

Thresholds & Unstable Boundaries

A Research through Design Exploration of
Queer Embodiment in Virtual Reality

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Thesis submitted in fulfilment of the requirements for the degree of

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under the supervision of

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Certificate of Original Authorship

I, Alexandra Chalmers Braithwaite, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Design, Architecture and Building at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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I pay my respects to the Wangal people of the Darug nation, the traditional owners of the land where I grew up; I also pay my respects to the Gadigal people of the Eora nation, the traditional owners of the land that I now live, work, and learn upon. Sovereignty of this land was never ceded, and this land always was, and always will be, Aboriginal land.

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Author Biography

I am someone who would say they “grew up on the internet”. I made my first tumblr account in either 2008 or 2009, and it was on the internet that I first became personally, academically and politically engaged with issues regarding gender and sexuality. The internet was also the space where I was queer before I was queer in everyday life. Since then, the cultural divide between “people who go on the internet” and people who don’t—the supposed divide between “online and real life”—has become far less obvious, although my early (and continuing) internet-ness continues to inform my work in obvious and sometimes unexpected ways.

My queerness has also informed my work in significant ways. My queerness is personal, political, academic and professional: the scholars and thinkers I draw on for academic argument have also shaped how I live my life, and how I live my life shapes how I think about and work with queer scholarly practices.

I began my undergraduate studies in Visual Communication in 2013 and completed a combined Bachelor of Visual Communication and Bachelor of Arts in International Studies (Spain Major) in 2017. During this time my creative practice centred on traditional media, illustration, and visual narrative; I wrote and illustrated comics and zines, including a set of comics based on interviews I conducted with queer couples regarding the Australian Marriage Law Postal Survey as it unfolded in 2017.

During my Visual Communications Honours year, 2018, I began exploring digital tools for creative practice, such as Tracery, a library for javascript that generates re-combinatory text. At the same time, I took the opportunity to engage deeply with queer theory and queer creative practice, a field I had a long personal interest in, but had not had the opportunity to immerse myself in at length as a field of study. As a result of my explorations, I developed *Sappho’s Ghost* (2018), a VR experience in which participants are given access to gloopy, physical texts generated from re-constructions of Sappho’s poetry, and in the course of the experience, the text they have touched becomes their body. This project is the foundation for my strong research interest in embodiment and VR and has informed my approach to this research undertaking.

I have worked as a research assistant on *Waves of Words* (2019), an ARC Grant research project investigating novel interfaces in VR for linguistic data. I was also research assistant to *Every Act of Reading Performs the Work* (2018-21) by Agatha Gothe-Snape, in creative research partnership with Dr Andrew Burrell. *Every Act of Reading Performs the Work* is an artwork that consists of a virtual reality sculpture (a virtual environment illustrated from within VR), a screen-based installation, and performance series hosted at Carriageworks Sydney. I have also worked as technical producer on Sidney McMahon's *Maggot* (2022), an interactive video work for UTS Gallery that used novel brain-computer interface technology, as technical assistant on *Starlight Junktion* (2022), an interactive drone-racing game by Fei Guo for Casula Powerhouse Arts Centre, and as Project Technical Lead, Unity Developer and Research Support on *Habit Habit* (2022) by Kalanjay Dhir. This last project is discussed in the course of this dissertation. All of these projects have informed my practice-based research and shaped my approach to creating queer VR.

Thesis format

This thesis consists of:

1. Written Dissertation: presented in this document. This document also refers to contents available in the Documentation Folio and further support material located in the appendices.
2. Documentation Folio: Documentation of the Body Traces VR experience prototype, the practice-based component of this research. This Documentation Folio is available in Appendix A: Body Traces Archive Documentation Folio.
3. Supplemental material in appendices B to D.

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Abstract

This doctoral research explores the design of embodied experiences for Virtual Reality. It introduces a novel queer methodology for VR and includes a prototype practice outcome that showcases the insights and approaches derived from this methodology. Two key texts—*Queer Phenomenology* by Sara Ahmed (2006) and Esteban Muñoz’s *Cruising Utopia* (2019)—form the basis of the queer theoretical lens used to explore two linked research questions. The first question takes a queer perspective to analyse histories of embodiment in the medium of VR; the second question focuses on how queer ways of working with digital technologies can then be used to craft new possibilities for embodiment within VR.

The primary practice-based output of this research is a prototype 10-minute VR experience, the Body Traces Archive, in which participants are invited to draw upon the surface of themselves in order to create a digital trace of their body. This digital trace then lives amongst an ecosystem of traces generated by previous participants.

This written thesis that exists in conjunction with the prototype comprises: a contextual review of approaches to embodiment in Virtual Reality; analysis of the theoretical basis of the queer methodology; theoretical and practical precedents in the field of cyberfeminism; the methodology used to conduct this research; critical documentation of preliminary experimentation and its contribution to the queer methodology for VR; the queer methodology for VR and an examination of its application in the process of developing the final prototype; and analysis of the participant experience of the final designed outcome.

This project contributes to a number of fields. Through the development of a queer methodology for VR, it contributes to design scholarship and practice by introducing the much-needed critical voices of queer and cyberfeminist theory to existing approaches for designing and developing VR. While this queer methodology for VR is concerned with VR specifically, and therefore offers its major contribution to the field of VR design and development, it has broader implications for how design works with immersive media more generally.

This research also contributes to the field of queer theory by extending the already existing applications of queer theory to digital technologies and immersive media. By integrating queer theory with practice-based approaches,

this research presents a novel manifestation of textual queer knowledge via the embodied, experiential medium of VR.

The practical outcome, Body Traces Archive, is also a contribution to the field of practice that constitutes VR development, itself an eclectic field consisting of software developers, UX designers, game developers, artists and creative technologists. The Body Traces Archive is a demonstration of the queer methodology as well as a model and starting point for further explorations in practice. The Body Traces Archive offers participants an experience of queerly inflected embodiment, an opening into a different way of understanding digital technologies and themselves.

Glossary

Within the main text of the thesis, words with a glossary entry are hyperlinked and marked with an underline.

Biotech - Biotech, or biotechnology in full, refers to technologies that intervene in biology, especially the human body. This includes technologies such as reproductive technologies or gene therapy.

Blob - See **goopy, glop**.

Cloth physics - *Unity* game engine, like many other game engines, provides a component that simulates the movement of cloth. A developer can set variables such as stiffness of cloth and amount of friction to achieve relatively realistic simulations of cloth behaviours, instead of having to code such behaviours themselves.

Deserialisation - See: **serialisation**.

Extended reality (XR) - Extended reality is an overall umbrella term used to describe media that integrate with physical reality in some way. Augmented Reality (AR) is used to describe media that overlay digital imagery on top of physical reality, with the digital imagery responsive to the physical environment; e.g digital characters that appear to “sit” on a physical seat shown via camera. Mixed Reality (MR) describes a similar overlay of digital and physical, with more interaction between the two worlds: rather than the physical world remaining as “background”, the two are more tightly mapped, and moving or interacting with physical objects causes changes in the digital overlay. Virtual Reality (VR) is used to describe the total occlusion of the physical world, usually by a **head mounted display**. Contemporary VR headsets also allow for a certain amount of pass-through, or visibility of the outside world, and may describe this as MR or XR.

Fragment shader - See **Shader**.

Haptics - Haptics, haptic feedback, haptic interfaces or haptic technology are terms used to describe the use of technology to provide sensory stimulation via touch, often through the use of vibration via embedded motors in hand-held controllers.

[Production note: This figure is not included in this digital copy due to copyright restrictions.]

Figure 0-1

Meta Quest 3 headset

Note. Quest 3 is the current flagship model of VR headset from Meta. Image from Meta Quest 3 [Image], Meta, n.d, Meta (<https://www.meta.com/au/quest/quest-3/>).

Head Mounted Display (HMD) - Head mounted display describes the use of stereoscopic screen display, mounted at a close distance from the eyes, usually in the form of a headset that can be worn or supported via straps. Headsets that fully obscure the eyes are most usual for VR. HMDs can be used for other **Extended reality** integrations if the physical world remains visible to the user. HMDs are also often accompanied by hand-held controllers, although contemporary headsets also often have integrated hand-tracking. An example of a current HMD is seen in Figure 0-1.

Goopy, glop - I use these and a range of other words as onomatopoeia for slimy, goo-like substances. This is also related to words such as “blob”, which, while not as obviously onomatopoeic, still bear slime-like associations.

Immersion – More in-depth discussion of immersion can be found in section 1.2.2 VR as an Immersive Medium. For the purposes of this research, I use the framework put forward by Hyunkook Lee (2020) and define immersion as a combination of physical, agential or narrative involvement, and understand the immersion offered by VR to be unique in the level of perceived physical immersion compared to other screen-based interactive media.

Intersectionality, intersectional - The concept of intersectionality is commonly used in social justice contexts and fields of social theory such as feminism and critical race theory. Intersectionality, coined by Kimberlé Williams Crenshaw in 1989, refers to an understanding of various forms of oppression and bigotry as intersecting (Carastathis, 2016). Crenshaw's primary analysis refers to the ways in which black women's experiences of workplace discrimination were inadequately remedied by legal solutions, as they were judged to be experiencing neither racism (black men were employed without discrimination) nor sexism (white women were employed without discrimination). Anti-discrimination bureaucracy was found incapable of addressing the way that black women were discriminated against as black women, as an intersecting identity. Taking an intersectional approach therefore means that when addressing experiences of oppression, such as in the work of feminism or anti-racism activism, analysis and praxis should take into account how other realms of oppression are interwoven with the primary concern at hand. One of the key principles of intersectionality is that oppression is not simply additive, and that to be part of multiple marginalised populations is a specific experience that is different from others who may bear some but not all of these experiences of marginalisation.

JSON (JavaScript Object Notation) - JSON is a data format that is readable by both machines and humans and is highly compatible with conversion to other data formats such as CSVs, spreadsheets, or **lists** in C#.

List (Unity, C#) - Lists are a type of data collection in code such as C# used in *Unity* game engine. Entries in a list can be accessed with an index or number that specifies which entry in the list to access.

Material (Unity) - In *Unity* game engine, materials work in conjunction with shaders to provide the appearance and look of the surfaces of an object. Materials can define properties such as colour, surface texture and amount of reflection.

Mesh (Unity) - The shape of 3D objects in *Unity* game engine are defined by their mesh. A mesh is a collection of triangles (each corner of which is a vertex) that are arranged as the surface of a 3D shape. This 3D shape is given its appearance by **materials** and **shaders**.

Metaballs - Metaballs are digital objects rendered using similar techniques to signed distance fields. Metaballs are generated by providing a set of **XYZ coordinates** of a point, and then defining its density via a mathematical function, rather than defining a spherical 3D shape via a **mesh**. One of the key features of metaballs is that it is possible to simulate their combination into

one entity in a way that is much more efficiently and effectively “blobby” than either **meshes** or particle rendering approaches.

Packages (Unity) - *Unity* game engine offers a package system, which allows for the modular installation of particular tool sets developed by Unity and other creators on an as-needed basis. These packages can be static assets such as 3d models, or code integration that provide significant functionality for the project. For example, XR Interaction Toolkit is a package offered by *Unity* that does not come pre-installed in *Unity*. Instead, developers must install this package. The XR Interaction Toolkit provides components and code that can be used to design and construct interaction systems with most available VR headsets.

Parent-child object hierarchy (Unity) - Objects in a *Unity* scene can be organised in a nested hierarchy, so that “child” objects follow the movement of “parent” objects. This also means that code located on the parent object can more easily access child objects. An example of parent-child object hierarchy is shown in Figure 0-2.

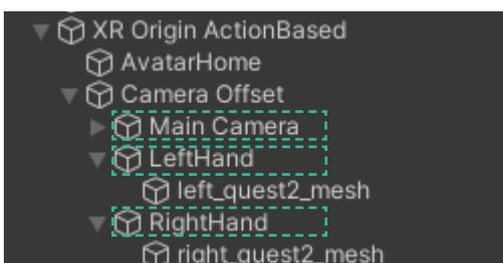


Figure 0-2

Parent-Child Object Hierarchy in Unity

Note. Screenshot shows the infrastructure within a Unity project that enables the participant to interact with the environment: the camera object, which tracks the headset movement, and the two “hands” that track the controllers. The objects for the camera and hands are children objects of the camera offset object, which is in turn a child of the XR origin point. Moving this XR origin point parent object automatically moves all of these child objects at the same time, retaining their organisation and spatial relation to one another. Screenshot from the Body Traces Archive Unity project.

Particle system (Unity) - In *Unity* game engine, a particle system is used to generate many smaller visual elements, called particles, that combine to create an overall effect based on the defined properties of the system. Particle systems allow you to set properties like the appearance—such as a specific image or colour for each particle—and the movement behaviours of the particles, such as speed, direction, size and rotation. These properties are then used in the procedural generation of the particles. This is often used to simulate complex dynamic materials or substances like water, fog, sparks, smoke and fire.

Participant - Throughout this thesis I use the term “participant” rather than “user” or “player” to describe people who enter and interact with VR, especially VR experiences that are artistic and participatory in nature. At times I deploy the word “user” in recognition of the dominant industry standard terminology, especially when describing VR experiences that conform to industry standard design for everyday consumers.

Photogrammetry - Photogrammetry refers to the process of using a large collection of 2D images to generate 3D data—usually a 3D model—of an object or scene.

Prefab (Unity) - *Unity* game engine allows for a game object, including its various components, code and children objects, to be saved as a “pre-fabricated” asset, like a template. This prefab asset can then easily be instantiated and deployed many times within a *Unity* scene via code.

Queer - Throughout this thesis I have chosen to use the word queer as a signal of my alignment with the academic field of queer theory. While the word is also used to describe people within the LGBTQIA+ community, the two are not exactly synonymous—there are people for whom the word queer remains a slur that they do not choose to re-appropriate and reclaim.

Ray tracing, ray marching (Unity) - Ray tracing and ray marching are two approaches to rendering a digital scene that, while bearing technical differences, generally operate on the same principles. Chris Roda in *Real Time Visual Effects for the Visual Artist* describes ray tracing as a process by which “sampling rays are projected from the camera through the image plane and return only with the accumulated lighting information of the objects in the 3D scene they intersect” (Roda, 2022, p. 77).

Ray marching utilises **signed distance fields**. As the rays march through the scene, they return the signed distance field value of each location. Objects are defined not via meshes but by positive signed distance field values.

These two methods are in contrast to the more standard **rasterised rendering**. For more explanation on the differences between, and applications of, ray tracing, ray marching and signed distance fields, see *Real Time Visual Effects for the Visual Artist*, by Chris Roda (2022).

Rasterised rendering (Unity)- Raster rendering is the most standard approach for *Unity* game engine's rendering pipeline. Rasterisation works by "projecting the 3D geometric scene onto a frame buffer within the image plane of the camera" (Roda, 2022, p. 77). This process means that the 3D geometry of objects in a scene (the **vertices**, **meshes** and **materials**) are converted into pixels for screen display.

Serialisation and deserialisation (Unity, C#) - Serialisation and deserialisation is the process of converting and storing data from one format into another, such as from C# to JSON.

Shader (Unity) - Shaders in *Unity* game engine are written in HLSL. The two most common ways to approach shaders in *Unity* are via Vertex Shaders and Fragment Shaders. Shaders write directly to the graphics card, and are a higher-level programming than the standard C# integration with *Unity* game engine. Vertex shaders modify the **vertices** of a **mesh**, and are integrated early in the rendering process, while fragment shaders modify the visual appearance of the render later in the process as it is turned into pixels for screen display.

Signed distance field (Unity)- Signed distance fields are used in conjunction with ray marching to define the location and size of objects in space, in contrast to a **vertices** and **mesh** method of defining 3d objects. In *Real Time Visual Effects for the Visual Artist*, Chris Roda (2022) provides the following definition:

A signed distance field is a function used to parametrically define a primitive object. The function simply returns the distance between a point and a volume surface. The sign of the returned value indicates if the point is in the volume (a negative value), outside the volume (a positive value), or on the surface of the volume (value equals zero). (Roda, 2022, p. 318)

Soft body system - A soft body system, or soft body physics, is a set of tools in a game engine such as *Unity* that allows for an object to deform and change shape (since it is a "soft body" rather than a "hard body" or rigid object) in response to factors such as gravity, speed of movement, or collisions with other entities.

Telepresence - Literally meaning “presence at a distance”, telepresence refers to the experience of being present in a location other than your physical location, through the use of communication technologies such as video call or networked Virtual Reality.

Unity game engine - *Unity* is the software I have used for the vast majority of practice-based inquiry in this thesis. *Unity* is a game engine, meaning that it is a software that is designed to be used to develop video games. Due to this intended functionality, *Unity* has a number of built-in and easily added tools (in the form of **packages**) that assist a developer or designer. *Unity* is integrated with C#, meaning that a designer can choose to use the graphic user interface offered within the *Unity* software itself to design and modify components, or can write their own code in scripts that will be active when the game is running. *Unity* projects consist of assets and scenes, with scenes acting as discrete “levels” or moments where assets are deployed within the 3D environment.

VertExmotion - VertExmotion is a paid **package** available on the *Unity* Asset Store, developed by Kalagaan. VertExmotion is a shader based soft body system, meaning that it makes it possible to create flexible, fluctuating surfaces without actually modifying the underlying **mesh** of a 3D object. This system requires less intensive computing power than if the **mesh** itself were to be deformed.

Vertex shader (Unity) - See **Shader**.

Vertices - A vertex is a point in 3D space that defines one corner of a triangle. Vertices and triangles are the basic building blocks of an object’s **mesh**.

Virtual environment - In this thesis I use the term virtual environment to describe the 3D interactable scene that is viewed and experienced via VR head-mounted display. As aptly summarised by Goslin and Morie, “virtual environments are places that exist entirely within the memory of a computer” (Goslin & Morie, 1996, p. 95).

Virtual Reality (VR) - See **extended Reality** for further contextualisation. In this thesis I use the term Virtual Reality to describe the overall media experience that consists of a 3D virtual environment that is accessed via a head-mounted display.

Wetware - Wetware is a term used in cyberpunk, sci-fi, post- and transhumanist circles to describe biological and bodily components, usually in conjunction with the concept of software and hardware. In a cyborgian context,

wetware refers to the human biological material (such as the brain) that is combined with technological hardware.

XR - See **Extended reality**.

XYZ coordinates (Unity) - *Unity* uses x-axis, y-axis and z-axis information to position 3D objects in space, as well as to define their rotation.

Typographic Voices

This thesis combines academic argument, reflections on practice, and participant testimony. To assist the reader, different typefaces are used to signal shifts in voice.

The majority of this thesis is typeset in Work Sans by Wei Huang in the style of this paragraph, denoting the main thread of argumentation.

Within literature-oriented chapters or sections, reflections on practice are indicated using this typeface, Source Serif 4 by Frank Grießhammer, along with the left-alignment and grey tint of this paragraph.

Within practice-oriented chapters, these reflections are laid out in the primary typographic style (with Work Sans) as practice is the main focus of these chapters.

Direct quotes from participants who have contributed to the practice-based outcome, The Body Traces Archive, are typeset using this monospaced font, Roboto Mono by Christian Robertson.

Chapter one:

Introduction

Before beginning this written dissertation, please view the *Body Traces Archive Full Length Experience* video, link available in [Appendix A: Body Traces Archive Documentation Folio](#).

1.1 *Experiencing the Body Traces Archive*

We meet at the main entrance of the university and then walk over to my building. It is a little awkward making small talk on the way, but we know each other enough to catch up and discuss whatever is new with us as we walk. When we get to my studio, you sit down and I offer to get you water (if I remember my manners). It is a little hard to know which seat to take: the office chairs are rolled haphazardly across the empty space off the floor or tucked into the desk spaces. On the floor is faded and scuffed tape defining a square of approximately 2m by 2m, seen in Figure 1-1.

There's a tripod in the back corner of the room with a camera, a set of lapel microphones that I am trying to juggle and turn on, and I have sheets of paper for you to read and sign. We're still chatting, talking about study, work, life; I am trying to make this feel like I know what I am doing, and that you are in safe hands.

Once I've put away your signed consent form, I ask you to clip your microphone to your shirt. I then go through the process of hitting record on all the various recording devices: the stand-alone voice recorder on the desk (back-up), the microphone recording on my laptop, and the camera on the tripod.

We commence the interview: I, holding my much-folded and unfolded piece of paper and notebook, read out the full list of questions (about eight) so that you feel prepared. I explain how long the process will take—the interview as a whole, about an hour, and the VR portion, about 10 minutes within that. I emphasise that if you feel unwell in VR—motion sickness is not unusual—you can say something and we can take you out of the experience. You aren't holding anything except for maybe a snack, if it is a snacking time of day.

To begin with, I ask how familiar you are with Virtual Reality. You have probably not done VR very often—most people haven't—and may have some scepticism regarding it; I encourage this and affirm that there is no right or wrong answer. I ask you whether there are aspects of your identity, expertise or lived experience that impact how you understand VR. We may talk about video games, or a lack thereof, while growing up; we might discuss how much time you spend on the internet, via computers or phones.

These early questions have gotten us into the rhythm of discussion now. You have started thinking about VR as a broader genre, as well as this specific

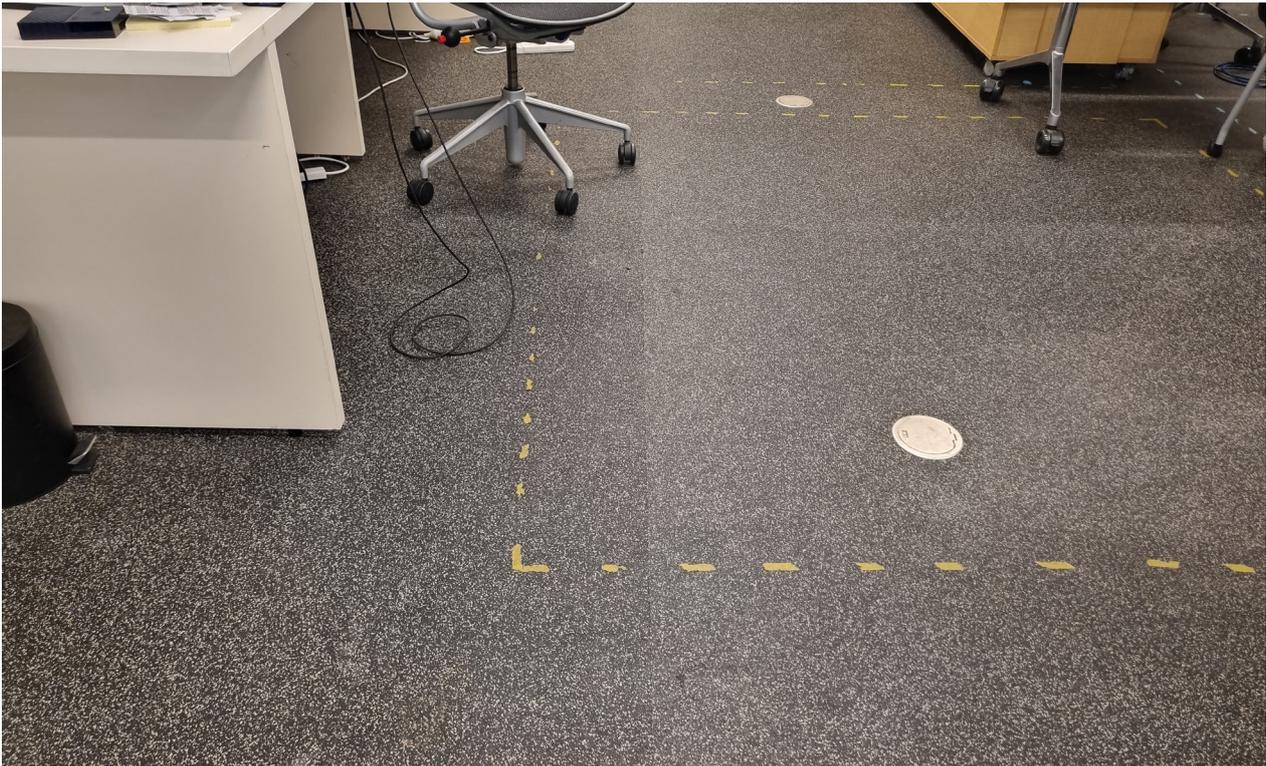


Figure 1-1

Studio floor location for participating in Body Traces Archive

example that you are trying out. I say something like, “okay, let’s give it a go,” and move towards the desktop computer with the VR headset. You roll your seat backwards to give me a little more space. I put your pseudonym into my program and start trying to turn it on: I stick my face into the VR headset momentarily, checking that it’s on and the settings are correct, then hit “run” on my desktop. I hand you the headset and ask you to stand in a particular spot, not quite in the middle of the taped square on the floor, but roughly equally distant from the various desks and chairs in the room. I want to avoid you running into anything while in VR, although a bright blue mesh will appear in the VR environment to warn you if you get too close to anything.

You may be nervous, not sure of where to stand and anticipating that this will feel embarrassing or unusual to do. You may be eager to start, and may put the headset on without me asking you to. You may need me to gently touch the strap at the back of your head and rearrange it to be more comfortable. I ask, “Can you see clearly? You might have to wiggle it around.” I again say something like, “and if you aren’t sure of what to do, or if you feel uncomfortable, you can say something.” I hand you the controllers, and our hands probably touch, because you can no longer see what I am doing: your hands wait obligingly as I position the controllers, and move your pointer finger so that it is on the trigger



Figure 1-2

Vr Controllers

Note. Participant for this documentation is the researcher.

that you will use. Now that both of your hands are busy holding controllers (seen in [Figure 1-2](#)), you can no longer reposition or touch the headset.

Inside the headset you are standing inside a large, green space, on a floating, pale blue circular floor. In front of you there is a still, pale bubble, shining an iridescent, streaky, pinkish-purplish colour. On my desktop I can see what you are seeing and where you are standing. I tick “User ready”, which starts the experience: everything freezes for a moment as assets load, and then you hear a narrator, speaking as if from all around you. Further away, a large, shiny mass of squiggles has faded in, like a ghost arriving. You realise that the narration is coming from this figure hovering opposite you (seen in [Figure 1-3](#)). You may be able to tell that it is my voice, but maybe not; I tried very hard to sound generic and professionally neutral. It took me many tries.

The guide asks you to step forward and touch the bubble floating in front of you. Picking up your feet feels strange, a little scary: you take an awkward shuffling step and reach forward with your controller in hand. If you are careful you manage to pop the bubble, hearing a soft “pop”, without grabbing the blob hiding inside. If you were vigorous with your reach, you may have picked it up at the same time: a blob about the size of your hand, glowing but opaque at its

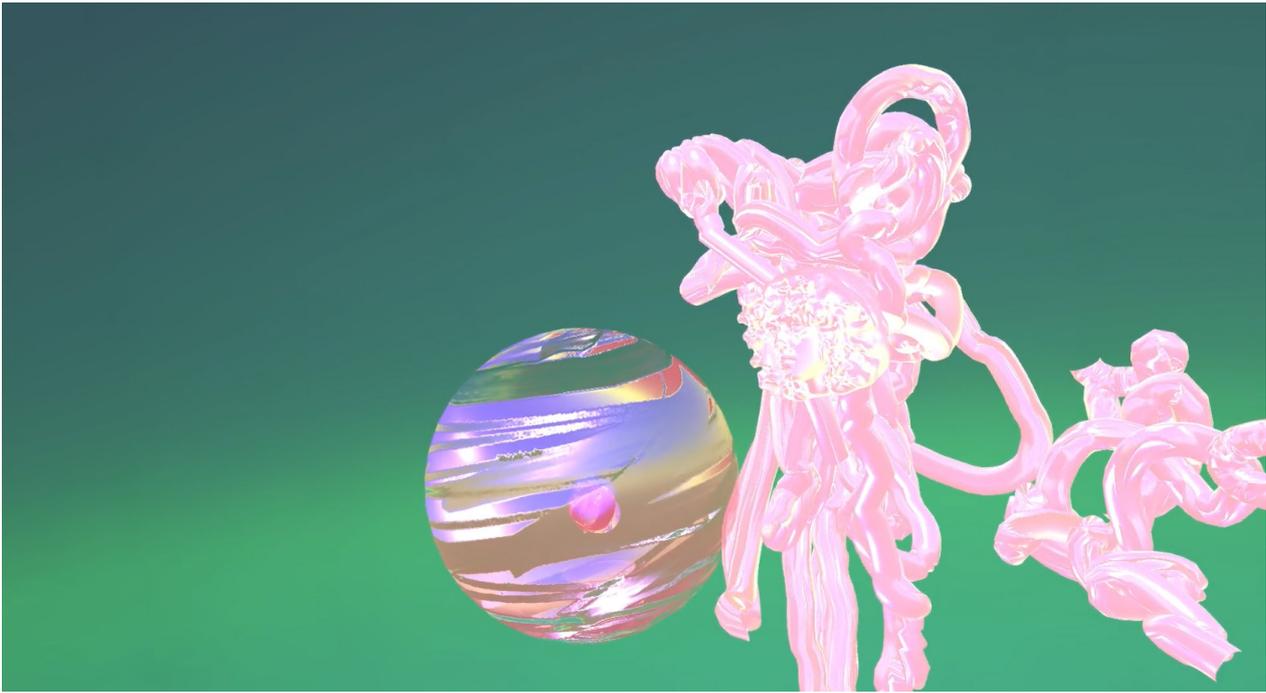


Figure 1-3

View from within VR when commencing the Body Traces Archive VR experience

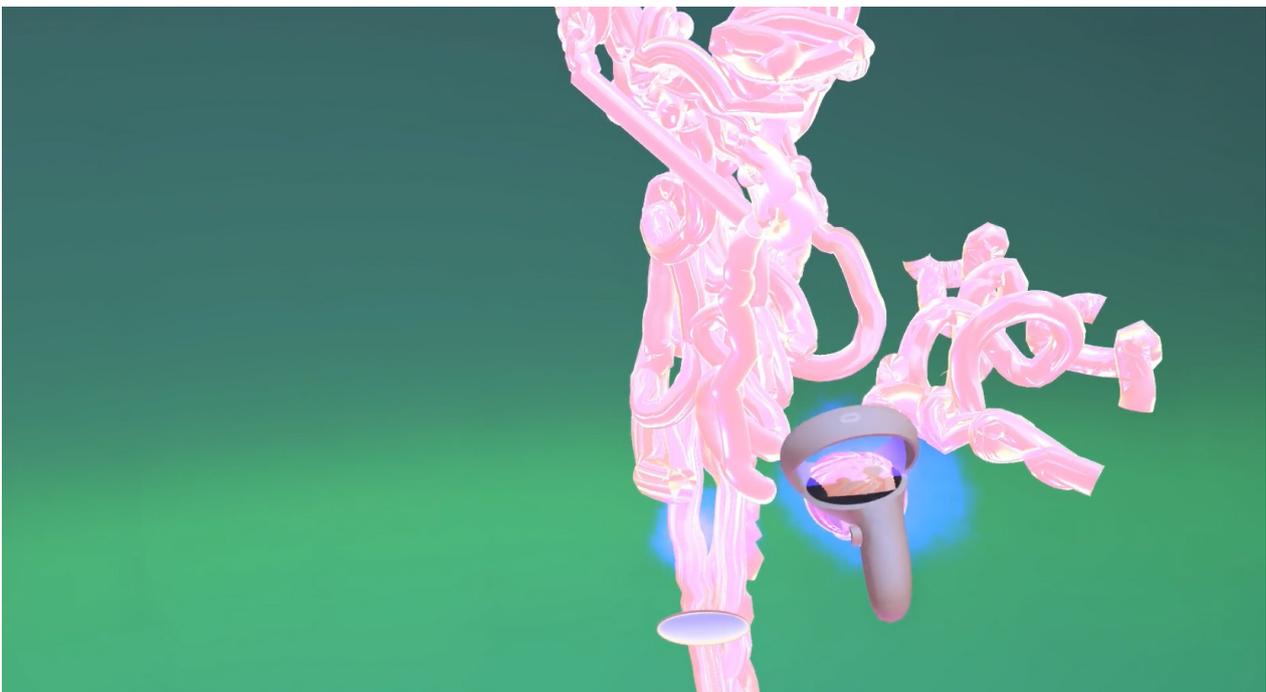


Figure 1-4

Participant controller holding the drawing blob

centre, a solid pink-orange that is now globbed onto your controller (shown in Figure 1-4). The guide figure explains that you can pass your blob from hand to hand, and that it will be your drawing tool.

Depending on the sort of person you are, you may hear the narration and immediately want to try to draw. You may pull the trigger on the controller, leaving a thick streak of pink in space in front of you. You'll laugh as soon as the next line of narration arrives: *you can't erase anything, so be careful!* You're giggling because you've done something a little bit wrong, and you feel a little tricked that the narration didn't tell you it beforehand.

The narration is explaining your task—there's quite a lot to listen to, and you quickly refocus on the instructions you can hear. You are instructed to think of where *you* start in VR. You are given options to choose from—your head, your chest, your feet. You may choose any of these options, and follow the instructions to place your controller there. Depending on how comfortable you are, you may hold the controller a short, hovering distance away from your body; a finger's width or so. You may press the controller against yourself more directly, making contact between your clothes and the curved edge of the controller (as shown in Figure 1-5).

How does this moment of contact make you feel? Are you nervous? Are you shy, knowing that I am sitting outside—outside VR, but still inside the room—watching?

The narration asks you to trace along the surface of yourself, holding down the trigger so that a shimmering, gooey tube follows behind the path you trace. As you draw, it may be against your body—dragging along your shirt and jeans, bumping over your shoes with the controller—or you may continue to hover it ever so slightly away from yourself, unable to see your physical edge but sensing it anyway, carefully avoiding direct contact. As you draw, your presence in the virtual environment becomes crowded by pink marks (seen in Figure 1-6), and you may try to avoid colliding with the marks around you, too, even though they have no physical presence. What does it feel like when your head bumps—doesn't bump, but appears to bump, passing through with an imagined touch—into this pink mass, which is you?

