School of Media, Creative Arts, & Social Inquiry

Out of Bounds:

A Visual Exploration of the Glitch

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Declaration

To the best of my knowledge and belief, this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material that has been accepted for the award of any other qualification in any university.

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Abstract

This practice-led research aims to present a body of artwork that responds to glitches found in contemporary action video games. By utilising the visual capabilities of a virtual reality headset, I have produced a series of artworks that showcase the sensory effects that a glitch has on a player's game world through the dismantling of hyperreal imagery such as slow movements that make the player feel as if they are floating. The artwork that I have developed translates the materiality of traditional drawing into a digital space to visualise the qualities of glitches.

This research asks, 'can a glitch create a sensory experience?' To answer the question, I explore glitches that I have experienced within hyperrealistic action video games such as *Red Dead Redemption 2* (Nelson and Sarwar 2018), *Ghost of Tsushima* (Fox and Connell 2020) and *The Last of Us Part 2* (Druckmann, Newman, and Margenau 2020).

Through my work, I provide an experience that allows the viewer to visually explore the environment with the movement and visual nuances of a digital space. Geographer Yi-Fu Tuan writes about specific spaces that can trigger uncomfortable feelings such as uncertainty and fear. My work elicits these feelings through the uncanny qualities of glitches by immersing viewers into a series of projected videos.

Rather than critiquing glitches as errors, I am tapping into its visual potential by creating artworks that showcase the visual qualities of specific glitches, such as the out-of-bounds glitch, which creates visual tearing. I aim to capture these qualities through elements of mark making, light and embodied experiences, thereby eliciting and exploring a range of emotional responses that are due to the glitch. I reference the theorist and glitch artist Rosa Menkman, who engages with the glitch as a visual subject that creates unforeseen consequences. I also explore Maurice Merleau-Ponty and his writings on perception and bodily expression to create artworks that trigger a range of bodily reactions from the viewer to mimic the experience of a glitch. Their writing is key to understanding how the glitch can create a sensory experience through concepts such as ludonarrative dissonance and the uncanny.

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This thesis has been professionally edited by a member of the Institute of Professional Editors. Editorial intervention has been restricted to Standards D and E of the *Australian Standards for Editing Practice*.

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List of Abbreviations

AI   artificial intelligence

CGI   computer-generated imagery

GIF   graphic interchange format

HUD   heads up display

NPC   non-playable character

UI   user interface

Chapter One: Introduction

Over two years ago, I experienced a glitch in the acclaimed open-world adventure title *Red Dead Redemption 2* (Nelson and Sarwar 2018). The glitch, commonly referred to as the 'out-of-bounds' glitch, transported my digital avatar into an other-worldly space constructed from various low-resolution forms, lines and objects. This experience prompted me to question how glitches such as the out-of-bounds glitch can generate a range of sensory experiences that affect the viewer's sight and body. My project is influenced by Maurice Merleau-Ponty's (1962) book, *Phenomenology of Perception* by exploring human embodiment, consciousness and perception, which "We build out of the perceived" (Ponty 1962, 5). The series of videos that I have developed aim to create a gulf between the viewer's perception and bodily expression, thereby recreating the experience of a glitch distorting a player's game world (Watkin 2009, 22). For me, the gulf between perception and the body is an important element in replicating the sensory experience of a glitch. For example, when my avatar is forced to float above the game environment, this can create a bodily reaction that makes me feel uncomfortable because I am no longer on the ground surface of the digital environment. In response to this, I have developed a series of video works that generate a whole-body experience to trigger a range of unsettling feelings, such as anticipation, uncertainty and fear through the uncanny nature of glitches.

This research, which comprises a thesis and a creative body of work, began as an Honours project in 2019 and has converted into a Master of Research. I started my Honours project by exploring and adopting the methods of Russian constructivist El Lissitzky who utilised drawing to create "harmony between objects and their spatial surroundings" (Dukhan 2016, 210). Comparatively, the portraits that I had developed as part of my Honours research merged objects, characters, and geometry by using drawing methods such as mark making and line to create a series of large-scale portraits. The work has naturally progressed from traditional drawing to developing a series of projected videos based on virtual reality, translating the material and physical properties of charcoal drawing into a virtual space. The virtual environment I have developed has been designed to capture visually my experiences of a glitch occurring within a digital game world. This thesis articulates and contextualises, over three chapters, the theoretical and studio-based research I have conducted over the last two years.

Chapter Two explores the theoretical areas and video games I have studied as an aspect of exploring the glitch. The main area I explore is the uncanny, which grew from researching Sigmund Freud's (1919) book, *The Uncanny*. Freud described the uncanny as "a source for the terrible that leads back to something long known to us, once very familiar" (1919, 1–2). Glitches can create a similar effect by removing the player from their current digital environment and placing them into a space that provokes the feeling of fear, such as an enemy outpost being morphed into an ominous geometric shape. Fear occurs due to the familiar imagery of the game world, for example geometry, becoming abstracted by the glitch's ability to disrupt and morph the various elements of the game's environment. Japanese roboticist Masahiro Mori (1970, 98) wrote in his essay *The Uncanny Valley,* "in climbing toward the goal of making robots appear like a human, our affinity for them increases until we come to a valley, which I call the uncanny valley". Video games are becoming increasingly realistic. Titles such as *L.A. Noire* (McNamara 2011) have led players into a valley where the characters from the game appear robotic in their appearance and animation, provoking strange and uncomfortable feelings. To elicit these feelings within my work, I reference Yi-Fu Tuan's (1979, 6) text *Landscapes of Fear*, in which he writes that "Imagination adds immeasurably to the intensity of fear in the human world". When I experience a glitch that dramatically changes the atmosphere of the game world, my imagination triggers because of the illusionistic qualities of the glitch. Chapter Two discusses the context in which I explore the glitch situated within hyperrealistic action video games. I link this to the French theorist Jean Baudrillard and his writings on simulation in which he explores that "it is the generation by models of a real without origin or reality: a hyperreal" (1981, 1). Comparatively my digital landscape serves as a simulation of multiple video game realities.

When a glitch teleports my avatar, I can observe the game world from an alternative perspective as well as the hyperrealistic elements of the game world becoming fragmented. From these fragments, I am able to imagine how the developers have constructed the game world and, more importantly, consider how I might take the distorted geometry and translate them into my three-dimensional digital environment. The specific types of hyperreal video games that my artwork references are *The Last of Us Part 2* (Druckmann, Newman, and Margenau 2020), *Ghost of Tsushima* (Fox and Connell 2020) and *Red Dead Redemption 2* (Nelson and Sarwar 2018). These are examined owing to their ability to utilise new technologies such as photogrammetry, which immerses players through a series of digital illusions.

Chapter Three serves as a response to Chapter Two by exploring the various drawing and digital methods to investigate the disruptive qualities of the glitch. These qualities include visual tearing, ghosting, looping, other-worldly aesthetics and the disruption of movement. Most notably, this research has experienced a significant shift since its inception—from charcoal drawing to producing a body of work within virtual reality. This shift is significant because I translate the materiality and physical properties of traditional drawing within my video works, which drew inspiration from viewing Yang Yongliang's digital artworks. Yongliang merges traditional Chinese artmaking such as ink painting and calligraphy with digital tools such as virtual reality. My work produces a similar effect by utilising virtual reality to translate the qualities of drawing, such as mark making, and simulating the interruptions that a glitch can cause during gameplay through sudden pauses in camera movement. The three videos that I have developed as part of this research combine to create an immersive experience of the glitch. They represent the same virtual environment yet capture a distinct part of that environment. Each video is projected at large scale to allow the viewer to explore the material and physical properties of the glitch visually through the flow and movement of the camera work, for example, close-up shots that highlight the charcoal's soft and rough scratched marks. The works are titled *Materiality* (2021), *Out of Bounds* (2021) and *Disruption* (2021) to reflect both my experience of the glitch and the drawing methods that I have utilised to visualise the glitch. The final section, Chapter Four, serves as a conclusion and reflection of the research I have conducted over the last two years.

Chapter Two: Video Games, and the Sensory Experience of the Glitch

Video games have significantly evolved in design and visual fidelity since the 8-bit era of arcade games such as *Pac-Man* (Iwatani 1980). Today, titles such as *The Last of Us Part 2* (Druckmann, Newman, and Margenau 2020) and *Red Dead Redemption 2* (Nelson and Sarwar 2018) have received critical acclaim for their ability to simulate reality by rendering worlds that are hyperrealistic in gameplay and graphical fidelity. Achieving an illusion of reality requires game developers to create complex gameplay systems, animations and immersive audio. Owing to the complex design of these action games, programming oversights and errors often occur, which create technical mishaps within a player's game world. These errors are referred to as glitches.

The term 'glitch' was first coined by the American astronaut John Glenn (1962), who described a glitch in his book, *Into Orbit* as "a spike or change in voltage in an electrical circuit" (1962, 245). Since then, the meaning of the word has changed because the introduction of new technologies such as video games has offered new forms of visual distortion. Glitches within video games are unavoidable since they are a by-product of game design and production. No matter how long a video game is in development, there will always be errors and technical mishaps in the final product. Notably, advances in technology have always followed this trajectory. As French theorists Paul Virilio (1998, 22) stated in his book *The Original Accident*, "To invent the sailing ship or steamer is to invent the shipwreck. To invent the train is to invent the rail accident of derailment". Comparatively, glitches are the same because they are an unmeasurable element of game design. Virilio (1998, 11) also wrote about the anticipation of the 'integral accident,' which is the idea that technology cannot exist without accidents. The glitch is similar in that it is an accident born of the software or hardware of the video game failing. With the recent release of the next generation of video game hardware, the Xbox Series of consoles and PlayStation 5, a new era of visual distortion will arise. This disruption occurs because the more exacting realism is, in games, the more complex the design data becomes; thus, the possibility of glitches increases. I believe glitches should not be disregarded as simply errors or imperfections; rather, they should be understood as ways to gain knowledge about how their inevitable nature can elicit emotional responses such as fear, uncertainty and confusion.

In video game media, glitches are associated with negative criticism by mainstream review outlets such as IGN and GameSpot, which typically lowers review scores, depending on the number of technical issues. This form of criticism may rely on the quality of the game itself, with titles such as *Fallout 76* (Howard 2018) receiving harsh criticism from prominent journalists such as Brandin Tyrell (2018, para. 1) at IGN, who stated the game is "A buggy mess of systemic designs that never seem to work together and regularly contradicts itself". This can be contrasted with other titles, such as the critically acclaimed, *Red Dead Redemption 2* (Nelson and Sarwar 2018), in which the glitches are excused because of the high bar the game set for open-world action games as well as the developer's reputation for high-quality games.

My research utilises glitches for their visual qualities. I believe the errors produced during gameplay are accidental and unexpected and thus can offer a range of sensory experiences for both players and outside viewers. When referring to sensory experiences, I primarily focus on two environmental stimuli—bodily and perceptual. These two forms of sensory experience are heightened when a glitch occurs in a player's game world. For example, the out-of-bounds glitch can often distort the player's sense of perspective, resulting in their judgement of depth being affected. The digital environment that I have developed elicits the feeling of being unbalanced through subtle shifts in camera movement to provoke bodily sensations. This relates to the out-of-bounds glitch affecting the game world's gravity, forcing the player to float above the intended gameplay area.

