use difficult to reach keys on a keyboard or that map buttons to unexpected mechanics, I suggest how games can reinforce a sense of our humanity by asserting their own logic based computation. Although it may appear odd to us for a keystroke to launch an avatar far into the air or cause them to self-destruct entirely, for instance, these apparent activities are carried out without judgement by the computer. Through intra-action players can emerge as distinctly 'human'. This feeling is reinforced with explorations of games that engage with issues of disability, gender and the death of a loved one. Filtering these human concepts through a logical lens, I argue, serves only to heighten their impact. We are left with no choice but to realise the cost of our being human; far from the definition proposed by the liberal human tradition wherein humanity brings with it a dignity beyond the nonhuman, in my posthuman understanding, playfully intra-acting with machines, we are left with a keen sense of our flawed, mortal existence.



A final, prominent aim of this thesis is to bring attention to some of the least discussed properties of the thriving contemporary independent game design scene. Each of the games analysed in this project, whether designed by a single programmer or by a team of differently skilled individuals, pushes past common preconceptions of the potential of videogames to deliver novel experiences. Importantly, these experiences all make explicit their reliance upon relationships. Whether that is the relationships of in game entities, or of hardware, software, and player. These (apparent) objects, we are reminded, rely on each other for their existence. My suggested method of game analysis provides us with an opportunity to shift our conceptual view, and become aware of this entanglement and our role in it. It shows just how videogames are particularly suited to asking provocative questions about the nature of being within systems of interrelated parts, and how they illuminate the valuable implications that these experiences provide. In the following chapter I will provide an overview of the critical landscape in which this project is founded; the intersection of game studies, media and software studies.