After you feel like you're finished with tracing yourself—when the mass of pink, wavering goo feels right—you follow the instructions to put the blob back where you picked it up from, on its little floating plinth. It disappears, and a large rectangle appears in front of you as the pink blobs you have drawn suddenly jerk and wiggle (shown in Figure 1-7). You can see your drawing in the rectangle in front of you. You have realised it is a kind of mirror, and that



Figure 1-5

Participant drawing their leg by running controller along the surface



Figure 1-6

External view within VR of participant drawing self

Note. Figure on the left is participant in the process of drawing themselves.

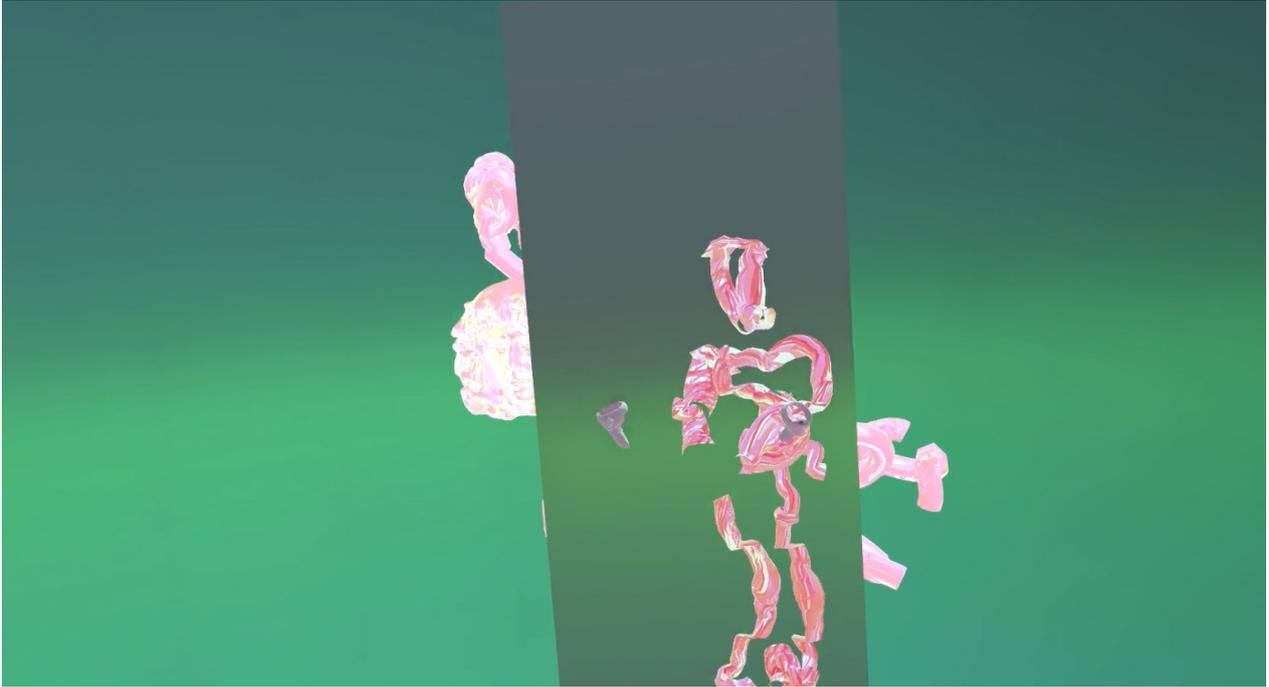


Figure 1-7

First person view of seeing self in the mirror

your drawing is now attached to you, and as you move, it moves with you. You wiggle a little and bounce side to side to test it. There isn't much else for you to do. There's no narration now. You're a little bit nervous, now that you're unsure of what to do next. Is this it? Has it finished?

Outside of VR, I might say, "Don't worry, it's still going," or I may let you stand there and wait. It depends on your energy. Do you seem like you need reassurance? Or are you okay to sit with the uncertainty?

Right when you are sure that nothing more could happen, the voice speaks again and announces: *there are new things joining you*. You see a circle of tiny pink dots in front of you appear and quickly grow into a collection of small scribbles (shown in Figure 1-8).

The narrator explains that you can touch these scribbles, which are the previous drawings of other visitors into the space. Maybe your hand-controller has already bumped into one; it makes a *gloop* sound and sticks to your hand as it grows to its full size. Now that it is as big as you, it is more recognisable as a bodily shape, sticking to your controller as you move it around. It gloops and glops large in your field of vision, bright, pink and yellow. You may sense it colliding with your head as you move your controller. If you shake your controller the scribble you are holding will free itself, gently flying away.

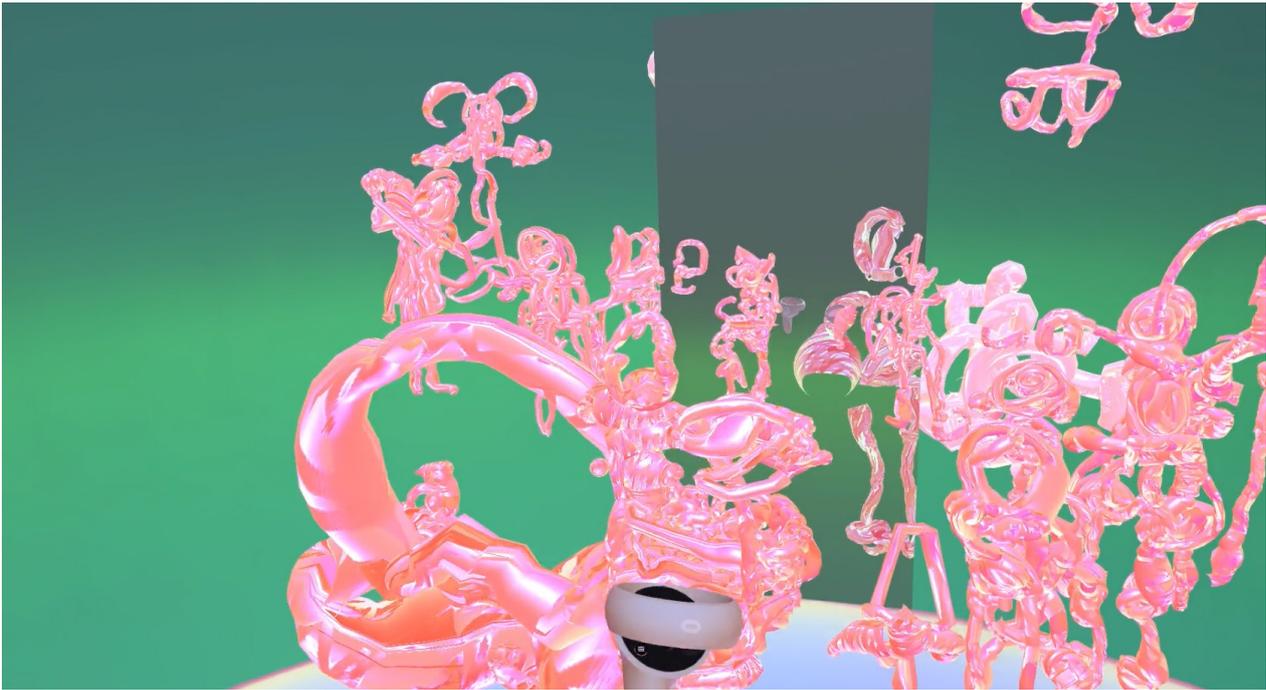


Figure 1-8

Participant touching archival drawings

The more you touch, the more drawings you free, and the louder the goopy, blobby sounds become as these drawings move around you, catching on your hands and sticking to you.

As other people's drawings float through the air, they may pass through you in surprising ways, approaching you with movement that feels too close or confronting; or maybe to you it feels like a gentle, friendly hug. You giggle or blurt out, "Shit!" or make a wordless exclamation of surprise. The more of these drawings you touch and release, the more they fly around and collide with you. With each collision, they grow a little larger, and the collision makes your own drawing grow too, in distended, throbbing pulses (shown in Figure 1-9). You lean sideways to avoid one as it floats towards your head. The more the drawings move, the more they grow, the more your vision is obscured, and the more collisions you cannot avoid.

The narrator interrupts your interactions with the archive of others' bodies to offer you a choice. Do you want to erase your current avatar or would you like to offer it to join the rest of the collected drawings? You decide to free your drawing and press your controller against your belly to grab the drawing, or perhaps it catches on your hand-controller accidentally as you brush your controller past your middle. Holding your avatar now, you can turn it this way and that, looking at yourself from outside yourself. When you shake your

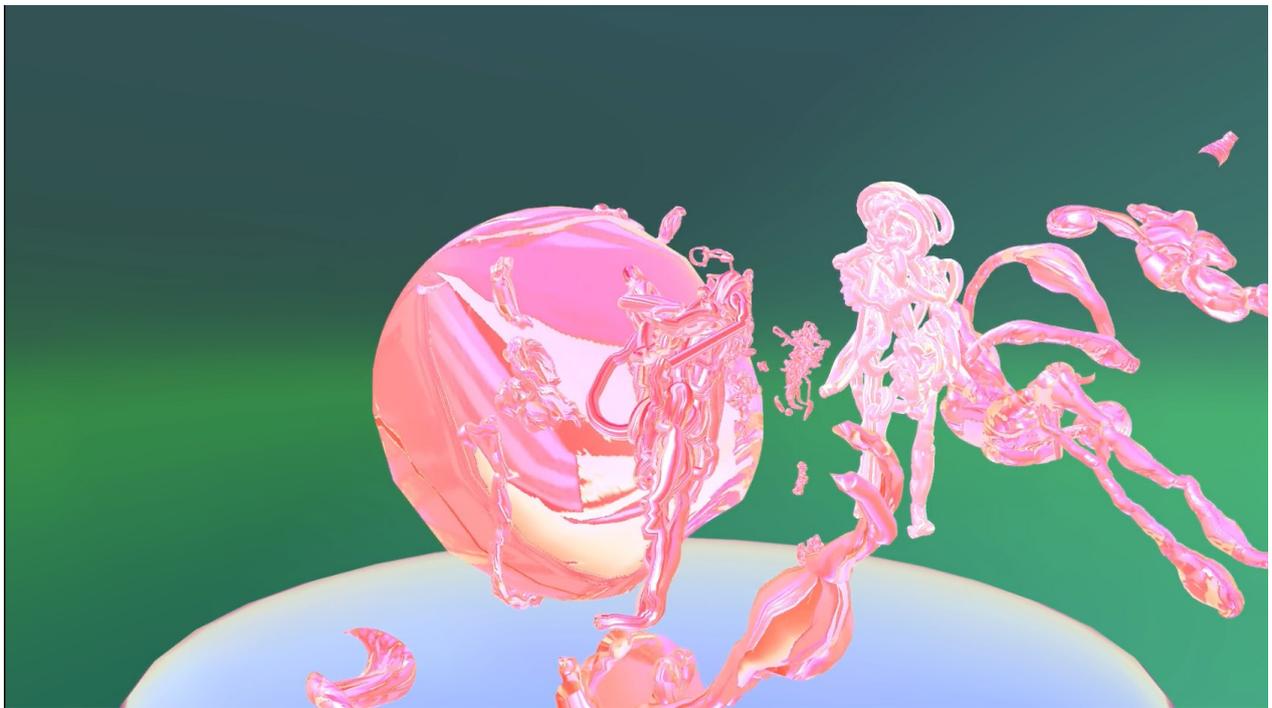


Figure 1-9

Body Traces Archive archival ecosystem from external perspective within VR

controller, it flies free. When you look in the mirror now you are once again disembodied, with only two floating controllers showing where you stand. When you look up, you can see your drawing, strange, large and gooping, amongst the rest of the ecosystem.

“Are you ready to leave?” I ask, from outside VR. Maybe you want to stay and play a while longer. Maybe you are feeling overwhelmed and ready to be back on solid land. I take the controllers from you first, and then help you undo the headset and lift it from your face. You blink and refocus on the room around you, maybe laughing a little at the strangeness of it. The lights are too bright. You don’t know quite where to look, since I’m busy putting the headset back on the desk and hitting buttons on the computer.

“Oh! You can sit back down,” I say. “Are you feeling okay?”

At this point some people feel nauseous, overwhelmed, or a little woozy in the head. It might feel, very faintly, like giving blood or waking up suddenly. Some of the awkwardness that had dissipated has returned. If I have snacks available, I’ll offer them to you as a gesture of assistance, whether you seem to need them or not. We’ll wait a moment before I begin asking you my follow up questions.

Once you seem present in the room again, I’ll ask you: how did this VR experience make you feel? How would you describe the experience of using your body in this VR experience? We’ll talk about where you started drawing and why. I’ll ask you about moments I observed—if anything made you speak out loud, or if you seemed to have a strong reaction to something. Often, having discussed your drawing of yourself, I’ll ask you about your general sense of presence: what of you was in that virtual world? This is a difficult question. You stop and wonder, struggle for words, or laugh a little.

Once we’ve finished my questions, I say, “Right, all done!” and turn off all my various recording devices. Maybe we are still discussing the closing topic—VR in general—and maybe we will go and get tea or coffee, or perhaps you will be on your way home. I’m not sure if you think about this experience for a while longer, or who you tell about it.

1.2 *Introduction*

We need our virtual worlds to be diverse, queer, thoughtful and touch-oriented, slimy and strange; and more importantly, we need virtual worlds that are beyond that, or inverse, or sideways to that—a diverse range of worlds for creators, visitors, occupants and beings to move amongst, create and build themselves. Body Traces Archive is a manifestation of queer aims and methods that developed over the course of this doctoral research, which are distilled into a queer methodology for VR that provides a set of conceptual and practice-based tools for other practitioners to develop queer VR. The previous introductory summary gives you—the reader—a sketch of the experience of using Body Traces Archive, the prototype VR experience I have produced. The Body Traces Archive is the practice-based research outcome of this overall practice-based doctoral research, existing as an artefact that argues for queer VR alongside this written thesis. While this prototype is only one particular world, it acts as a demonstration of the value of taking a queer approach to VR, in order to open the possibility of more such worlds that encourage us to roam along different paths.

This prototype exists in contrast to the majority of contemporary Virtual Reality experiences. Current Virtual Reality (VR) development is driven by narrow agendas of capitalist accumulation and data acquisition (Dare, 2020; Evans, 2018), with VR often reifying dominant structures of exclusion and oppression. This research project aims to critique contemporary dominant paradigms of VR development to open up possibilities for virtual queer worlds. This research uses queer theory as part of a Research through Design (RtD) (Frayling, 1993) investigation of Virtual Reality. This project centres on examining how to use—or misuse—the affordances of VR to design virtual experiences that are inclusive, expansive and disruptive of heteropatriarchal norms embedded in VR currently.

1.2.1 **Defining VR**

Virtual Reality (VR) is a digital medium that offers immersion, telepresence and embodied interaction through interfacing technologies such as head-mounted displays—the headset and controller set that most people think of when using the phrase “VR”. These head-mounted displays and linked controllers (see Figure 1-10) enable storytelling and worldbuilding in immersive 360 degree, high-fidelity simulated virtual environments; i.e., 3D digital worlds that surround the user and can be walked amongst and interacted with through the use of

motion tracking and real-time animation. How these VR experiences should be designed and implemented for wider audiences is still an ongoing negotiation amongst practitioners, researchers, commercial developers, and scholars (Dare, 2020; Evans, 2018).

Howard Rheingold, an early key scholar of digital technologies and their surrounding cultures, defined the features of VR in his 1991 book *Virtual Reality*:

One is immersion, being surrounded by a 3D world; another is the ability to walk around in that world, choose your own point of view; and the third axis is manipulation, being able to reach in and manipulate the 3D world. (Rheingold, 1991, p. 34)

[Production note: This figure is not included in this digital copy due to copyright restrictions.]

Figure 1-10

Meta Quest 3 Headset

Note. This headset, the Quest 3, is the most current flagship product from Meta; the Body Traces Archive was produced using a Meta Quest 2. Headsets from other companies, such as the HTC Vive, are designed differently, but have the same basic components of a stereoscopic headset that is held to the head with straps, accompanied by handheld controllers. Image from Meta Quest 3 [Image], Meta, n.d, Meta (<https://www.meta.com/au/quest/quest-3/>).

Brenda Laurel, an interaction designer and researcher well known for her extensive work in VR during the 1980s and 1990s, consolidated much of her knowledge in the book *Computers as Theatre* (Laurel, 2013), first published in 1991 and republished as a second edition in 2013. In the second edition, she defines VR as

a medium in which the human sensorium is surrounded by (or immersed in) stimuli that are partially or wholly generated or represented by artificial means and in which all imagery is displayed from the point of view of an individual participant, even as he or she moves around. The effect is to give an interactor the sense of being present in a place where their body is not currently located. (Laurel, 2013, pp. 183–184)

Brenda Laurel has more recently provided a comprehensive overview of the features of VR in her blog post “What Is Virtual Reality?” (2016), which authors Kozel, Gibson and Martelli have summarised and condensed in “The Weird Giggle: Attending to Affect in Virtual Reality” (2018):

1. Complete surround environment (up, down, all around).
2. Affordances for depth perception and motion parallax.
3. Spatialised audio, not just stereo.
4. Affordances for tracking the participant’s direction of motion distinct from the direction of gaze.
5. The participant’s sensorium as the camera (first person medium).
6. Natural gesture and movement (not game controllers).
7. Affordances for narrative construction.
8. The principle of action (affording kinaesthesia and proprioception).

(Kozel et al., 2018, p. 16)

Across these definitions we see that participant action and manipulation within the digital world are defined as a key feature of VR. It is crucial here to differentiate between interactive VR and cinematic VR. Interactive VR allows for gesture, movement, interaction and manipulation as listed by Laurel and Rheingold. On the other hand, cinematic VR usually consists of a 360 degree digital environment that participants are located within and surrounded by but do not have the ability to interact with, although they may have some ability to move or turn within the environment. While this research is informed by aspects of creative practice in cinematic VR, it focuses on the qualities, affordances and properties of interactive VR. Another differentiation worth making is between solo VR and social VR. Solo VR is a Virtual Reality experience consisting of an individual participant, similar to a “single player” video game.

While many people may be able to participate in the experience via multiple headsets, each headset would be running its own instance or version of the experience. In contrast, social VR refers to when multiple participants access a shared VR environment that is networked in some way. This allows for interaction between participants and for any changes they make in the environment to persist across different participants' experiences. This research discusses both solo and social VR, and the Body Traces Archive VR prototype is a predominantly solo VR experience that nevertheless features some qualities of social VR, as participants can interact with the contributions of others.

1.2.2 VR as an Immersive Medium

When defining VR, the term “immersive”—or words relating to the concept—float to the surface repeatedly. As previously mentioned, Rheingold defines VR by its offering of immersion and being surrounded by a 3D world, while Laurel more specifically identifies a completely surrounding environment and depth perception as important features of VR. Writing about extended reality more generally (which includes augmented reality, mixed reality and virtual reality), Hyunkook Lee, a contemporary researcher in the AR/VR and audio engineering space, details the range of different deployments of the term immersion. He notes that terms such as “presence, involvement or engagement” (Lee, 2020, p. 2) are often used interchangeably with, or in relation to immersion, and that the term immersion can be used to describe imaginative, playful or task-based immersion (such as reading a book or playing a table-top roleplaying game) as well as perceptual or sensory immersion (such as listening to spatialised audio or standing within a 360 panorama painting). Consolidating a variety of frameworks, Lee presents a model of immersion consisting of immersive systems (such as VR) that provide immersive experiences. According to Lee, an immersive experience is a result of a combination of physical presence, social- or self-presence, and involvement. Involvement is itself a broader term that can be used in relation to emotional involvement, narrative involvement, strategic or challenge-based involvement.

For the purposes of this research, involvement is best understood as both internal involvement—cognitive and emotional investment in a particular narrative and emotional landscape—and agential involvement, which is to take part in an activity or task.

This conceptual framework of immersion is particularly useful, because it acknowledges that many digital media have some kind immersion, with these three different aspects—physical, social or involvement—taking lesser or greater roles in the development of an overall sense of immersion: playing a video

game with a handheld controller and large TV screen may involve significant self-presence and involvement, but less significant physical presence, whereas cinematic VR involves significant physical presence and self-presence, but lesser involvement (as there is no way to interact with the environment, but there are still opportunities for narrative and affective investment).

The model of immersive VR that I utilise throughout this research emphasises the role of embodied interaction available via interactive VR. Paul Dourish defines embodied interaction as “interaction with computer systems that occupy our world, a world of physical and social reality, and that exploit this fact in how they interact with us” (2001, p. 3), emphasising that an embodied interaction framework examines “not just how we act *on* technology, but how we act *through* it” (Dourish, 2001, p. 154, emphasis in original). In using the term embodied interaction, I emphasise how physical presence and agential involvement—the body being there and doing things—are a crucial part of what defines the immersive nature of VR in contrast to other media. Enabling participants to feel present within a virtual environment that they can manipulate with physical actions results in an experience of virtual embodiment. This experience of virtual embodiment via embodied interaction is key to the meaning-making process for VR, and the immersive sense of bodily presence—of “being in it”—is what differentiates VR from other forms of digital interactive technologies (such as desktop computer interfaces). Therefore, it is essential to consider how embodiment as a foundational aspect of VR reifies—or challenges—dominant social values, and to construct experiences of embodiment in VR that offer ways of “being in it” that are expansive and inclusive.

1.2.3 VR as a Cultural Presence

In the 1980s and 1990s, as VR headsets first entered the consumer market, the medium was connected to emerging subcultural cyberpunk and posthumanist thinking (Hayles, 1999; Lanier, 2017). VR does not stand completely alone, and has certainly inherited certain qualities of more established screen-based media such as video games, television and cinema. However, VR has also taken on a unique and outsized role in mediating cultural understandings of digital technology. Cyberpunk and posthumanism—represented in sci-fi novels, TV and movies, as well as magazines such as MONDO 2000, often with imagery related to VR headsets or virtual environments—focused on subverting and deconstructing dominant cultural paradigms through the use of digital technologies; a “radical underground hacking” (Murphy & Vint, 2010, p. xii) that extended as far as speculative goals of reconfiguring human consciousness with digital implants and VR technologies. At the time, these diverse countercultural movements were deeply engaged with the interrelated politics of digital technology and embodiment (Murphy & Vint, 2010; Wajcman, 2004).

These posthumanist goals of early engagements with VR were not limited to the countercultural or anti-capitalist; they were also deeply connected to neoliberal capitalist frameworks. Fictional sci-fi engagements (whether that be textual or cinematic) often took deeply ambivalent stances towards more capitalist instantiations of cyberspace, a concept intimately connected with the medium of VR. Discussing William Gibson's iconic cyberpunk novel *Neuromancer* (1984), Benjamin Noys notes that:

The historical significance of Gibson's novel (leaving aside aesthetic judgements) lies in the fact that it is poised between anxiety and endorsement, critical distance and immersive *jouissance*, in its vision of cyberspace, augmentation and the accelerative disembedding of social relations. (Noys, 2014, p. 39)

The contemporary landscape of VR development, meanwhile, is currently dominated by a narrow set of Silicon Valley tech giants (Evans, 2018), with relatively scattershot critical attention within industry given to how the currently developing norms for VR can reinforce social and political hierarchies at the exclusion of minority perspectives and experiences. When VR is concerned with progressive politics, it often takes the form of "VR for Good". Beginning as an initiative from Oculus in 2016, VR for Good is the main nonfiction documentary production program now run by Meta (Carter & Egliston, 2024). Describing this program, Lisa Messeri notes that it is "focused on improving the elite individual" (2024, p. 9), problematically eliding questions of what "good" is, and for whom it generates these supposed benefits. Rather than a top-down, corporatised vision generated from within "Big Tech's harmful circuits of power" (Messeri, 2024, p. 10) contemporary Virtual Reality needs multiple viewpoints and diverse perspectives that can create VR for our own purposes. Chapter Two of this thesis, *Histories of Embodiment in VR*, presents a more detailed examination of the history of VR, its cultural positioning, and how embodiment has been understood throughout the history of the medium.

1.2.4 What is Queer Embodiment?

If physical presence is a crucial aspect of what makes VR immersive, how should we go about understanding what physical presence *is* and what it does? I use the concept of embodiment as my main tool for understanding and analysing physical presence, and I specifically approach embodiment through a queer lens. In *Queer Phenomenology* by Sara Ahmed (2006), Ahmed defines embodiment as the process by which bodies occupy space and enact gestures; embodiment is what bodies do, and therefore what they are enabled to do

(Ahmed, 2006, p. 60). Queer embodiment, more specifically, is attentive to how presence, gesture and action of the body is restricted or enabled based on gender and sexuality, situated in specific contexts. It is attentive to how these contexts—dominant heteronormative environments—inhibit queerness, and how spaces such as nightclubs, private homes—liminal queer moments amongst a primarily straight world—open up possibilities for queer existence.

Bringing an understanding of queer embodiment to VR therefore requires focusing on how processes of embodiment occur, and how the virtual embodiment enabled in VR either heterosexualises and normalises, or instead, could orientate towards queerer pathways. A queer understanding of embodiment questions the norms that constitute the “being in it” of immersion in VR, and sees it as an opportunity to expand and experiment with the “being”-ness of the experience.

1.3 *Research Questions*

To direct this research, I use two key research questions to investigate relevant contexts and then carry out design experimentation.

The first question is: “How might a queer critique of the history of VR locate strategies for queer embodiment in VR?”

This enables me to develop a contextual grounding for the second question, identify what key issues and lenses of analysis are appropriate for a queer theory approach to VR, and establish how other practitioners have enacted insights from queer theory in their own practice with digital media.

“How might a queer approach provide new ways of understanding—and working with—embodied experiences in VR?”

This question is primarily intended for my design experimentation, which uses prototyping and making for VR as a way to explore and develop insights regarding this question.

1.4 *Research Context*

1.4.1 **Queer Praxis and Perspective on Digital Technologies**

In considering how VR can more appropriately include diverse and queer perspectives, I propose that queer theory can offer a rigorous analytical and creative approach to developing embodied experiences in Virtual Reality. Queer theory, such as the work of Sara Ahmed and José Esteban Muñoz, which I use as key texts to ground my methodology, considers how hierarchies of gender and sexuality are reified socially, politically and through media. By applying queer theory to digital technologies like Virtual Reality, we can expand upon the already developing queer techniques and approaches that incorporate critical perspectives and new ways of thinking and working with the medium.

Queer theory has already proven insightful and essential in bringing complexifying critique to VR development, with interactive media scholars such as Bo Ruberg taking a queer position to critique dominant patterns of VR development. Ruberg specifically critiques the popular framework of VR as an “empathy machine” (2020a, p. 59), originally put forward during the nascent stages of mid 2010s VR popularity by creators such as Chris Milk. In her article “Feeling Good about Feeling Bad” (2020), Lisa Nakamura presents a similarly strong critique of the model of VR as empathy machine, paying specific attention to the way that VR experiences that purport to be anti-racist nevertheless are primarily experiences of “identity tourism” (Nakamura, 2020, p. 56) that reproduce and re-inscribe incidents of racism. Nakamura critiques the fundamental premise of the empathy machine model as “invit[ing] the user to confuse immersive viewing with access to the actual experience of an-other” (Nakamura, 2020, p. 54).

Queer theory has also been used by creative practitioners as an initiating theoretical provocation for developing VR experiences that expand the experiential languages of VR. Through aesthetic and interactive design choices, queer creators have challenged the norms of VR regarding avatar design, embodiment and agency (Misra, 2020; Ruberg, 2020a, 2020b). Chapter Three of this thesis, Foundations of Queer Theory, and Chapter Four, Queer Theory Applied in Digital Contexts, discuss key ideas of queer theory that are relevant when examining VR, and provide a more in-depth overview of how queer theory has been used in the tasks of critiquing and developing novel approaches to

digital technologies such as VR. As the field of VR development continues to solidify patterns for embodied and social interaction in virtual worlds, queer theory's examination of normative structures of gender and sexuality can bring a valuable perspective to critically examination of the technological-human intertwinings that virtual environments enable.

1.4.2 Research through Design and Practice-based Research

In order to further the conversation between Virtual Reality and queer theory, I have undertaken a Research through Design (RtD) inquiry that has enabled me to develop particular methods for creating queer embodied experiences for Virtual Reality. A Research through Design approach enables practice-based experimentation, testing, iterating and prototyping with the medium of Virtual Reality, using the provocations of extensive literature-based research.

This practice-based process was divided into two stages of research. First, experimentation enabled discovery of methods for working with VR, such as experience design, interaction patterns and embodiment strategies through a series of material experiments. These experiments also involved developing a workflow for designing VR in *Unity* game engine specifically, and exploring non-VR applications for aspects of this workflow. At the same time, literature-based research assisted me in grounding the general conceptual framework of this development. This extensive literature-based research and preliminary set of practice-based experiments resulted in a queer methodology for VR, which consolidated these conceptual and practical approaches to designing queer VR.

Then, based on this range of findings from my practice-based experiments as well as the literature-based research, I undertook the process of developing a prototype in order to put my findings from stage one into action. This manifestation of my findings is an interactive VR prototype: the Body Traces Archive. User testing interviews then allowed me to gather data regarding the affective and experiential qualities of this work. My findings from the development process, final outcome, and user testing are recorded and analysed within the latter chapters of this thesis. This process allowed me to refine and consolidate the methodology for queer VR.

This queer methodology for VR is one of several contributions to knowledge. It is consolidated into two parts: a conceptual framework that consists of goals of crafting queer VR, premises of queerness, and values of queer VR development. The second part, a set of practice-based approaches, identifies

properties of VR, strategies of craft for utilising these properties, and qualities of queer VR, which are the intended effects (and affects) of these strategies. This methodological structure is detailed in depth in Chapter Eight: 8.1 Queer Methodology for VR.

To reiterate the overall goals of this research, the primary purpose of this research was the development of a queer approach to designing embodied experiences for Virtual Reality. As a result of this, my work both explores the current application of queer theory to VR and related mediums and expands upon this with a novel integration of specific concepts from queer theory for designing VR. The Body Traces Archive VR prototype stands as an artefact that embodies my queer methodology, representing a unique synthesis of theoretical queer knowledge and practice-based design insights.

1.4.3 Dissertation Structure

This dissertation presents an argument for a queer approach to designing VR, laying out the necessity of this, the issues present in the medium of VR that this queer approach is primed to intervene in, and the theoretical arguments that shape its methodological justification and material contents. The process of developing the queer methodology for VR via practice is discussed to demonstrate the utility of practice-based approaches. The effectiveness of this methodology for generating novel queer VR experiences is demonstrated and assessed in depth via a discussion of the Body Traces Archive prototype and user testing processes.

This thesis consists of two overarching sections, the first detailing the historical and conceptual grounding of this project, the second providing a detailed case study of the practice-based engagements undertaken as part of this research. Section One, containing Chapter Two, Three, Four and Five acts as a contextual review. Chapter Two of this thesis presents a history of conceptualisations of embodiment in Virtual Reality to describe and contextualise the problem space the work is positioned in. Chapter Three presents a discussion of the theoretical frameworks of queer theory and how it has grounded the conceptual framework of my queer methodology for VR. Chapter Four discusses two key queer theoretical texts, how they have informed this conceptual framework, and how they—along with other queer theoretical positions—have been utilised by scholars and practitioners in design and digital media. Chapter Five discusses cyberfeminism and its utility as a similar, aligned perspective of criticality towards digital technology, and how cyberfeminist understandings are integrated into the queer methodology adopted.

Section Two of this thesis, containing Chapter Six, Seven, Eight and Nine, provides an examination of the practice-based research and its findings. Chapter Six details the Research through Design methodology and the practice-based methods used put the theoretical frameworks of queer theory and cyberfeminism into practice. Chapter Seven provides an overview of preliminary practice-based experiments that were undertaken via this RtD methodology, and discusses how these experiments have shaped the development of the queer methodology for VR as well as the final practice-based prototype, the Body Traces Archive. Chapter Eight details the final queer methodology for VR, which consolidates the conceptual framework developed via synthesis of queer and cyberfeminist literature with the practice-based approaches that were developed via RtD practice-based explorations. Chapter Eight also details the practical application of this queer methodology for VR, discussing the processes and methods applied in the development of the Body Traces Archive prototype and the findings that emerged as a result. Chapter Nine provides a detailed examination of the participant experience of the Body Traces Archive in order to evaluate the effectiveness of the queer methodology for VR, and is followed by the conclusion.

Appendix A contains the Body Traces Archive Documentation Folio, which provides a full length video and still image walkthrough of the full Body Traces Archive VR experience, as well as documentation of participants contributions. The reader is directed to examine this documentation at pertinent times.

Appendix B provides supplemental process documentation to support the analysis of practice-based work detailed in Chapters Seven and Eight. Appendix C provides the user testing data from which some of the findings of Chapter Nine were drawn. Appendix D provides the journal article “Fractured and fragmented selves: Queer approaches to designing virtual experiences” by Dr Andrew Burrell and Alexandra Chalmers Braithwaite (the researcher).

Section One: *Contextual Review*

Chapter Two:

*Histories of
Embodiment in VR*

2.1 *Queer Glimmers in VR's History*

This chapter will develop an understanding of Virtual Reality as a historically situated medium and establish the scope of this research. By looking at the general history of the development of the digital technology we now call “Virtual Reality”, we can also start to see where pertinent areas of concern for a queer approach to VR started to coalesce. We can see that artistic engagement and research into embodiment in VR during the 1990s contained what we can now recognise as queer impulses, while at the same time we can identify deeply embedded values within the medium that a queer methodology can work to challenge.