My project aims to create a sense of disconnect arising from the uneasiness of the glitch, allowing viewers to become active participants in the sensory experience of a series of glitches dismantling a hyperrealistic game world. Merleau-Ponty (1962, as quoted by Watkin 2009, 19) wrote that the human consciousness and body are unified as "anchored in the body and the world". Comparatively, video game developers intentionally unify the body and perception into a singular avatar, a state known as 'player–avatar identification'. This term originates from Freud's (1921, as quoted by Li, Liua, and Khoo 2013, 257) writing on identification, which he described as "being the process of personality formation through taking the role of the other". Identifying objects in a game world plays a significant role in immersing the player into the game world because they can immerse themselves into an alternative perspective.

Glitch artist Rosa Menkman (2011, 26) discussed in her book *The Glitch Moment(um)* how "the glitch is an unexpected occurrence or disruption in a system which cannot be singularly codified". This is true of video game glitches such as the out-of-bounds glitch since they are errors that cannot be measured, and they disrupt the logic of the game world. When a glitch occurs in a player's game world, this often leads to a sense of uneasiness for the player, which can be described as an uncanny experience.

Within the video game industry, games' media and developers refer to these uncomfortable sensations as the 'uncanny valley,' which is a term used to describe the unsettling sensations felt when a digital subject is human-like in its visual or physical appearance (Pollick 2009, 69). Freud (1919, 1), who defined the uncanny as *unheimlich* or unhomely, wrote, "it arouses fear, dread, and creeping horror". Shortly after experiencing my first encounter with the out-of-bounds glitch, I explored Freud's theory in *Das Unheimlich* (1919). He wrote that the uncanny provokes anxiety through the "dimension of the gaze" and that it creates a "series of coincidences that have a fateful meaning" (Freud 1919, as quoted by Dolar 2013, 6). When experiencing the out-of-bounds glitch in *Red Dead Redemption 2* (Nelson and Sarwar 2018), I experienced feelings of fear and danger as my digital avatar was aggressively forced through the environment. Freud's (1919) theory shapes the work that I have developed since I aim to recreate the experience of the glitch through a series of projected viewing experiences that trigger a range of uncomfortable feelings that can be described as uncanny.

I discovered when playing video games that they create a similar effect when elements of a character model realistically mimic their real-life counterparts, producing a sense of uneasiness owing to the game's lack of visual fidelity. Perhaps one of the most recognised examples of the uncanny valley in a video game is Team Bondi's detective action-adventure game *L.A. Noire* (McNamara 2011). When the game was released in 2011, it was highly commended by mainstream game publications for its accurate portrayal of human expression and its attention to character detail. However, as players progressed through the game's narrative, character models became increasingly uncomfortable to engage with because of their low-resolution textures. The stilted facial expressions became far more apparent as they were broken down into simple button inputs during the game's interrogation sequences. This 'gamification' of facial expressions further provoked the feeling of the uncanny in *L.A. Noire* (McNamara 2011) because the facial animations of the characters became highly

repetitious within the gameplay of the game, thereby removing the hyperrealistic illusion of the game.

My research explores the uncanny to create an experience that provokes uncomfortable feelings in the viewers. This mirrors the experience of a player being transported from a safe and familiar space into an area that is eerie and unrecognisable. I utilise this existing knowledge on the uncanny to provide a sense of awareness of the glitch's disruptive behaviour through the tearing and dismantling of a game world's hyperreal imagery. The glitch triggers the uncanny by eliciting uncomfortable feelings owing to its distorted and destructive traits.

To understand how a glitch may cause this, I have spent the last two years researching and visually exploring multiple forms of glitches within hyperrealistic video game environments. As mentioned in the introduction, this research began responding to a glitch I experienced in the open-world action-adventure title *Red Dead Redemption 2* (Nelson and Sarwar 2018). This glitch is commonly referred to as the 'out-of-bounds' glitch, and it occurs when a player intentionally—or sometimes unintentionally—tests the boundaries of the game world's playable areas. By exploiting the game's respawn system, the glitch forced my digital avatar through a surface of the environment, resulting in my avatar leaving the playable space and entering an area constructed from a range of corrupted and other-worldly imagery that did not aesthetically sit within the games' setting, which is the American frontier in 1911.

This moment was significant because it revealed how developers build a game world through the layering of two-dimensional textures. Seeing these two-dimensional forms up close broke the hyperrealistic illusion of the space. The geometry of the game's original environment had become compressed into a low-resolution version comprising a series of flat images that constantly shifted between obscurity and familiarity. This was heightened when I encountered the glitch known as the 'black cube'. This cube (figure 1) was designed to work as a respawn trigger; hence, when a player dies, they can re-load into the game world.

Figure 1. The 'black cube' in *Red Dead Redemption 2*, video game

Source: Figure reproduced from Rob Nelson and Imran Sarwar, Rockstar Games (2018).

The black cube is a hidden object in video games and is typically placed underneath the game world so that players, such as myself cannot discover it. At first, I thought that the cube was a form of visual tearing that the developers had left behind. Still, the further I analysed this strange cube through the game's camera tools, the more I began to question it and the more it reminded me of the peculiar and other-worldly aesthetic of monoliths found in films such as Stanley Kubrick's (1968) movie *2001: A Space Odyssey* (figure 2). The film features a character called HAL 9000, an artificial intelligence (AI) that interacts with the crew of a spacecraft. The behaviour of this AI is comparable to a glitch as he interferes with members of the crew and prohibits them from leaving the spacecraft.

Image removed due to copyright restrictions.

Figure 2. Still from the film *2001: A Space Odyssey* by Stanley Kubrick

Source: Figure reproduced from Salon. Kubrick (1968). https://www.salon.com/2020/11/30/mysterious-utah-monolith-evoking-2001-a-space-odyssey-has-vanished_partner/.

Additionally, a series of questions arose in my head: Can I touch it? Can I interact with it? and, Will it kill me? Before I could act on the cube, sections of the game world began flickering in and out of existence, prompting me to think about the machine behind the game, otherwise referred to as a game engine, which is a framework for game development that supports and brings together several core areas (Unity n.d.). Glitches such as the out-of-bounds glitch often disrupt these core areas. In this particular instance, previous locations began to layer on top of each other, giving the impression that the game was struggling to identify where my avatar should be. As an artist, I found this experience creatively engaging. I was visually rewarded for my curiosity by obtaining a sneak peek into the game's hidden artifacts, which I perceived as a forgotten remnant of a previous game reality that the developers had left behind during its development.

This is not to say that glitches such as the out-of-bounds glitch can only be provoked by the player intentionally breaking the game, distorting their perception of time. While traversing the virtual landscape in *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020), I experienced an environmental glitch during the end of the game that forced my character to fall through the ground of a building while removing audio from the game (figure 3). I was trapped and had no visible way of leaving because I had entered an environment that the developers had not completed. The removal of audio enhanced the uncanny qualities of the

space as my physical connection to the digital space began to dissipate. Music and sound effects of *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020) play a significant role in how players identify with what objects they may interact and how they are able to prepare when enemies are close by. Most players find these slippages frustrating because they hinder their progress through the narrative. For me, this moment provoked the uncanny as the once familiar environment became unfamiliar, giving rise to fear and uncertainty because my avatar was trapped in a visually distorted space. The experience prompted me to consider how moments of disconnect brought about by the glitch facilitate a deeper understanding of certain player behaviours and how glitches may reward or punish the user for pushing the limits of the game world.

Figure 3. Still of 'out-of-bounds' in *Half-Life: Alyx* (2020), video game

Source: Figure reproduced from Jay Pinkerton, Sean Vanaman, and Erik Wolpaw, Valve Softworks (2020).

Tuan (1979, 1) writes that humans attach emotional responses to both interior and exterior spaces, for example, "the sight of hospitals and prisons; fear of muggers in desolate streets and neighbourhoods". However, these responses are subjective and dependent on an individual's context, such as having a fear of apparitions and dark spaces. When a glitch triggers within a game world, it often shape-shifts the familiar elements of the game world in alternative and unsettling versions of itself. For example, I experienced a glitch known as 'artifacting' that removed Notre Dame Cathedral's visual detailing in *Assassin's Creed:*

Unity (Amancio and Albinet 2014). Artifacting is a term that has been defined by various gaming communities on Steam and Reddit to describe the visual tearing that occurs as a result of a user's video card overheating, resulting in strange black voids appearing in the player's game world.

The cathedral sits in the centre of the game world, serving as a structure that players can use to teleport to various sections of the game world through a method known as fast travel. The gothic cathedral became a safe and familiar structure. Still, as the glitch took hold of the building's realistic qualities, it became unrecognisable as it was dominated by dark, ominous voids that removed all resemblance to its original form. As a result, I began to feel a great sense of uneasiness and fear as the building lost its familiar aspects, such as its stained-glass windows and central spire. This led me to consider how glitches can unexpectedly trigger these feelings as the game world slowly morphs into a space that is unrecognisable and uncomfortable in its appearance.

The game genre that I base my research upon is action games. This choice stems from the mechanical complexity of action games, which allows for multiple ways that a player can manipulate their movement in a game world. Game developers have adopted movement through gameplay to enable players to run, jump and navigate through various environments. Action typically provides three functions of movement—walking, jogging and running. However, fast movement speeds can often lead to mistakes or slippages in the game's logic because players can break or 'clip' through the landscape surfaces. Titles such as *Red Dead Redemption 2* (Nelson and Sarwar 2018) tie the player's movement to the character's animation, creating slow and realistic movements. The developers of the game, Rockstar Games, create worlds that aim to be as convincing as reality itself through the game world's immersive qualities. In an IGN interview with Rob Nelson, co-head of Rockstar North and producer of *Red Dead Redemption 2* (Nelson and Sarwar 2018), Nelson (2018, para. 1) stated, "we've always tried to make these worlds places you can get lost in. Feel like they exist when you're not even in them—like they're waiting for you". By slowing their movements, players can become immersed in the environment's various realistic qualities, such as how the sunlight accurately reflects on characters' clothing and skin.

Video games refer to this level of graphical detail as 'hyperrealism'. Theorist Jean Baudrillard examined real-world spaces that aim to simulate other realities in his 1981 book, *Simulacra*

and Simulation. Baudrillard framed spaces such as Disneyland as a hyperreality that "reflects a profound reality" (1981, 6). Video game developers create hyperrealistic worlds that mirror other realities, for example, *Red Dead Redemption 2*'s (Nelson and Sarwar 2018) American frontier presented through a series of digital illusions powered by modern technology. My work aims to highlight this by creating a series of videos that showcase a digital, three-dimensional space that simulates the experience of being in a glitched video game environment. To simulate hyperrealistic video game environments, I utilise digital drawing tools from virtual reality to copy and reconstruct various forms and structures that sit within game worlds, such as those of *Red Dead Redemption 2* (Nelson and Sarwar 2018) and *Ghost of Tsushima* (Fox and Connell 2020).

Video games typically immerse players into other realities through high-resolution flat-screen experiences, for example, via televisions and monitors. However, within the last five years, there has been a resurgence in virtual reality technology, allowing users to participate in three-dimensional game worlds. Environmental scientist Jeremy Bailenson (2018, 4) writes in his book *Experience on Demand,* "virtual reality does not only give us access to experiences that are difficult to obtain, but it also allows users to see impossible things". As an artist, I regard virtual reality as a tool for replicating personal experiences through the sensory nature of the technology by creating videos that disrupt the viewer's sight and body. My work utilises the capabilities of virtual reality to capture the intangible nature of the glitch, creating an embodied interaction between the viewer and the glitches. Akin to my own out-of-bounds experience, my work shifts the viewer's position from floating to standing. When writing about his digital artwork *Weather Inflections*, artist Julian Stadon (2015, para. 1) described it as an "Ontological reframing of the relationship between human bodies, the environment and technologically mediated experience". My work creates a similar experience by reframing the relationship between the player and the glitch to create an embodied experience that provokes a range of emotional responses fluctuating from familiarity to uncertainty.

This project is situated within the practice of glitch art since I redeploy the visual qualities of glitches, such as visual tearing and artifacting. First coined by artist Ant Scott in 2001, 'glitch art' refers to the use of digital or analogue errors for aesthetic purposes. Glitch art can be explored through various methods, such as video, graphic interchange format and still images. Digital artist Paul Thomas in 2020 examined the relationships between human interaction and digital subjects by digitally constructing images that have a felt quality, for example, in

Quantum Weave (2020). This body of work mirrors the physicality of a video game glitch since it is a "visualisation of what exists in the real-world experience and a world of uncertainty" (2020, para. 1).

When Menkman (2011) reflected on her experiences with the glitch artwork produced by JODI, titled *Untitled Game* (1996–2001; figure 4), she wrote, "I walked away from it, confused and titillated. In hindsight, I learned about myself at that moment—about my expectations and conceptions of how a videogame should work" (Menkman 2011, 7). Menkman's words mirror my own experiences of out-of-bound glitches. I discovered that writing personal reflections after the glitch had occurred proved a valuable tool for reflecting on and understanding the glitch's uncanny nature.

Image removed due to copyright restrictions.

Figure 4. Jodi. *Untitled Game*. 11 Quake modifications for PC Mac. 1999

Source: Figure reproduced from *The Glitch Moment(um)*. http://www.networkcultures.org/networknotebooks.

Through this moment of reflection, I realised that these experiences are uncanny, which is a feeling that I visually identify as a result of the familiar hyperreal imagery becoming distorted and unrecognisable. In turn, this was due to the game's technologies failing, such as photogrammetry, which is a technology that video game developers have recently adopted to produce hyperrealistic results. As stated by the graphics engineering company Graphine (n.d., para 1), "Photogrammetry estimates the 3D surface of objects from taking multiple photographs, each taken from a different position". These technologies have been predominantly used in the film industry to create computer-generated imagery, for example,

Christopher Nolan's (2010) *Inception*, which utilises CGI to immerse viewers in Nolan's distorted and surreal imagery. In this setting, photogrammetry is used to replicate the realism and illusionism of reality. Video games cannot truly recreate the real world, but developers have been able to 'simulate' reality through such new technologies. As noted by Andrzej Poznaski (2014), who is one of the lead designers behind the horror-adventure title *The Vanishing of Ethan Carter* (2014):

> Your brain does take notice when things are not normal. Even if on the unconscious level, your brain points out to you all those perfect tiling textures, all those evenly worn-out surfaces, those stains placed in all the wrong places. (Poznaski 2014, para. 4)

Players who spend a great deal of time within video games like *The Vanishing of Ethan Carter* (2014; figure 5) often develop a familiarity with the game's various hyperrealistic elements, such as the placing of objects and sensations of the controller vibrations when interacting with the environment. However, when a glitch disrupts those elements, this can often prompt the player to question the realism of the environment owing to the lowering of resolution and object detail.

Image removed due to copyright restrictions.

Figure 5. Still of environment in *The Vanishing of Ethan Carter*, video game

Source: Figure reproduced from Polygon (2014). https://www.polygon.com/2014/5/21/5738456/the-vanishing-of-ethan-carter-release-window.

Realism in drawing and art often provokes philosophical questions regarding how humans construct an image. Video games are perhaps the newest form of depicting realism; they offer a new form of capturing reality by developing artificial systems that attempt to simulate reality. While the game simulates realism, the glitch can often take hold and leave a devastating impact, resulting in the hyperreal imagery being pulled apart and isolated from the rest of the environment's visual cohesion. As a result, this creates a flat and unrealistic appearance to the space as the illusion of the game's hyperrealism quickly fades into obscurity.

The pulling apart of the game's realism often leads to the movement and fluidity of the digital environment being disrupted, resulting in the glitch threatening a user's sense of connection to the space through the stuttering and pausing of the player's movement. However, over the last decade, players have formed communities known as 'speedrunning' communities. Speedrunners exploit glitches to navigate beyond the game's intended speed, similar to how I existed in *Red Dead Redemption 2*'s (Nelson and Sarwar 2018) game world. Speedrunning grants users the ability to navigate through surfaces. This is known as 'clipping'. Players exploit clipping to reach new time scores, which allows them to break up their movement.

Player agency also has a predominant role in the movement and experience of a video game world. As noted by Gordon Calleja (2011, 56) the head of the Institute of Digital Games at the University of Malta, "The player does not merely consume a pre-established piece of media, but instead, they are active participants in the creation of their experience". Valve Corporation intentionally designed Half-Life: Alyx (Pinkerton, Vanaman, and Wolpaw 2020) so that the player can choose how they interact with its various science fiction environments by manipulating objects and finding solutions to intricate puzzles.

Owing to the violent nature of hyperrealistic action video games, I believe it is important to acknowledge the current issues surrounding this genre, especially regarding how developers convey hyperrealism within their games. For many game publishers, such as Activision and Electronic Arts, violence in video games has provided a large source of income. For example, Activision's published action title *Call of Duty: Black Ops* (Anthony, Lehmkuhl, and Dwyer 2010) "is the highest-seller in the franchise as it has sold 30.99 million units worldwide since its release in 2010" (Clement 2019, para. 1). The multi-million-dollar franchise *Call of Duty* is one of the most profitable entertainment properties of all time, and it situates players within

a range of realistic military scenarios ranging from intense infiltration missions in suburban locations such as London to large-scale battles in the Middle East. As a result, this franchise has provoked significant controversy because of its gamification of real-world events. For example, the recently released *Call of Duty: Modern Warfare* (Bloom et al. 2019) hired real military operatives (figure 6) to provide motion-capture animation for the non-playable characters to add another layer of immersion for the player. My series of videos creates a similar experience by projecting a 360-degree view of a digital space to immerse the audience within a simulation of a video game environment. This research does not seek to explore the current discourse of violence in video games. However, I do consider the glitch to be a form of violence in relation to its ability to disrupt and dismantle hyperreal imagery in an uncanny manner.

Image removed due to copyright restrictions.

Figure 6. Still of motion capture animation from *Call of Duty Modern Warfare*, video game

Source: Figure reproduced from *The Washington Post* (2019).
https://www.washingtonpost.com/graphics/2019/video-games/call-of-duty-modern-warfare-behind-the-scenes/.

Over the last decade, glitches have contributed to the critical discourse surrounding 'ludonarrative dissonance', a term first coined by game designer Clint Hocking in a blog post as "a dichotomy of concepts that participate in creating dissonance" (2007, as quoted by Seraphine 2016, 1). Hocking felt this dissonance between the gameplay mechanics and story in the action game *Bioshock* (2007). In his post, Hocking described how the game unintentionally broke the connection between gameplay and narrative, creating a betrayal. Hocking (2007, as quoted by Seraphine 2016, 3) writes, "in the game's mechanics, I am

offered the freedom to choose to adopt an objectivist approach, but I also have the freedom to reject that approach".

This element of choice can often create friction between the game's narrative and gameplay mechanics, resulting in the player's immersion being broken. I consider ludonarrative dissonance to be a 'developer glitch' that unintentionally creates errors between the gameplay and narrative. As previously mentioned, instead of disregarding the glitch as an annoyance, I aim to tap into its visual potential to elicit specific emotional responses through the shifting of hyperreal imagery. As stated by Virilio (1998, 30), "you cannot prohibit the catastrophe, you must surf it!" Glitches are unavoidable in video games because they are a by-product of video game development, especially in modern video games, attributable to complex design and graphical fidelity. When a glitch occurs, it does more than disrupt the elements that bring a video game world together. It also deconstructs the player's emotional connection to the world as the familiar elements of the game world, such as buildings and terrain, become corrupted and unrecognisable from their original form. As an artist, I find these errors offer far more than just visual engagement; they reveal visible traces of a previously unknown reality. This creates a great sense of uneasiness as the player becomes unaware of what they are observing. Chapter Three explores how I arrived at this moment in my research through the various drawing and digital methods that I have utilised over the last two years of research.

Chapter Three: Visualising the Glitch

As discussed in Chapter Two, this research started as a response to the accidental nature of the glitch, leading to the triggering of a range of emotional responses. Although my work is situated within glitch art, I present a different position in relation to how developers and the games media perceive glitches. I believe the glitch should not be combated or disregarded as an annoyance but rather considered a way of gaining knowledge to understand and elicit emotional responses, such as fear and uncertainty.

As stated in my introduction, this research came about when I experienced the out-of-bounds glitch in the open-world game *Red Dead Redemption 2* (Nelson and Sarwar 2018). After experiencing the glitch, I began this project using traditional drawing methods such as charcoal, ink and paint pens to capture visually how the glitch challenges the game's operational elements. I utilised drawing as a tool to visualise the qualities of glitches through the process of mark making and negative space. The mark making is enhanced by projecting the work in a dark space, allowing viewers to observe the various ways in which light reacts to the marks. In the book *Between the Lines of Contemporary Art* (Tormey et al. 2007), the authors refer to drawing as an artistic practice that emphasises two aspects as central characteristics: 'the performative', which is shown through the physical act of drawing, and the 'speculative', which is a means of exploring a subject to gain new information (2007, 10). This is achieved through the physical inputs I use to create the space, such as applying pressure to build tone and manipulating texture by stretching the applied marks, which are achieved using the haptic controllers of virtual reality. Finding various methods from these controllers to capture the experience of glitches leads my work to produce a sense of speculation. Before I explore the final body of work, which takes the form of three projected video works, I believe it is important to discuss the drawing methods I developed during my first year of research because they had a significant impact on how I can utilise the visual qualities of glitches to create a sensory experience.