This chapter looks at Virtual Reality both as a medium and as a cultural entity. This chapter argues that it is necessary for a queer methodological approach to pay attention to how VR developed, and the interactions between subculture, technology and artistic production that shaped this development. A queer approach to VR wants to know the norms it operated in, what was subcultural or deviant from the norm, and it wants to know the fringe elements: the freakish, weird, radical and exploratory. A queer methodology for VR needs to identify historical structures of norm and deviance in the medium and consider how alternative subject construction and embodiment has shifted throughout its history, in order to find potential strategies for creating queer embodiment in the current day. It also requires examining contemporary research involving VR, and the kinds of critique that have emerged as a result.

The introduction chapter discussed the basics of Virtual Reality—such as headsets, controllers and the concept of 3D virtual environments. This chapter discusses how this particular technological arrangement has come to be and considers what in the history of VR is most useful for a contemporary queer approach to designing VR experiences. It is important to understand how the contemporary iteration of the medium has come to exist in its specific technological and cultural arrangement, since none of what VR is today is inevitable, and what it becomes in the future is also something that we can change. It is crucial for designers to understand the material and economic arrangements that we operate within, and to understand the cultural touchpoints that inflect the meaning we create with VR.

This discussion will also allow us to more clearly distinguish between VR as an assemblage of digital technologies from VR as a culturally produced concept. VR as an assemblage of digital technologies—accelerometers, screens, buttons,

Bluetooth connection, software and so on—is what enables the creation of virtual environments with particular affordances and material properties, which cohere as a defined medium for designers and developers to create with. VR as a culturally produced concept is the set of ideas we hold regarding the medium, often inflected by contexts such as science fiction and the marketing of companies that develop VR.

2.2 *Rise, Fall, and Re-emergence of VR*

What we now know as Virtual Reality or VR—in the form of digital 3D environments accessed via head mounted displays (HMDs)—has its origins in the *Sensorama* system developed and patented by Morton Hellig in 1960, as well as the *Sword Of Damocles* system developed by Ivan Sutherland at the Lincoln Lab at MIT in the late 1960s (Rheingold, 1991). The term “Virtual Reality” as a description of digital 3D environments accessed via HMDs was established by Jaron Lanier in 1986, and while there were other naming conventions, such as “virtual environments”, “virtual worlds”, “synthetic environments” used across academic, engineering and military contexts, Virtual Reality has endured as the most commonplace and recognisable descriptor (Heim, 1996).

In his key book on the topic of VR development, *The Re-emergence of Virtual Reality* (2018), Leighton Evans details the contemporary reinvigoration of interest in VR after a long period of disinterest following the dot com bubble collapse. Evans argues that the improvement of consumer-grade headset options in the 2010s have made the interactive experiences that were promised but unachievable during the peak of VR’s popularity in the 1980s and 1990s much more feasible. In her article “The Immersive Turn: Hype and Hope in the Emergence of Virtual Reality as a Nonfiction Platform”, Mandy Rose (2018) echoes Evans’ history of fluctuating popularity and describes three general waves. The first was its origins in academic and military research regarding digital head-mounted displays, such as the *Sword of Damocles* prototype in 1968; the second wave rose in the 1980s and 90s when Jaron Lanier coined the term Virtual Reality and VR seemed to be a potentially commercially viable medium; the third wave began with the launch of the Oculus headset in 2014. Denise Doyle, when discussing the applications of VR for art purposes in her article “The Two Waves of Virtual Reality in Artistic Practice” (2021), focuses on the two latter moments as the key periods where the majority of novel artistic experimentation has been possible. Doyle identifies the second “overall”

wave in the 80s and 90s as being the first moment that bespoke and non-commercial VR hardware became available to artists in limited contexts (i.e. a first wave of artistic VR); while the current third wave starting in the 2010s is characterised by commercial headsets available to both artists and the general public (i.e. a second wave of artistic engagement with VR).

It is vital in any history of VR to recognise the deep ties the technology has with military-oriented research, especially in this early period of the “rise” of VR, spanning roughly from the Sensorama in 1960 until the bursting of the dot com bubble in 2000–2002. Writing in 1996, creative technologists and VR artists Mike Goslin and Jacquelyn Ford Morie note that “to date, most of the work in virtual reality (VR) has been done for either military training or entertainment games, with a few commercial exceptions” (1996, p. 95), and they themselves worked on a VR research project for the US army. While I look predominantly to art and subcultural spaces for guidance on potential strategies for contemporary VR, this was but a subset of the wider research and development into the medium, and the militaristic origins of the medium are always nearby. In examining the history of VR, it is vital to identify the threads of resistance that existed within the dominant norm without side-stepping the way that VR is irrevocably tied to military goals in its hardware development and creative strategies, materially and aesthetically. In her book *In the Land of the Unreal*, Lisa Messeri describes how VR became a technology and medium in entertainment in Los Angeles “by way of aerospace and defense funding” (2024, p. 43), and describes how foundational VR research in the 1960s to 1980s was generally pointed towards the goal of developing simulator training tools for the US military.

2.3 Developers, Hackers, Artists & Their Bespoke Tools: The Early Era of VR Viability

During the late 80s and early 90s, VR pioneers such as Jaron Lanier, Myron Krueger, Timothy Leary and Brenda Laurel investigated and explored the broader potentials of the medium, critically engaging with contemporaneous social and technological values (Laurel, 2013). Messeri notes that the VR of the 80s and 90s was “textured ... by cyberpunk escapism and desires for bodily transcendence” (2024, p. xiii). Jaron Lanier, a well-known computer scientist, futurist and coiner of the term Virtual Reality, began the company VPL Research

in 1984. One of the first companies dedicated to Virtual Reality research and consumer products, VPL research produced early examples of surgery simulations and multi-user virtual environments (Lanier, 2010). The group of researchers and developers built their own programming language as well as their own hardware in the form of the DataGlove (shown in Figure 2-1), The EyePhone (shown in Figure 2-2), and the DataSuit.

Lanier was particularly interested in haptics and touch, with the DataGlove and DataSuit offering both tracking and haptic feedback (Doyle, 2021). Most crucially, VPL Research demonstrated the centrality of bodily immersion and embodiment to this era of artistic VR experimentation. The company developed lobster avatars as part of ongoing interest in what Lanier called “weird avatars”, as part of a wider exploration of “homuncular flexibility” (Lanier, 2017, p. 169). While a relatively simple example, this prioritising of the weird shows a particular aesthetic sensibility that is oddly lacking in contemporary mainstream messaging regarding embodiment in VR. Meta’s emphasis on bringing “accurate” legs into VR (Peters, 2022) shows a very different attitude to what the experience of occupying and performing a body should be in VR. Somewhere between the era of early experimentation and Meta’s current dominance in the field, the belief that you can use VR to be anything other than what you already are seems to have been lost.

VPL Research filed for bankruptcy in 1990, and shortly afterwards the VR was featured in the 1992 sci-fi movie *The Lawnmower Man* (Mosher, 2018). More than a fun piece of trivia, this feature of contemporaneous VR technology—already proving to be financially non-viable—in science fiction points to an ongoing and circular exchange between fictional grapplings with technology and the actual development; this will be discussed in further detail later in this chapter. In his article, “Some Aspects of California Cyberpunk” (2018), Mike Mosher points to this movie as a breakthrough moment for the visualisation and depiction of VR for mainstream audiences, while also pointing out that the narrative of VR usage is sexist and hyper-masculine, missing the opportunity “to visualise techno-feminist experience as a realm of progress and fulfilment” (Mosher, 2018, p. 7). Here we can already see the interrelation of gendered norms and VR imaginaries in the mainstream, even as the fledgling industry—and its seeds of experimental, expansive approaches—wobbled and pitched off-course.

While VPL research did not successfully survive the transition into the 1990s, other artists and developers continued to explore the potentials of the medium, with an ongoing focus on expansive, alternative performances of embodiment in virtual environments. Brenda Laurel, the author of highly



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Figure 2-1

VPL Research DataGlove

Note. From VPL Research DataGlove [Photograph], by VPL Research, 1987, TECHNÈS Encyclopedia Database (<https://encyclo-technes.org/en/base/98841s/4992>).



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Figure 2-2

VPL Research EyePhone and DataGlove

Note. From *VPL Research EyePhone* [Photograph], by J. Reinking, 1999, TECHNÈS Encyclopedia Database (<https://encyclo-technes.org/en/base/60195x/4998>).

influential *Computers as Theatre*, first published in 1991 with a second edition released in 2013, was particularly involved in artistic experimentation with VR. In Laurel's collaborative VR project, *Placeholder* (1993), participants in the virtual environment embodied crows, spiders, fish, and snakes as part of a critical engagement with "gestural languages" and the "body politics" (Laurel & Strickland, 1994, pp. 123, 125) of Virtual Reality.

Placeholder (1993) was developed as part of the Art and Virtual Environments project at Banff Centre Canada, which funded nine VR artworks (Doyle, 2021). The work was based on locations in the area, and collaboration with a local improvisational theatre company was used to develop the narrative and performance elements. In their 1994 article, "PLACEHOLDER: Landscape and Narrative in Virtual Environments", Laurel and Strickland provide an account of the practical and creative decisions made throughout the development process. The tracking system they used was customised for this project, using sensors strapped to the participants' hips to determine what direction they would move in, rather than the head-based movement that was common at the time. This allowed participants to look around independently in multiple directions as they moved. They also made their own "Grippee" (Laurel & Strickland, 1994, p. 123) hand controllers for recognising grasping movements, rather than collecting unnecessary movement tracking information, which led to minimal visual representation of hand location within the virtual environment. In this work (seen in Figure 2-3 to Figure 2-6) and others from the same time, we can see that ad-hoc, customised approaches to the technological assemblage that constituted the Virtual Reality system allowed for explorative, expansive visual and experiential designs.

Looking at this example for its approach to embodiment goes beyond simply recognising that participant avatars took the shapes of animals rather than humans. What was more key was the performance required of each participant, and the way that particular movement patterns were encouraged and facilitated by the animal appearance of the avatars. In their reflections Laurel and Strickland emphasise the importance of the participant meeting the avatar before becoming the avatar. They explain that

a not-so-obvious goal was to make humans aware of being embodied by inducing them to intentionally enter the body of a critter. We did not want the body in the virtual world to be taken for granted, and we did want to explore the idea of how places look and feel different to different kinds of beings. (Laurel & Strickland, 1994, p. 124)

In this, we see that there were a few outlier VR projects that were highly concerned with how avatars shaped participants' experiences in a virtual



Figure 2-3

Placeholder (1993) Virtual Reality Experience Exhibition Space

Note. Screenshot adapted from documentation footage, *PLACEHOLDER (1993)* [Video], by R. Strickland, 2011, Vimeo (<https://vimeo.com/27344103>).

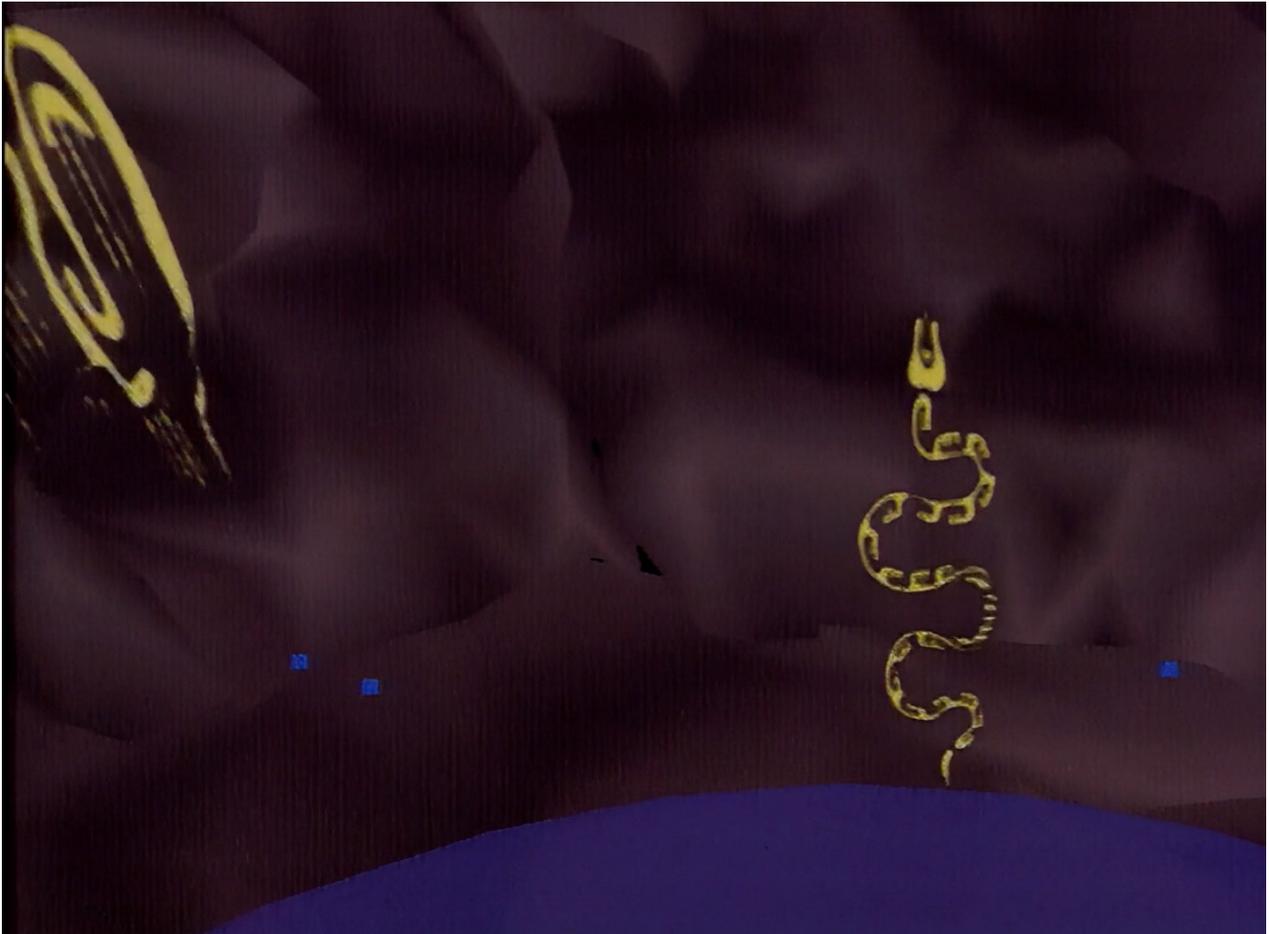


Figure 2-4

Placeholder (1993) *Virtual Reality Experience*, captured from inside *Virtual Reality*

Note. Screenshot adapted from documentation footage, *PLACEHOLDER (1993)* [Video], by R. Strickland, 2011, Vimeo (<https://vimeo.com/27344103>).



Figure 2-5

Participant using VR headset and custom controllers within Placeholder (1993)

Note. Screenshot adapted from documentation footage, *PLACEHOLDER (1993)* [Video], by R. Strickland, 2011, Vimeo (<https://vimeo.com/27344103>).



Figure 2-6

Placeholder (1993) *Virtual Reality Experience*, characters from the virtual environment

Note. Screenshot adapted from documentation footage, *PLACEHOLDER (1993)* [Video], by R. Strickland, 2011, Vimeo (<https://vimeo.com/27344103>).

environment, and furthermore, how the design and unfolding of the experience in the virtual environment enabled a critical relationship between participant and avatar that caused reflection upon the nature of subjecthood and embodiment.

In the same artistic program at Banff Centre was the project *Dancing with the Virtual Dervish: Virtual Bodies* (1994), which featured interactive performances with dancers and participants in VR. The work features large skeleton models and screens within the virtual environment showing recordings of dance performances, as seen in Figure 2-7 and Figure 2-8.

Embodiment as a process—as well as the body as a material and as a concept—was clearly a focus point for artistic experimentation when exploring what was, at that point, a relatively novel and inaccessible digital medium. The artists themselves described how in the work, “the virtual body thus becomes an immersive, non-linear book, a text to be read, an architecture to be inhabited” (Gromala and Sharir, as cited in Dixon, 2006, p. 36, as cited in Doyle, 2021, p. 5). We also see here the emerging idea of embodiment as an unstable, changeable, “non-linear” process that exists across and through physical and virtual environments. While not explicitly identified as a queer creative position at the time, in both projects we can see a distinct compatibility with queer understandings of the performativity of gender and sexuality that were emerging contemporaneously in feminist philosophy (Butler, 2006). In drawing this connection, I am not trying to argue that performance and performativity are synonyms. However, in both projects, attention to embodied performance leads to a perspective that aligns with a performative understanding of subject formation and identity.

In the chapter “The Design of Virtual Reality”, author Michael Heim recounts his experience of *Dancing with the Virtual Dervish* (1994), in which he stayed within the virtual environment for three hours straight. He describes what he calls “Alternate World Syndrome”:

Alternate World Syndrome (AWS) is an acute form of body amnesia which can become chronic Alternate World Disorder (AWD). Frequent virtuality can lead to ruptures of the kinesthetic from the visual senses of self-identity, a complaint we already know from simulator sickness and from high-stress, techno-centred lifestyles. AWS mixes images and expectations from an alternate world so as to distort our perceptions of the current world, making us prone to errors in mismatched contexts. The virtual world obtrudes upon our activities in the primary world, and vice versa. The responses ingrained in the one world get

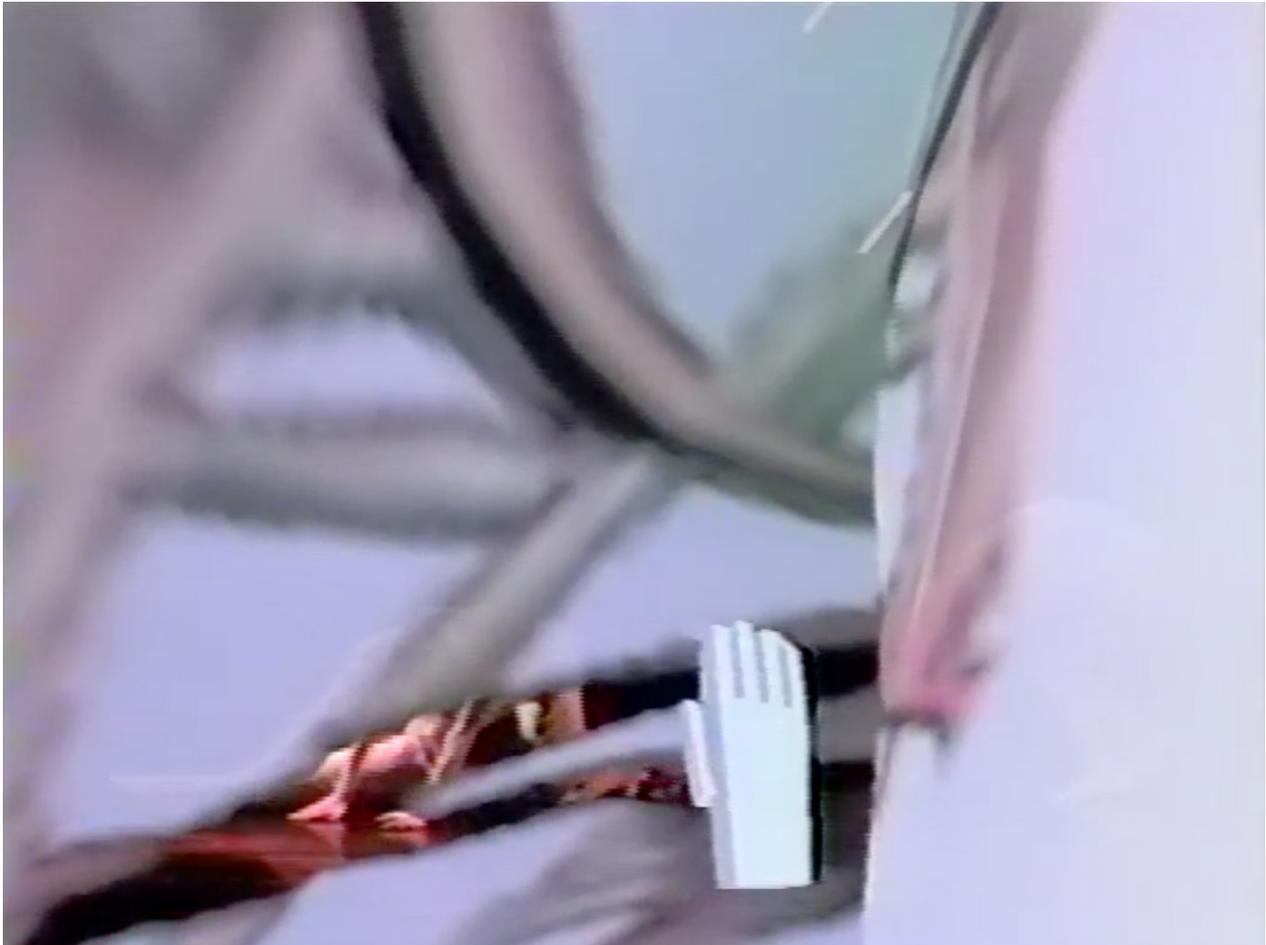


Figure 2-7

View from within Dancing with the Virtual Dervish (1994) Virtual Reality Experience, showing virtual hand of participant

Note. Screenshot adapted from documentation footage, *Dancing with the Virtual Dervish: Virtual Bodies—Virtual Body: Dances Within; April 1994* [Video], by Y. Sharir, D. Gromala, 1994, The University of Texas at Austin Texas ScholarWorks (<https://repositories.lib.utexas.edu/items/cd3c572b-1657-4be6-8dd0-dfb52d9d945f>).



Figure 2-8

View from within Dancing with the Virtual Dervish (1994) Virtual Reality Experience, showing layering of footage of physical performance and digitally generated visuals

Note. Screenshot adapted from documentation footage, *Dancing with the Virtual Dervish: Virtual Bodies—Virtual Body: Dances Within; April 1994* [Video], by Y. Sharir, D. Gromala, 1994, The University of Texas at Austin Texas ScholarWorks (<https://repositories.lib.utexas.edu/items/cd3c572b-1657-4be6-8dd0-dfb52d9d945f>).

out of synch with the other. AWS shows the human being merging, yet still out of phase, with the machine. ... The AWS lag occurs between the virtual body and the biological body. The lag comes not from asynchronous interruptions within the virtual experience but from the sequential switching between worlds. A conflict of attention, not unlike jet lag, arises between the cyberbody and the biobody. (Heim, 1996, p. 67)

This relatively contemporaneous first-hand account of the effects of this VR experience is immensely valuable, as is the analytic move that we can see. Heim chooses to use a medical vocabulary, pathologising the affective changes brought about by the experience and labelling it a “syndrome”. In contrast, I would like to point to this conflict of attention, out-of-synchness, world-mixing, and ruptures in self-knowledge via the layering of virtual and physical as a key queer quality of VR, in which the straightness of here and there, the normative binary split between cyber- and bio- are disrupted in a potent mixing that up-ends the participant’s sense of normality—that creates a sense of “body amnesia” in which new possibilities can be considered.

Char Davies’ highly influential interactive VR artwork *Osmose* (1995) (seen in Figure 2-9 and Figure 2-10) further demonstrates the centrality of the body to early artistic VR experimentation. In the work, participants were given a custom harness that monitored their breathing, and the system then used this information to pilot the participant through the virtual environment that was shown to them in the headset—breathing in steered people upwards, while breathing out steered downwards (Doyle, 2021). Reflecting on the novel technological assemblage that brought embodied experience into a virtual environment, Davies stated,

I believe that it is only through the body, through body-centred interfaces (rather than devices manipulated at arm’s length) that we can truly access this space and explore its potential. Such emphasis on the body’s essential role in immersive virtual space may be inherently female. (Davies, 1998, as cited in Doyle, 2021, p. 12)

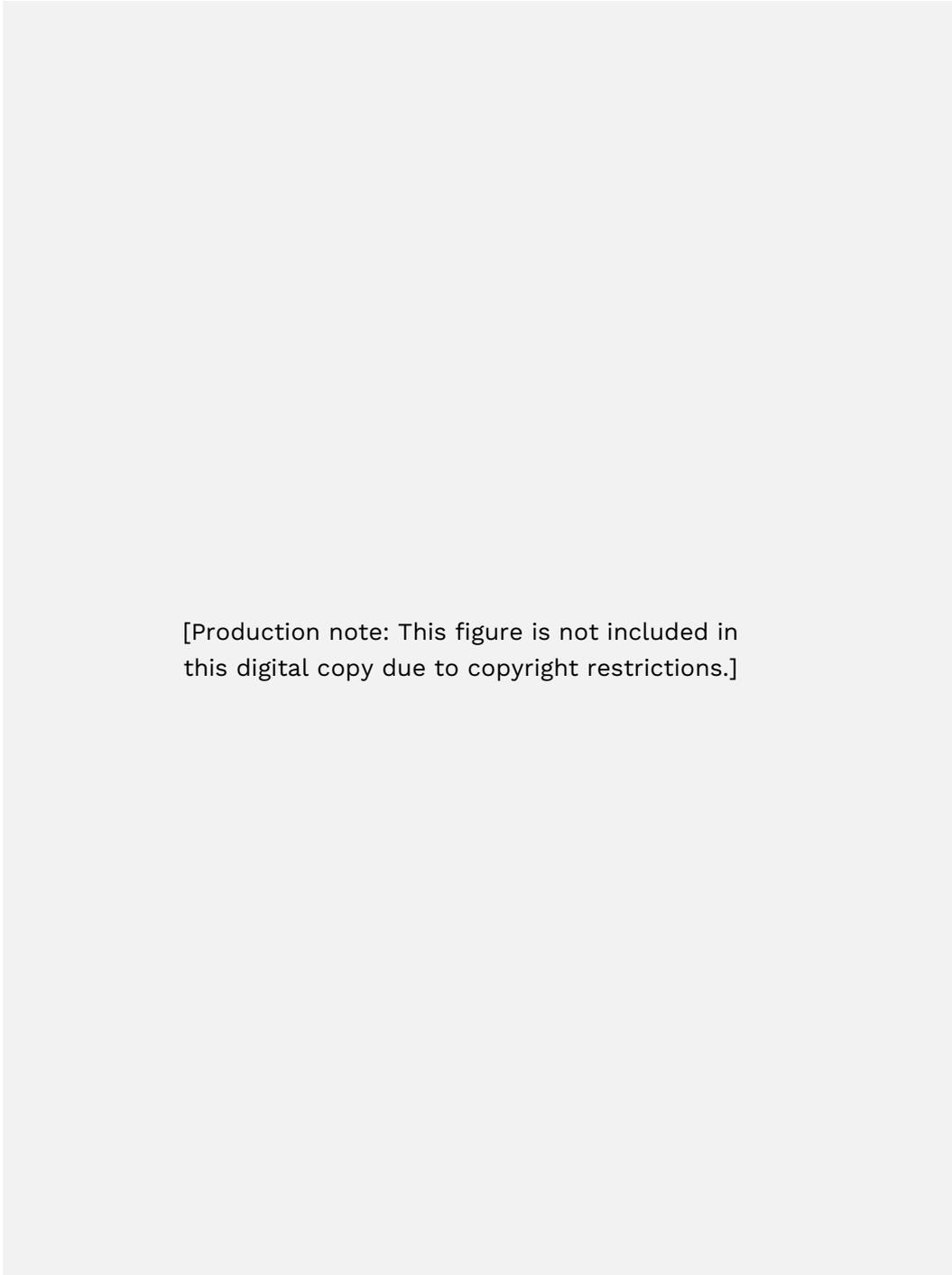
In her own history of VR, Messeri notes that “women, unsurprisingly, have been scrubbed from vr’s history” (2024, p. 170). While not a deliberate curatorial choice to begin with, it is notable that the key examples I have drawn out in this section as unusual, playful, meaningful explorations of embodiment in early VR were all designed by, or in partnership with women—which is certainly not true of all VR (historical or contemporary). In both my own investigations and in Char Davies’ own account, we can recognise some kind of compatibility



Figure 2-9

View from within Osmose (1995) Virtual Reality Experience

Note. Image is captured from first person perspective from within Osmose VR Experience. From *Tree from Osmose* [Still image capture from within VR], by C. Davies, 1995, Immersence, https://www.immersence.com/osmose/os_tree.html.



[Production note: This figure is not included in this digital copy due to copyright restrictions.]

Figure 2-10

Photo of immersant (Char Davies' term for a VR participant) experiencing Osmose (1995)

Note. Image from Osmose VR experience installation. From Osmose *Immersant* [Photograph], by Immersence Inc, 1995, Immersence (https://www.immersence.com/osmose/os_screenshadow.html).

of VR with a feminist program for working with digital technologies. There is a risk, however, that this could be read as a kind of gender essentialism that my own queer principles prioritise disrupting.

Rather than arguing for an inherent or essential quality of femininity to the medium of VR, I would instead like to acknowledge this recognised compatibility with slightly more separation between VR and womanhood. I want to claim here that a queer, cyberfeminist methodology can use the qualities of VR—immersive, non-linear, embodied—to materialise anti-normative experiences. This does not mean that these particular qualities need to be understood solely as feminine in order to be useful.

Clarifying an anti-essentialist position is important, as Lisa Messeri, in her in-depth research into VR communities in LA in recent years, notes that contemporary industrial discussions concerned with social equality can position women as “natural leaders”. Messeri cautions that this may be a strategic error, as “essentializing difference naturalizes inequality” (Messeri, 2024, p. 177). In a contemporary context, Messeri suggests that a xenofeminist approach—coined by Helen Hester and the Laboria Cuboniks collective, building on cyberfeminist praxis—may be a way forward for a contemporary VR context that is often unaware of cyberfeminist histories (Messeri, 2024). Messeri argues that:

Rather than either essentializing gender or denying gender (as some cyborg approaches do), xenofeminism leans into the ways biology shapes embodiment. It does, however, reject the fixity of both biology and embodiment. The body is a site of technopolitical intervention through its reworking. (2024, p. 177)

Chapter Five presents an examination of cyberfeminism and its theoretical and practice-based engagements, as well as a discussion of cyberfeminism’s relevancy for a contemporary queer methodology for VR. Chapter Five thereby works to address this lacuna of knowledge regarding cyberfeminism in a contemporary VR context that has been pointed out by Messeri.

While each of these examples of early VR experiences are solidly located in an arts context, we can see broader implications for a design and creative practice with VR in general. New media art practices at the time are aligned with what we could now call a design research, critical design or practice-led research approach. Each of these projects involved key questions regarding interface, narrative, and performance, and used experimentation and creative practice to begin to offer new ways to understand this emergent-at-the-time medium. Each project recognised the compatibility of VR with critical investigations of

the body and embodiment, and the developmental landscape of VR at the time meant that creating their own novel interfaces was practical and necessary. Each artist or developer recognised embodiment as an essential factor, not just in the storytelling or immersion within the virtual environment, but also for the political and philosophical existence of VR as a cultural medium. The varied experimentality around body and interface was in part enabled by the lack of existing commercial headset and lack of normative accepted rules downstream of any existing mainstream VR use. For a contemporary queer approach to embodiment in VR, these are important precedents that illustrate the potential of the medium, while also providing guidance for the queer methodology for VR that sits at the heart of this project.

This mid-nineties era was essentially the peak for artistic VR experimentation. Lanier's VPL Company had already filed for bankruptcy in 1990 and attempts at consumer products like the Nintendo Virtual Boy were not successful. In the *Re-emergence of Virtual Reality*, Leighton Evans states that "at the core of the failure of VR to become a mass market medium in the 1990s was [the] lack of fit between the expectations (and discourses) of VR and what was on offer" (2018, p. 31). While artists were able to further the medium with one-off projects, the lack of viability as a commercial, consumer project ultimately led to its recession from public and artistic interest.

There is certainly a risk in over-valuing what came before and relying on nostalgia. As discussed in the introduction to this section, the majority of early VR development from the 1960s to the 1990s was shaped by research funding prioritising outcomes for military purposes, greatly at odds with my own goals for a queer form of VR. However, examining key examples from alternative artistic practices during this period allows us to see how weirdness was able to flourish, if only for a short while. This history of experimental moments in artistic VR orients a queer approach to VR by setting the scope, providing a set of concerns, and suggesting principles and strategies from early critical practice that can be deployed when designing our own contemporary queer VR experiences.

2.3.1 Cultural Values During the Rise: Cyberspace Sci-fi, Cyberpunk and Posthumanist Ideals

The developmental landscape of VR in the 1980s and 1990s was drastically shaped by its own presence in cultural media: the concept of VR, as a headset that enabled individuals to visit a digital place of otherness, featured strongly in

science fiction literature and cinema well before headsets were commercially available. Science fiction author William Gibson coined the term “cyberspace” in his iconic cyberpunk novel *Neuromancer* in 1983, and fictional depictions such as these were not only responses to pre-existing technology: they also influenced what came into existence. In *How We Became Posthuman: Virtual Bodies in Cybernetics*, literature and informatics scholar N. Katherine Hayles notes that “William Gibson’s vision of cyberspace had a considerable effect on the development of three-dimensional virtual reality imaging software” (1999, p. 21). In their article, “Imagining Feminist Futures on the Small Screen: Inclusion and Care in VR Fictions”, Lisa Messeri and Marisa Brandt observe that:

SF [science fiction] has always mediated VR, creating a hall of mirrors when studying the worlds that VR creates and inhabits. Today’s VR innovators narrate their field through a mix of fictive and historical touchstones, centred on the tales of male progenitors. (Brandt & Messeri, 2019, p. 2)

Outside of fiction, community publications developed discourses surrounding the potential uses and properties of Virtual Reality. *Mondo 2000*, a cyberculture magazine that became the locus of cyberpunk subcultures, prioritised posthumanist ideas of freedom, biohacking, and experimental consciousness (Mosher, 2018). It covered VR closely and featured writers such as Jaron Lanier, Howard Rheingold, Timothy Leary and other key figures of radical engagement with emergent digital technologies. Other magazines such as the *Whole Earth Catalogue* and early online communities also allowed for the development of communities around these subcultural lines. In the cultural landscape of the 80s and 90s, VR was a medium and technology solidly associated with counter-culture movements; this is relevant to consider in comparison to the contemporary situation, where VR development is primarily being funded and supported by dominant corporations such as Meta, which are well and truly mainstream within contemporary culture.