I began and completed my first year of research by developing a triptych of large-scale drawings highlighting hyperrealistic character models' uncanny qualities. One such character was Senua, from *Hellblade: Senua's Sacrifice* (2017), which features a young woman portrayed with a likeness to the real-life actor who played her. In response, I re-created Senua's character model (figure 7) using mixed-media drawing methods. Each mark that I

applied to the ground emphasised her uncanny features by pulling apart and isolating the character's realism. The drawing methods that I developed during this early development stage were influenced by the Russian constructivist El Lissitzky, who "balanced line, space and form to create a visual language that challenged and denied photography's visionary potential during the twentieth century" (Drutt et al. 1999, 14). The triptych that I created aimed to mirror Lissitzky's process by exploiting glitches as a means of disrupting hyperrealistic character models.

Figure 7. Thomas Goates, *Senua 1* (2019), ballpoint pen, acrylic, spray paint and paint pen on coloured paper, 135 x 214 cm

Source: Reproduced from Thomas Goates.

By developing large-scale portraits (figure 7), I gained new knowledge about the visual qualities of glitches, such as visual tearing and artifacting and their relation to the uncanny in the context of hyperrealistic video games. After developing the triptych of drawings, I then produced a series of charcoal drawings, which were developed within the first six months of my second year of research. These drawings aimed to utilise the materiality and atmospheric

properties of charcoal to synthesise and simplify the qualities of glitches. As seen in (figure 6), I used a two-point perspective because the linear nature allowed my drawings to appear realistic by creating the illusion that the viewer is looking at the subject. Perspective relates to the uncanny as I utilised drawing to simulate an existing digital space, creating a feeling of uncertainty, as if the space within the door is not coherent with the remainder of the image. I deployed a two-point perspective as the first step to capture the illusion of the hyperrealism breaking. As I deconstructed the hyperreal imagery I was referencing, I discovered that charcoal drawing can capture the distortion that occurs in a game world. For example, in (figure 8), I mapped the skybox, which would typically sit above the drawing, within the doorway to capture the player's perspective becoming distorted. Using a kneadable eraser, I pulled back the detail of individual sections of the drawing, such as the door, to capture the glitches, isolating the wooden textures, leaving minimal scratching and mark making.

Figure 8. Thomas Goates, still of *Untitled* (2019), charcoal and pastel on toned paper, 30 cm x 25 cm

Source: Figure reproduced from Thomas Goates.

Through developing the charcoal drawings, I gained further insight into drawing as a method to visualise the destructive properties of glitches. However, the black and white nature of charcoal drawing created limitations in regard to capturing the accuracy and interruptions that a glitch can create. Interruptions play a significant role in representing the pauses that occur during gameplay. For example, when I experience a glitch such as 'artifacting,' which is a

form of visual tearing, it forces me to pause for a split second and reflect on what has just happened. I then shifted my focus from charcoal drawing to developing a series of digital drawings that experimented with multiple forms of interruptions, such as artifacting. These drawings were drawn from my experiences in *Call of Duty: Modern Warfare* (Bloom et al. 2019).

The digital drawing titled *Behind You* (2020; figure 9) demonstrates this by situating a digital soldier in an environment that is intensely lit. This intense lighting is produced as a result of the player's night-vision goggles being activated, which illuminate the claustrophobic space with vivid green tones. The interruption is shown through the picture frame, which is influenced by artifacting through the black and white voids, providing clues as to how the artifacting has occurred—typically when a user's video card overheats.
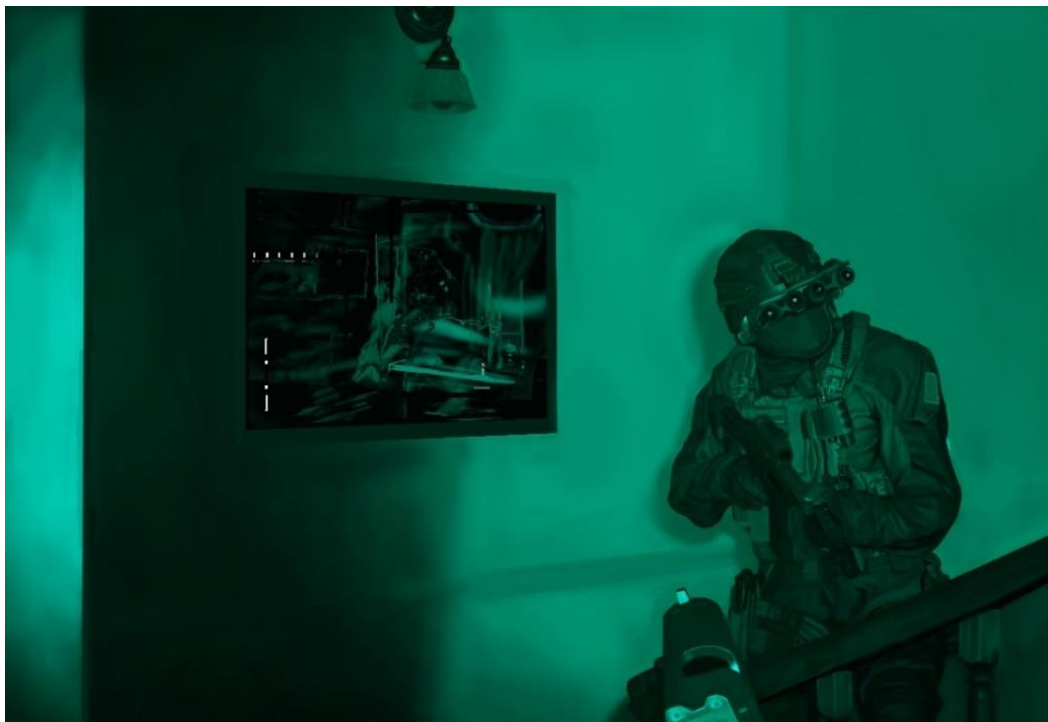

Figure 9. Thomas Goates, screenshot of *Behind You* (2020), digital drawing

Source: Figure reproduced from Thomas Goates.

Figure 10. Thomas Goates, screenshot of *Ghosting* (2020)*,* digital drawing

Source: Figure reproduced from Thomas Goates.

The second drawing (figure 10), titled *Ghosting* (2020), explores the glitch called 'ghosting' or 'inverse ghosting'. This type of glitch has no origin, but, similarly to artifacting, the term has been utilised by gaming communities found on websites such as Reddit to describe the visual errors that appear when the pixels of a user's display are overworking. This results in the user's screen changing the colours of the pixels beyond those of the targeted colour range, creating a slippage in the digital environment.

The digital drawings represent significant attempts to understand how I might visualise glitches and their ability to manipulate light to enhance uncomfortable feelings such as claustrophobia and uncertainty. Additionally, the drawings serve as explorations into utilising digital drawing to simulate an existing simulated environment to create an uncanny feeling. Although this project has significantly shifted from purely capturing the visuals of glitches to creating a sensory experience, these methods have provided a foundation for the final installation, which takes the form of three projected videos.

The videos provide a psychological space for the uncanny in which the visual elements of the virtual environment trigger a range of feelings that shift from being uncomfortable to meditative. The videos provide a lens for the viewer to engage with the psychological nature

of the environment, through three dimensions, capturing the glitches' traits from 360 degrees. Additionally, the environment collects a range of forms and structures from multiple hyperrealistic action titles such as *Ghost of Tsushima* (Fox and Connell 2020) and *Red Dead Redemption 2* (Nelson and Sarwar 2018) that transfer in and out of reality, actively removing the viewer from the familiarity of the digital space and into an area that appears unfamiliar to the viewer, thereby triggering uncomfortable feelings.

Virtual reality enables a whole-body experience, allowing viewers who are unfamiliar with video games and virtual reality to become wholly immersed in the sensory experience of a virtual environment. In the videos, I create an immersive and sensory experience of glitches by simulating the feeling that the viewer is floating and being interrupted by the distorted camera angles, which change from vertical to horizontal. When I began experimenting with this new and exciting technology, the controllers' inputs granted me the ability to interact and engage within a diverse range of digital spaces, such as the science fiction title *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020). As discussed in Chapter One, the experience of the out-of-bounds glitch in *Red Dead Redemption 2* (Nelson and Sarwar 2018) and *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020) forcing my body underneath the game world provoked a range of emotional responses and triggered my artistic sensibilities, such as mark making and line work. This experience was further heightened while wearing the virtual reality headset because the sensory experience of touching and walking around a digital space elevated the glitch's presence. The virtual reality gameplay of *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020) enhances the players senses as they can switch between different perspectives of the environment by moving their head and body.

Unlike traditional flat-screen experiences, the experience of playing a game within virtual reality allows users to become highly immersed in the game world through the sensory inputs of the haptic controllers. The tactility of using these controllers is simulated through vibrations. This creates physical feedback to the end user, allowing the player to interact and feel the various elements of a game world, such as the wooden surface of a crate or the transparency of water. I experienced these sensations of touching and grasping in *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020), and my work visually translates these sensations through a range of camera movements that tilt and pan as the video progresses.

My work provides an alternative approach to virtual reality as I capture the physical and material properties of drawing and projecting in the real world. The reasoning is to increase the qualities of drawing to a large scale for viewers to observe how drawn marks and surfaces overlap and bleed into one another. I also utilise virtual reality to create atmospheric shadows that can immerse viewers into the projected artworks. The dark setting in which the videos are played enhances the feeling of the uncanny as uncertainty and fear arise when the videos slowly reveal that the digital environment is a space where no life can exist.

Before I began developing my final three-dimensional environment, I developed a small black and white digital space by using the virtual reality art application known as Google Tilt Brush. Artists have used this application to translate their existing art practice into the virtual reality space, as seen in the 2017 Google artist in residency program, which showcased various performers, painters and illustrators translating their existing art practice into a virtual reality format. Principal researcher for Microsoft, Eyal Ofek (2017, para. 1), writes, "whenever users try to reach out and touch any virtual object, the illusion will break, it is only a mirage, and the hand will end up touching or grasping air". This illusion of feeling also assists in revealing the hyperrealistic illusions that my work is deploying. In doing so, the illusionism greatly enhances the uncanny nature of my digital space as the three-dimensional forms appear flat and eerie in their appearance. The dark setting assists in producing this uncanny feeling because the viewer feels trapped owing to the intensity of the blacks that dominate the space, mirroring the sensory experience of being out of bounds. Once I had recorded these experiences of using the virtual reality headset, I reflected on how this sensory technology could capture drawings' immersive qualities. The primary drawing method that I utilised to construct the space is mark making. To achieve this, I filtered the chaotic properties of glitches such as visual tearing through merging space, emphasising the materiality of marks, shifts in perspective and digital mark making.