The dominant understanding of VR during this period was driven by the “idea of VR as a transcendent technology of the near future” (Evans, 2018, p. 29). VR was understood as an independent, liberatory utopian finale, a materialisation of Gibson’s as-yet only literary cyberspace. But what was so alluring about the promise of cyberspace made “real”?

In her book *Updating to Remain the Same: Habitual New Media*, Wendy Chun identifies “freedom and anonymity” (2016, p. 104) as the central promises of cyberspace. In her framing, the internet was seen as the manifestation of these ideals. She notes that Gibson’s characters were “elite marauding

console cowboys [who] disdainfully referred to their bodies as meat” and that the internet was perceived as a “bodiless public” (Chun, 2016, pp. 104, 106) that could be a utopia free from racism because it was free of raced bodies (as opposed to being free of racist behaviours or racist individuals). Chun argues that this utopian understanding of the internet was greatly at odds with the actualities of the internet: “This notion of the Internet as a medium of the mind, in which body and soul, physical and mental location, could be separated, relied on a very odd understanding of the Internet—one that ignores the actual operations” (Chun, 2016, p. 106).

This points to a fundamental tension in the discourses surrounding cyberspace and VR in this time: there is a deep prioritising of disembodiment via the hope of escape into pure information, while at the same time, an inarguable link to staying with the body through altered experiences of embodiment and bodily modification. For a contemporary queer methodology for VR, the goal is not to disdain the body as meat, or to transcend the body via soul-upload into a perfect digital heaven. Instead, a queer position stays with the bodily experience of VR, the “Alternate World Syndrome” of experiencing laggy, glitchy, multiple world-layerings that are inescapably material in their production. *Staying with the body*—not escaping it—is how queer experiences can be created for VR.

2.4 *The VR Recession of the New Millennium*

While VR may have been appropriate for art projects and specialised installations during the 1990s, there was a lack of actual use cases for everyday users and consumers. As Evans notes, “the early period of VR was characterised by a vision that was far ahead of the technological possibilities of the time” (2018, p. 6). The technologies of VR—headset screens, motion sensors, real time digital simulation and 3D rendering—were unable to improve and be comfortable and accessible for a wide consumer base. Early VR remained expensive, impractical for long periods of use, and insufficient in visual quality for the immersion that was expected (Evans, 2018; Saker & Frith, 2020). These expectations that could not be met had been generated, as previously discussed, by non-VR media: movies, novels, technologists and developers themselves in their excited and expansive approach to describing the possibilities of the medium.

The failure of VR to “catch up” to the vision was part of the eventual abandonment of the medium, especially in the wider context of the dot com bust of the early 2000s. Brenda Laurel, one of the previous artists mentioned, noted the drastic impact of the 2000s bust for more experimental avenues like VR (Laurel, 2013). With the technology unable to deliver within the “vision” of VR, VR was reliant on its reputation as a visionary, future-oriented medium that encapsulated the ideals of cyberspace speculation. With the economic failure of the dot com bubble and greater scrutiny for the promises of digital technology speculation, VR’s lack of actual utility became much more obviously a failure. Desktops with keyboard, mice and screen won out over VR as the most financially accessible and, at that point, useful everyday interface point for what was emerging as “the internet”. Desktop-based online platforms such as Second Life (launched in 2003) where users could create avatars and interact socially in synchronous shared 3D environments—a kind of “virtual world” (Wolf, 2017, p. 192)—became the new mainstream vehicle for conceptualising cyberspace.

2.5 *Contemporary Resurgence*

There have been significant changes in the landscape of consumer digital technologies since the popularity of VR in the 1990s. Video games have become a financial and cultural juggernaut, the internet has become accessible via hand-held phones, and social media companies have matured into leaders of the digital technology industry, with drastic cultural and political impacts.

The contemporary resurgence of VR has been driven by a number of different facets of contemporary “digital tech” culture—with mobile phone developers such as Samsung releasing headsets compatible with their phones and video game companies such as Valve and Playstation collaborating or developing their own headsets. The HTC Vive headset, produced by HTC Corporation in collaboration with video game company Valve, was released in 2015, and independent startup Oculus Rift’s first head-mounted display product shipped in 2013. Meta, a social media company best known for Facebook and their acquisition of Instagram, acquired the Oculus Rift headset company in 2014 (Egliston & Carter, 2022) to kick start their own development of what would become the current Meta Quest headsets. Meta’s ascension to financial and cultural leader of digital technologies and services has been a key factor in the reinvigoration of VR, but VR has also generally experienced a well-funded period in the spotlight of Silicon Valley techno-futurist entrepreneurship (Egliston & Carter, 2022; Evans, 2018) after investment and interest began to take off again

in the early 2010s. The mid 2010s era of VR was defined by an understanding of VR as an “empathy machine”, as a way to access the experiences of others, and “by the end of 2015 this zeitgeist had permeated the community, popular discourse, and much of the early critical academic reactions to today’s vr” (Messeri, 2024, p. 123). By 2018, Messeri argues, the over-simplified jingoistic claims of VR as a world-changing empathy creator were already wearing out their welcome. By the 2020s, the framing had fallen out of favour amongst industry leaders, and Meta—along with other key players in the consumer digital technology sphere such as Microsoft and Riot Games—instead pivoted to a “Metaverse” conceptualisation, a contemporary re-imagining of cyberspace that emphasises cross-platform compatibility for maximum profit extraction and corporate control (Carter & Egliston, 2024). VR was no longer a short, one-off transformative experience (as in the empathy model), but was to be promoted as an everyday, ubiquitous technology (Egliston & Carter, 2022).

More recently, Apple has released their “spatial computing” headset, which is more aligned with a mixed reality framework, allowing users to blend between fully virtual and overlaid augmented reality. However, Lisa Messeri argues that it is best understood in tandem with Meta’s Quest product:

Though Apple might wish for its product to be distinct and distant from Meta’s, both converge on integrated virtual and physical worlds, where the screen is no longer in our pocket or on our wrist, but attached to our face and made essential (should these companies achieve their fantasies) for accessing the world as it might be. (Messeri, 2024, p. 203)

Leighton Evans’ (2018) account of the boom of the late 1980s and early 1990s era followed by bust and then contemporary resurgence is particularly useful for considering what else has changed ideologically and economically over that time, reconfiguring how VR is produced and received by potential audiences in a contemporary context. VR development in the first wave featured a subset of promising countercultural artists appropriating military technologies for their own innovative goals. Now it is now led by venture capitalists solidly located within the mainstream, with much more powerful computing and data collection embedded within the technological interfaces and digital programs that users engage with. In this contemporary context, there is a significant need to consider how technologies such as VR—and their design and deployment to wider audience—reify normative social values with minimal criticality (Egliston & Carter, 2022). In our contemporary environment, we have Meta and other similar technology corporations, driven by corporate interests in data collection and platform capitalism (Dare, 2020; Evans, 2018). Meta appears to be operating within their “social media” profit model of making money via

harvesting data and selling advertising space. Whether this is a sustainable model for Meta's future or not, the intent seems to be for their VR offerings to slot into this (Carter & Egliston, 2021; Dare, 2020).

Evans argues, "VR applications, systems, platforms and hardware are the products of design principles and organisations that have ideological and political character that will shape the form of the VR worlds being made" (Evans, 2018, p. 5). Coming from Silicon Valley industries steeped in dominant problematic social values regarding gender and race (Levina & Hasinoff, 2017), contemporary Virtual Reality technologies and experiences have the potential to transcribe and reinforce damaging and exploitative political and social structures into this emergent medium. Meta drastically dominates the current VR hardware landscape, and therefore also dominates the software environment via their operating system and the curatorial control they exert over what apps can be installed on the headset. This hardware-software configuration means that Meta currently enjoys a hegemonic ability to define the norms of how VR is used to access 3D virtual environments, and how sociality, identity and interaction work in that space.

2.5.1 Contemporary Research Perspectives on VR in HCI

In academic spaces, VR scholarship tends to focus on taking a media studies approach to analysing cinematic (non-interactive) VR, or working within human computer interaction (HCI) design, under the aegis of IT and engineering. HCI has been particularly effective at testing tools and interactions with instrumentalist approaches that focus on functionality, conducting practical investigations of the utility of interface strategies and other similar construction considerations (Boletsis et al., 2017). However, there is a significant need for critical attention beyond instrumentalist research. The most relevant findings from HCI for the field of avatar design for VR have been a set of key ideas such as social presence (Oh et al., 2018), sense of embodiment (Fribourg et al., 2020; Kiltani et al., 2012) and body ownership illusion (Banakou et al., 2013; Slater et al., 2010). HCI has also produced a limited range of research into the effects of embodying difference such as race, gender, or sexuality via VR; one example looks at how the experience of being embodied as a different race within VR affects perceptions once outside Virtual Reality afterwards (Kiltani et al., 2013).

This approach to directly embodying the physical characteristics of disenfranchised or marginalised identities to achieve supposed empathy can

be understood as part of the general VR design ethos that values an “empathy” model for VR (Dare, 2020; Ruberg, 2020a) where experiencing a short virtual experience is intended to—but likely fails to—provide meaningful insight into the complex experiences of others. This simplified approach to social justice and VR has been examined for its political potential (Ceuterick & Ingraham, 2021) as well as heavily criticised for the lack of critical engagement with wider fields of social analysis (Nakamura, 2020; Ramirez et al., 2021; Ruberg, 2020a). From a queer perspective, prominent games studies and interactive media scholar, Bo Ruberg, has pointed out that this is an oversimplified understanding of why marginalised creators craft digital experiences such as VR. Ruberg proposes a more complex understanding of the affective qualities of VR (Ruberg, 2020a, 2020b). This is discussed in more depth in the following chapters, but I raise it here to point to the crucial need for further research and critique regarding the interplay of embodiment and marginalised experiences in Virtual Reality, and what it means to bring a marginalised perspective (in the case of my research, a queer perspective) into Virtual Reality for an audience to experience. The approaches of HCI for prototyping and manifesting political meaning with embodiment in VR have received a strong critical response from scholars working with social and political theory. This indicates that the current models within HCI for engaging with marginalised experiences in VR are insufficient, and that there is significant need for the cultivation of stronger and more rigorous engagements with social theory. While my own RtD inquiry is not centred in HCI approaches, my inquiry offers a contribution that enriches these ongoing conversations regarding embodied experiences in VR via the application of queer theory.

In general, research in the HCI field presents a problematic lack of interest in considering the ethical implications of VR. One valuable contribution to the topic is “Real Virtuality: A Code of Ethical Conduct. Recommendations for Good Scientific Practice and the Consumers of VR-Technology” (Madary & Metzinger, 2016). This article discusses research ethics for VR, as well as ethical considerations for usage by the general public. They note that “the comprehensive character of VR plus the potential for the global control of experiential content introduces opportunities for new and especially powerful forms of both mental and behavioral manipulation” (Madary & Metzinger, 2016, p. 5). They provide a clear outline of principles that should guide the conduct of research with VR, with consideration of how the specific affordances and qualities of VR differ from other screen-based media. While discussing the risks associated with VR, they observe that VR would

have obvious military applications in training soldiers to have less empathy for enemy combatants, to feel no remorse about doing

violence. We will not go further into the difficult issues regarding the use of new technology in warfare, but we note this possible alternative application of the technology. (Madary & Metzinger, 2016, p. 10)

While valuable that they raise this concern, their lack of in-depth consideration of the matter shows a notable shortfall in how VR research handles ethical quandaries; they are not the only researchers to raise and then avoid such a discussion. In a similar article titled “The Ethics of Realism in Virtual and Augmented Reality”, by a collection of prominent researchers in VR associated with various universities and corporations such as Magic Leap and Facebook (Slater et al., 2020), the authors divest themselves of responsibility for the history of the medium, including its military uses. They acknowledge that VR is used widely in a range of sensitive deployments, such as treatment in physical and mental health therapies, rehabilitation, and training “in several areas including military, medicine, surgery, and disaster response” (Slater et al., 2020, p. 1). They also acknowledge that contemporary military operations involve technologies of telepresence that are similar to VR, with an interface allowing an operator to fire drone strikes from a safe distance. While Madary and Metzinger at least allow that the military use of VR is an ethical issue for the medium (even if they do not discuss it at length), Slater et al. argue that in this situation, VR “is used solely as an interface” (Slater et al., 2020, p. 6). The authors then distance the problem from the medium of VR by asking, “is this an ethical problem intrinsic to VR itself?” (Slater et al., 2020, p. 6).

In “Technologies of Experience: Harun Farocki’s *Serious Games* and Military Aesthetics” (2017), Anders Engberg-Pedersen gives an introduction to Harun Farocki’s long term engagement with and investigation of military training technology, especially in the form of critical engagement with military-developed “VR war games” (Engberg-Pedersen, 2017, p. 156). Farocki examined these VR war games in the video work *Serious Games: Immersion III* (2009), shown in Figure 2-11. Engberg-Pedersen gives an overview of the interrelations between entertainment and military industries, and then turns to an examination of the “affective and sensory management” achieved by implementing VR simulations for would-be and returning soldiers, in which repeated use of specially designed VR “configures and trains its users to see and sense the world in a certain way” (Engberg-Pedersen, 2017, pp. 160, 165). Rather than aiming to create a hyper-realistic reconstruction of wartime experiences, instead, the games provide a simplified rubric of engagement that provide “a fixed configuration of the world, a tactical, militarized way of seeing, feeling and acting” that “make the awful reality of war less real” (Engberg-Pedersen, 2017, pp. 170, 168).

Engberg-Pedersen identifies three qualities of the VR simulation that work to naturalize this embodied orientation towards the world:

First, the VR simulation is based not on the past but on future expectations. It borrows from a series of imagined futures[,] things *not* experienced, things *not* seen, and reflections *not* had. And these imagined futures are then realized by the simulation to generate actual behavioral patterns. ... Second, the VR simulation is based on compression. It performs a condensation of a variable set of possible experiences. ... Third, the VR simulation is based on repetition. Not only are future missions replayed over and over; ideally, the experience of actual events will be a repetition of the simulation. (Engberg-Pedersen, 2017, p. 171, emphasis in original)

Engberg-Pedersen then examines Farocki's strategies in his installation series for unearthing and examining the dynamics of normalisation at play. In his video works, Farocki juxtaposes images of interface, game design, and soldiers undertaking training, and Engberg-Pedersen describes the affective experience for a viewer as a "sense of disorientation and uncertainty" (Engberg-Pedersen,

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Figure 2-11

Still image diptych from Serious Games III: Immersion showing a simplistic rendering of a sunset over a road in a desert landscape on the left, and a person in military fatigues wearing a stereoscopic headset and headphones

Note. Image is a still from *Serious Games III: Immersion* [Video], by H. Farocki, 2009, Ludwig Museum (<https://www.ludwigmuseum.hu/en/work/serious-games-iii-immersion>).

2017, p. 174). These aesthetic and affective qualities—that I later describe as potential strategies within VR for a queer methodology—are presented as oppositional to the militaristic VR program.

By presenting their analysis of Farocki's work, Engberg-Pedersen answers the question of whether the use of VR for military purposes is an ethical problem intrinsic to VR with a resounding yes, making it clear that VR is never “solely interface” but instead, always an imbricated technology that carries its material histories in its formal qualities and affordances. Every iteration of VR carries its history of entanglement with military research funding, and its cultural usage to desensitise and mould participants' engagement with warfare. The formal qualities of immersion that allow VR to create potent queer landscapes of potentiality are also what make it effective for military training. It is not solely the purpose it is put to that requires ethical consideration, but the fact that VR is, indeed, so effective at “affective and sensory management” (Engberg-Pedersen, 2017, p. 160) due to its immersive qualities. My argument is that a queer methodology for VR should not dismiss this question of the ethics of the medium or rely on simplistic models where we can put an audience into (disenfranchised, marginalised) shoes, as in the empathy model. Instead, a queer methodology for VR must sit with the uneasy fact that the same headset used for a queer virtual utopia can be used for video games that recreate military missions for entertainment purposes or may be used for military purposes itself. A queer methodology stakes a claim that the immersive properties of VR are immutably ethically inflected, and that therefore it is crucial to work to create experiences that can destabilise and disrupt normative conceptions of the utility of VR, and instead make possible alternative, queerer worlds and ways of being for both participants in VR and creators of VR.

2.5.2 Contemporary Social Imaginaries of VR

In the current contemporary landscape, VR remains a culturally mediated technology, with its use defined as much by the stories we tell about it as what we experience with it. Meta's rebrand and focusing on the idea of “the Metaverse” draws from science fiction in a similar way to Gibson's “cyberspace” previously. In Neal Stephenson's novel *Snow Crash* (1992), “the Metaverse” is a singular networked, publicly accessible Virtual Reality system situated amongst a wider network of exploitative techno-capitalist infrastructures. The usage of science fiction terminology in the 1990s and now in the 2020s reflects a broader interrelationship between science fiction and technology development,

in which the ideas of both inform and shape each other (Brandt & Messeri, 2019; Lanier, 2017; Muri, 2003).

Throughout its more pragmatic technological developments and improvements, VR has served as an ideological ground for this negotiation back and forth between fiction and actuality, important for its cultural role as a representation of internet-embeddedness and full digital immersion. Lisa Messeri and Marissa Brandt's recent analysis of the social imaginaries of VR presented by contemporary science fiction television productions (Brandt & Messeri, 2019) notes the role of science fiction in mediating everyday understandings of emergent digital technologies, and furthermore, the role of counternarratives in opening up other possibilities. In their history VR development and fictional depictions of VR, it is clear that VR is potent both for the viable future quotidian uses it offers as well as what it represents as an idealised (or demonised) future digital cyberspace.

In their article "Oculus Imaginaries: The Promises and Perils of Facebook's Virtual Reality", Eglison and Carter give an account of what they call "the Oculus imaginary" (Eglison & Carter, 2022, p. 71), examining the socio-technological values and potential VR futures communicated by then-Facebook's acquisition and management of the Oculus hardware and brand (which is now called the Meta Quest line of headsets). Eglison and Carter identify the concept of VR as a form of social media as key to Meta's framing of their development of VR, with emphasis on VR as a quotidian, integrated element of everyday life, facilitating connection between users.

This range of analysis from Messeri & Brandt and Eglison & Carter is essential critical work for examining what kinds of manifestations of VR are encouraged, enabled and made possible both through technological development as well as through the shaping of broader cultural understandings of what VR can be. It shows how development in VR is highly contingent on wider shifting commercial contexts in digital technology development such as corporate interest and funding, business models and emergent entertainment markets. Furthermore, development in VR is also shaped by cultural attitudes and social values regarding VR that are in turn demonstrated in, and informed by, media representations of VR (Brandt & Messeri, 2019; Eglison & Carter, 2022).

Early Covid-19 pandemic lockdowns experienced locally in Australia as well as in places such as the USA led to mass shifts towards online learning and working from home. Teleconferencing with desktop platforms such as Zoom became everyday experiences. Putting on a VR headset, however, did not. Despite widespread potential use cases, Meta's early efforts at generating a

new audience for VR have not been particularly successful.

Part of the issue may be that there is already an audience for, and range of communities within VR, who aren't particularly interested in Meta's offerings, besides the advantages offered by hardware. Internet subculture communities have been socialising in VRChat for some time now and have developed their own particular set of social and embodied norms within the medium.

2.5.2.1 VRChat & We Met in Virtual Reality

We Met In Virtual Reality (2022) a documentary by Joe Hunting filmed entirely in VRChat, contains interviews and footage of a number of communities who socialise virtually. We are introduced to Helping Hands Club, an American Sign Language organisation, a variety of individuals in long distance relationships and friendships, a community of queer VR users, and a group of "exotic dancers" (as they refer to themselves in the documentary) who dance for paying audiences. Previous to this, Hunting produced shorter documentaries regarding VRChat. *Documentary filmed inside VRChat: A Wider Screen* (2019), which I refer to as *A Wider Screen* from now on, is a 13-minute documentary available in full on YouTube. It focuses on embodiment within virtual environments and the social possibilities enabled by avatars that are different from a "real" self.

These documentaries show the specific nuances of communities who already use Virtual Reality and reveal the novel social practices emerging within virtual environments thanks to the affordances of the medium. *A Wider Screen* includes a particularly touching interview with a VRChat user discussing his experience meeting and (unexpectedly) dating another man through VRChat.

As shown in the quotes featured in Figure 2-12 and Figure 2-13, the interview subject is preoccupied with identifying the non-normative position of their relationship (its "weirdness") and how it has come to be; the discussion itself is an intimate and thoughtful discourse on what we take to be normal and what we expect of ourselves. But I raise it here not to closely examine this one example of unexpected discovery of non-normative sexuality. Instead, what is valuable to consider is how the documentary makes space for such a discussion, and positions VR, especially social multiplayer VR such as VRChat, as a space where the unexpected and out-of-everyday can occur, and where fragile intimacies that could not otherwise come into being have a chance to flourish. The documentary overtly repositions VR as a technology and medium with specific subcultural and community ties, rather than as a general mass "social media" for all, and makes an implicit argument for a different kind of VR social imaginary than what is being shaped by Meta. Hunting's documentaries



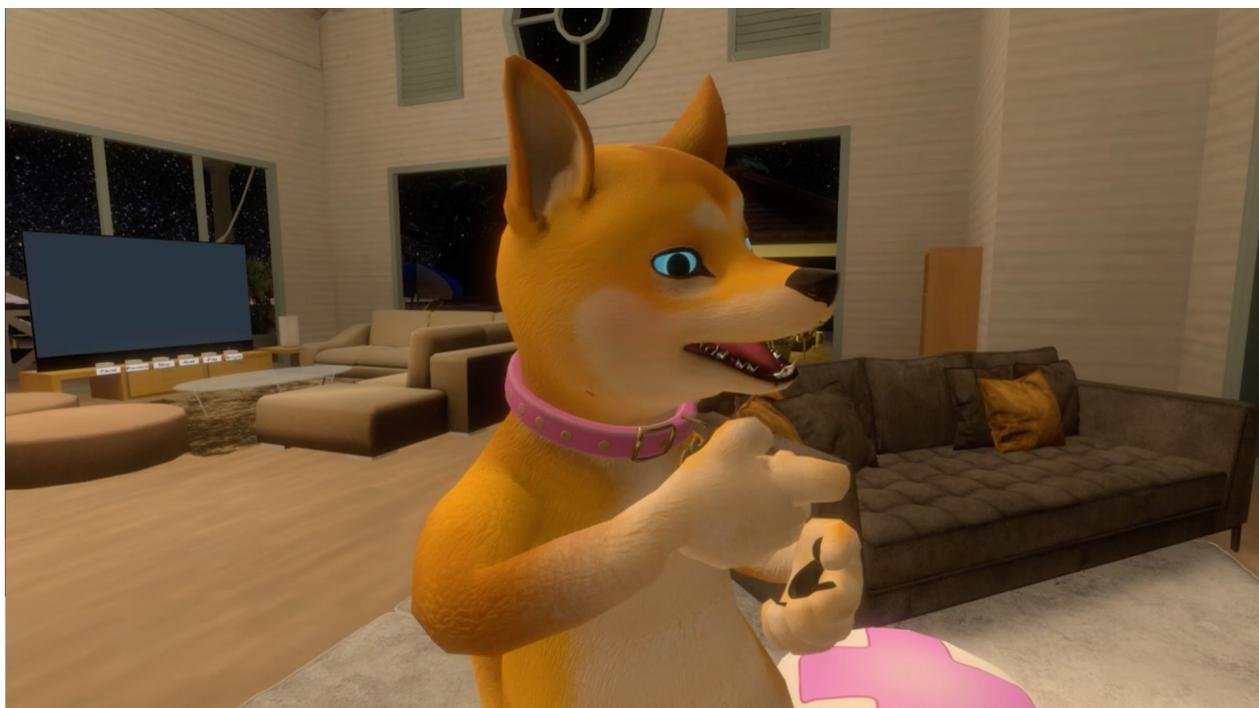
Quote from speaking individual:

“Basically our dating has been on VRchat, like, in the VR Sphere. It’s weird. all of it’s weird, and it’s not something that’s socially accepted yet. Which is a shame, because it can be quite amazing”

Figure 2-12

Image captured from A Wider Screen (2019) documentary showing interview participant

Note.: Image and transcript captured and transcribed by researcher at 5 minutes 28 seconds from A Wider Screen [Video], by J. Hunting, 2019, YouTube (<https://www.youtube.com/watch?v=n9QuXftW21M>).



Quote from speaking individual:

“You’re connecting people from all across the world, and then, um, I just, I never expected—with a guy. Is that weird?”

Figure 2-13

Image captured from A Wider Screen (2019) documentary showing interview participant

Note. Image and transcript captured and transcribed by researcher at 8 minutes 40 seconds from A Wider Screen [Video], by J. Hunting, 2019, YouTube (<https://www.youtube.com/watch?v=n9QuXftW21M>).

present an account of avatar usage that demonstrates the expanded social potentials of anonymity or obscured identity that non-realistic, non-mimetic avatars offer participants, while also always anchoring this reflection in a recognition that it is not an experience of *dis*-embodiment, but rather, differently-enabled embodiment that always bears a relation to the physical.

In my own explorations of both VRChat and the tools on offer in Meta's VR platforms that come with the Quest headset, I have found that Meta emphasises connecting accounts to your Facebook account (which requires your real name) as well as selecting and designing from limited avatar representation options that appear human-like. Meanwhile, VRChat requires only an email to sign-up, offers a wide range of avatars designed by its user base—a cyborg shark, a talking fox, an infinite range of anime girls, a tiny mushroom, a bottle of wine with arms—and also allows you to design your own once you become a trusted user. This simple comparison demonstrates fundamental differences in the practical elements that constitute VR as a social media and demonstrates contrasting philosophies regarding the purposes of VR as social media.

Contemporary research into the social practices of VRChat users show that exploratory, experimental usage of avatars to challenge and expand upon performance of gender in virtual online spaces is a conscious and widespread practice for VRChat users (Au, 2023). In their article “Gender Expression and Gender Identity in Virtual Reality: Avatars, Role-adoption, and Social Interaction in VRChat”, Jingyi Zhang and Joshua Juvrud found that:

Users [of VRChat] can challenge and subvert traditional gender norms by portraying avatars that do not conform to their real-life identities. By customizing avatars, altering their voices, learning gender-specific behaviours, or minimizing actions that convey masculine or feminine qualities, users demonstrate the fluidity of gender expression in virtual environments. (Zhang & Juvrud, 2024, p. 10)

It is my argument that this user-driven experimentation is facilitated by the specific choices that designers and developers of the platform have made. It is also my argument that this developing set of community practices shows an approach to queer bodily representation that is distinct from a Silicon Valley model of cyberpunk-esque individual transcendence and freedom from embodiment. The practices developed in VRChat show a critical inter-relationship between physical embodiment and virtually performed embodiment. Here, gesture, bodily actions, language and vocal tone (all aspects of physical gender performance in non-digital environments) are layered amongst novel avatar designs to create a newly performative

iteration of gendered existence; one that is more fluid, malleable and more consciously self-defined than it is usually understood to be (although the perceived malleability of gender in everyday contexts may be the impetus of users' experimentation in VRChat). A queer methodology for VR should take into account these already emerging practices that reflect queer impulses towards expansive and alternative embodiment. VRChat, in contrast to Meta, is focused on facilitating a set of niche community values, rather than mass capture of wide demographics, and as a result has enabled queerly inflected experimentation with embodiment and sociality.

2.6 Contemporary VR Avatar Creation and Bodily Representation

As part of my inquiry into contemporary VR, I documented my usage of platforms such as the built-in virtual lobby environment of the Meta Quest headset and VRChat. I also analysed the marketing material surrounding the Apple Vision Pro, the latest arrival in the HMD market. These critical engagements have informed my understanding of contemporary VR, and I have included visual documentation here (Figure 2-14 to Figure 2-18) as an abridged overview of contemporary industry norms regarding embodiment in Virtual Reality.

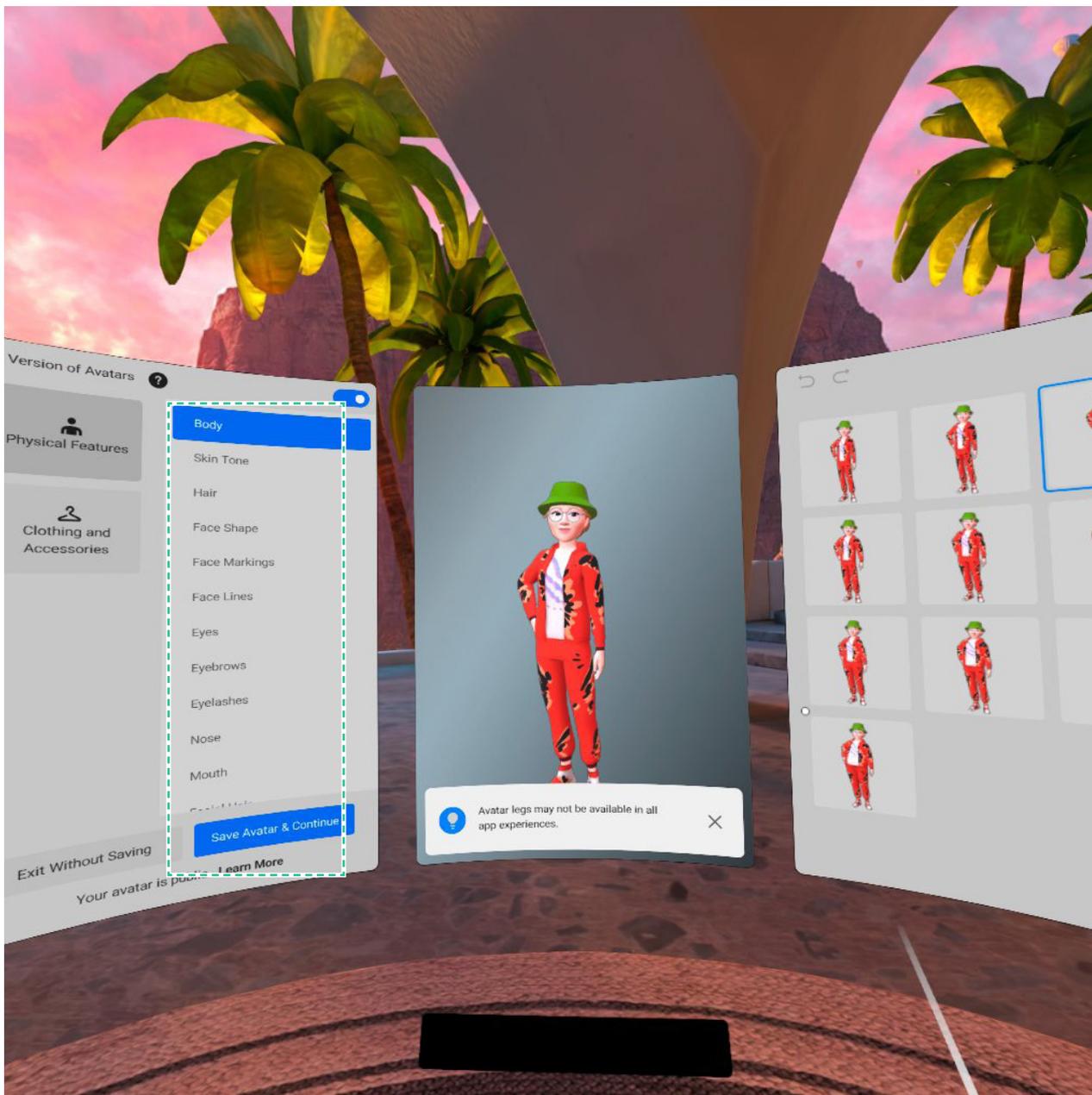


Figure 2-14

Meta avatar creation menu

Note. Image captured by researcher in February 2022. Interface requires user to define physical features such as body shape, skin tone, hair, face shape, eyebrows and so on, highlighted on the left.