I constructed the space using digital mark making to capture these qualities, which leave visible traces within the virtual environment. Traces provide narratives and evidence of a previous reality, thereby creating a sense of destruction and eeriness. As stated by Menkman (2011, 29), "The glitch is a powerful interruption that shifts an object away from its flow and ordinary discourse, towards the ruins of destructed meaning". Various scenes in the videos capture a sense of destruction and interruption when the camera slowly pauses and pans across a desolate space. When layering multiple marks on top of one another, I also add to the

landscape's overall distorted appearance. For example, I show this through the scratched marks that visually describe the ground surface, which were made by layering multiple brushes, leaving visible marks and artifacts. A glitch can create discernible marks through the 'noise' or 'artifacts' left behind as a result of the glitch's presence. These artifacts destroy the video game's hyperrealistic illusions by transporting the player from one reality into another. The glitch achieves this by breaking the player's movement, forcing the player to be unexpectedly relocated to a different section of the game world. The digital landscape highlights this by drawing close attention to the ground's visible marks and various surfaces that scatter across the landscape. In (figure 11), the scratched marks visible on the surface serve as a trace of a previous reality that references different objects, forms and structures from action, open-world video games. I aim to highlight the compression and distortion that occurs when a digital image is converted from one system into another through mark making.
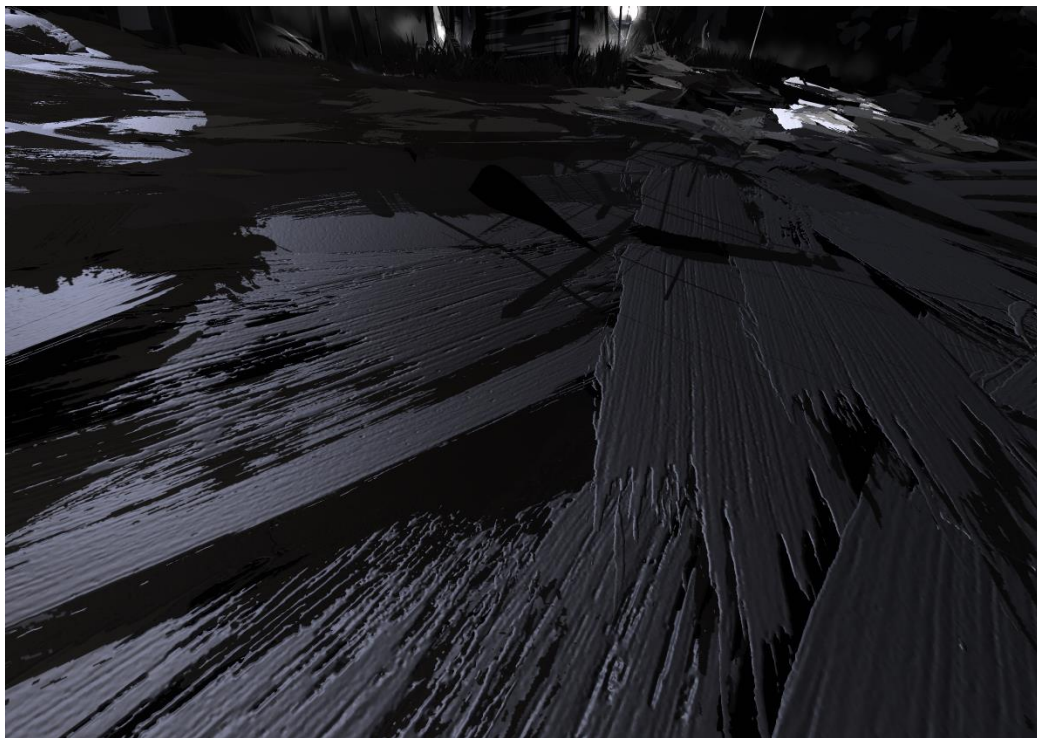
Figure 11. Thomas Goates, close-up shot from *Materiality* (2021), digital image

Source: Figure reproduced from Thomas Goates.

As previously mentioned, my artwork is influenced by Chinese artist Yang Yongliang, who combines traditional Chinese artmaking, such as calligraphy and ink painting, with new technologies, such as virtual reality and digital painting, as seen in (figure 12), *Eternal Landscape* (2017). As described by Yongliang (2017, para. 1), "The artwork is a virtual

reality experience that serves as a constructed Songyuan mountain landscape". When reading this quotation, I thought about the visual possibilities that virtual reality can produce by constructing a digital space that serves as an authentic reproduction of action video game environments. Although the work is entirely digital, Yongliang still maintains the qualities and materiality of traditional Chinese artmaking by exploiting "a connection between traditional art and the contemporary oriental aesthetics with modern language and digital techniques." (Yongliang, n.d., para 1). His work captures the rapid development of Chinese architecture and merges with fantasy landscapes, resulting in outcomes that appear other-worldly and grounded in urban China's realism.

Image removed due to copyright restrictions.

Figure 12. Yang Yongliang, screenshot from *Eternal Landscape* (2017), virtual reality and film. Beijing and London

Source: Figure reproduced from Yang Yongliang website. https://www.yangyongliang.com/eternal-landscape.

Yongliang stitches and collages his photographs of various natural Chinese landscapes, including waterfalls, rivers and trees. This stitching technique creates an illusion as the work warps and distorts under the pressure of this process, "emphasising the idea of mind-travelling in landscape paintings" (Yongliang, n.d., para 1). I use digital illusions to replicate the qualities of the glitch through the shifting of imagery and camera movements. Akin to Yongliang, I mirror my digital drawing methods to charcoal-based drawing to capture the construction of natural landscapes and the resulting alienation that happens to their inhabitants. Yongliang is concerned with the disconnect created from urbanisation and the isolation that occurs as a result.

The videos reflect Yongliang's work by exploring his process of capturing physicality and materiality through methods such as mark making and atmosphere within a three-dimensional virtual space. The various forms and structures that sit within the space are built from marks and scratches, which are displayed from the projector at large scale, intentionally obscuring the resolution of the marks during specific scenes. By disrupting the graphical fidelity of the drawn marks, I aim to replicate the experience of a glitch distorting the textures of a game world.

When I draw in the real world, I am immersed within the medium's materials and texture, such as the qualities of toned paper and the smokiness of a charcoal stick. However, when I apply a mark in the virtual space, thanks to the controller's haptics, I can feel my hand being involved with the creation of the landscape through the pressure of applied marks. While developing the three-dimensional environment, I would also find myself becoming lost within the immersive space.

It is important that I present the three-dimensional environment outside of the virtual reality headset. This has been a conscious decision because it enables viewers to move around the space freely and in a safe manner while also allowing for a sense of control, granting the ability to engage visually with any of the three videos. Control plays a role in the overall experience of the three videos since viewers can decide at any moment to switch perspectives.

Players primarily experience video games on flat screens such as monitors, mobile phones or television displays. These screens provide a visual experience that creates a circuit between the player's physical body and the video game world (Keogh 2018, 41). The projected nature of my work also relates to the filmic approach that I take, in which the audience can watch the glitches and their sensory effects. With this sentiment in mind, I use projection to create an experience that visualises the unpredictable nature of glitches to elicit feelings that could be considered a surprise to some audience members, such as confusion, fear and uncertainty.

By projecting the virtual environment outside of the headset, I can control the pacing of the viewing experience and display the internal nature of virtual reality for viewers who may have limited knowledge and understanding of virtual reality. When I enter the virtual realm, I become immersed in a singular experience. I also provide multiple viewpoints for the viewer by projecting the three videos beside one another to capture the uncanny nature and sensory

experience of glitches from a range of camera angles such as close ups and wide angles. Additionally, it is important to note that, as an artist, I have control over what the audience experiences. By using multiple camera angles to guide the viewer through the various visual elements of the glitches, I am able to control the pacing of their experience. This level of control also creates uncertainty as the audience cannot change the scene or speed of the camera. Control also applies to particle effects, such as embers, which fade in and out of the digital environment's skybox.
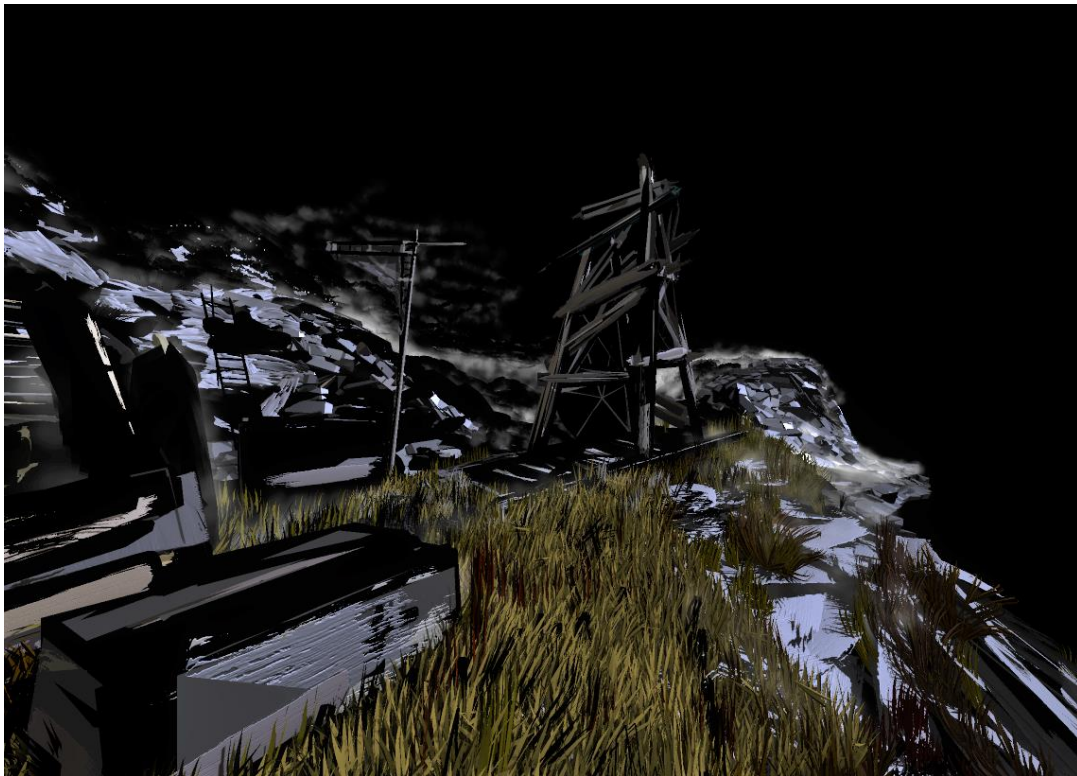

Figure 13. Thomas Goates, wide shot from *Out of Bounds* (2021), digital image

Source: Figure reproduced from Thomas Goates.

I have spent a significant amount of time within the virtual space, leading me to discover how this technology can be utilised as a medium for artistic expression, thereby providing new ways of visual representation through the display of the headset. Although the final series of videos is presented outside of virtual reality through projection, I aim to capture the immersive and sensory experience of wearing a virtual reality headset. When I wear the headset, I become deeply immersed in the digital space since I can touch and feel the drawn mark that I am creating through the haptic feedback of the controllers.

In Merleau-Ponty's (1979) text *Le Visible et l'Invisible*, he writes about contact with the external world as "something exciting, difficult, but also irritating and disappointing" (1979, as quoted in Watkins 2009, 14). Comparatively, glitches are similar because they are an unpredictable force that may be either exciting, annoying or difficult to experience.

I treat the videos as three distinct realms that each explore different compositions, lighting and perspectives, immersing the viewer in the environment as a whole. I have chosen to project the three videos beside one another to create a natural flow between the videos. This allows viewers to physically move around the space to follow the various movements of the videos. For example, in *Out of Bounds* (2021; figure 13), I have intentionally created a sudden, five-second shift in lighting, which draws the viewer's attention to the glitch. By projecting the videos, I pull from these experiences by placing the viewer in a situation in which they can choose to engage visually with any of the three videos.

The lighting of the virtual environment is further enhanced by projecting within a dark space. This approach creates a sense of ambiance by turning a digital reality, the game world, into a physical three-dimensional projection in which the viewer may walk up to the projection to reach out and touch. This emulates the experience of a glitch as viewers cannot 'physically' touch the environment, which in turn can result in the viewer feeling disconnected from the space. The digital landscape I have created is dream-like in its appearance, challenging the viewer's familiarity with the space, which is shown through the manipulation of light. The program that I utilised to develop the area allows the morphing of real-time lighting. Real-time lighting is used in hyperrealistic action games to immerse players in the game's day and night-time cycles, producing accurate lighting that interacts with the game world's surfaces, such as marble and cloth. My work obscures lighting placement by indicating the sunlight from various perspectives, for example, below and above the environment. As the digital space becomes dominated by deep, black shadows, this creates an other-worldly appearance that shifts from day to night, harking back to the black and white charcoal drawings that I produced. The digital environment also generates the physical appearance and materiality of a charcoal drawing, which is an integral part of my work. I encourage viewers to engage with the various marks of the environment by moving closer to the videos or walking away.

The combination of the dark setting and the projection also enlarges the drawing qualities through scale. The drawing methods I have utilised in the virtual environment play a

significant role in immersing viewers in my work. For example, during the early stages of the research, I experimented with the atmospheric qualities of charcoal drawing to captivate viewers in a glitched video game environment. The resolved artwork translates the atmospheric qualities of the earlier charcoal drawings into the virtual realm by stretching and manipulating the drawn marks at large scale to create the impression that they are infinitely looping.

The mark making of the ground's surface morphs into a panoramic view, allowing the viewer to observe the various marks from a wide angle. As the videos progress, so does the size of the wide angles, which damages the drawn marks, forcing them to break and splinter. This method is significant because it showcases multiple glitches through the visible noises and artifacting of the broken marks available for the viewer to see. Combined with the sensory nature of being in a dark room, the experience of the marks engage the viewer in the space. As viewers become accustomed to the mark making, flow and momentum, they begin to crack and fall apart within the digital space, producing an apparition or ghostlike image as seen in (figure 14), which captures the moment when the marks begin to break apart.

Figure 14. Thomas Goates, projections of videos *Materiality* and *Disruption* (2021), installation view

Source: Figure reproduced from Thomas Goates.

The dark setting in which the videos are projected also plays a significant role in the glitch's overall immersive experience (figure 14). As discussed in Chapter One, glitches have the capacity to distort a player's perception of time, such as in my *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020) out-of-bounds experience, in which I became an active participant in and viewer of the destruction of the game world. The ambiance of the dark space mirrors for the viewer the experience of *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020) out-of-bound glitch. The videos are suggestive since they are not a place that the viewer can physically visit. Instead, the videos serve as a lens through which the viewer can enter a distorted, uncanny game reality. Each video aims to capture a distinct perspective; for instance, *Materiality* (2021) provides a series of close-up shots that slowly capture the physical and material properties of the environment. The ground of the space is built using drawn charcoal and ink-based marks that capture the atmospheric effects of the environment. *Disruption* (2021) serves as a lens through which viewers can closely examine the destruction of the space that I have created through digital line work, which pierces in and out of the environment's surfaces.

I show destruction through the subtle flickering of the environment's skybox and the shimmering of light on sharp structures. The bright lights correspond with the artwork's projected nature and the glitch's ability to disrupt how light functions in the game world. The darkroom further elevates these qualities through the reflections and shadows, which dominate the overall appearance of the space. For example, during *Disruption* (2021), the camera pans towards a group of trees. As the camera pans closer, it reveals that the trees are constructed from multiple layers of two-dimensional marks (figure 15). As the camera slowly pans around the area, the shadows morph under the light's pressure, revealing the illusions that I have deployed. By revealing the illusions, they also highlight the material properties of charcoal drawings with their scratched and smooth surfaces, which aim to recreate the textures of the trees found in *Ghost of Tsushima* (Fox and Connell 2020).

Figure 15. Thomas Goates, medium shot from *Disruption* (2021), still of video

Source: Figure reproduced from Thomas Goates.

The virtual environment I have developed merges *Ghost of Tsushima's* (Fox and Connell 2020) feudal Japan and *Red Dead Redemption 2*'s (Nelson and Sarwar 2018) American frontier to tap into a user's sense of familiarity with a digital space. To capture this successfully, I reflect on how my virtual reality space may be visually perceived by the viewer since each viewer brings a certain subjectivity when they enter into the visual experience. This raises an important question of how I might deliver a sensory experience to viewers who are unfamiliar with the visual language of video games. For example, there may be viewers who have never played a video game or do not understand the visual language that is learned by a player, such as the terms HUD (head-up display) and UI (user interface). The virtual environment I have developed translates the visual language of video games into recognisable forms and structures that an outside viewer may recognise, which includes mountains, tall grass and farmhouses.

The video games my work references are set in fictionalised versions of real-world locations. I chose these games because the real-world structures, forms and objects that the developers

drew upon enable a viewer who is not familiar with video games to feel connected to the digital landscape. Action video games, in particular, rely on the player being familiar with the game's various HUD and UI elements to understand the visual language of the game. My work removes the HUD and UI elements to isolate the game world's hyperrealistic imagery, as seen in the visualisation of the trees that sit in the corner of the digital space. The digital drawing methods I use to create these trees relate to my *Red Dead Redemption 2* (Nelson and Sarwar 2018) out-of-bounds experience. In the *Red Dead Redemption 2* (Nelson and Sarwar 2018) out-of-bounds glitch I observed a variety of floating two-dimensional textures layered upon each other to create the illusion of hyperrealism. The video *Out of Bounds* (2021) welcomes the viewer into the space through the familiar imagery, but as the videos progress, the various elements, the trees and tall grass begin to layer upon each other. This forces viewers to pause and reflect on the environment's hyperrealistic and immersive qualities as the various elements of the space become isolated and unsettling in their appearance.

As stated in Chapter One, my work aims to reframe the uncanny by presenting a new perspective within video games and distorting the relationship between a player's digital body and their surrounding game environment. I aim to capture this through interference with the viewer's physical connection to the three-dimensional environment. My work simulates this embodied experience by disrupting the viewer's physical attachment to the space and causing the viewer to reflect on their experience, which relates to Merleau-Ponty's (1962, 10) writing on an environment being a "field for thoughts and all explicit perceptions". The digital space that I have created is inspired by this idea; it provides moments for viewers to reflect on their emotional responses to the glitch's ability to be uncanny by disrupting the environment's familiar elements.

I have also intentionally limited physical interaction with the environment by condensing my virtual reality experience into a projected format. When art curator Joanna Marsh (2006, para. 3) wrote in her text *Looking Beyond Vision*, she stated, "Perspective not only serves as a device for structuring pictures but to also be seen as analogous to the structure of human perception". Glitches are similar in that they disrupt the player's perception as their familiarity with the environment fades into obscurity. I emphasise this in *Out of Bounds* (2021); as the video progresses, the camera work intensifies by rotating and pivoting into the ground surface of the digital space. This corresponds to my uncanny experiences of

the out-of-bounds glitch by creating visceral interactions between a viewer, causing them to feel fearful.

Interference with the space creates a ghostly and uninhabitable appearance to the environment. To visualise this, my work develops an interplay between the atmospheric effects and the game world's geometry to create a dissonance between the viewer's body and the digital space. This embodied experience is further enhanced by incorporating the visuals of the glitches' clipping, artifacting and ghosting to visualise the friction between a player's digital body and the game's physical properties.

This distortion of the environment's physical elements heightens the embodied experience through the slow-moving camera work and captures the feeling of a player floating through the game world. Video games provoke the embodied experience through gameplay systems, allowing players to take control of their avatar's movement, resulting in "the player being transported from their corporeal reality into a world of polygons, abstract temporality and arbitrary rule structures" (Bayliss 2007, 96). *Disruption* (2021) aims to trigger this experience through the subtle movements of atmospheric effects such as fog. I utilise fog to distort the viewer's physical positioning, leading them to feel they are floating above the surface of the space. The atmospheric fog also sits within the environment's ambient spaces, triggering a sense of eeriness or a feeling of strangeness as the world suddenly loses momentum.

When examining the digital space's visual elements, I began analysing how these various elements sit with one another to create a cohesive composition of digital backgrounds. Michael Betancourt (2017, 7) writes in his book *Glitch Art in Theory and Practice*, "The data hidden in the human perceptual blind spot contains worlds waiting to be explored". When reflecting on this statement concerning the digital environment, I began thinking about how game developers use perceptual blind spots to blur compressed objects within the game world. As the videos progress, certain elements of the environment, such as grass, become compressed and transform into ghostly and ominous forms. This was achieved as a result of my computer failing to meet the demands of the object's high-resolution. This can be seen in (figure 16), which is a snapshot capturing the moment of the tall grass transitioning into another form as it loses its graphical fidelity, resulting in visible artifacts as the camera pans closer.
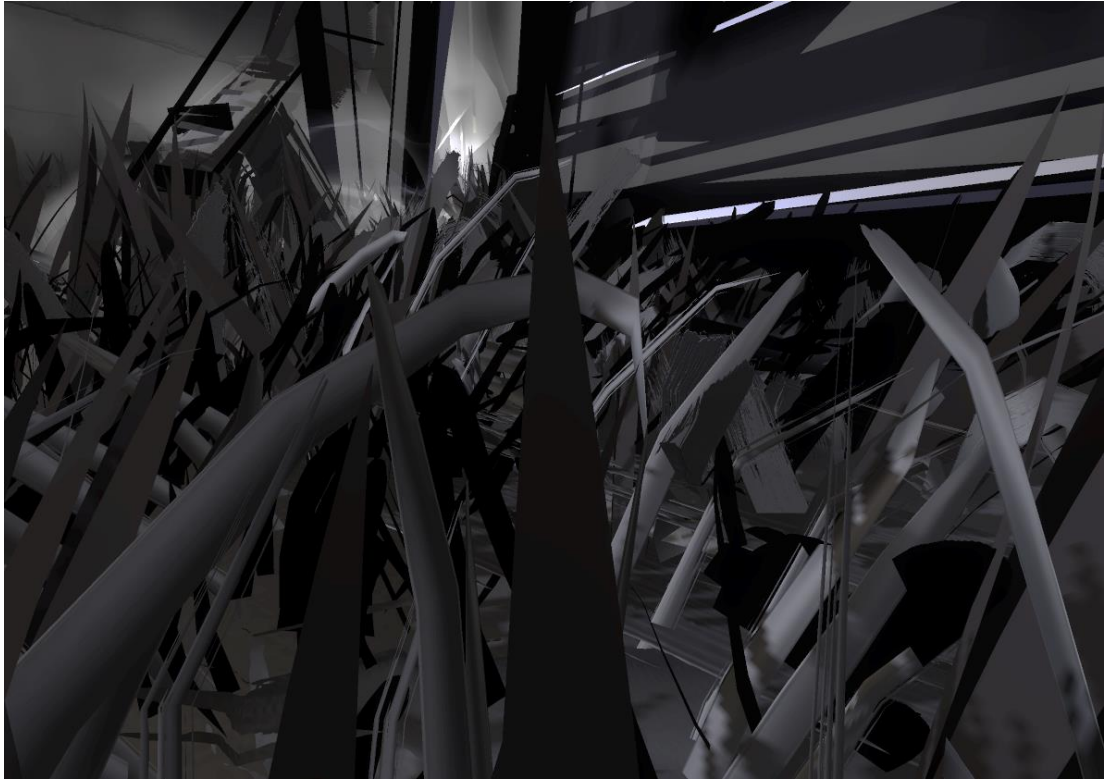
Figure 16. Thomas Goates, extreme close-up shot from *Disruption* (2021), still of video

Source: Figure reproduced from Thomas Goates.