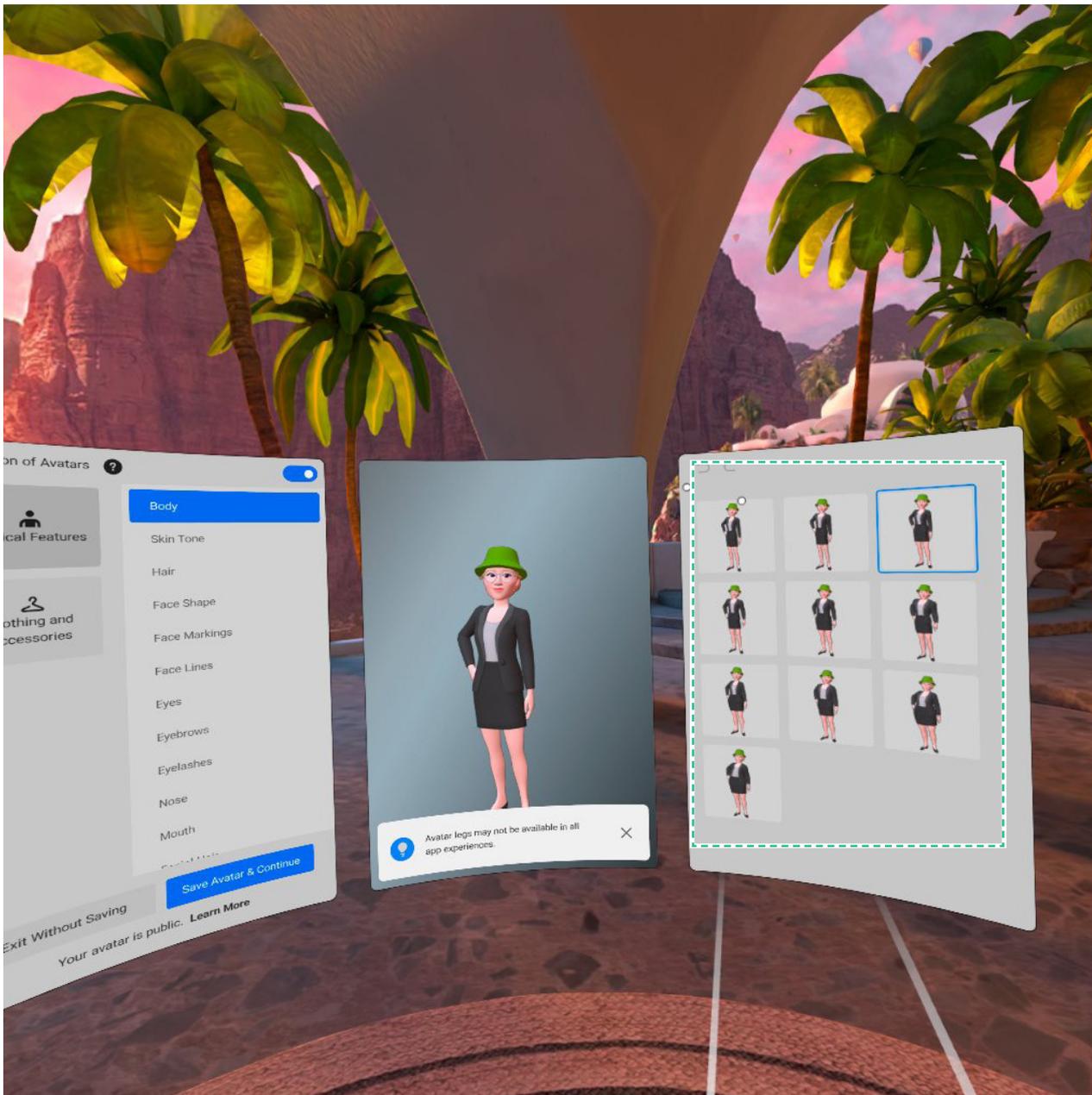


Figure 2-15

Range of body types in Meta VR avatar design process

Note. Image captured by researcher in February 2022. Highlighted in this screenshot to the right is the range of body types available to select from; while there are some variations in size, these ten options to select from obviously fail to capture the range of sizes, shapes, ages, postures, limb differences, mobilities and abilities, and any and all other forms of embodied difference that a participant may wish to represent.



Figure 2-16

Individual using Apple Vision Pro stands in a bedroom in front of virtual panels that show a presentation and other individuals

Note. Apple presents their headset in a mixed reality context, where aspects of the physical world are still visible for a user. In this example, a user conducts a business call in a bedroom; Apple's marketing material combines personal, business and virtual in one amalgamation. Screenshot captured by researcher from 1 hour, 33 minutes, 43 seconds in *WWDC 2023 — June 5 | Apple* [Video], by Apple, 2023, YouTube (<https://www.youtube.com/watch?v=GYkq9Rgoj8E>).



Figure 2-17

Individual uses the Apple Vision Pro headset to scan their face

Note. Apple demonstrates how users of the headset are represented on a video call: they first generate a scan of their own face with the headset. Screenshot captured by researcher from 1 hour, 52 minutes, 55 seconds in *WWDC 2023 — June 5 / Apple* [Video], by Apple, 2023, YouTube (<https://www.youtube.com/watch?v=GYkq9Rgoj8E>).



Figure 2-18

Results of face scan are animated as an avatar during facetime calls by Apple Vision Pro

Note. The results of the face scan are shown as an avatar representation that closely emulates the visual appearance of the user's physical appearance. Screenshot captured by researcher from 1 hour, 36 minutes, 4 seconds in *WWDC 2023 — June 5 / Apple* [Video], by Apple, 2023, YouTube (<https://www.youtube.com/watch?v=GYkq9Rgoj8E>).

2.7 *Queer Embodiments in the History of VR*

Excavating both VR's history and its contemporary instantiation raises the question of how best to utilise all of these differing threads as a contemporary practitioner. During the first wave of VR's widespread popularity in the 1980s and 1990s, VR was connected to cyberpunk values of total disembodiment and escape into pure cyberspace, but there were artistic experiments at the time that explored the potential of VR as an *embodied* medium. In these early artistic works there is a promise of a different future than the one that we currently occupy, one in which VR as a medium and interface is not entirely dominated by monopolistic headset manufacturers intent on cultivating a universal social virtual environment (a "Metaverse") for maximum data harvesting and profit extraction. In looking to the past of VR for strategies for a contemporary queer methodology for VR, I am not trying to set up a simplistic binary of "old, good, golden days" and "new, bad, current misery" for VR. Instead, this history intends to recognise that during its false starts, constant failures, problematic origins and always fluctuating set of values regarding the body, VR has always been a medium with practitioners who have worked to make something other than a reification of what already is; there have always been practitioners who have used the affordances of VR to craft what we can now recognise as feminist-ly and queerly aligned work.

There was the potential for this niche artistic experimentation with VR to bring a more complex, embodied understanding of experiences in VR to the fore—however, this boutique experimentation was limited, and ultimately the first commercial wave of VR floundered and the medium faded out of relevancy. When VR re-emerged more recently, tech giants like Meta were setting the agenda, working to make VR an "extension of Facebook's existing software and as an apparatus of Facebook's platform empire" (Egliston & Carter, 2022, p. 72) with an emphasis on pseudo-realism and mimetic reproduction of participants' physical characteristics in VR.

The history of VR therefore shows a distinct tension between two main conceptual approaches to embodiment in VR: one, of total escape from embodiment, and the other, reproduction of physical appearance in search of mimetic realism. A queer position sees the tension between these two ideals as a productive, generative force; it is VR projects that trouble, problematize, blend, play with and upend this binary that offer the most insightful guidance for a queer methodology for VR.

I want to orient our path forward with this in mind: that a queer approach to embodiment in VR is not a completely novel idea, but is instead connected closely with particular experimental approaches located in the history of VR as a medium. A queer approach to VR histories looks at the first wave of artistic VR development—these potent explorations of alternative embodiment—and sees the first impulses of queer embodiment and worldbuilding for virtual environments.

In drawing on the past in this way, I am cognizant of José Esteban Muñoz’s argument that “the past, or at least narratives of the past, enable utopian imaginings of another time and place that is not yet here but nonetheless functions as a doing for futurity, a conjuring of both future and past to critique presentness” (Esteban Muñoz, 2019, p. 106). I am presenting a narrative of VR’s past as a fraught medium that served as grounds for negotiating wider social issues of digital technology, in which a small subset of practitioners worked to expand its formal and philosophical boundaries, especially in terms of embodiment. This offers a way for us to critique the contemporary landscape of VR development and think about potential alternative futures to Meta’s version of ubiquitous surveillance.

A queer approach to VR looks to the past to see what we can make with the resonances and queer moments within VR’s history, and what we can gain from thinking about them in light of what we know now, for current queer communities. Queer VR can be the ghost that haunts “the Metaverse”, the failed beginnings from the first wave of VR experimentation that prioritises the fringe rather than gaining access to every household. A queer VR isn’t glad to be on the margins per se, but it is certainly glad not to be in the mainstream. A queer perspective has an extreme amount of suspicion for what happens when you are made visible and put under surveillance at the centre of things. If a queer methodology for VR is therefore going to be happy occupying the margins and expanding them—without necessarily having an interest in reforming the state of mainstream VR—it is vital for this queer perspective to know the way in which the dominant social norms for VR have been established, and to identify the radical or deviant strains of thought within that.

Rather than seeing the first waves of VR as a failure or cast of warnings and dead ends, a queer approach to VR asks what potential futures outside of the mainstream could be opened up by re-considering the lost promises embedded within the early days of VR. The goal for a queer methodology for VR, then, after examination of the complex history of VR, is to create a contemporary iteration of VR that is an alternative to both the historical conceptions of VR as a disembodied space of transcendence, and to present an alternative to

contemporary mainstream corporate visions of VR as a mundane reproduction of our everyday reality. A focus on historical artistic engagements with VR that explore its embodied qualities has unearthed a range of alternative modes of understanding embodied experiences in VR, with a focus on body politics, homuncular flexibility, gesture and performance, and the potential of dizzying disorientation. This highlighting of historical examples is not to say that subversive contemporary projects do not exist. As previously discussed in this chapter, hobbyist spaces like VRChat show how design of custom avatar systems contrary to the mainstream model offered by Meta can enable more complex relationships between participants and the process of embodiment in VR. Non-mainstream approaches have not been completely extinguished, and it is essential to continue attending to the strategies utilised in these alternative constructions of embodiment in VR.

For the overall aims of this practice-based project, understanding of VR as a socio-technological medium embedded in specific cultural imaginaries is a crucial critical lens. A practice-based approach can work to identify the specific ways in which cultural narratives shape the design choices and embodiment possibilities present in contemporary VR development. Understanding the complex contextual landscape allows for engagement with VR that considers not only the formal qualities of the medium but also how alternate manifestations of VR impact and inform broader understandings of how VR should be used and implemented. Design can then use this knowledge to create alternative interactions and processes of embodiment that expand and re-orient design languages for VR, and in turn, challenge the larger narratives around VR, and suggest alternatives to the dominant model being put forward by companies such as Meta.

Chapter Three:

*Foundations of Queer
Theory*

3.1 *Core Concerns for a Queer Perspective*

In this chapter I present an overview of key theoretical concepts in queer theory that have informed my queer methodology for VR, which is discussed in depth in Chapter Eight. Here, I discuss key concepts from queer theory that shape the foundation of my queer methodology for VR, including concepts such as heteronormativity, gender performativity and affect. These concepts ground my reading of more specific queer theory texts as well as my examination of the work of scholars and researcher-practitioners applying queer theory to the task of working with digital media such as VR.

3.1.1 Use of the Term “Queer”

Throughout this thesis I use the term “queer” rather than “LGBTQIA+” or “gay”. The term “queer theory”, more specifically, was first used by Teresa de Lauretis in 1990; the usage was a challenge and departure from the terms “lesbian and gay”, in order to

avoid all of these fine distinctions in our discursive protocols, not to adhere to any one of the given terms [such as homosexual, gay or lesbian], not to assume their ideological liabilities, but instead to both transgress and transcend them—or at the very least problematize them. (de Lauretis, 1991, p. V)

Emerging out of feminist and LGBT Studies as well as broader identity-oriented critical theory academic fields in the 1980s, queer theory asserted a radical disruption and reconsideration of academic structures, including identitarian approaches to gender and sexuality (Amin, 2020).

Queer itself has a long history in its use as a slur against gay people (McCann & Monaghan, 2019) or those who have failed to successfully embody the ideals of heterosexuality in the eyes of the attacker (whether they feel themselves to be gay or not). Before being used in an academic setting, queer was already being reclaimed and reworked (Love, 2007) by same-sex activists as an embrace of the non-normative position it denigrated, and was a significant part of early AIDs-related activism (McCann & Monaghan, 2019), with the Queer Nation offshoot of Act Up releasing their manifesto in 1990.

This tense ground of repossession and reclamation makes the use of queer an inherently political move, even if queer theory is now understood to be a

legitimate and well-established scholarly field. Despite growing acceptance of both LGBTQIA+ identities and queer as an identity label, it is important to recognise this history of reclamation as the process by which queerness—as a method, set of concerns, interests or affinities—can do important work, cognisant of our histories of oppression and the effort already put towards freeing ourselves from such. I am highly aware of the work that has been done to make queerness available to me in a professional and academic context, as an identity, as an epistemological position, and as a way of life.

3.1.2 Queer Theory as a Discipline

As a scholarly set of concerns, queer theory draws on realms of knowledge as diverse as “postmodernism, poststructuralism, lesbian feminism, lesbian of colour theory and activism, lesbian gay and bisexual activism, gay and lesbian studies, trans activism and theory” (McCann & Monaghan, 2019, p. 7). Queer theory is also often applied outside of its supposed disciplinary bounds, “beyond questions of sexual categories” (McCann & Monaghan, 2019, p. 5). A core tenet—if a field as diverse as queer theory can be said to have core tenets—is that it is not about a specific social configuration of same-sex desire; rather, it questions how and why these configurations come to be. In the chapter “Feminist Criticism and Queer Theory”, Heather Love similarly positions the use of queer as a response to debates during the 1980s regarding the political efficacy of identity politics and strategic essentialism that was associated with the terms gay and lesbian:

Whereas ‘gay’ and ‘lesbian’ might refer to specific and recognisable sexual identities, queer evinced a thoroughgoing scepticism about the stability and usefulness of such categories. Queer theorists understood the category of homosexuality as socially constructed and therefore contingent. Rather than affirming gay and lesbian identity, queers focused instead on countering homophobia and at the same time undermining the distinction between homosexual and heterosexual. (Love, 2007, p. 302)

When thinking of how the foundational principles of queer theory can be incorporated into a contemporary research and design practice, we can see that the assimilationist goal of “being treated like we’re straight” is not the aim: instead, the goal is to acknowledge and celebrate sources of difference, to critically consider how such difference is produced, and then to destabilise such processes. This is crucial work that needs to be done, with VR as a field of design in particular need of queering beyond the first steps of representation of gay people or gay stories.

In Lauren Berlant and Michael Warner's 1995 article "What does Queer Theory Teach Us About X?" they argue that "without forgetting the importance of the hetero-homo distinction of object choice in modern culture, queer work wants to address the full range of power-ridden normativities of sex" (1995, p. 345). In my use of queer theory, I am extending this concept of "power-ridden normativities" beyond the realms of sex and gender in their specificity to consider how such normativities are re-inscribed within the digital medium of VR. By doing this descriptive work of identifying normative patterns of embodiment in VR, I can then take up the task of designing Virtual Reality experiences that challenge such norms and present alternative ways of designing for, and being embodied within, VR.

3.2 *Key Concepts in Queer Theory*

Foundational scholars in queer theory, including Michel Foucault, Judith Butler and Eve Kosovsky Sedgwick (Amin, 2020) explore a wide range of concepts: power and disciplinary regimes, the materiality of the body, the construction and enforcement of gender and sex, the way literary cultures express homosociality, and how discourses on perversity extend beyond queerness. Not all of these scholars would have labelled their work as queer theory at the time. However, they all highlighted how gender and sexuality are context-dependent constructs that can be disrupted through performative acts. This is not to imply that these acts are inauthentic; rather, they are performative in the sense of a performative speech act—where saying something enacts a change or action.

There are distinctions between queer theory, women's studies, feminist philosophy, and gender studies, but there is also significant shared ground. For example, Heather Love notes that "queer theory did depart from feminism, particularly in its focus on sexuality as distinct from gender, but it also borrowed heavily from the methodology of feminist studies" (Love, 2007, p. 303). In drawing on queer theory specifically, and later, cyberfeminism, I am acknowledging this intellectual cross-pollination while also delineating my own specific points of reference. What is most valuable is how the richness of these interrelated fields can contribute to a queer methodology and motivate material experimentation with the medium of Virtual Reality. My own focus in drawing on queer theory is how the arguments, theories and motivations I outline below can enable designing for Virtual Reality in a queer manner.

To explore the key ideas and developments in contemporary queer theory, I will provide a brief overview of influential concepts and their originating scholars,

as well as a description of how their work and its ensuing interpretations have shaped this research. In a vast and diverse field, I look to these scholars for foundational insights and starting points. Although my research doesn't align entirely with their perspectives, it is undoubtedly influenced by their intellectual legacies. The two primary texts anchoring my methodological exploration and development —*Cruising Utopia: The Then and There of Queer Futurity* (2019) by José Esteban Muñoz and *Queer Phenomenology: Orientations, Objects, Others* (2006) by Sara Ahmed—are deeply influenced by three core concepts: critiquing normativity, examining performativity, and queer affects, all of which I will discuss below.

In the ensuing chapter, I will then examine these two primary texts by Esteban Muñoz and Ahmed that have anchored my methodological development, and turn to a discussion of how queer theory broadly, and those two texts specifically, have been utilised by scholars and practitioners who are working to bring queer theory and digital technology practices together.

3.2.1 Critique of Normativity

Michel Foucault's work is critical to our contemporary understanding of queerness, particularly due to his analysis of same-sex desire throughout history. Working in the field of post-structuralist philosophy in France in the 1960s and 70s, Foucault's work explores how power operates within societal structures. His book *History of Sexuality (vol i)*, first published in English in 1978, provided analysis of how same-sex desire was historically understood as a form of deviance or perversion that anyone could be susceptible to, and then became medicalised in the early 20th century by sexologists who developed the diagnostic model of "inversion". By tracing the historical development of sexual norms and their relationship to power, Foucault shows how societal discourses construct, manage, and discipline sexual identities. It is from Foucault's post-structuralist approach to examining "sexuality, normativity [and] biopolitics" (Amin, 2020, p. 20) that we now have an understanding of sexual norms as, quite loosely, a social construct; and more so, the understanding that sexuality is an essential function of regimes of power and knowledge in western modernity.

Critiques of normativity from within queer theory have continued to build on Foucault's work, and during the 1990s, the concept of heteronormativity became a theoretical tool to describe the ways in which queerness is policed, repressed, hidden and discouraged—and heterosexuality enforced and encouraged. In their overview of queer theory, McCann and Monaghan explain

that “[Michael] Warner coined the term ‘heteronormativity’ to describe the pervasive and largely invisible heterosexual norms that underpin society” (2019, p. 11). The concept of heteronormativity is also influenced by the framework of compulsory heterosexuality put forward by Adrienne Rich (1980), a lesbian feminist scholar, in order to examine and explain how women as a class (not just those who identify and understand themselves to be queer, lesbian or gay in some way), are affected by the regulation of normative heterosexuality. This framework is considered further through the lens of embodiment via Sara Ahmed’s *Queer Phenomenology* (2006), which I discuss at length in the next chapter.

For the purposes of this research, and for many others working to bring queer theory into conversation with digital technology and immersive media such as Virtual Reality, Foucault’s critique of normativity—and the ensuing development of heteronormativity as a concept—is an essential foundation to both analytic and generative projects (Blas & Cárdenas, 2013; Ruberg, 2018; Ruberg et al., 2018). When looking at embodiment in VR, it is a crucial first step to identify what normative regimes are at play, and how they are developed, reinforced, and reinscribed via the medium of VR itself. This involves considering more expected “textual” elements, such as the narrative of a VR experience, as well as the designerly qualities: how the interface and spatial design encourage and delimit particular ways of being within the virtual environment.

3.2.2 Gender Performativity

Judith Butler’s *Gender Trouble* (1990) provides a feminist critique of essentialist approaches to sex (Amin, 2020). *Gender Trouble* offers the concept of gender performativity as a key critical framework: “challenging the idea that gender behaviour follows naturally and inevitably from sexual essence, Butler suggests that gender is a series of repeated and stylised acts that create the illusion of a bodily ground” (Love, 2007, p. 308). For Butler, gender is not an inherent part of identity, but a practice that is strictly policed, with punishment for those who flirt with, escape, challenge or ignore (and, in these various forms of intentional or unintentional rebellions, threaten the structural integrity of) the boundaries of societal gender norms. In a circular dynamic, this enforced and regulated performance is then “taken as evidence that ‘normal’ gender is natural, biologically determined and inevitable” (Love, 2007, p. 308).

Butler draws upon and builds on the work of materialist feminist theorist Monique Wittig and feminist philosopher Simone de Beauvoir, as well as Foucault’s understanding of subject formation and J. L. Austin’s concept of

performativity, in order to construct their argument. Rather than viewing gender as a fixed and natural binary emerging from biological sex, Butler argues that gender is something that we “do” via repeated actions. In the introduction to the 2006 edition of *Gender Trouble*, Butler describes the performativity of gender with two key formulations: one, that “the anticipation conjures its object”, with our expectation that gender is an “interior essence” (Butler, 2006, p. xv) that is the cause of its production. Two, that this production is not a momentary bursting into existence or installation upon a blank surface, but instead “a repetition and a ritual, which achieves its effects through its naturalization in the context of a body” (Butler, 2006, p. xv).

Rather than speaking to an existing field of queer theory, *Gender Trouble* (1990) sat at a nexus of feminist, lesbian and lesbian feminist discourse (McCann & Monaghan, 2019), acting as an “intervention into debates about the relations between lesbianism and feminism and ... an attempt to take seriously the practices of sexual and gender subcultures” (Love, 2007, p. 308). *Gender Trouble* also offers a particular glimmer of hope for those who wish to change the status quo: recognising the performative nature of gender, Butler argues, means that gender “is open to intervention and resignification” (Butler, 2006, p. 45).

The critical framework that Butler provides offers a number of key insights for a queer methodology for VR. First, it establishes that gender and sexuality are intertwined concepts and cannot be understood in isolation. Understanding gender performativity is part of understanding heteronormativity, and understanding heteronormativity is needed to understand the performativity of gender. The naturalisation of “repeated and stylised acts” (Love, 2007, p. 308) includes heterosexual acts. Wittig, one of Butler’s key referents, claims that “the refusal to become (or to remain) heterosexual always meant to refuse to become a man or a woman, consciously or not” (Wittig, 1992, p. 13), linking queerness with a disruption of the “correct” performance of gender. Butler provides a model for how gender and sexuality function and are policed. For a queer methodology in VR, this means that embodiment within VR should be understood as a continuation of the everyday quotidian process of being a gendered subject. Therefore, it is necessary to examine the narratives and patterns of interaction of VR for how the medium enables particular reinforcing rituals of gender and sexuality. It also means asking the crucial question that Butler poses in their conclusion: “what interventions into this ritualistic repetition are possible?” (Butler, 2006, p. 199). Using Butler’s concept of gender performativity for VR means, in the context of practice and generative work, asking what VR can do to confound and “displace the very gender norms that enable the repetition itself” (Butler, 2006, p. 203).

Butler's identification of rigid gender binaries—and their ensuing critique of how these rigid binaries are enforced—offers valuable insights for queering design and immersive media such as VR. It is especially relevant in the task of identifying and challenging the normative structures at play in contemporary VR. Butler's specific focus on fluidity also suggests a methodological approach to challenging these normative structures. Kadji Amin argues that:

We might locate Butler's legacy in the queer method, borrowed from poststructuralism, of unsettling and subverting binaries, and in the tendency to put more political weight on moments of slippage, fluidity, and subversion that call entire ontological systems into question. (Amin, 2020, p. 19).

This “queer method” for destabilising the gender binary lives as a central lodestar and methodological approach in my own project, with its glow reflecting upon the surfaces of all the other projects and texts that have come to inform my work.

3.2.3 Queer Affects & Touch

Eve Kosofsky Sedgwick's book *Epistemology of the Closet* (2008), first published in 1990, is widely understood to be a key originating text for queer theory. It argued that the homo/heterosexual binary was not limited in its relevance solely to matters of sexuality but was rather essential to Western thought as a whole. This book proved foundational to queer theory, because Sedgwick argued for the importance of examining sexuality in analysis of culture more broadly: “this radical and universalising claim for the importance of sexuality was instrumental in founding the field of queer studies and in finding it a place in the academy” (Love, 2007, p. 310).

Kosofsky Sedgwick's scholarship was expansive, ranging across literature studies with a concern for homosociality, queer performativity and the study of affect. Weiner and Young highlight the profound impact of Kosofsky Sedgwick's scholarship on queer theory, noting that if queer theory

derived its object from the operations of the epistemology of the closet, which is to say, the operations of homophobia, this helps explain why from the outset, queerness has been invested as a position or impetus of subversion, resistance, and opposition. (Weiner & Young, 2011, p. 228)

Sedgwick understands the process of subject formation in a way that can be read as similar to Butler's previously discussed framework of performativity,

but Sedgwick, drawing on the affect theory of Silvan Tomkins, introduces an affective layer as motivational explanation: “what motivates performativity and performance, for example, and what individual and collective effects are mobilized in their execution?” (Kosofsky Sedgwick, 2003, p. 17). In *Touching Feeling: Affect, Pedagogy, Performativity* (2003), Sedgwick looks specifically to the feelings that are generated for a queer subject—and the feelings that, in fact, generate such a queer subject, amidst the ever-constant performative process of becoming. Sedgwick identifies shame as a specific affective experience that is definitionally entangled with queerness:

Queer, I'd suggest, might usefully be thought of as referring in the first place to this group or an overlapping group of infants and children, those whose sense of identity is for some reason tuned most durably to the note of shame. (Kosofsky Sedgwick, 2003, p. 63)

Shame itself as a specific affect—and its potential definitional relation to queerness—is not a key focus of this research. But Sedgwick's positioning demonstrates an analysis of affect and its potential interrelation with wider politics, which both Ahmed and Esteban Muñoz take up in their own work. Furthermore, the general concept—that certain affective attunements can be understood as queer—is something that is present in the two key queer texts that anchor my methodological offering. The practice-based component of this research, the Body Traces Archive prototype, and the findings of user testing processes with this prototype, further reveal and develop this queer interpretation of affective experiences.

In the book *Touching Feeling*, Eve Kosofsky Sedgwick also presents a discussion of texture and touch as closely interrelated with affect, due to their phenomenological natures: “if texture and affect, touching and feeling seem to belong together ... what they have in common is that at whatever scale they are attended to, both are irreducibly phenomenological” (2003, p. 21). This is very useful for a queer methodology for VR, as it suggests a particular focus for practice-based experiments: a project concerned with queerness and affect should therefore take texture and touch as its material and technique; its raw materials and toolkit, so to speak. In the introduction to the book, Sedgwick states that:

To perceive texture is never only to ask or know What is it like? nor even just How does *it* impinge on *me*? Textural perception always explores two other questions as well: How did it get that way? and What could I do with it? (Kosofsky Sedgwick, 2003, p. 13, emphasis in original)

Texture and touch have become essential elements of my process for designing in VR, and are discussed in more depth in Chapter Four, discussing the aesthetics and principles of cyberfeminism, and in Chapter Seven, which summarises the prototyping process of the Body Traces Archive.

3.3 *Extending an Affective Perspective*

The relation between queer theory and affect theory—beyond Sedgwick’s specific configuration—is well documented. Ann Cvetkovich, a prominent queer theorist and figure in the Public Feelings project alongside Lauren Berlant and José Esteban Muñoz, describes “the affective turn in cultural criticism, which has not only made emotion, feeling, and affect (and their differences) the object of scholarly inquiry but has also inspired new ways of doing criticism” (Cvetkovich, 2012, p. 3).

She specifically points to how queer theory’s critique of normativity has contributed to analysis of the politics of emotions such as shame. Both key methodological anchors I draw on in the following section, Sara Ahmed and José Esteban Muñoz, are identified as key theorists in the field of affect theory (Seigworth & Pedwell, 2023); providing background on the field that has significantly shaped their work, therefore, assists in configuring and orienting my own queer methodology for VR.

In the introduction to *The Affect Theory Reader*, the authors describe affect as “found in those intensities that pass body to body (human, nonhuman, part-body, and otherwise), in those resonances that circulate about, between, and sometimes stick to bodies and worlds” (Gregg & Seigworth, 2010, p. 1) and claim that:

Affect is integral to a body’s perpetual *becoming* (always becoming otherwise, however subtly, than what it already is), pulled beyond its seeming surface-boundedness by way of its relation to, indeed its composition through, the forces of encounter. With affect, a body is as much outside itself as in itself—webbed in its relations—until ultimately such firm distinctions cease to matter. (Gregg & Seigworth, 2010, p. 3)

Gregg and Seigworth identify Eve Kosofsky Sedgwick and Adam Frank’s essay “Shame in the Cybernetic Fold” (Sedgwick & Frank, 1995) and Brian Massumi’s

essay “The Autonomy of Affect” (Massumi, 1995b), as two key landmarks in the field of affect theory, shaping the resultant lines of investigation in the field. Sedgwick and Frank’s essay caused a turn to Silvan Tompkins’ “psychobiology of differential affects” (Gregg & Seigworth, 2010, p. 5) while Massumi’s writing brought to the fore Deleuze’s Spinozan interpretation that “locates affect in the midst of things and relations” (Gregg & Seigworth, 2010, p. 6).

Sara Ahmed—one of the key authors I draw on for my queer methodology for VR—has worked extensively to examine the political implications of how emotions circulate, such as in her book *Cultural Politics of Emotion*, first published in 2004 and republished in a second edition in 2014. The book provides “an analysis of affective economies, where feelings do not reside in subjects or objects” (Ahmed, 2014, p. 8) and critiques the predominant model of emotion that positions emotion as a purely interior experience. While this book is more evidently situated in the field of affect theory than the key text of hers that I draw on, *Queer Phenomenology* (Ahmed, 2006), this latter volume can still be understood in relation to the wider field of affect theory; as Gregg and Seigworth identify, “phenomenologies and post-phenomenologies of embodiment” (Gregg & Seigworth, 2010, p. 6) are a particular line of investigation for affect theory.

My work takes as impetus the charge that affect is a vital aspect of phenomenological experience, and that affect should be considered critically and in tandem with wider questions of performativity and normativity. My work is aligned with Ahmed’s perspective that sees affect and emotion as politically imbricated, yet first and foremost experienced as embodied. Examining the phenomenology of affect in Sara Ahmed and Judith Butler, Alexandra Morrison states that:

For Ahmed, affect is closely connected to the way in which bodies responsively configure their spatial surround, or ‘orientation’; her work shows how affect connects us to, or separates us from, others, and thus is linked to the politics of space, mobility, action, power, and the formation of identity. (Morrison, 2020, p. 147)

When looking at the wider field of affect theory, what is useful for a queer methodology is the core understanding of affect (and emotion) as part of the process of performativity, and as a profoundly relational experience in which an individual is placed “in a circuit of feeling and response, rather than opposition to others” (Hemmings, 2005, p. 552). For a queer methodology for VR, examining affect—quite loosely, the bodily reactions that precede what we come to identify and comprehend as emotions—means taking a critical position

towards what sensations are enabled and encouraged by VR experiences, and in turn, how participants are encouraged to understand these feelings they are experiencing.

A critical perspective towards affective regimes within VR—and the wider discourses that surround them—is therefore crucial, and there are scholars who have worked to bring a critical queer lens to the way certain affects are deployed in discussions surrounding both VR and similar media. Writing about discourses surrounding the concept of empathy in video games (Ruberg, 2020a), queer media and video game scholar Bo Ruberg utilises the theoretical frameworks of Berlant, Massumi and Ahmed as “theorists at the intersection of affect and politics” (Ruberg, 2020a, p. 55) to interrogate the oversimplification of what queer games offer. In particular, Ruberg critiques a model of empathy where queer video games are seen as primarily an opportunity for straight people to feel bad for queer people. Ruberg is discussing video games when they say the “question of how video games make players feel, and how the discursive networks that surround games suggest that games *should* make players feel, is fundamentally political” (Ruberg, 2020a, p. 56, emphasis in original); this is a lens of critique that can and should be applied to VR. As an alternative to over-simplified, normative models of empathy, Ruberg suggests that:

Without the cover of empathy as a catch-call [sic] buzzword, sympathy, depth, and allyship become more visible and therefore more accessible for critique. Caring, compassion, sorrow, loss, and queer entanglement are powerful concepts that deserve to be spoken out loud. (2020a, p. 68)

In a queer methodology for VR, a normative program of affect—a perspective where there are “correct” emotions to be felt, for the benefit of a select privileged few—is something to be reconsidered and challenged. Through the process of developing and testing my prototype with participants, it became clear that the affective realm was a potent and crucial aspect of both experiencing, and analysing experiences of, Virtual Reality. I discuss these findings in more depth in Chapter Eight.

3.4 *Situating a Queer Methodology for VR*

Queer theory is a complex field that is concerned with the dynamics and experience of sexuality, normativity, and performativity as they pertain to social arrangements and subjecthood as a whole. In my own work I am concerned with how a queer position can consider the needs of LGBTIA+ individuals and communities. I am also engaging this particular field of knowledge in order to extend and expand upon the possibilities of the medium of VR. To do this, I draw on queer theory's disciplinary interest in examining and critiquing normativity, Butler's framework of gender performativity, and Kosofsky Sedgwick's interest in affect to construct the foundations of a theoretical framework for designing embodied experiences for VR.

These are the underlying motivations and principles of my own work and form the foundation of my queer methodology for VR that is discussed in depth in Chapter Five. It is also vital to recognise that queer theory, while concerned with same-sex desire and the policing, construction, repression, and expression of such, also intersects with gender studies, trans studies, crip studies and disability studies and queer of color critique, as well as many other social and activism-oriented schools of thought. In the 25th anniversary edition of *Gay and Lesbian Quarterly* in 2019, DeVere Brody and Ochoa recognise that:

What we call queer theory, or 'lesbian and gay studies' (to quote our increasingly problematic subtitle), has changed over time as a result of the radical essays produced in our pages. ... The constitutive 'outside' once signified by trans studies, disability studies, and queer of color critique—has been incorporated into the journal's pages. (DeVere Brody & Ochoa, 2019, pp. 1–2)

I do not wish to separate my work from these fields, nor do I claim to have fully incorporated their concerns to the extent that I can assert their perspectives as my own. Although the goals of my project are broadly intersectional, aiming to improve VR for all marginalised potential participants, my perspective is specifically queer and cyberfeminist. In developing a queer methodology for VR—particularly in a design context—my goal is to introduce queerness to design in a way that aligns with the objectives of other socially and activist-oriented methodologies, without overshadowing their unique concerns, goals, and methods.