The program I utilised to develop the three-dimensional space, Google Tilt Brush, mimics game development elements such as level design, lighting, texture and geometry placement. Today, game developers typically rely on compression, especially if using 4k resolution, so that they can condense their games to meet hardware requirements. When I elevated the environment's resolution, the program began to lag and struggle to meet my inputs' demands. Again, I regarded this as another opportunity to elevate the glitch's qualities by incorporating the moments of lag within the videos. Lag can be produced from various factors, such as an unstable internet connection or limitations in hardware. In the videos, I utilise lag to disrupt the flow and momentum of the camera work to create uncanny moments as the camera angles shift from smooth transitions to subtle shakes in the motion of the camera, causing the viewer to feel uncomfortable. This disruption of flow also helps create tension between the viewer and their sense of connection to the space as the camera shifts from being smooth to disjointed and the program begins to buckle under the pressure of the environment's resolution.

The methods I have deployed throughout the project's development reflect and visually capture the physical process of drawing. For example, throughout the digital environment's development, I would stop and find myself stepping back from the structure and forms that I was drawing to observe their qualities from afar. Additionally, when squinting my left eye in virtual reality it created an opposite effect to the expected sharp and narrow focus as the lens's low-resolution rendered focusing difficult. This circumstance is caused by visual artifacts that create a "screen-door effect that considerably compromises the viewing experience". (Zhan et al. 2020, 2). This form of distortion became valuable by blurring both the background and foreground together, reflecting the glitch's ability to merge various landscapes. Naturally, objects that sit closer to the viewer's eyes will appear too large to simulate distance and depth. When a glitch occurs, such as the out-of-bounds glitch, it distorts the viewer's perception of reality; for example, when I analysed the Notre Dame Cathedral in *Assassins Creed Unity* (Amancio and Albinet 2014), distant qualities such as the stained-glass windows appeared closer than they should be in the viewer's reality, thereby breaking the logic and illusion of the game's realism.

Tilt Brush allowed me to utilise multiple digital tools that mimicked real-world drawing methods to capture these illusions. The first tool that I used was 'splatter,' a brush which creates a series of smudged marks on the digital space's surface, simulating the appearance of a charcoal mark being erased and generating empty, desolate spaces that further add to the destructive appearance of the glitches. When layered upon each other, the brush creates the illusion of a distant forest as the various marks blend. This was an important discovery because when the camera pans close to these marks in the video *Disruption* (2021), the viewer can see the illusion of the forest. The forest that sits within the space also serves as a boundary for my digital landscape, creating a dome to signify the limits of the space for the viewer. During the halfway point of the videos, the camera veers outside of this boundary, giving the viewer a glimpse into what is beyond the landscape, visualised as a grey skybox through its eerie and empty appearance. This grey skybox also produces a floating sensation as the environment's physicality—for example, the mountains and forested area—begins to dissipate.

The second and perhaps most significant digital tool that I utilised is the 'paper' and 'marker' brush. As the titles suggest, both tools are designed to mimic accurately the surface qualities of paper and the deep blacks produced by marker pens. When combined, they create the

illusion of a physical charcoal drawing floating within a virtual space. As I applied these marks within the virtual reality space, I became highly immersed in my own space because the program simulates the illusion of a physical drawing experience, requiring me to bend my back to apply marks underneath certain surfaces, such as the roof of a straw hut, and execute fast hand movements to scribble the blades of grass. All of these physical actions influenced the video's flow and movement. The camera shows evidence of my hand through the stuttering and often awkward flow of the camera's movement as I struggle to reach certain areas of the space. This experience reflects Menkman's writing of a glitch being an imperfection, and the digital brushes that I have applied within the digital space provide physical traces of my personal experiences of glitches through mark making. As discussed, glitches such as the out-of-bounds glitch instil moments of reflection through shifts in imagery. By providing physical marks, I aim to provide a visual representation of the experience of glitches since they are highly unpredictable and can elicit a range of emotions. The marks that are heavily present on the ground surface of the virtual environment also showcase previous game worlds that have been destroyed owing to the unpredictable behaviour of glitches.

My research seeks to create a new artwork distinct from other forms of glitch art through the preservation of drawing qualities. As a result, the digital landscape seems intangible, diffused and refracted as a result of the video game's realism. Glitch artists, such as Menkman aim to capture these types of distortion by exploiting various technologies that make images appear chaotic and unsettling in their behaviour.

The camera's flow and momentum welcome the viewer into the space through the smooth and soft marks. In the video *Out of Bounds* (2021), sections of the environment are filmed on a virtual dolly to produce smooth horizontal and vertical camera movements. The shift in realism occurs by vanishing the atmospheric effects of the landscape, such as smoke and fire. This technique emulates the behaviour of glitches, in that it removes the detail from the game world and creates the feeling of repetition as the camera seamlessly loops back to the beginning of the video. *Out of Bounds* (2021) welcomes viewers into the space as the camera pans closer to the drawn qualities. Eventually, the program begins to reveal its visual limitations by producing visible artifacts surrounding the mark's outline. Typically, when wearing virtual reality goggles, these artifacts are difficult to observe because of the immersive quality of the goggles, which masks the inconsistent visuals. When the digital

marks become isolated, the program reveals the limitations of the mark's fidelity, thereby creating a ghosting effect that adds another layer of distortion. In terms of my project, this is significant because it enhances the distorted qualities of video game glitches while also capturing the digital charcoal drawing physical attributes as seen in (figure 17).

Figure 17. Thomas Goates, projections of videos *Materiality* and *Out of Bounds* (2021), installation view

Source: Figure reproduced from Thomas Goates.

Materiality (2021) and *Out of Bounds* (2021; Figure 17) illustrates how the videos loop the immersive qualities, leading to the sense of a real and tangible place that can exist for eternity. This looping of the two videos helps create the illusion that there is no 'conclusion' or 'finale' to their duration as they continuously repeat. This strategy also produces a sensation of anticipation as the camera slowly pans towards elements such as fog. Although there is an element of repetition within my work, each playback of a video reveals more detail as the viewer spends more time within the environment. This has been designed in this way so viewers can accumulate further knowledge about glitches and glitch qualities to reflect on their emotional responses. For example, during my first time watching the video *Out of Bounds* (2021; figure 18), I felt a great sense of uneasiness due to the juxtaposition of the fog and dark forms that sit in the space, such as tall grass and trees. While watching for the fourth time, my emotions changed: I felt more curious, wanting to go deeper into the ominous fog to

discover what was behind. This sense of exploration and curiosity plays a significant role in engaging or potentially disengaging viewers, which could deliver a range of possibilities as the viewer decides to watch or walk away from the videos.

Figure 18. Thomas Goates, medium shot from *Out of Bounds* (2021), still of video

Source: Figure reproduced from Thomas Goates.

The videos' infinite looping is also significant in that it captures the experience of a glitch repeating itself within the game world. As stated by the authors of Software and Media Technology at Aalborg University, "loops and repetitions in a soundscape are likely to be detected and perceived as unrealistic" (Serafin and Serafin 2004, 2). Glitches such as ghosting create loops in gameplay, causing the player to be aware that something is wrong within the space, thereby breaking the hyperrealistic illusion of the digital space as the flow of movement becomes repetitive and awkward. This situation mirrors the experience of a glitch breaking the player's physical connection to the world as the frame rate and movement becomes stilted and unnatural.

To enhance the glitches' qualities, the three-dimensional environment reverses technological methods of photogrammetry by abstracting the hyperrealistic qualities of a game world. The game worlds that the space references strive to simulate reality and allow the viewer to become familiar with the game world's various objects and imagery, such as trees, grass and

mountain forms that reside within the space. Tuan (2013, 7) writes, "Without objects, a human sense of the world cannot emerge". My videos are comparative because I abstract the familiar visual elements of action video game worlds to create a disconnect between the viewer's body and the digital space as the viewer watches elements slowly become uncanny in their appearance.

Intentionally removing all signs of human life within the virtual environment creates a space that appears uninhabitable as the hyperrealistic elements, such as the oil mill and farmhouse, turn uncanny owing to the visual makeup of the forms becoming distorted and unfamiliar, increasing the suspense and tension between the viewer and the digital environment.

The video titled *Disruption* (2021; figure 19) showcases this further through the loss of detail as the glitches elevate the surrounding fog's intensity, shape-shifting the grass into alarming spikes that rip through the surface of the ground. The foliage references the tall grass from *Ghost of Tsushima*'s (Fox and Connell 2020), which Sucker Punch Productions, the developers of the game, utilised not only to immerse players into the game's feudal Japan setting but also as a video game gameplay system in which the player can stealth their way through the game world, feeling safe because they are hidden from the enemy non-playable characters.

Figure 19. Thomas Goates, extreme close-up shot from *Disruption* (2021), still of video

Source: Figure reproduced from: Thomas Goates.

These forms and structures are densely packed together, producing intense shadow as the light source from the skybox shifts throughout the videos. As a result, it is challenging to observe where the shadows are cast from—an outcome relating to the interplay between disconnection and immersion. By disrupting the signposts scattered across the environment, it becomes challenging to identify the sequence of events that provoke the feelings associated with the uncanny because the viewer is suddenly teleported without a logical reason. This strategy of suddenly moving the viewer from one space into another aims to generate a feeling of the uncanny in the viewer. It elicits uncomfortable sensations by shifting the reality of their experience. The videos create this feeling by suddenly teleporting viewers from densely populated areas of the environment into emptiness enhanced by the atmospheric qualities of fog. Drawing out these uncanny feelings is a core aspect of the project's ability to provide a sensory experience for the viewer through the uncomfortable movements that the camera angles create.

Early in the development of the virtual environment, I tested audio by creating a five-minute audio track that combined a range of distorted audio that I had recorded from *Ghost of Tsushima* (Fox and Connell 2020), such as footsteps from a player and animal sounds found within the game world. I then tested the audio track with a group of five viewers who were unfamiliar with video games. I noticed that the audio did not cause the viewers to feel uncomfortable. Rather it made them feel comfortable because of the recognisable sounds of a horse galloping and the footsteps of an NPC. As a result, I made the decision not to include audio for the virtual environment because of my limited knowledge and expertise regarding audio design, although I do intend to pursue further testing of audio in the future as an extension of evoking the uncanny. At this point in time, I am focusing on developing a visual project that explores the uncanny nature of glitches.