In design research, and more specifically within an RtD, practice-based context, queer theory offers specific consideration of what the goals of a queer research project should be and how to achieve them. Queer theory provides us with an opportunity to challenge dominant structures and norms, offering a critical lens to question and subvert traditional design practices. This is especially important when working with VR, a design medium that is still evolving in terms of its structure and design principles, yet often reinforces normative patterns of embodiment, interaction, and experience. The work of constructing this queer methodology for VR means actively interrogating how VR as a medium may privilege certain bodies, identities, and experiences while marginalising others, whether that be through its conceptual, formal, or narrative properties. By applying queer theory to practice, my queer methodology for VR works to challenge and disrupt these normative patterns and manifest alternative approaches to designing for VR that are both subversive and inclusive.

Questions of the political utility of queer theory (Berlant & Warner, 1995) are often concerned with what it can contribute and critique in the realm of cultural production, reaffirming the relevance and importance of such a bridging between design practice and queer theory. The question “What Does Queer Theory Teach Us about x?”, the title of Berlant and Warner’s article, demonstrates a multi-discipline drive, a roving promiscuity and urge to get amongst other areas. In my own use of queer approaches, methods, theories, agendas or priorities, I am essentially aiming to ask, “What does queer theory teach us about embodiment in Virtual Reality?”. The queer theory in this question refers to the complex scholarly genealogies that make up queer theory, anchored by my key theoretical references, but also to the living theories that I myself embody, experience and know as a queer creative practitioner myself. My goal in bringing a queer methodology to bear on Virtual Reality is to engage in “the process of making queerness imaginable” (Berlant & Warner, 1995, p. 246), within Virtual Reality and within a research-practice environment.

A queer methodology for VR is rooted in an anti-normative stance, not just in how gender and sexuality are depicted as subject matter or narrative content via digital media, but also in the wider regimes of normativity regarding interaction, embodiment, sense of self, agency and affective experience. In order to examine these wider regimes of normativity, in the next chapter, I look to two key queer theory texts that drive my methodology and engagement with practice. I also examine how scholars and practitioners have applied queer theoretical positions in the examination and production of new media and digital technologies such as VR.

Chapter Four:

*Queer Theory Applied
in Digital Contexts*

4.1 *Methodological Positioning*

In this chapter, I build on the previous discussion of the key concepts of queer theory and discuss two specific queer theory texts, *Cruising Utopia* by José Esteban Muñoz (2019) and *Queer Phenomenology* by Sara Ahmed (2006), that have informed the development of my queer methodology for VR. Both works are informed by the previously outlined critique of normativity, understanding of performativity, and attention to affect that I have established as key concepts of queer theory. Following this, I look to precedents in the field of queer technology studies, queer video games studies, and queer new media art, to examine how other scholars, practitioners, and research-practitioners have integrated queer theory with practice-based work. These discussions significantly shape and inform the development of my own queer methodology for VR.

While their methods and focuses are quite disparate, both Esteban Muñoz and Ahmed offer a range of insights into how aesthetic and material arrangements reflect and shape queer experiences; their different scopes complement one another. Esteban Muñoz's *Cruising Utopia: The Then And There Of Queer Futurity*, first published in 2009 and republished with a tenth year anniversary edition (Esteban Muñoz, 2019), which I cite from now on, uses a critical utopian perspective to examine aesthetic manifestations of queer hope and futurity. Ahmed's book *Queer Phenomenology: Orientations, Objects, Others* (Ahmed, 2006) is particularly focused on taking bodily experiences as the starting point of her analysis. By combining the approaches of these two key methodological anchor texts to the task of investigating Virtual Reality, I can examine the embodied experiences of Virtual Reality with close attention to spatial arrangements and broader political worldbuilding, considering not just environment design, or the design of embodied interaction, but how these fit together in a greater whole to create a queerly motivated aesthetic and affective experience.

I use the phrase "key methodological anchor texts" in reference to Zoë Sadokierski's model of "contextual anchors" (2020, p. 10), which she uses to describe key literature or design precedents that anchor and influence a designer's creative practice and methodology, and which can be documented as part of practice-based research. To develop a queer methodology for VR, I have drawn significantly on the foundational concepts outlined in the previous chapter, and anchored this with specific theoretical works from José Esteban Muñoz and Sara Ahmed.

4.1.1 *Cruising Utopia: The Then and There of Queer Futurity*

Utopia is always about the not-quite-here or the notion that something is missing. Queer cultural production is both an acknowledgment of the lack that is endemic to any heteronormative rendering of the world and a building, a “world making,” in the face of that lack. A nothing is a utopian act insofar as it acknowledges a lack that is normalized as reality and attempts to work with and through nothingness and ephemerality: it is both a critique and an additive or reparative gesture. Queer utopian practice is about “building” and “doing” in response to that status of nothing assigned to us by the heteronormative world. (Esteban Muñoz, 2019, p. 118)

Cruising Utopia: The Then and There of Queer Futurity (2019) a highly influential text in the field of queer theory, was first published in 2009 and republished with a 10th anniversary edition that I cite throughout this thesis. As a student of Eve Kosofsky Sedgwick, Esteban Muñoz’s work resonates with that of his teacher’s in his examination of affect and performativity. His focus on cultural documents as an access point to examine broader social politics is an echo of Kosofsky Sedgwick’s own approach, although his methods do not come from literature studies proper. His earlier book, *Disidentifications: Queers of Color and the Performance of Politics* (Muñoz, 1999), is a detailed examination of cultural production and political aesthetics for oppressed communities, particularly focused on providing a queer of color critique—a deeply necessary furthering of queer scholarship.

Cruising Utopia (Esteban Muñoz, 2019) offers a model of queer futurity via Ernst Bloch’s notion of critical utopias. Muñoz argues that sites of cultural production contain moments of “anticipatory illumination of queerness” (2019, p.22), and throughout the book, examines key instances of aesthetic manifestation that demonstrate the spatiotemporal contours of a queer futurity. Introducing the project, Esteban Muñoz states that “at the center of *Cruising Utopia* there is the idea of hope, which is both a critical affect and a methodology” (2019, p. 4). This, then, is core to the project of making queer VR: how to use hope, and how to enable it in a queerly inflected manner with VR. Esteban Muñoz’s work also stands in as a critique of what he calls “the antirelational turn in queer studies” (Esteban Muñoz, 2019, p. 11), most notably demonstrated by Leo Bersani’s book *Homos* (1996) and Lee Edelman’s *No Future* (2004). Esteban Muñoz instead insists “on the essential need for an understanding of queerness as collectivity” (2019, p. 11), and this relational approach is fundamental to my own queer methodology.

By examining Tony Just and Kevin McCarty's photography of queer spaces, Samuel L. Delany's memoirs, Kevin Aviance's dance performances and many other instances of queer cultural production, Esteban Muñoz gives an account of an eclectic political imaginary that critiques the assimilatory compromise of mainstream LGBT politics and instead argues for a queer politics rooted in radical hope. Esteban Muñoz's work recognises and argues for the importance of cultural production and worldbuilding as a critical queer activity. For a queer methodology, *Cruising Utopia* provides a very specific framework for understanding the utility and potential of VR. As a non-actual space that can be visited for only a short period of time, a VR experience can be used as a manifestation of a relational, hopeful, critical queer utopia. A VR experience, in which a participant stands in two places at once, physically located in a room they cannot see, seeing a place they cannot touch in actuality, can act as a utopian form of "temporal disorganization" (Esteban Muñoz, 2019, p. 97).

This utopia is not solely about escaping the present but is also intended to be a form of critique of what exists in the here and now. According to Esteban Muñoz,

Utopia is not about simply achieving happiness or freedom; utopia is in fact a casting of a picture of potentiality and possibility. This casting or imaging is also an act of negation. What is negated is the present in lieu of another time or place. Thus, utopia has a positive valence, that of a projection forward, and a negative function, which is the work of critique. (Esteban Muñoz, 2019, p. 125)

A utopian VR experience, in its non-actual yet experientially immersive qualities, can point "to what should be" (Esteban Muñoz, 2019, p. 64), while simultaneously critiquing what already is. Throughout the course of my project it has been entirely unthinkable that the eventual VR prototype would be a simulation of an experience of homophobia or bigotry; instead, it has always been about creating something that captures the delight, the joy, the nuanced and bittersweet sensations of being adjacent to the expected. It has always, fundamentally, been about finding the queer in the hopeful and the hopeful in the queer. In this way, it also critiques the absence of queer hope in the everyday, and the heteronormative forces that place it out of reach.

When considering the specific aesthetic properties that such a utopia should take, Esteban Muñoz argues that "the queer utopian project [...] is drawn to tastes, ideologies, and aesthetics that can only seem odd, strange, or indeed queer next to the muted striving of the practical and normalcy-desiring homosexual" (Esteban Muñoz, 2019, p. 26). This gives a queer methodology a

direct orientation to aesthetic development in VR; we see that the odd and strange are what we should be searching for in VR, and that the oddities of VR are what we should be celebrating, rather than trying to remove or hide such idiosyncrasies.

While his work does not consider digital technologies or VR, Esteban Muñoz's overt political understanding brings a crucial critical lens to considering what VR could and should be. If VR allows for users to visit another place, Esteban Muñoz's work argues that we should do what we can to ensure that this is a utopian manifestation that argues for wider possibilities amongst the everyday. In a queer methodology for VR, the goal is to create moments of "what Bloch described as a form of 'astonished contemplation'" treating VR as a space of potentiality, of "opening and indeterminacy" (Esteban Muñoz, 2019, pp. 5, 9). The goal, however, is not to create a space of total dislocation and transcendence. As discussed in Chapter Two, VR has stood at the forefront of a particular cultural conception of "cyberspace" as a potential realm of pure digitality, a kind of electronic heaven to upload the soul into. A queer utopia is always a critical utopia, tied to the concrete every day in its offering of a different set of possibilities. Rather than offering a smooth transition into frictionless simulation, a queer VR utopia uses the glitchy, fringe qualities of VR—features that mainstream development often aims to design out, such as bodily confusion or disorientation—as a core strategy to stay grounded.

4.1.2 *Queer Phenomenology: Orientations, Objects, Others*

Sara Ahmed's *Queer Phenomenology: Orientations, Objects, Others* (2006) sits amongst a body of work concerned with intersectional feminist scholarship and activism. *Strange Encounters: Embodied Others in Post-Coloniality* (2000) is an early examination of migration and coloniality, and her article "Collective Feelings: Or, the Impressions Left by Others" (2004) and ensuing book *The Cultural Politics of Emotion*, first published in 2004 with a second edition in 2014 that I cite here, show her concern with affect and embodied feeling as an aspect of politics. Using a phenomenological lens in *The Cultural Politics of Emotion* (2014), Ahmed considers how emotions work in nationalist and racist discourses. Describing the importance of orientation to her theory of affect, in *Queer Phenomenology* (2006) she summarises the earlier work of *The Cultural Politics of Emotion* and describes how she

worked with a phenomenological model of emotions as intentional: as being 'directed' toward objects. So when we feel fear, we feel fear of

something. I brought this model of emotional intentionality together with a model of affect as contact: we are affected by ‘what’ we come into contact with. In other words, emotions are directed to what we come into contact with: they move us ‘toward’ and ‘away’ from such objects. (Ahmed, 2006, p. 2, emphasis in original)

Queer Phenomenology (2006), a later volume, presents a reconsideration of sexual orientation through the lens of Merleau-Ponty’s phenomenology, including a reframing of Adrienne Rich’s concept of compulsory heterosexuality (1980). Rather than a psychoanalytic model of queerness—a common ground for queer theorising—Ahmed instead critiques Freudian understandings of female same-sex desire and offers a phenomenological perspective that builds on the model of emotional intentionality established in *The Cultural Politics of Emotion* (Ahmed, 2014). As a whole, her work on phenomenology, affect and sociality argues that skin, as a site of feeling and border of bodily integrity, is also a social surface created and mediated by our interactions with others: “the skin connects as well as contains” (Ahmed, 2006, p. 54).

Queer Phenomenology brings an embodied understanding to matters of sexuality and oppression, looking to understand “how bodies take shape through tending toward objects that are reachable, that are available within the bodily horizon” (Ahmed, 2006, p. 2). By closely examining the concept of “sexual orientation” in and of itself through a phenomenological lens, Ahmed questions what it means to be orientated, and what this means for how we understand sexuality; she “aims to show how bodies are gendered, sexualized, and raced by how they extend into space, ... [offering] in other words, ... a model of how bodies become orientated by how they take up time and space” (Ahmed, 2006, p. 5).

In her methodological introduction, Ahmed posits that “a queer phenomenology, perhaps, might start by redirecting our attention toward different objects, those that are ‘less proximate’ or even those that deviate or are deviant” (2006, p. 3). This particular lens, then, is something that I carry into a methodological approach for VR: thinking both how we can be redirected from “proximate” ways of working with VR towards deviations from the mainstream within its history, and further, how within VR we can encourage participants to turn towards encounters with the unexpected. Her focus on orientation within generational dynamics, in which to be queer is to choose lifelines that disrupt the production of a heterosexual family tree, leads her to observe that:

It is certainly desire that helps generate a lesbian landscape, a ground that is shaped by the paths that we follow in deviating from the

straight line. And yet, becoming a lesbian still remains a difficult line to follow. The lesbian body does not extend the shape of this world, as a world organized around the form of the heterosexual couple. (Ahmed, 2006, p. 20)

To take this phenomenological account of sexuality seriously in the context of VR is to question what lines of being are open for a participant in VR, and to work to make the lesbian body—and other queerly inflected bodies—a shape that can exist in the spatiality of a virtual environment. What shape such a queer body could take in VR—in a digital immersive landscape—is the question at hand.

In drawing on Ahmed's *Queer Phenomenology* to iterate and prototype for VR, my argument is that this model of desire and spatial orientation should be considered crucial in the design of virtual environments. When considering and designing embodied experiences of VR, a queer way of working would follow Ahmed's lead in understanding that:

What makes bodies different is how they inhabit space: space is not a container for the body; it does not contain the body as if the body were 'in it'. Rather bodies are submerged, such that they become the space they inhabit; in taking up space, bodies move through space and are affected by the 'where' of that movement. (Ahmed, 2006, p. 53)

Ahmed's queer phenomenology therefore complicates our understanding of immersion in VR as simply "being in it"—as if a participant or visitor to VR is a pre-existing and stable entity who is simply plonked into an inert virtual box. Instead, Ahmed's framework sees the body—and our embodied experiences—as constantly in processes of becoming, and therefore in applying Ahmed's queer phenomenology to VR, we should also see "being" within VR as a kind of submersion in which embodiment is a process of continual re-emergence in relation to the virtual environment.

The understanding of queerness as a phenomenological experience—in which we attend to "how the bodily direction 'toward' such objects affects how bodies inhabit spaces and how spaces inhabit bodies" (Ahmed, 2006, p. 23) as a core methodological concern—provides both a lens of analysis when examining examples of VR experiences, and an agenda for material experimentation when designing with VR. Adopting Ahmed's "politics of disorientation" can allow us to "face a different way" (Ahmed, 2006, p. 24), not just as a matter of speculative metaphor, but in material ways within VR experiences.

Identifying specific phenomenological experiences such as disorientation

as queer modes of disruption provides a potent model for what queer aesthetic and experiential strategies can be incorporated into developing unique embodied experiences in VR. By understanding the phenomenological experience of embodiment and sexual orientation as intimately linked, Ahmed's work suggests that design approaches of disruption, reconfiguration and repositioned embodied norms (such as in VR) can be understood as specifically queer aesthetics and experiences. Queer (dis)orientation can be utilised as a form of re-alignment of gender performativity, and assists us in thinking through how performativity (from Butler) unfolds in virtual environments. Ahmed's queer phenomenology gives us structure for thinking through the queer potentials of an affective lens, too, in that we can now have a goal for affective interventions; the goal is to create experiences—"structures of feeling" (Esteban Muñoz, 2019, p. 41)—that enable redirections and re-orientations away from the heteronormative and towards the queer.

4.2 Integrating Queer Theory in a Praxis for Digital Technology

The previous chapter provided a short introduction to some of the key ideas of queer theory, especially particular subfields or lines of thought that are most relevant to my project. In the previous section within this chapter, the work of both Sara Ahmed and Jose Esteban Muñoz is examined for its relevance to a queer methodology for VR. The scholarship of Ahmed and Esteban Muñoz has proven highly influential and impactful for the field of queer theory and has been taken up by creative practitioners in diverse fields. Research practitioners, artists and scholars in fields relevant to a practice-based VR project have engaged deeply with the provocations of queer theory generally (and Esteban Muñoz and Ahmed specifically) in order to interrogate, rethink and reshape digital technologies, including VR. Therefore, in the following sections of this chapter, I discuss examples that demonstrate how queer theory texts can be used in the development of critical aesthetic vocabularies, theoretical frameworks, and design strategies for queering digital technologies and Virtual Reality. These examples are crucial precedents that inform and shape my own approach to synthesising the insights of queer theory, Ahmed and Esteban Muñoz into a flexible and widely applicable queer methodology for VR.

4.2.1 Queer Technology Studies

I am using the term queer technology studies to refer to a loose coalition of writers working within new media studies, digital humanities, science and technology studies and queer theory. In their article “Queer Technologies: Affordances, Affect, Ambivalence”, Shaw and Sender ask, “What happens when we consider communication technologies as having sex and gender, when we queer media architectures and circuitry?” (2016, p. 1). Drawing on the work of new media scholars such as Lisa Nakamura and Wendy Chun, as well as science and technology studies theorist and multi-disciplinary scholar Donna Haraway, they ask:

How can queer theory and queer methodologies complicate our understanding of communication technologies, their structures and uses, and the cultural and political implications of these? And how can queer technologies and their uses inform debates about affect, temporality, and publics? (Shaw & Sender, 2016, p. 1)

This focus on affect, temporality, and publics—how we feel, what we feel, when and how we become people together—shows the concerns that arise when applying queer theory to questions of digital technology, and are therefore highly relevant concerns for my practice-based investigation of VR.

Contemporary queer technology studies scholar-practitioners such as Zach Blas and Micha Cárdenas (Blas & Cárdenas, 2013) have done extensive work to develop nuanced and specific theory-practice relationships, in which digital technologies shape iterations of queerness, and queerness drives a more radical agenda for digital technologies. Their article “Imaginary Computation Systems: Queer Technologies and Transreal Aesthetics” (Blas & Cárdenas, 2013) provides an overview of both authors’ speculative design practices in queer technologies (Blas) and transreal aesthetics (Cárdenas). The projects bridge a variety of material and conceptual grounds; the project *ENgendering Gender Changers* presents rethought cable adapters that challenge the industry-standard phallogentric “male”/“female” plugs, while *Gay Bombs* provides a manifesto and “how to” guide for queer technological activism, and discusses “viral aesthetics” as a way to embed work within capitalism while remaining critical of this context. Their work shows that queer political principles can be explored and manifested via practice-based explorations. Their particular emphasis on speculative worldbuilding gives a guide for a set of strategies for the critical task of “exposing, playing with, and reconfiguring digital technologies to make them align more with our politics and desires” (Blas & Cárdenas, 2013, p. 565).

Kara Keeling's 2014 article "Queer OS" (2014) is a particularly valuable contribution to queer technology studies and practices. In her article, she argues that:

The materiality, rhetorics, forms, and ontologies of new media readily lend themselves to a theoretical encounter with queer theory that might enliven and enrich both film and media studies and queer theory, thus deepening the capacity of each to attend to the sociopolitical registers of contemporary life. (Keeling, 2014, p. 152)

This is of particular relevance to my project: considering not just what queer theory offers to working with Virtual Reality, but also what engagement with emergent media such as VR can contribute to the field of queer theory. A significant aspect of my queer methodology for VR is the exploration and manifestation of queer principles and goals in a material sense, in a format that is experiential and unique in its affordances; this presents the opportunity for novel findings outside the bounds of textual scholarship.

Keeling notes that scholarship appropriate to a Queer OS (operating system) already exists, and that it is necessary to make connections, agendas and analysis more explicitly collected under the rubric of Queer OS. Crucially, she argues that a Queer OS is not a siloed, solitary endeavour. She argues in particular that phenomena and experiences such as race, class and gender, disability are "mutually constitutive with sexuality and with media and information technologies" (Keeling, 2014, p. 153) and that therefore, thinking about any of them in isolation is doomed; instead, a Queer OS necessitates intersectional ways of working.

Keeling's article was revisited in 2016 in "Queer OS: A User's Manual" (Barnett et al., 2016), which provides the collective authors' (including the previously mentioned Blas) own model of Keeling's Queer OS. They argue specifically for "a relational, embodied, and transformative interface" (Barnett et al., 2016, p. 52). Their suggested queer praxis for digital technology also argues for a specific way of understanding the digital technologies at hand. They focus on the interface as the meeting point of person and technology, as the site that "binds together, mutually or reciprocally" (Barnett et al., 2016, p. 52). They argue that a queer strategy for digital technology focuses intently on the performance of this connection and what emerges from this activity of entanglement; they question—and re-conceptualise—"those forms of action that qualify as legible to the operation of our system" (Barnett et al., 2016, p. 52). Taking this provocation into account in the realm of VR specifically, a queer praxis for VR therefore pays close attention to the interface point where a person becomes a

“user” or participant, and in turn becomes a visitor, and where skin becomes a surface within a virtual environment.

Further contemporary work such as *Introduction to Queer Circuits: Critical Performance and Digital Praxis* (Haber & Sander, 2018) posit that critical approaches to digital culture on the one hand, and queer and performance studies on the other, have “bidirectional” opportunities (Haber & Sander, 2018, p. 97). Haber and Sander argue that desire and embodiment are a crucial queer strategy for understanding and configuring our digital contexts, critiquing the loss of a focus on “embodiment, sex, and erotic possibility” (Haber & Sander, 2018, p. 101). While they do not mention VR specifically, their line of thinking shows a potential compatibility with their goals and the particular qualities of VR.

In their argument for the goals of a queer praxis with digital technologies, Haber and Sander identify a representation-oriented agenda as a strategic misstep: they point out that corporations such as Meta (Facebook, at the time) implement opportunities for users to declare identities such as queer, gay or lesbian as a way for Meta to collect data for marketing purposes. Instead, the authors call for a return to intersectional approaches, drawing on Esteban Muñoz’s previously discussed work, especially his emphasis on ephemera and ephemeral performance as a form of queer evidence. In a digital context, when working against the motivations of capitalist data accumulation, queer ephemerality becomes a strategy to disrupt the record-keeping and profiteering of the platforms we use, while still working towards manifesting expansive modes of sociality that allow us to live queerly. They state: “In developing our own archives, then, the task shifts from bolstering the traces of queer life and experience to developing a politics around opacity and transparency, deletion and preservation” (Haber & Sander, 2018, p. 101).

This engagement with opacity, visibility, transparency and data privacy in general is also reflected in Zach Blas’ work, such as the *Facial Weaponization Suite*, developed over 2012–2014. Including works such as *Fag Face Mask* (2012), the *Facial Weaponization Suite* uses facial biometric data collected from a group of participants to critique the ubiquity of this very technology, “protest[ing] against biometric facial recognition—and the inequalities these technologies propagate” (Blas, n.d.) with masks that, while made from facial data, appear as warped, twisted blobs (shown in Figure 4-1).

The series of masks engages with questions of visibility, vulnerability and public life through a range of lenses, with *Fag Face Mask* (2012) centred on the unfortunately-very-real concept of using facial recognition to “out” or

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Figure 4-1

Photograph of Fag Face Mask (2012) from the Facial Weaponization Suite by Zach Blas

Note. From *Fag Face Mask* [Photograph], by Z. Blas, 2012, Zach Blas (<https://zachblas.info/works/facial-weaponization-suite/>).

identify gayness. Another looks to the semiotic meaning of blackness alongside the failure of common facial recognition algorithms in cameras to properly recognise and adjust to the skin-tones of black subjects. A third mask looks at the concept of masking through a feminist lens. This range of conceptual anchoring shows an intersectional approach, and how a queer way of working can engage productively with related, allied experiences of similar yet distinctively nuanced oppressions.

A key challenge, then, for my development of a queer methodology for VR is incorporating these concerns around data and wider architectures of digital technology in my own development of Virtual Reality. It is clear that a core concern for a queer way of working with VR is the question of what data is being monitored, saved and re-represented, especially if we are to follow Haber and Sander's and Barnett et al.'s call for critical engagement with embodiment, sexuality, desire and eroticism, a potent but vulnerable set of concentrations amongst which to be recording and using data.

As a call to action, Barnett et al.'s article "Queer OS: A User's Manual" (2016) draws out key qualities that bring together tenets of queer theory with compatible digital strategies. Rather than concrete rules, their article provides speculative provocation and gestures towards a queer digital future. Alongside a focus on embodiment and performative interface they argue for modification and boundary-crossing, echoing the queer methods of Judith Butler previously discussed. With slippage, fluidity and subversion as implicit methodological goals, the authors contextualise this in the realm of digital embodiment and ask:

What might it mean to construct an interface with the capacity for co-constitutive modification, ... which connects and transforms us, an infectious intimacy in which bodies are open to the transformation that arises from one to another? What would it mean for an interface to take self-modification as its ontological premise, such that interaction with an interface might transform both the user and the system?
(Barnett et al., 2016, p. 52)

They specifically argue that distinctions between individuals, between the self and the other, between the self and environment, should be disrupted via an interface "In which the self is shattered such that the mediating skin of the interface disappears but is not naturalized, through which we might acknowledge the always already mediated nature of our interactions as between and among one another" (Barnett et al., 2016, p. 53).

This gestures to an important consideration in integrating queer theory with

creative digital technology practices: that what we create is intended to cause reflection upon our relations with technology and self, and additionally, our much wider relations, too.

In the article “Toward a Queer Digital Humanities”, authors Ruberg, Boyd & Howe explain:

“Queer” can also act as a verb: to queer is to destabilize, to subvert, or to unearth queer desire beneath the surface. Amplifying a long-standing thread within queer theory of attending to the interplays between queerness and race, contemporary queer studies scholars are increasingly considering queerness within an intersectional context, addressing how queer issues are interwoven with questions of race and ethnicity, class, socioeconomics, and disability (Chen; McRuer; Muñoz). In a fundamental sense, however, what unifies uses of “queer” is that the word still contains at its heart a basic desire to live life, and to understand life, “otherwise” (Halberstam, “Queer Art,” 2). (Ruberg et al., 2018, p. 110)

This overview of queer technology studies shows that both theoretical and practice-based work has been done to develop and extend the insights of queer theory in the realm of digital media such as Virtual Reality, doing the work of occupying and deploying “queer” as a verb. This is the fundamental premise of a queer methodology for VR—that queerness is a method of *doing* that we can apply to digital media, specifically VR. For queer technology studies, living and understanding life otherwise also means living, understanding, and working with our digital tools otherwise. As pointed out by the authors—and as present in previous examples discussed in this section—this otherwiseness also must be considered as an interwoven alliance with other minoritarian subjects who also find themselves outside of the norm.

4.2.2 Queer Video Game Studies

Queer video games studies is an emergent field that sits in relation to queer technology studies and shares similar concerns, although it focuses on slightly different material in its analysis. While my VR design experimentation is not intended to be a video game per se, drawing on queer video game studies acknowledges the significant influence and importance of video game industries and creative networks for VR development, especially as the two most prominent game engines used in industry—*Unity* game engine and *Unreal* game engine—are the primary available tools for developing VR experiences. Furthermore, as James Ash argues in *The Interface Envelope: Gaming*,

Technology, Power, “videogame interfaces are at the forefront of interface technology, both in terms of the devices used to control videogames and in terms of the software engines that run the games themselves” (Ash, 2015, p. 3). Video games are often the format in which the majority of the public first encounter novel interfaces such as gesture control; familiar examples include the controllers of the Nintendo Wii or the body-tracking Xbox Kinect camera (Ash, 2015). While queer video games and video game developers have existed throughout the history of the medium, a publicly identifiable collective community of queer game makers, critics and scholars is a more recent development. Naomi Clark and Merritt Kopas, in their keynote presentation *Queering Human-Game Relations* at the Queerness and Games Conference (Clark & Kopas, 2014), provide an overview of queer games studies and creative production and identify 2012-13 as the start of a recognisable and relatively robust queer games scene.

Queer video games studies and the creative networks that it examines are highly concerned with how storytelling, immersive environments and digital technology interfaces reflect and reinforce cultural values of gender and sexuality. Bo Ruberg is a key scholar in this field, bringing together queer studies, new media studies and emergent video games analysis in a varied series of articles and books. In their 2018 article in *GLQ*, “Queerness and Video Games: Queer Game Studies and New Perspectives through Play” (2018) Ruberg argues that the concept of “play” is the key overlapping quality of video games studies and queer studies, with play being a generative method in both fields, as well as the goal for praxis that combines the two: “play” as an experience to be encouraged and lived amongst. In addition to previously mentioned scholars in queer technology studies, Ruberg also argues that representation is a limiting approach, and that rather than focusing on the inclusion of LGBTQIA+ characters in video game narratives, there are wider opportunities for the structure of games to incorporate queer ways of working, doing and being. Ruberg argues for the body and embodiment as the specific site where this methodological interest in play can manifest, stating that:

Ultimately, it is in the body that queerness meets video games.

Both approaching video games through queerness and approaching queerness through video games represent experiments in bringing the queer body—its desires, its loss, its expression of self—to press up against a game, to see where the two attract and where they repel, to form an intimate, erotic, and often subversive connection between the embodied experiences of queerness, the beauties and dangers of LGBTQ lives, and the medium of video games. (Ruberg, 2018, p. 553)

Ruberg's later book *The Queer Games Avant-Garde* (Ruberg, 2020a) provides an ethnographic study and media analysis of creatives working to create queer games, identifying game designers such as Robert Yang who are critically engaging with the medium of games through a queer lens. In Chapter Twelve, Ruberg details the work of Seanna Musgrave, a developer working at the time at VRChat, a key social VR platform that is still very active and prominent in the contemporary VR landscape. Musgrave's work, *Animal Massage* (2016), is part of a larger project called VR Spa, produced by the Portland Immersive Media Group. *Animal Massage* is a VR experience that considers the contextual, physical environment that a participant remains present in, even as they visit a virtual world. Participants lie down on a comfortable bed, and Musgrave touches the participant as calming visuals surround them in Virtual Reality:

When a bird flies overhead, Musgrave brushes a feather past the player's body; when the player sees themselves snuggled by kittens, Musgrave nuzzles the player's real-life cheeks with a pair of fuzzy mittens. The result is a multisensory experience that is at once sweet and strange. It is part spectacle (for non-players who have gathered to watch) and part queer, sensual exchange between Musgrave and her player. (Ruberg, 2020b, p. 143)

Ruberg astutely identifies that Musgrave's work is not overly concerned with representational regimes, or with asking participants to "step into the shoes" of a queer experience of oppression. Instead, the work uses the evocative potential of touch and embodiment, and the threshold of the skin, to create a more complex and queerly considered Virtual Reality experience that provides an unusual mode of sociality. Musgrave herself states that:

Animal Massage is a really tactile game. A lot of people focus on the visual and audio component of vr, but my focus in vr is on feeling. ... A lot of my games are touchy-feely, and part of that is figuring out how to relate to people, especially strangers. For me, that's related to being queer and being trans. When you're queer and trans, your methods of being in relationships and relating to others are more improvised. We need to figure out our own ways of forming relationships. (Ruberg, 2020b, p. 148)

This is a complex quote, rich with ideas relevant to the project at hand. The linking of VR with affordances of *touchy-feely-ness* is a crucial insight for material experimentation and suggests a key aesthetic focus for prototyping for queer VR, with significant compatibility with the theoretical insights of Eve Kosofsky Sedgwick, as outlined earlier in the discussion of affect. The linking of

touch itself with feeling, with a wide range of bodily and emotive sensations—a link that Sedgwick herself makes—draws us towards an affective mode of attention for what VR can achieve. Subsequently, Musgrave explains that to be queer and trans is to have a critical, or perhaps incongruent, relation to the normative expectations around these affective experiences. This combination of all three—VR, queer subjectivity, and affective experimentation and subversion—is something that emerges more fully through later analysis of my own work.

Further scholarly material such as the “Queerness and Video Games” special issue of *Games Studies*, edited by Bo Ruberg and Amanda Phillips (2018) demonstrates a wide range of provocative and insightful queer analyses of video game narrative and interface design. This scholarship challenges and extends the instrumentalist approach of traditional HCI research and brings a more rigorous, socially situated approach to the aesthetics, narrative and interaction design of digital media experiences such as VR. The article “Queering Control(lers) Through Reflective Game Design Practices” by Jess Marcotte (2018) describes both the “hegemonic status quo of mainstream game design” (Marcotte, 2018, para. 1) and queer ways of disrupting, subverting or challenging the identified norms of controller design. Marcotte argues that the norms of game design “prioritize smooth, seamless experiences that are designed to be self-effacing and encourage subjugation into the flow state. These norms within game design best practices tacitly support other hegemonic practices” (Marcotte, 2018, para. 39).

Marcotte draws a link between the material qualities of game design and the wider political and cultural meaning embedded in these experiences. While designing with video game controllers in an expected, industry-standard way does not immediately register as overtly heterosexist or homophobic, Marcotte is suggesting that the strength of this normative drive in one small facet, like controllers, is a reflection and manifestation of wider normative effects that overall, work to foreclose queer opportunities. Marcotte is therefore positioning their proposal for alternative controllers as a specifically anti-normative tactic that can be used for a queer methodology. They argue that “we can and should create gameplay experiences by taking players out of the flow state and away from seamless, invisible experience” (Marcotte, 2018, para. 39), and that alternative controllers are one way to provide affective experiences of boredom, confusion, and “any number of the other emotions that are part of the spectrum of human experience beyond the limited set that flow and industry best practices encourage” (Marcotte, 2018, para. 39). This is particularly useful to integrate into a queer approach to VR, as the use of VR controllers is not entirely standardised yet; there is a prime opportunity to experiment with

the affective impacts of controller usage, and to consider what is normalised (and why) in how participants are expected to engage with controllers. Instead of solely focusing on experiences of pleasure and frictionless concentration (such as through “flow states”), a queer methodology for VR can use controllers to dis- and re-orient towards queerer possibilities.

While video games are not always VR, and VR experiences are not always games, the development of a critical queer games studies demonstrates a successful development of strong community discourse surrounding a particular digital medium with close relations to VR. The methodological concerns and techniques demonstrated by both the scholarship and creative practices of queer video games studies are key touchpoints for a queer methodology for VR, demonstrating how the frameworks, concepts and goals of queer theory can be activated via specific techniques and approaches to craft.

4.2.3 Queer Affects in VR

Queer technology studies and queer video games studies are both crucial contextualising fields that I have drawn on in the development of my queer methodology for VR. Now we will consider how queer theory or queer positioning has been deployed in the development of Virtual Reality more specifically. The article “The Weird Giggle: Attending to Affect in Virtual Reality” by Kozel, Gibson and Martelli (2018) uses phenomenology and affect theory to discuss a VR artwork made by one of the authors. Their explanation of affect theory, especially the work of Kosofsky Sedgwick, draws an explicit link between affect theory and queer theory, and their article puts forward an argument for the value of “the spirit of the weird giggle, a mix of strangeness and delight that arises when expectations do not quite map directly onto perceptual flow and create a small rupture like a ‘shimmer’” (Kozel et al., 2018, p. 2).

The VR work *MAN A VR* (2015) (Figure 4-2 and Figure 4-3) presents a world where dance performers are represented by strange, blocky, geometric shapes patterned with black and white spots or stripes, against a background of a similar pattern. These dancers perform a Skinner Release Technique activity, a somatic dance practice not originally intended to be reproduced in VR. By combining affect theory and phenomenology to analyse this particular VR work, the authors are able to identify crucial junctures in the experience where the piece has enabled embodied reactions and to consider the significance of this more broadly.



Figure 4-2

Image captured from first person view within MAN A VR (2015) showing striped dancing figures against a similarly striped background

Note. Screenshot captured by researcher from documentation video *MAN A VR 2015* [Video], by R. Gibson and B. Martinelli, 2016, Vimeo (<https://vimeo.com/189308777>).

They draw on Kosofsky Sedgwick’s affect theory to argue for the value of contradiction within affective experiences: “one can be excited by anger, disgusted by shame or surprised by joy” (Kozel et al., 2018, p. 5). They link this specifically to the kind of embodied experiences available via VR, especially “the weird giggle” that gives the article its title. They link the creation and experience of these affective experiences with a political perspective, arguing that it is possible to use VR to “shift affective patterns and expand a somatic register according to which it is possible for bodies to act and re-act” (Kozel et al., 2018, p. 6). For a queer methodology for VR, this is an essential recognition. If, in drawing on Sara Ahmed’s *Queer Phenomenology* (Ahmed, 2006), the goal is to dis- and re-orient away from heteronormativity and towards queerer possibilities, this then shows that considering the affective experience created by the VR experience is an essential part of the process. The affective realm, and more specifically, contradiction, shifting, and expansion of what is considered “normal” to feel, is a particularly vital strategy for creating queer VR experiences.

Kozel et al. identify that the potential disorientation and unfamiliarity of VR is often spoken about negatively, but working from their perspective grounded in

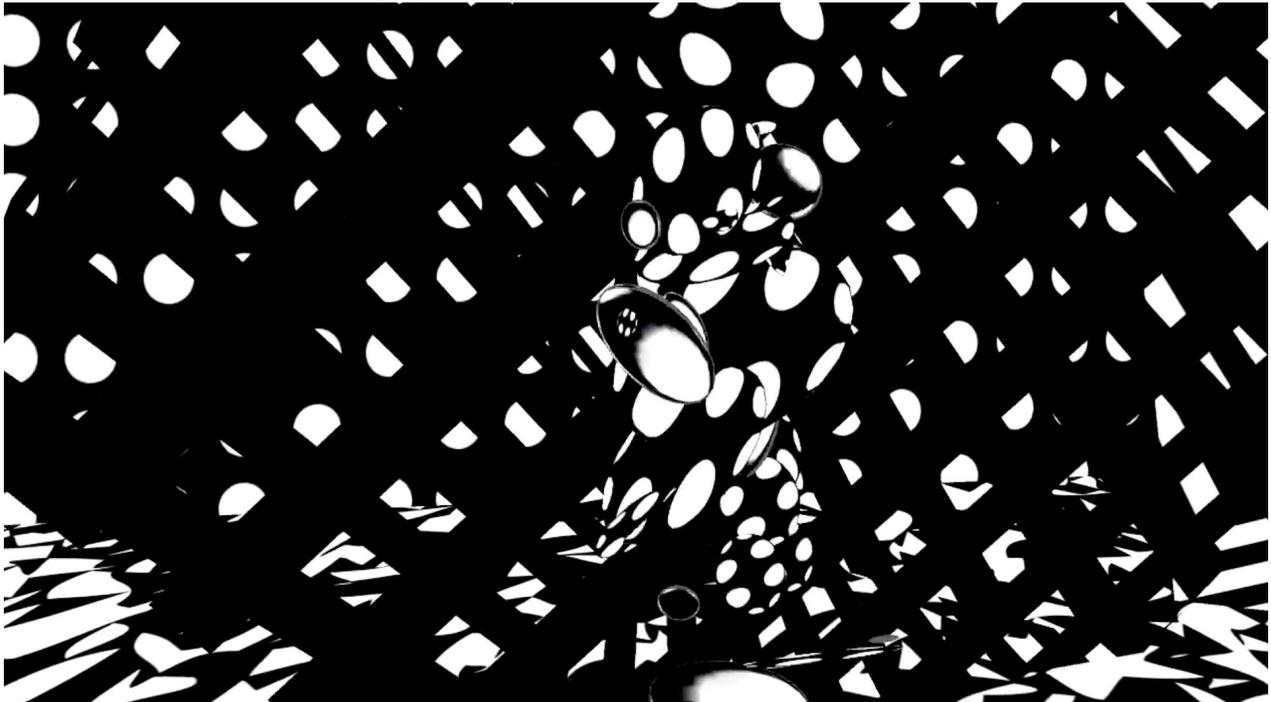


Figure 4-3

Image captured from first person perspective in MAN A VR (2015), showing a dancing figure consisting of ovals and spheres patterned with circles, against a background of similar circular patterns

Note. Screenshot captured by researcher from documentation video *MAN A VR 2015* [Video], by R. Gibson and B. Martinelli, 2016, Vimeo (<https://vimeo.com/189308777>).

phenomenology, affect theory and the Skinner Release Technique, “abstraction and loss of orientation ... are powerful indicators of releasing old habits and opening scope for new ones” (Kozel et al., 2018, p. 14). Their overall argument shows that phenomenological description and analysis of the affective qualities of a VR experience is a vital rubric for evaluating embodied experiences in VR. They describe how, for participants of the VR experience, “some qualities evoke familiar affective designations, such as vulnerability, surprise, restlessness, unease, but others merge affect with kinaesthetic or perceptual qualities like undulations, calling to touch, thwarting, bleed-through, hitch, and eyes in the back of the head” (Kozel et al., 2018, p. 19).

Kozel et al. have crucially identified the ways in which embodied norms can be expanded in VR, and what language and concepts can be used to describe the sensorial and affective experiences that participants may experience, beyond the everyday vocabulary of feeling. While not explicitly queer in its orientation, there is a common goal to their project and my own—challenging established bodily norms and providing an expansive embodied experience with VR. Their framework of analysis provides crucial guidance regarding the aesthetic

and affective strategies that can be taken up by a queer methodology when designing VR.

Scholars such as Sonia Misra (2020) have used queer theory, specifically Ahmed’s *Queer Phenomenology* (2006), to examine contemporary queer cinematic Virtual Reality projects such as Jacolby Satterwhite’s *Domestika* (2017), seen in Figure 4-4. Misra argues that experiences of disrupted agency and partial immersion found in VR should be understood as queer meaning-making strategies, based on Ahmed’s understanding of queer disorientation as a way of turning away or being (dis)oriented away from heterosexual paths. Other crucial precedents include *Virtual Drag* (2017) (seen in Figure 4-5), an Australian produced VR experience containing 3D photogrammetry scans of drag performers. It expands and extends queer strategies for VR, especially in the visual language for recording and manifesting performer bodies, with glitchy, porous, fragmented forms. I discuss both these examples in depth in the article “Fractured and Fragmented Selves: Queer Approaches to Designing Virtual Experiences”, co-authored with Dr. Andrew Burrell (2023), attached here in Appendix D.

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Figure 4-4

Image captured from first person perspective from within Domestika (2017), showing large fantastical pyramid and spaceship surrounded by smaller flying entities

Note. Captured by researcher from within VR experience *Domestika* [Virtual Reality Experience], by J. Satterwhite, 2017, The New Museum (<https://www.newmuseum.org/exhibitions/view/artists-vr>).



Figure 4-5

Image from within Virtual Drag (2017) VR experience showing drag queen figure in pink celestial landscape, with repeated iterations behind her

Note. Captured by researcher from 360 video VR experience *Virtual Drag - 360 VR Video* [360 Video], by A. Bennett, M. Beckwith, M. Payne, 2017, YouTube (<https://www.youtube.com/watch?v=W3sTRVKZUyU>).

These examples demonstrate emerging community visual and interactive languages for working with VR and virtual environments, demonstrating how to manifest principles from queer theory with the affordances of digital materials. These are the contexts that my own work draws on, speaks to and contributes to.

4.3 *Activating Queer Scholarship for VR*

This chapter has built on the foundation of queer theory in the previous chapter in order to extract specific insights that can be used as the grounding of a queer methodology for VR. *Cruising Utopia* by Esteban Muñoz (2019) and *Queer Phenomenology* by Sara Ahmed (2006) in particular, while not directly concerned with digital technologies such as VR, offer key insights into aesthetic and experiential understandings of queerness and how material experimentations in the medium of VR could be implemented to create instances of queer utopia. They offer analytic viewpoints useful both for understanding experiences of VR, and as the starting point for a queer methodology for VR that we can use to work towards a more politically situated, rigorous and rich set of virtual worlds and embodied possibilities. Rather than focusing on creating realism-oriented representation of queer individuals or narratives, the queer methodology that is detailed in Chapter Eight aims to create bodily, affective experiences for a participant. Rather than aiming to demonstrate the ills of homophobia by depicting oppression to scare straight people into behaving more considerately, this queer methodology aims to open up queer sensory experiences as a positive space of potentiality, giving us new lines of access to queerness and to each other. To do this, my methodology takes up the suggested experiential and aesthetic strategies outlined by scholars and practitioners who have brought a queer or queerly-aligned perspective to digital technologies, new media art, and video games: opacity and visibility, intimacy and touch, strange or unexpected affective qualities, playfulness, sociality, contradiction and ambiguity. These goals and set of focuses give us potent avenues to explore when designing embodied experiences in VR and are fully explicated within my queer methodology for VR.

In the next chapter, I look to cyberfeminism as an example of how theory and practice have been combined to create explorations of gender and technology. This provides a crucial model for my queer approach to VR, while also providing specific insights into how we can understand gendered and queered embodiment in association with Virtual Reality and similar digital technologies.

Chapter Five:

*Cyberfeminism and
the Potentials of Slime*

5.1 *Slime as a Digital Material*

When I first started making VR years ago, I wanted slime, goo, and stickiness. I had only a beginner's rudimentary understanding of working with Unity game engine. I started with images of water that I tinted green or bright blue, which were then placed on flat surfaces and default spheres or rectangles (seen in Figure 5-1). These early attempts were simple and clumsy, looking like early video game graphics in their sparseness.

As I learnt more about the system I tried using Unity packages such as VertExmotion, which uses a shader-based system to deform the appearance of an object, serving as a kind of rudimentary physics simulation that meant objects wiggled and jiggled satisfyingly as I yanked them around (shown in Figure 5-2). The problem of making slime was never quite solved, though. If you want slime, do you use a liquid particle system? Do you make a mesh, give it cloth physics, and make it flop around? Is it a liquid—in CGI terms, a collection of particles—or a solid—a mesh, a 3D object defined by vertices and triangles? How do I make something in between out of these two options? Is a shader on a mesh—a moving surface on a discrete object—a digital slime, or just the illusion of it?

Why did I want slime? I still want slime in my work now. It comes from a sensorial fascination as well as the history of cyberfeminist design practice in the 1990s, which heavily featured textures and aesthetics along the lines of sliminess. It also comes simply from the challenge of it—the more I investigated, the more complicated the problem of making digital slime revealed itself to be, and in turn, the more interesting it became. Slime is a lacuna, a physical thing that cannot be easily reproduced in the digital. Attempting to create digital slime became a way for me to learn the practicalities of working with a game engine, to test its boundaries, as well as the boundaries and nuances of cyberfeminist history.

This chapter will look at some of the theoretical underpinnings of cyberfeminism, and examine how cyberfeminism understands embodiment and VR. This chapter will then turn to a closer examination of slime and provide a consideration of how this aesthetic and conceptual substance can be part of a queer methodology for VR.

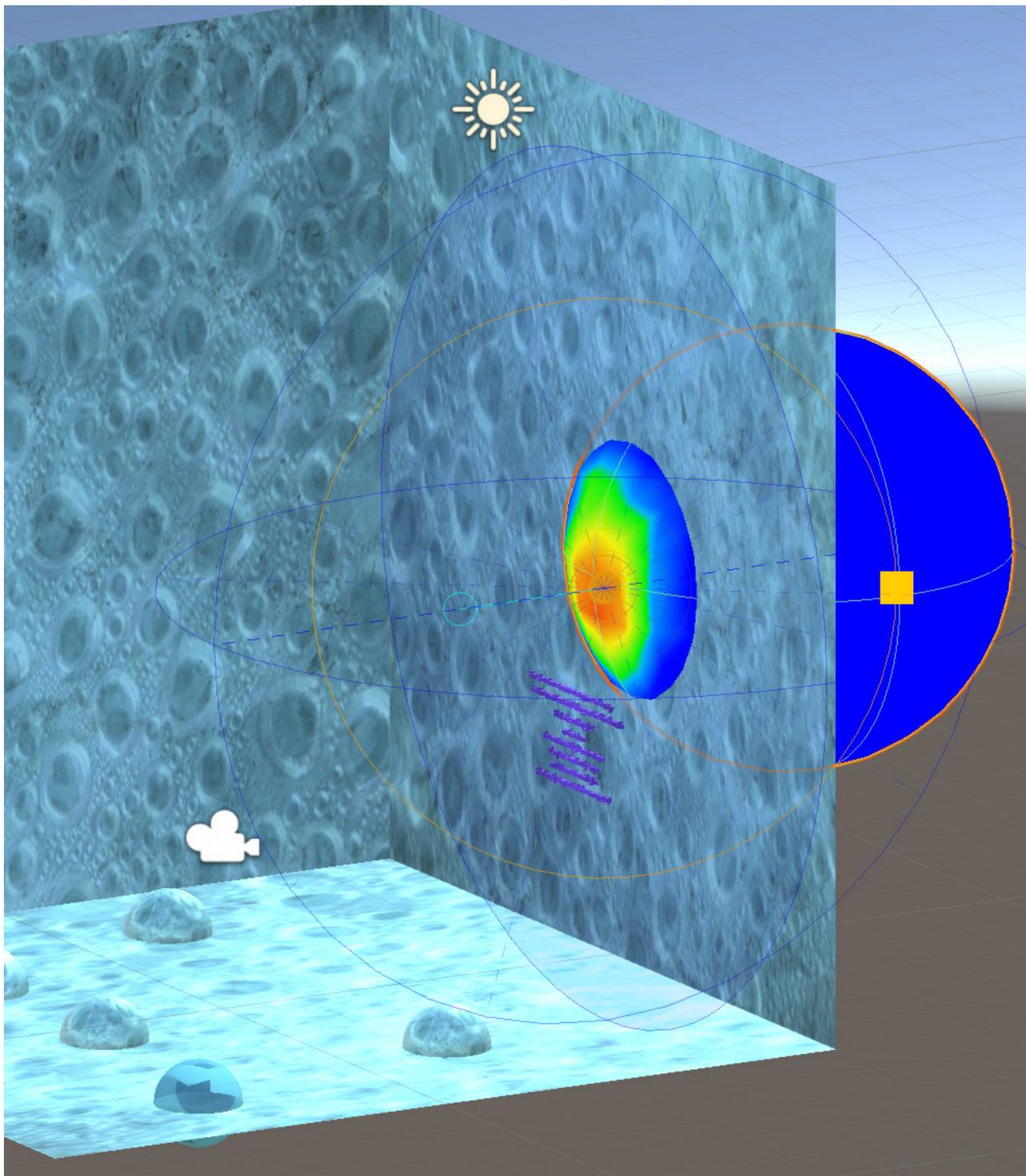


Figure 5-1

Early experimentation by researcher with slime textures as part of Sappho's Ghost (2018) development

Note. Screenshot captured in 2018 within Unity Game Engine by researcher.



Figure 5-2

First person perspective of participant's hand touching text within Sappho's Ghost (2018)

Note. Image captured by researcher from first person perspective within VR experience *Sappho's Ghost* [VR Experience], by the researcher, 2018.

Rather than presenting a comprehensive history of all the varied manifestations of cyberfeminist impulses, sparks, touches and reimaginings, my goal with this chapter is to sketch out a sense of a community of practice for cyberfeminism, with inevitably varied aims that nevertheless coalesced through shared social, creative, and intellectual labour. Cyberfeminism involved experimentation and exploration of digital communication media (such as early forms of connectivity that would later become the internet), and crucially, it proposed new ways of working with technology *via* experiments with the technology in question. This approach has had lasting impacts on contemporary critical praxis that engages with digital technology. By looking at the history of cyberfeminism, we can recognise a mode of creative praxis that acts as a forebear to a queer methodology for VR. Cyberfeminism also provides crucial theoretical and practice-based approaches to the specific quandary of embodied relations with digital technologies, a key tension identified in Chapter Two. Rather than seeing digital technologies as a tool to escape the body, or aiming to “accurately” reproduce a mimetic copy of the physical body in digital form, cyberfeminism sees the juncture of physical and digital embodiment as an opportunity for manipulation, malleability and fluctuation that is mutually transformative of both flesh and technology. This generative understanding is core to my queer methodological approach.

After an introductory examination of the history of cyberfeminism this chapter will look at the work of Sadie Plant in her field-defining book *Zeroes and Ones* (1998), which gives a history of how knowledge is valued when it is understood as disembodied, and how in concert with this, womanhood is defined as being an embodied material without knowledge. Plant’s argument is that to confront both of these paradigms, cyberfeminism should recognise women’s contribution to significant epistemological shifts (such as Ada Lovelace’s contributions to the field of computing), while also recognising embodied materiality as a source and form of knowledge.

Following this discussion, we will then look at creative practitioners, including the iconic VNS Matrix, a group originating from Tartanya/Adelaide—who coined the term cyberfeminism at a very similar time to Sadie Plant—and Linda Dement, a fellow Australian cyberfeminist artist. After examining the practice-based strategies of these artists, we will then consider slime and its crucial role in cyberfeminist aesthetics as a whole, followed by a discussion of how we can use slime as part of a queer methodology for Virtual Reality.

5.2 *Cyberfeminist Origins*

Cyberfeminism provides a set of examples of rigorous critical engagement with digital technologies based in feminist theoretical foundations. These historical critical engagements can be integrated with a contemporary, queer approach to VR. While my primary theoretical lens is queer theory, as outlined in the previous chapters, feminist theory is also a significant contributor to queer theory, with notable scholarly cross-pollination. In bringing queer theory (and queer technology studies and queer video games studies) into conversation with cyberfeminism, I am recognising that they are co-informed practices with differing—but compatible—legacies. The insights and approaches of cyberfeminism are particularly helpful for a queer methodology for VR when critiquing normative practices in VR and proposing alternative development goals, especially as cyberfeminism emerged during key early stages of VR's rise as a potential consumer product in the 1990s. Cyberfeminism engages critically with what were at the time newly emerging ideals, and shows the potential for an alternative way of understanding VR both then and now. Cyberfeminism is also particularly concerned with the interrelation of digital technologies and gendered embodiment and therefore provides a set of conceptual and practice-based tools for working through the tensions identified in the second Chapter, Histories of Embodiment in VR. Embodiment in VR is contested ground, and cyberfeminism provides critical analysis that can elucidate the gendered implications of embodiment in VR specifically.

The term cyberfeminism itself was coined fairly simultaneously in 1991 by Sadie Plant in England and VNS Matrix in Australia (Hosea, 2019). Both groups drew significant inspiration from Donna Haraway's *Cyborg Manifesto*, first published in 1985 and republished in numerous collections since. Cyberfeminism was a reaction to, and development of, techno-utopian thinking that emerged as digital connectivity became accessible to Western consumers via nascent networked media (such as the now obsolete fax machine). There was also a specific focus on bringing digital connectivity to audiences and people who felt excluded from working with digital technology, especially women (Plant, 1998; Sollfrank, 2019).

VNS matrix, Sadie Plant and other practitioners and researchers within the cyberfeminist movement expanded upon a feminist position informed by post-structuralist feminist theory, in particular the *écriture féminine* of Hélène Cixous and Luce Irigaray. Cyberfeminism aligned with the feminist post-structuralist “attack [on] the notion of fixed and unitary cultural identities” (Humm, 2003, p. 216) and brought this critical lens to emerging information technologies

and digital consumer products. While certainly concerned with the goal of disrupting the sense of digital technology as “men’s tools” in order for women to gain access to digital technology, scholars such as Birgitta Hosea note that “cyberfeminism did not simply argue for equality of access to digital technology, but for a profound rethinking of how to use it” (Hosea, 2019, p.138). Key cyberfeminist theorist Judy Wajcman also states that for the cyberfeminists of the 1990s, “the Internet provided the technological basis for a new form of society that is potentially liberating for women” (Wajcman, 2006, p. 12). The goals of cyberfeminists were wide ranging and mutually entangled—to shape emerging, new technologies along feminist axes, and to reshape gender via this technological blossoming.

Coming later, technofeminism is a response to cyberfeminism, emerging in the mid-2000s with the work of Judy Wajcman (2004, 2006). It consolidated development in science and technology studies and feminist science and technology studies to respond more broadly to the interrelations of gender and other axes of oppression with technologies. Less focused on the specificities of digital networked technologies such as the internet, and instead taking a more generalist approach to science and technology (Sollfrank, 2019), technofeminist scholarship drew forth critique of broader technologies of gender, such as medicine and assisted reproductive technologies. My own work does not draw significantly upon technofeminism, but recognises its position in relevant lineages of feminist scholarship.

The scholarship, creative practice and communities of cyberfeminism and technofeminism have been highly influential in creative digital practices. In a contemporary context, the resonance of cyberfeminism and technofeminism with queer perspectives has become more explicitly acknowledged. Contemporary projects such as Mindy Seu’s *Cyberfeminism Index* (2022) and *Glitch Feminism* by Legacy Russell (2020), as well as retrospective discussions by V.N.S. Matrix, note the emergent queer qualities of the work that is now visible to a contemporary audience.

5.3 *Enacting Cyberfeminism*

VNS matrix is an artist collective originating from Tartanya/Adelaide, consisting of members V Barratt, Francesca da Rimini, Julianne Pierce and Josephine Starrs. Founded in 1991, their originating manifesto, “The Cyberfeminist Manifesto for the 21st Century” was printed at Tin Sheds, at the time an independent art studio located in the University of Sydney, and then posted

on a public billboard in Sydney. Throughout their history as a collective, they worked across digital and print media and often showed their work as installations that brought together multiple works. More recently, their corpus is being recognised for the significance it holds for cyberfeminism, featuring in Mindy Seu's *Cyberfeminist Index* (2022), a comprehensive and ever-growing history of cyberfeminism in both print and digital forms. VNS Matrix have also shown their previous work in contemporary Australian art contexts, such as Ten Thousand Suns, the 24th Biennale of Sydney in 2024.

The origin story of VNS matrix resists stability, morphing and reiterating its mythic position, uninterested in claiming "cyberfeminism" as a pioneering first; they enthusiastically acknowledge its concurrent emergence in a wider network of thinkers. After a number of years of output until 1997, they were largely inactive as a collective in the 2000s, until they re-emerged in the mid-2010s to collaborate once more on new works and retrospective showings of their original works (VNS Matrix, 2024). As an example, one of their key works was *ALL NEW GEN* (1992), "a project that took multiple forms, initially exhibited as a series of lightboxes and sound works at the Third International Symposium on Electronic Art (TISEA) in Sydney in 1992 before being reconstituted for subsequent exhibitions and conferences" (Hurst, 2023, p. 53).

With a bricolage of elements, including their ground-breaking text-based video game that featured a female protagonist working to defeat "Big Daddy Mainframe", *ALL NEW GEN* (1992) shows an approach where creative practice is used to build worlds, envisioning futures adjacent to what is, in an effort to create what could be: a feminist cyberspace.

The first Cyberfeminism International Conference was organised by the Old Boys Network in 1997, documented by the *First Cyberfeminist International Old Boys Network Reader 1* (Sollfrank & Old Boys Network, 1998). Members of the OBN include Cornelia Sollfrank, a key figure in cyberfeminist scholarship as well as a practising Net artist. Over the course of the conference, participants produced 100 *anti-theses* as a form of manifesto that defined cyberfeminism by what it wasn't:

...

78. cyberfeminism is not a horror movie
79. cyberfeminism is not science fiction
80. cyberfeminism is not artificial intelligence
81. cyberfeminism is not an empty space
82. cyberfeminism is not immobile
83. cyberfeminism is not about boring toys for boring boys

84. cyberfeminismus ist keine verlegenheitsloesung

85. cyberfeminism is not a one-way street

...

(Old Boys Network, 2020)

The Old Boys Network was essential for bringing together the emerging, diverse landscape of ideas amongst theorists and practitioners.

The scholarly work of cyberfeminism (Braidotti, 2006; Plant, 1998) and technofeminism (Hester, 2018; Sollfrank, 2019; Wajcman, 2004) is particularly useful for considering how interactions between humans and technologies reify gendered and heterosexualised politics, laying significant groundwork for understanding the socio-technological configurations of VR specifically. It is of considerable importance that both originating cyberfeminism and contemporary technofeminism work to challenge the disembodiment of dominant posthuman technological paradigms (Hayles, 1999; Muri, 2003). In their article “Of Shit and the Soul: Tropes of Cybernetic Disembodiment in Contemporary Culture”, Muri explains that “disembodiment became part of both cyberpunk literature and academic jargon from the 1980s on, supporting proclamations of human spirit at the brink of either enrichment or destruction depending on the author’s politics or relative degree of optimism” (2003, p. 76).

Muri details a range of arguments from McLuhan, Baudrillard, William Gibson (to name a few) that claim disembodiment to be a key condition of posthuman subjectivity, describing the common underlying anxiety as “the loss of selfhood and elimination of the ‘real’ or ‘natural’ body due to electronic media” (Muri, 2003, p. 74). Muri describes the ongoing “equation of technology with disembodied consciousness and superfluous bodies” (2003, p. 75), but cautions that this conceptual “split” from the body is in fact nothing new: “disembodiment in our literature also arises from a western Christian literary tradition of regeneration, renewal and refinement of human spirit” (Muri, 2003, p. 83). Arguing against the concept of the “cyborg” as a necessarily disembodied subjectivity, Muri states that:

We need also to emphasize that human consciousness is inalienably enmeshed with its corporeality, with the everyday actualities of its flesh, its giving-birth, its growths and excrescences, the regularities or indignities of its secretions; our consciousness is mediated by hunger pangs roiling beneath the rib cage, by dripping and oozing mucal secretions, by the insistence of that imperative erectile tissue in our genitalia, by the sometimes pleasurable and urgent necessity to shit. (Muri, 2003, p. 77)

Cyberfeminism worked to stay with this corporeality, and to disrupt the “dream of achieving transcendence by becoming an informational pattern” (Hayles, 1999, p. 271). Cyberfeminism also worked to challenge the assumed male default (Plant, 1998) that so often drove—and still drives—the socio-technical imaginaries of digital technologies in general and VR in particular. Instead of aiming for disembodied transcendence via upload into the mainframe, cyberfeminism and technofeminism aim to stay with the body, to work amongst the material entanglements of technology, culture, and societal values (Wajcman, 2006) that produce experiences of gendered embodiment. A queer perspective examining the history of cyberfeminism and technofeminism very quickly notices this shared focus on embodiment and materiality—in terms of labour, the body and technology—and brings a specific consideration of desire and sexuality to the conversation.

A key figure in the scholarly history of cyberfeminism is Sadie Plant, who worked alongside Nick Land and Mark Fisher at the Cybernetic Cultural Research Unit, formed in 1995 at Warwick University; she left the institution in 1997. Her work in exploring the interrelation of gender and technology culminated in the publication of *Zeros and Ones* in 1998. A riotous, complex amalgam of history, feminist analysis and speculation, *Zeros and Ones* gives a history of the development of the first computer and the role that Ada Lovelace played as the first (female) computer engineer. This serves as the launching point to speculate further on the ways that feminised knowledge and creativity—such as the complex art of weaving—are discredited, particularly by fields such as psychoanalysis. Plant argues that the contemporaneous understanding of digital technologies as masculine was in fact erroneous, and that information technologies are deeply tied to feminised epistemologies.

In Plant’s text we see the importance of Donna Haraway’s “A Cyborg Manifesto” to the cyberfeminist movement: “Haraway’s text excited a wave of subversive female enthusiasm for the new networks and machines” (Plant, 1998, p. 59). Haraway’s work is a still relevant anti-essentialist engagement that aimed to explode the false dichotomy of nature and culture. Rather than turning away from the risks of technology, it calls for a deep engagement with materialist concerns of emerging digital technologies as an opportunity for an emancipatory feminism (Plant, 1998; Sollfrank, 2019). Originally published in *Socialist Review* in 1985 as “Manifesto for Cyborgs: Science, Technology and Socialist Feminism in the 1980s”, Haraway’s essay has been extensively republished. For my own purposes, I cite *Manifestly Haraway*, published in 2016, which places “A Cyborg Manifesto” alongside “The Companion Species Manifesto” and features an interview where Haraway discusses the ongoing relevance of the work. In the republished essay, Haraway states that “this

essay is an argument for *pleasure* in the confusion of boundaries and for *responsibility* in their construction” (Haraway & Wolfe, 2016, p. 7, emphasis in original). Haraway argues that the cyborg is a figure made of “leaky distinction[s]” (Haraway & Wolfe, 2016, p. 11) between human and animal, organism and machine, physical and nonphysical. Rather than retreating to claims of essential, natural unity amongst women, Haraway positions the cyborg as a subjectivity generated through the breaking down of structuring binaries that have been “systemic to the logics and practices of domination of women, people of color, nature, workers, animals—on short, domination of all constituted as others” (Haraway & Wolfe, 2016, p. 59). The cyborgian figure, then, who so transgresses the binaries of body vs mind, technological vs organic, nature vs culture, also “cracks the matrices of domination” (Haraway & Wolfe, 2016, p. 53) that enforce these boundaries.

Plant’s work further engages with Luce Irigaray, Simone de Beauvoir and Monique Wittig, as well as wider psychoanalytic and materialist feminist scholarship. Plant details the massive cultural and economic changes of the 1980s and 1990s that simultaneously shifted employment patterns and gender relations, with women becoming an increasingly visible and integrated source of labour within a casualized, technology-oriented workforce—a workforce in which technology and womanhood are seen by the pre-existing demographics as similarly threatening presences to male hegemony. Noting the rise of self-employment and business leadership of women in China, Singapore, Thailand, Indonesia and Japan, Plant argued that:

There is enormous resistance to these changes whenever and wherever they occur. As their effects began to be felt in the early 1990s there were men who jerked their knees and went on TV to lament the fact that women and robots had apparently conspired to take their masculinity away. (Plant, 1998, p. 40)

This fundamental alignment of feminist praxis and digital technologies lies at the heart of Sadie Plant’s work, and this analysis is something worthwhile considering in the current climate. Many women and queer creators are working in creative digital fields such as VR development (Messeri, 2024; Ruberg, 2020b), in part because VR’s perceived newness offers a landscape less pre-defined by gendered and racialised hierarchies in the way of established media industries such as TV or cinema, or more established digital technology circles. If both changes to gendered relations and technological arrangements are seen as threatening to dominant norms, then a queer methodological approach to working with VR sees this as a prime opportunity for an alliance—to stick with this disruption, not to placate—and as an opportunity not only to

realign normative hegemonic structures of gender but to question the whole enterprise.

While Plant does point out this affinity in how technological and gender transformation are viewed by dominant masculinist concerns, Plant is still critical of the emerging digital technology of the time: “If anything, technologies are only ever intended to maintain or improve the status quo, and certainly not to revolutionize the cultures into which they are introduced” (Plant, 1998, p. 38).

Despite—and in fact precisely because of—the potential for dangerous dynamics of objectification, repression and surveillance, Plant calls for a feminist engagement with technology in order to capitalise on the alien qualities that digital technology can offer a praxis concerned with shifting gender relations. This is an engagement that I am continuing by integrating the concerns and techniques of cyberfeminism amongst my queer methodology for VR: rather than avoiding VR altogether and all of its troubling imbrications, the goal is to critique its problematic aspects while investigating what we can make that generates queer, anti-normative experiences of embodiment.