The juxtaposition of the sharp lines and subtle movements elevates this feeling of being uncomfortable. For example, during the halfway point of *Disruption* (2021; figure 20), the camera slowly pans away from the grass and towards a small farmhouse. This structure has been designed through a series of tapered marks that simulates the straw appearance of Minka, which is a vernacular structure commonly found within the *Ghost of Tsushima*'s (Fox and Connell 2020) feudal Japanese setting.
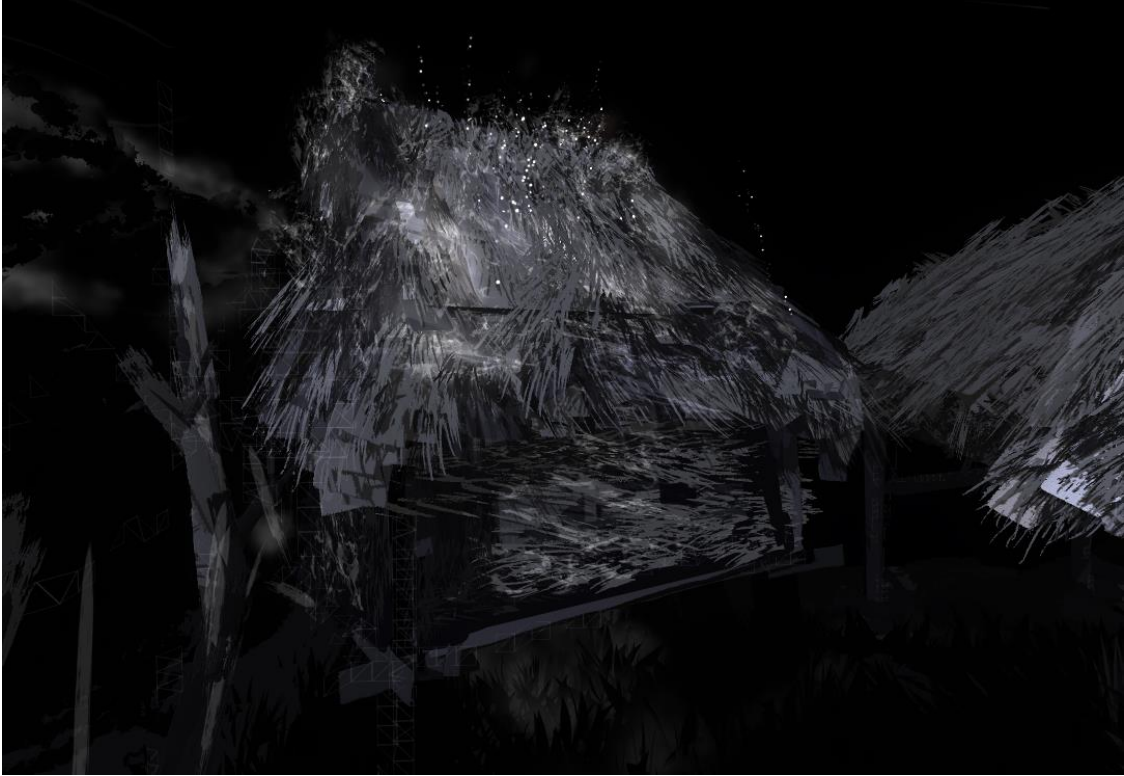
Figure 20. Thomas Goates, medium shot from *Disruption* (2021), still of video

Source: Figure reproduced from Thomas Goates.

This project references multiple game worlds to create a visually diverse space to tap into the visual potential of glitches. One such game is *Red Dead Redemption 2* (Nelson and Sarwar 2018), which I reference often in my work. My work attempts to simulate its hyperrealistic nineteenth-century American setting by translating the various structures and geometry, such as mountain ranges and oil mills. My reason for doing this is to create an access point for the viewer to interpret the glitches as the camera distorts these forms and structures into a flat, two-dimensional copy. For example, the mountains that sit within the corner of digital space mimic the aesthetic of the game's tall, rocky mountains through a combination of rough and smooth marks. In (figure 21), as the camera pans around the rocky formation, elements of glitches start appearing through a series of geometric cubes that pierce through the mountain, turning it into an other-worldly form that does not sit well with the visual cohesion of the space.

Figure 21. Thomas Goates, wide shot from *Materiality* (2021), still of video

Source: Figure reproduced from Thomas Goates.

The digital tool I utilised to create this form is titled 'Shiny Hull'. The tool grants the user the ability to change the marks' texture in real time, shifting from a matt black to a reflective grey. This is an effective method because it creates a moment of dissonance between the marks as the visual is consistently broken. Shiny Hull also produces an optical illusion as the various geometric marks layer upon each other, creating a dream-like sequence that infinitely repeats itself.

This discovery injected new knowledge about the digital methods that I was deploying to build the three-dimensional space. I used the Shiny Hull tool to elevate the monolith's reflective qualities (figure 22) and create a series of five dominant monothetic forms that protrude from the environment. The monoliths reside in the corner of the space, hiding in between the dense foliage and the tall structures.

Michael D. Miller (2018, 1), a horror fiction writer, described in his book *Lovecraft Annual. No. 12* that a monolith is a device for "acquiring knowledge to travel to a gate, shifting beyond space and time". I have achieved similar effects by visualising and incorporating the black cube into a three-dimensional space and utilising it as a gateway into another reality.

This approach helps activate the viewer's consciousness, further increasing their sensory experience through the feeling of uncertainty. The cube is featured in the video *Disruption* (2021), and it has been created using the Shiny Hull tool to closely mimic a monolith's aesthetic through its shiny and metallic surface qualities. As the camera pans slowly towards the monoliths, the light source from the skybox casts down an intense beam of light, resulting in the monoliths' metallic coating reflecting the light on the foliage and structures, producing a variety of deep, black shadows that slowly fragment over the monoliths. The strategic use of shadow and light also guides the viewer into the backdrop as they are slowly greeted by the glitches, which take the form of a series of white lines that crosshatch within the space. However, just before the viewer can physically reach out to the lines, the camera pans back and the monoliths begin to flicker, providing a small snapshot of a previous reality. This is significant because it elicits an emotional response from the viewer, causing them to feel unsettled by both the camera movement and the behaviour of the glitches and by the light reacting to the environment's textures and marks. In relation to the illusionistic qualities of the digital space, the viewer continually ascends and descends, losing their sense of physical connection to the space. This result is a direct response to my out-of-bounds experience in *Half-Life: Alyx* (Pinkerton, Vanaman, and Wolpaw 2020), in which I was trapped within a low-resolution space that featured a distorted light source that turned the textures of the various surfaces into flickering lights; it references glitches such as ghosting, by providing traces of a previous reality.

Figure 22. Thomas Goates, close-up shot from *Disruption* (2021), still of video

Source: Figure reproduced from Thomas Goates.

The final area that my work engages with is perception, that is, my work simulates the experience of glitches through the movement of the viewer's eyes. To distort the viewers perception my work is inspired by the dream-like sequences of Nolan's *Inception* (2010), the monoliths that I have created (figure 22), reside within the environment to provide a gateway for viewers to perceive other realities through the bending and manipulation of the space. Although these forms are static, the relation between light and materiality creates an embodied interaction between the viewer and the visual properties of the virtual environment.

During this stage of development, I noticed that utilising conventional drawing methods to capture perspective was not applicable within virtual reality. The projected videos that I have created mimic this technique by allowing viewers to engage with the visual elements of glitches from three perspectives. As a result, the viewer becomes an activate participant within the space as the various materials and marks warp in and out of the space. Additionally, this technique that I simulate mimics the tracking capabilities of a virtual reality headset, which is used to track the user's presence and body positioning.

Chapter Four: Conclusion

As a result of developing this body of work, I believe that Tuan's (1979) writings about a landscape being a source of fear can be applied to a virtual environment. My work generates these feelings through the experience of glitches distorting a digital environment's familiar imagery. As the audience becomes comfortable with the environment's forms, structures and objects, the glitches trigger and create a sudden shift in imagery, removing the hyperrealism and producing an atmosphere that bounces between the meditative and the unsettling. The three videos that I have developed serve as an exploration into the uncanny nature of glitches as well as simulating the experience of a glitch suddenly teleporting the player into an eerie and desolate space that is strangely quiet. All three videos begin simultaneously and welcome the viewer into the virtual three-dimensional space through recognisable structures and forms taken from open-world action games such as *Ghost of Tsushima* (Fox and Connell 2020) and *Red Dead Redemption 2* (Nelson and Sarwar 2018) that sit calmly within the area. As the video progresses, the destructive behaviour of the glitches begins and they take control of the virtual environment, distorting the various structures, and evoking feelings of fear and uncertainty.

When I began this research, the feelings that glitches trigger in me sparked multiple questions. Glitches such as the out-of-bounds glitch and artifacting elicited uncomfortable emotional responses through a range of corrupted imagery. These glitches also challenged my sense of agency within game worlds. In games, such as *Red Dead Redemption 2* (Nelson and Sarwar 2018), I felt a strong sense of control and familiarity with the game as I continued to spend more time with its gameplay mechanics. However, when the glitch took control I felt uncomfortable as I lost control of my ability to interact with the game world. This loss of familiarity with the game world's visual elements and gameplay mechanics was also heightened when artifacting occurred as it disrupted the qualities of the game's environments, such as the skybox and lighting.

Leading up to this project, I perceived glitches as an annoyance or frustration that hindered the enjoyment and experience of playing a video game. Experiencing a glitch through an artistic lens has changed my viewing experience as I have become immersed in the various distorted qualities of the glitch.

By leveraging my knowledge and experience of various drawing methods, I aim to translate and isolate the diverse qualities of glitches. Through disrupting a player's movement, I discovered that the glitch could activate an embodied experience between the player's digital body and the game world. In turn, this creates a sudden shift between the avatar's positioning and the space, creating a disconnect or dissonance.

In terms of a creative body of work, the videos *Materiality* (2021), *Out of Bounds* (2021) and *Disruption* (2021) merge the drawing methods I have developed over the last two years. Starting with charcoal drawing to capture the materiality and atmospheric properties of glitches, I then produced a triptych that translated their qualities into a visual language to explore the uncanny qualities of hyperrealistic character models. The second year of research comprised an investigation into the exploitation of glitches and their visual attributes, which led to the final artwork of recreating the experience of glitches through the capabilities of virtual reality.

The digital space that I have created may serve as a form of self-reflection for video game developers, such as Rob Nelson, who strive to develop hyperreal game worlds that treat glitches as a hindrance to their games. With the recent release of the next generation of video game hardware, such as the Xbox series of consoles and PlayStation 5, a new era of visual distortion will arise. Through my research, I hope this project inspires current and future artists to take this digital torch further to create new and exciting knowledge relating to the sensory and uncanny experience of glitches.

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