Somewhat optimistically, Plant declared that the 1990s were a time in which:

Women were becoming mothers on their own terms, or not at all. Heterosexual relations were losing their viability, queer connections were flourishing, the carnival had begun for a vast range of paraphilias and so-called perversions, and if there was more than one sex to have, there were also more than two to be. Anything claiming to be normal had become peculiar. (Plant, 1998, p. 43)

This is perhaps an oversimplification that elides the difficulties faced by marginalised and queer communities at the time, but it also speaks to a consciousness and embrace of outsider positions; it reflects a sense of optimism embedded in the time, where counter-cultural technology, feminism and queer movements were seen as a coalition that was achieving real change. This counter-culture, coalition approach is an important aspect of my own queer praxis, especially in drawing on the work of Esteban Muñoz and his repudiation of the assimilationist goals of certain strains of LGBTQIA+ activism. He describes how, as part of an

encroaching assimilationist ideology in the mainstream gay and lesbian movement, some gays and lesbians want to be found on a normative map of the world. Being lost, in this particular queer sense, is to relinquish one’s role (and subsequent privilege) in the heteronormative order. (Esteban Muñoz, 2019, p. 73)

To take Esteban Muñoz’s provocation that “queerness is lost in space or lost in relation to the space of heteronormativity” (Esteban Muñoz, 2019, p. 72) seriously, a cyberfeminist, queer praxis is one that refuses to be located easily amongst the mainstream even when it is offered to us. Now, more than 25 years after Plant’s book was first published, the social and political climate for LGBTQIA+ communities has certainly improved in some aspects—but there is always an awareness that this acceptance is partial and conditional, that the mainstream has certain expectations it enforces as the price for everyday comfort. By committing to staying lost from the heteronormative, a dual cyberfeminist-queer positioning refuses to abandon the margins, and more importantly, refuses to abandon our fellow wanderers who have not been offered such acceptance into “the norm”: as transgender, gender diverse, and queer communities come under heavier scrutiny and attack, it is important to affirm that a queer, cyberfeminist praxis recognises that those of us who have occupied the marginal queer position (but who may now enjoy certain liberties, such as the ability to legally marry our partner) cannot leave our allies behind; we must travel together in queerness, and find the pockets of emancipation for all of us.

The performativity of gender, which was becoming understood at the time through the feminist work of Judith Butler (discussed in Chapter Three), was a potent concept for Plant’s cyberfeminist program. Both Plant and Butler drew extensively on Monique Wittig—an icon of lesbian theory—and her arguments regarding performativity of the body and lesbian embodiment. Post-structuralist feminist philosophy and the emerging understanding of the performativity of gender were concepts that opened up new horizons of existence in a cyberfeminist framework:

There is no such thing as being human, male or female. Femmes, drag queens, even male to-female transsexuals: No one ever arrives at the point of being a real woman. Butches, drag kings, and female-to-male transsexuals meet the same problem: There is no real man to become. (Plant, 1998, p. 212)

This terminology is outdated—the contemporary term is “transgender” rather than “transsexual”—but her emphasis on the lack of a natural, essential, pre-existing, gendered subjectivity such as male or female in the context of drastic digital technological innovation is at the heart of the cyberfeminist project: to challenge hegemonic and normative gender, technology, and their mutually constitutive intertwining. In her consideration of the performativity of gender, Plant draws a parallel between the socially constructed, socially situated nature of gender and sex configurations, and the technological emergence

of intelligent machines, which threatens humanist ideals of intelligence and consciousness. Plant's work overlaps these concerns to ask: if neither gender nor consciousness is stable or innate, what kind of subject are we?

Contemporary scholars engaging with Plant's work do critique threads of gender essentialism present in earlier cyberfeminist texts. In her essay "After the Future: N Hypotheses of Post-Cyberfeminism", technofeminist and queer theorist Helen Hester points to Plant's use of psychoanalysis as a form of "problematic essentialism" (2017, para. 5), although in a footnote Hester does allow that "this accusation may be partially undermined by Plant's consistent framing of the female/feminine/feminist in terms of the simulatory or the virtual" (Hester, 2017, para. 46). Hester acknowledges that while Plant's work does resonate with certain now-critiqued essentialist strategies of second-wave feminism, her technology and cybernetic-focused lens of analysis led her to challenge the concept of "natural" gender. Hester's critique reveals some of the benefits of technofeminism—the passage of time and ability to review cyberfeminism's early years with hindsight, and with a stronger grasp of the emergent queer theoretical positions that can enrich the arguments of work such as Plant's.

Overall, in looking at cyberfeminist history and Plant's work in particular, my own queer methodology for VR draws upon how a cyberfeminist praxis understands the similarities between the digital and the social, and cyberfeminist strategies for how they can be brought together in productive, anti-normative ways. *Zeros and Ones*, as well as the wider realm of cyberfeminist scholarship, suggests that gendered relations are mutable and will continue to shift, and that wider relations of digital technology are an unavoidable part of this process. For a queer methodology for VR, the question is then how VR experiences can contribute bodily- and technology-based intertwinements that mutate experiences of embodiment towards queer possibility.

Cyberfeminist scholarship disturbs the myth of scientific objectivity and unwavering technological progress; instead, technology is understood to be deeply intertwined with the question of what it means to be human and a person in community, and what it means to occupy and embody an identity in relation to self, others and the technologies around us. Cyberfeminism establishes that critique of the Cartesian mind-body dualism is a feminist critique, and in its place cyberfeminism puts forward an understanding of embodied knowledge as cyberfeminist praxis. Cyberfeminism argues against the idea of technology as a naturally masculine domain, and instead claims that the properties of digital media in fact make it aligned with gender rebellion.

5.4 *VR and Embodiment in Cyberfeminism*

An overview of cyberfeminist thinking shows that a contemporary queer engagement with VR should focus on engaging critically with the history of the medium and its material entanglements in order to fully understand what potential there is for VR to disturb and reorient gender norms. Cyberfeminism shows the importance of social and economic histories of digital mediums that recognise the mutually constitutive nature of gender and technology. In his history of VR, *The Reemergence of Virtual Reality* (2018), Leighton Evans discusses the significant influence of John Perry Barlow's manifesto, *A Declaration of the Independence of Cyberspace* (1996), in which "cyberspace was a world created by collective actions through 'transactions, relationships, and thought itself ... a world that is both everywhere and nowhere, but is not where bodies live' (Barlow, 1996)" (Evans, 2018, p. 29).

This, we now know, is a direct contrast to the viewpoint of cyberfeminism, which is invested deeply in how cyberspace can extend, modulate, affect and enable the body—but never escape it. At the time of the publishing of *Zeros and Ones* (Plant, 1998), VR was at the zenith of its popularity (and rapidly approaching the fall of the dot com bust). From her cyberfeminist perspective, Plant critiqued the contemporaneous fantasy of VR and its patriarchal goals of "mastery", characterising the dominant imagining of VR as "a realm of the mind—seemingly abstract, cool, clean, and bloodless, idealistic, pure, perhaps part of the spirit, that can leave behind the messy, troublesome body and the ruined material world" (Plant, 1998, p. 180).

Plant argued that masculinist VR manifests as a desire to "escape from 'the meat'" (Plant, 1998, p. 180). For Plant, this is a betrayal of the truth of the matter, which is that embodiment is the experiential core of consciousness:

This is not a brain opposed to the body. This brain is body, extending even to the fingertips, through all the thinking, pulsing, fluctuating chemistries, and virtually interconnected with the matters of other bodies, clothes, keyboards, traffic flows, city streets, data streams. There is no immateriality. (Plant, 1998, p. 167)

In her sharp critique of what was dominant at the time—and, quite frankly, still dominant now—we can see a mirrored possibility, the inverse of what she decries: a VR that is the realm of the body, actual, hot, messy, bloody, material, sullied, base. A VR, in short, that stays with the meat. Whether this can be

achieved is another matter, but this can be our guiding purpose.

Plant critiqued the cyberspace-oriented, disembodied understanding of VR with a direct comparison of how men and women react to the medium: “When men talk about virtual reality, they often use phrases like ‘out-of-body experience’ and ‘leaving the body’” (Plant, 1998, p. 177). In masculinist, mainstream visions of VR, the body was understood as “a cage, a bondage, a snare; at best an unfortunate inconvenience, the vessel for a soul which struggles to keep it controlled and contained” (Plant, 1998, p. 178). On the other hand, Plant argues that “when women talk about VR they speak of taking the body with them... the body is not simply a container for this glorious intellect of ours” (1998, p. 188). A queer approach to VR can stick with the body in a similar way, seeing the body not as something to escape but as the fundamental interface with which to access VR, and perhaps synthesise these supposed contrasting, gendered positions by still acknowledging that for many the body is something that is an inconvenience, or a snare, or a form of bondage; but that this doesn’t necessitate a futile attempt at escape—rather we can ask what comes from staying with the body by choice, with deliberation, and see what we can newly generate amongst this contested ground (Burrell & Chalmers Braithwaite, 2023).

Staying with the body is also not a call for a stable, backwards-facing misplaced nostalgia for a “natural” form of presence. Instead, cyberfeminism understands that “the skin is both a border and a network of ports; a porous membrane, riddled with holes” (Plant, 1998, p. 187). This is not something to be afraid of, to try and shore up or escape. Donna Haraway asks, “Why should our bodies end at the skin, or include at best other beings encapsulated by skin?” (Haraway & Wolfe, 2016, p. 61). The porosity is the point. Even as cyberfeminism argues for the return of the body to the forefront, the physical cannot be mistaken for the stable; instead, a cyberfeminist subject disrupts and disturbs boundaries, including—in fact, *especially*—the supposedly obvious boundaries of the physical body.

This focus on embodiment, and especially the skin as the delimiting surface of the body, does not originate solely in cyberfeminism—instead it draws on, and contributes to a line of thought in wider feminist and posthumanist scholarship, such as the work by Elizabeth Grosz, Rosi Braidotti, and Judith Butler (Ahmed & Stacey, 2001). *Thinking Through the Skin* (Ahmed & Stacey, 2001), was edited by Sara Ahmed and Jackie Stacey and published before *Queer Phenomenology* (Ahmed, 2006). In this volume we see an early connection between Ahmed’s emerging interest in phenomenology, her feminist scholarship and her queer work. In their introduction to the collection, Ahmed and Stacey argue that “the body” has become a locus of attention in contemporaneous

feminist theory; their book wishes to specify a particular examination of the skin as the surface, contact, definer, and container of the body as a conceptual entity. They state that:

The feminist concern with revaluing the body, and undermining such mind/body dualism, has led to an acknowledgement that bodies are not simply given (as 'nature'), that bodies are differentiated and that subjectivity and identity cannot be separated from specific forms of embodiment. (Ahmed & Stacey, 2001, p. 3)

This shows an enduring connection between cyberfeminist engagements with embodiment and wider feminist discourses; while the initial iterations of cyberfeminism drew on earlier writers from continental, post-structuralist schools of feminist philosophy, cyberfeminism throughout the 1990s developed alongside a wider turn towards the embodied. To connect more specifically with Ahmed's *Queer Phenomenology* (2006), Ahmed states that:

We perceive the object as an object, as something that 'has' integrity, and is 'in' space, only by haunting that very space; that is, by co-inhabiting space such that the boundary between the co-inhabitants of space does not hold. The skin connects as well as contains. (Ahmed, 2006, p. 54)

The porosity of the skin, the troubling of bodily boundaries, then, should be understood as one of the key overlapping areas of a cyberfeminist and queer project.

From within cyberfeminism, Plant argues for an epistemological regime of contact and reciprocity: "anything seen has no say in the matter, but that which is touched always touches back" (Plant, 1998, p. 18). When thinking about how we can incorporate this into VR for a queer agenda, we can consider what aesthetic provocations arise in Plant's statement that "sight is the sense of security. Touch is the feeling that nothing is safe" (1998, p. 186). Rather than seeing VR as an opportunity to give participants a god-like, transcendent view of their digital surrounds, a queer methodology for VR instead takes the instability-provoking and boundary-blurring nature of touch as its aesthetic starting point and uses the porosity of the skin surface as a worldbuilding principle.

There are a number of creative practitioners already exploring this line of thought, although generally it is an under-explored aspect in contemporary creative practices (Hayes & Rajko, 2017). Hayes and Rajko argue that the third person empirical research model of HCI research (human computer interface research) makes it difficult to study, taxonomise and develop best practices

for using touch as an aesthetic protocol. Hayes and Rajko focus on interactive installations with digital new media, primarily using sound and other forms of haptics, in combination with somatic dance and music practices. Their use of creative practice suggests a mode of research and practice for investigating touch as a way to “stay with the body” at the troubled (and perhaps troubling) coupling of body and machine.

Hayes and Rajko ask, “When the range of potential physical sensations within human-machine engagement runs from pleasurable to painful, how can this be critically and safely implemented? How can notions of privacy be appropriately preserved?” (Hayes & Rajko, 2017, pp. 1–2).

These questions introduce the ethical dimension explicitly and are a vital set of concerns to integrate with a queer methodology for VR. If, in drawing on cyberfeminism, we take the troubling of bodily boundaries via touch as a key aesthetic strategy, we will need to consider how such contact can be made safe, yet meaningful.

5.5 *Cyberfeminist Creative Practices*

In addition to considering scholarly material, significant insight and guidance can be gained from examining the work of cyberfeminist creative practitioners. VNS Matrix and Linda Dement were two key contributors to cyberfeminist artistic practices in the early years, both coming from Australian contexts. Their works show how the critical positioning of cyberfeminism—especially its interest in and reworking of the entanglement of gendered embodiment and digital technologies—can be put into action via artistic and designerly responses. Their work offers aesthetic models and strategies for a design agenda, bringing theoretical critique into the realm of creative practice. In the work of both Linda Dement and VNS Matrix we see visual techniques such as collage, transformation and re-making of bodily forms, and an emphasis on disrupting then-standard digital technology aesthetics of machinic efficiency. Their overall mode of creative practice is particularly worth taking into consideration when developing a queer methodology for VR. V Barratt of VNS Matrix described how “the idea of ‘play’ and ‘creative production’ or simply ‘research’ with no outcomes that were necessarily useful in terms of capitalism were anathema to the tech industries” (as cited in Hurst, 2023, p. 45). This is in close accord with what Bo Ruberg identified as the compatibility between queer theory and video games; play is both a founding principle of creative

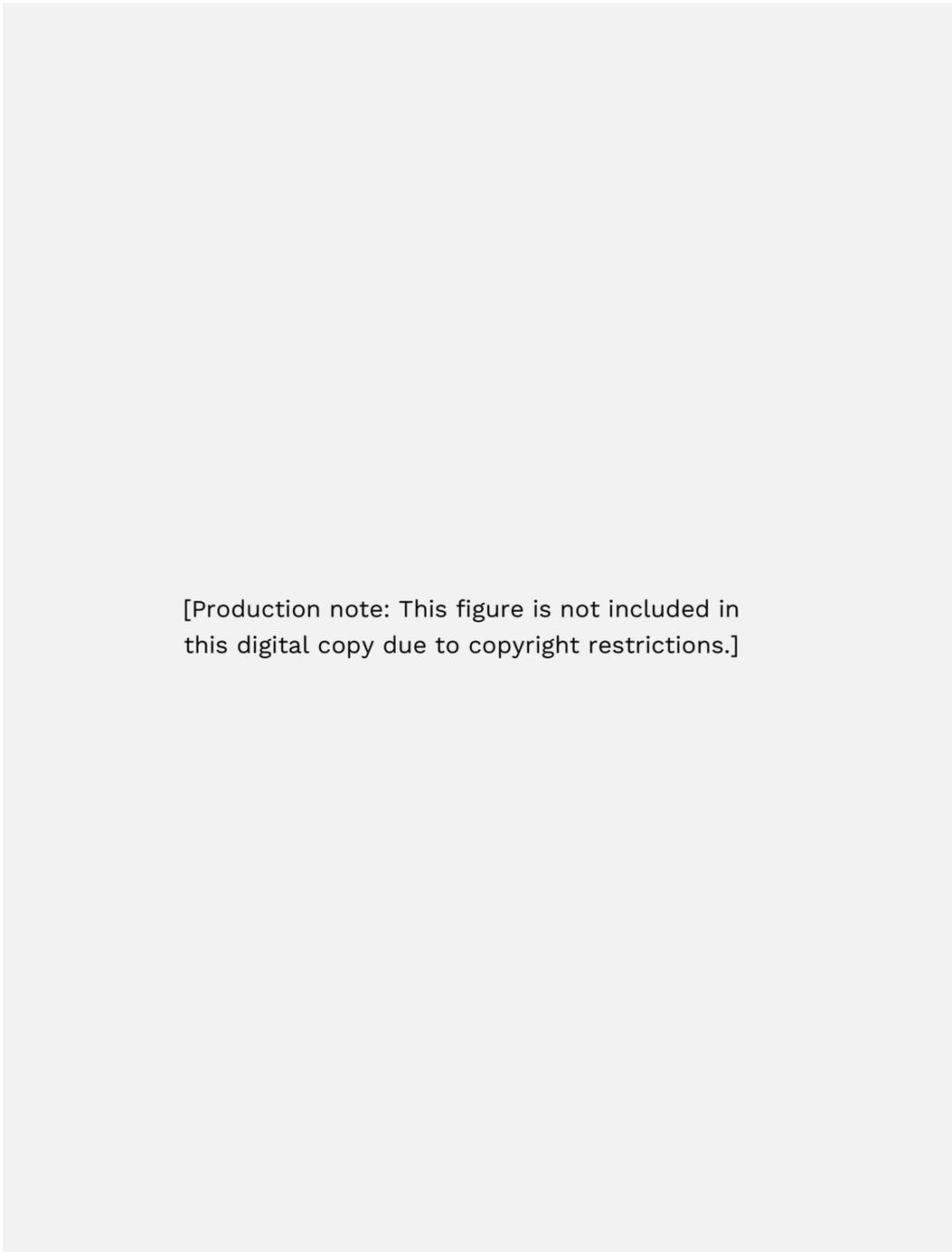
practice and the goal of creative production. Integrating play and playfulness into a contemporary design research methodology is therefore informed by cyberfeminism, queer theory and critical digital practices. Creative exploration, experimentation, and simply “futzing around” as part of a broader praxis act as a form of critique of industry-led engagements with digital technologies that prioritise financial accumulation. Instead, a cyberfeminist, playful approach encourages a kind of working that is more expansive in both its purpose and methods.

VNS Matrix declared themselves to be “Mercenaries of Slime” (1991) in their defining manifesto, bringing a viscous, visceral, bodily focus to the centre of their assertively political art practice.

Their work combined the eclectic practices of the members, incorporating writing, poster-making, video-game modding and performance art. Their work has been shown as installations in-situ (such as their manifesto billboard) and in art exhibition contexts. Their website, *VNSMatrix.net* (VNS Matrix, 2024) provides extensive documentation of their work, collecting a timeline of their projects as well as event appearances, publications and essays. The website—designed, coded and managed by Francesca d’Ath in coordination with VNS Matrix—is itself a piece of cyberfeminist work: collecting, curating and archiving a collective practice that is not yet adequately documented by cultural institutions. The group’s work together began with *A Cyberfeminist Manifesto for the 21st Century* (VNS Matrix, 1991), shown in Figure 5-3. The work *ALL NEW GEN* (1992) began as a series of images of characters and designs for a hypothetical video game, showing the importance of speculative worlding in their practice, especially as they integrated a fluid approach to gender in these speculative visions of the future (Hosea, 2019). This then developed into a playable game, which was shown alongside *Beg and Gen in the Bonding Booth* (1993) a soft-core speculative sci-fi erotic film.

Writing about the *Bonding Booth* in “VNS Matrix-Pilled: Three Propositions for Revisiting 1990s Cyberfeminist Art Now”, Cameron Hurst details the radical intertwined intimacies of body and technology on display:

The narrative of the voice-over is driven by the speaker taking on technological bodily modifications to engage in a digital sexual encounter with an artificially intelligent entity. “I construct an appropriate bio/psych system for the session. I image a muscular hybrid, a cold warm, wet dry invertebrate. I apply the filters smartskin and erotomania ... I lock into the morph”. The video does not depict sex merely documented or aided by new technology, but rather sex entwined with and made possible by new (imagined) technology.



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Figure 5-3

Digital PDF version of A Cyberfeminist Manifesto for the 21st Century (1991)

Note. Image from *A Cyberfeminist Manifesto for the 21st Century* [Poster as digital file], by VNS Matrix, 2016, Net Art Anthology (<https://vnsmatrix.net/wordpress/wp-content/uploads/net-art-anthology-rhizome-new-museum-and-online-cyberfeminist-manifesto-poster-vns-matrix-2017.pdf>).

Rather than subscribing to a simple binary of dehumanised technosex (fem-bots, online porn) or normative, ‘natural’ sex (in extreme, a non-medicated heterosexual couple having procreative sex), the artists present a third option. Queer subjectivity extends to technological sexual encounters. (Hurst, 2023, p. 53)

This is an important recognition—that from a contemporary position, we can see what we now understand to be queer qualities in their work. It is not just a question of whether the film contains two characters who appear to be of the same gender—especially not when one character isn’t even meant to be human. Instead, what resonates with the queer position I have discussed in Chapter Three and Four is how the work explores the fringes of new desires and erotics, getting “lost”, as Esteban Muñoz would have it, amongst the radical potential of unnatural couplings.

Virtual Theme Parks (1996) continued their speculative worlding strategy, presenting advertising material for four imagined interplanetary theme-park worlds—Magik World, Viral Pleasure World, Limit of Worlds, and Gender Filth World (VNS Matrix, 2018c). Gender Filth World invites guests to “Explode the binary with deviant software bombs! Feel your gender markings dissolve!” (VNS Matrix, 2018c, para. 9).

In their examination of VNS Matrix, art historian Cameron Hurst describes the importance of French feminist post-structuralism to the ethos of the group. She highlights Julia Kristeva’s landmark work on the concept of abjection, “which describes the process where the subject must disavow the liminal borderlands of the body—manifested in apparitions such as corpses, milk, blood, wounds, and congealment—in order to continue as a stable entity” (Hurst, 2023, p. 48). Hurst links this to the VNS Matrix manifesto, which asserts that “cyberfeminists ‘go down on the altar of abjection/probing the visceral temple we speak in tongues/infiltrating disrupting disseminating/corrupting the discourse’” (VNS Matrix, 2018d, para. 2).

These aesthetics of liminal, visceral, bodily thresholds—and the corruption of such—manifest throughout VNS Matrix’s work and are called upon in one version of their founding myth:

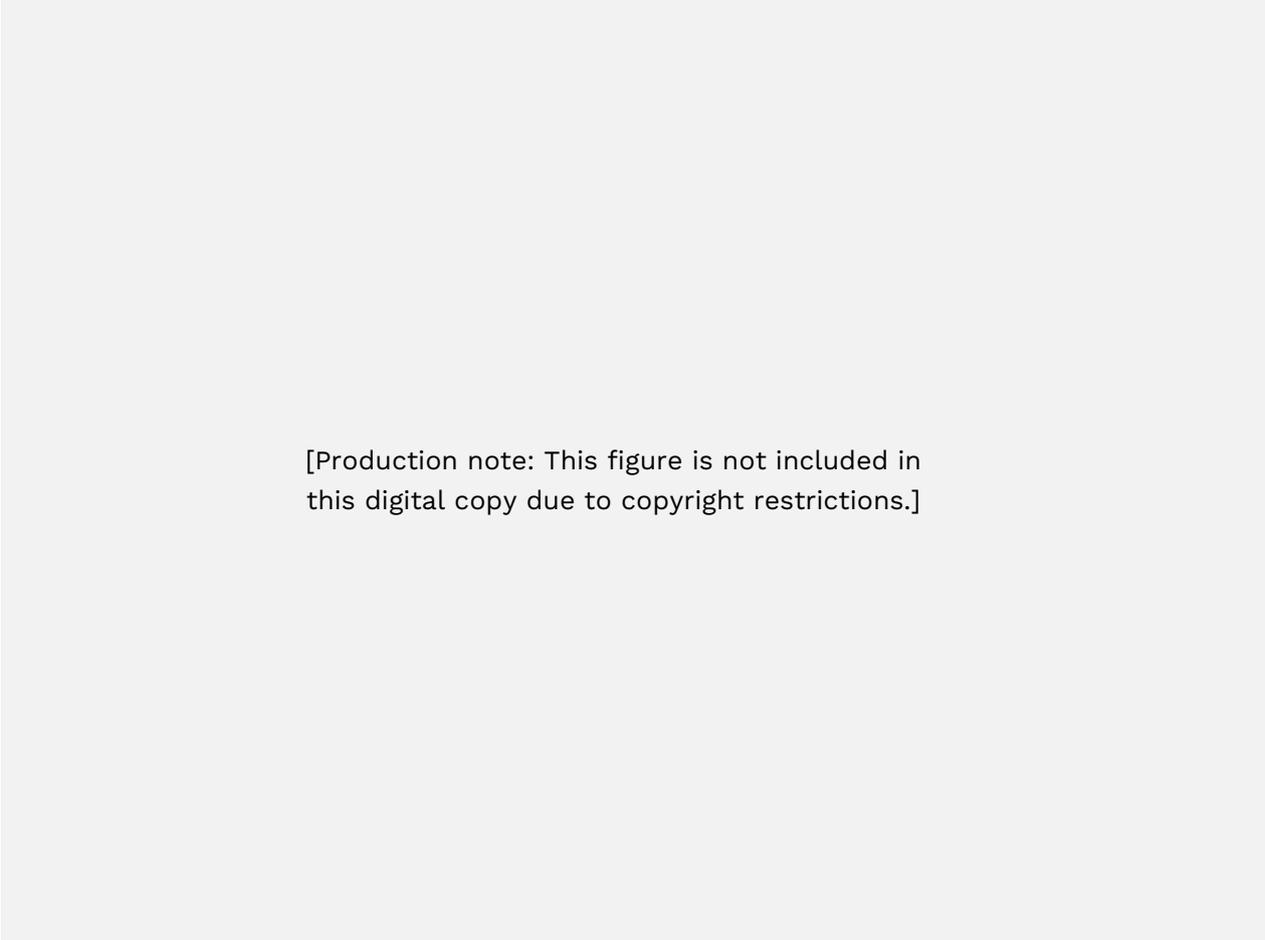
The most consistent VNS Matrix genesis story is that VNS Matrix crawled out of the cyberswamp in the particularly hot summer of 1991 and via an aesthetics of slime initially generated as porn (by women for women) VNS Matrix forged an unholy alliance with technology and its machines, and spewed forth a blasphemous text which was the birth of cyberfeminism. VNS Matrix was on a mission to hijack the toys from

technocowboys and remap cyberculture with a feminist bent. This is one story. (VNS Matrix, 2018d, para. 3)

Linda Dement is also identified by Hosea as a crucial practitioner of cyberfeminist art, noting the ongoing resonance of “themes of sexually active women, slime and abjection polluting the rational, clean digital world” (Hosea, 2019, p. 140). Rather than presenting utopian speculation, however, “Dement’s world is rife with the droll beat of a mad and dying modern existence” (Riley, 1995, p. 27). Dement’s work *Cybergirl Fleshmonster* (1995) (seen in Figure 5-4 and Figure 5-5) takes the form of a point and click digital visual and textual essay, combining written material and quotations with the severed and recombinatory growths of scanned body parts. On her website, Dement describes how the body parts are donated scans from around 30 women, collected over the course of Adelaide Festival (Dement, 2020). The regularity of the body is blown apart in the work, with the outer becoming inner, the inner becoming outer as organ-like protuberances evolve in a multi-media ecology.

Both VNS Matrix and Linda Dement set practice-based precedents that show specific strategies for a queer methodology for VR. The works of VNS Matrix show the effectiveness of speculative worldbuilding with a utopian bent, especially in generating cyborgian narratives where slime and abject viscera enable the coupling of human and technology in a post-gender squelch of machinic lubrication. Dement, meanwhile, brings together the body as a medium itself to be documented, disturbed and transgressed in the making of new entities and new forms that can tell marginalized stories that are unaccounted for by the mainstream. Examining a lineage of aesthetic experimentation and developing visual vocabularies also shows that part of critically engaging with the social, historical and material qualities of a digital technology involves *play*, researching through making, tweaking, hacking, and generating new worlds with the technologies in question.

While cyberfeminist artists may have referenced or worked with imagery associated with Virtual Reality (VNS Matrix, especially), this was mostly on a conceptual level; as discussed in Chapter Two, during the 1980s and 1990s, VR was most present as an idea or fictional depiction, with limited opportunities for artists to engage with the technology directly. For this reason, there is not extensive material experimentation with VR by cyberfeminist artists, although theorists such as the aforementioned Sadie Plant have analysed its conceptual significance. Therefore, part of the task of integrating a cyberfeminist position with a queer methodology for VR is synthesising the theoretical analysis of VR provided by cyberfeminist scholars with the specific aesthetic strategies of cyberfeminist creative practitioners.



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Figure 5-4

Still from Cyberflesh Girlmonster (1995)

Note. Visible elements are animated and interactive in original work. Still image is from documentation of *Cyberflesh Girlmonster* [Interactive CD-ROM], by Linda Dement, 1995, Linda Dement (<https://www.lindadement.com/cyberflesh-girlmonster.htm>).



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Figure 5-5

Still showing interactive menu from Cyberflesh Girlmonster (1995)

Note. Visible elements are animated and interactive in original work. Still image is from documentation of *Cyberflesh Girlmonster* [Interactive CD-ROM] by Linda Dement, 1995, Linda Dement (<https://www.lindadement.com/cyberflesh-girlmonster.htm>).

5.5.1 Slime as Cyborgian Metaphor for VR

In order to do this work of synthesising theoretical insights regarding VR and practice-based approaches within VR, I want to dig in at the use of slime in cyberfeminism as a conceptual and aesthetic tool, especially as a potential substance that can work in the realm of touch to bring about cyborgian interminglings. In the 1990s, slime featured prominently in VNS Matrix's first manifesto, but appeared less obviously in their work, especially as the state of computer graphics at the time did not allow for much 3D animation or simulation. They did, however, use visual symbolism that leaned heavily towards the viral and microscopic made giant; their visual language often featured molecular structures or DNA. Working primarily in 2D formats and with limited computing power, VNS Matrix also used visual editing and modifications such as circular warping, seen in the documentation of *ALL NEW GEN* (1992) in Figure 5-6 and Figure 5-7.

In the first still shown in Figure 5-6, an unidentifiable material is folded in on itself, twisted and expanding, taking up the whole field of the image, pink-ish and possibly organic, its scale flipping like an optical illusion: are we zoomed in on someone's palm? On a slopped together collection of organs? Are we hovering in their air, staring at garbage-bags piled together, or maybe a distant topography? These questions are answered by seeing the full work (as it is a video piece that clarifies the contents shown), but considering this ambiguous still picture as a stand-alone image provides its own insights. The textures and colour scheme bring bodily associations and expands them beyond the bounds of human scale, disturbing the conceptual boundaries of the body as a distinct, stable entity.

In the second still, shown in Figure 5-7, glowing circular ripples and a wobbly, sparkly symbol of some kind are laid over a photo of what seems to be a gently moving ocean, combining to give a sense of substances in flux, oozing down and towards the characters of the game.

If not slime itself, these visual strategies can be identified as slime-“esque”, as aesthetic experimentation with the “wet, dark and tactile” (Plant, 1998, p. 178) that cyberfeminism aligns itself with in order to challenge the supposed objective stark cleanliness of mainstream technological fantasies. Slime is an oddly indistinct word in and of itself, with an array of onomatopoeic synonyms: goo, goop, ooze, glob. It is a substance that is neither entirely solid nor entirely liquid. Mud, the suspension of dirt particles in water, is a familiar, everyday kind of slime, as are any number of bodily fluids we may encounter. The field of computer graphics will describe the difficulty of animating “visco-plastic

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Figure 5-6

Still image from ALL NEW GEN (1992) showing a landscape of pinkish plastic bags, overlaid with transparencies of small numbers; in the middle is a small frame showing an individual shooting a gun

Note. Still image from documentation of the work *ALL NEW GEN* [Multimedia installation], by VNS Matrix, 1992, VNS Matrix (<https://vnsmatrix.net/projects/all-new-gen>).

[Production note: This figure is not included in this digital copy due to copyright restrictions.]

Figure 5-7

Still image from ALL NEW GEN (1992) showing three doll-like figures made up of a mix of animal and human features. Above them is the text "DNA SLUTS"

Note. Still image from documentation of the work *ALL NEW GEN* [Multimedia installation], by VNS Matrix, 1992, VNS Matrix (<https://vnsmatrix.net/projects/all-new-gen>).

fluids” or “visco-plastic simulation”, with results that often would be more straightforwardly described as slime.

Slime is the amniotic goo that Neo floated amongst in the Matrix all those years ago, the “bio” in “biotech”, the “wet” in “wetware”, and the stretchy, satisfyingly tactile substances that populate millions of ASMR videos across Youtube and Tiktok. This commercial explosion of slime is not just an amusing side note. Much as the radical central ideas of cyberfeminism—women using computers, gender and sexuality re-written by technology—have become interwoven in our everyday, slime has become a mundane consumer product, especially as a result of the viral spread of online content; this history is discussed at length in Freddie Mason’s book *The Viscous: Slime, Stickiness, Fondling, Mixtures* (2020).

Cultural analysis of the stuff we call slime points towards its ambivalence, its abjectness, and its pseudo-bodily status as its primary values for a feminist agenda. For example, Simon Estok in “Corporeality, Hyper-consciousness, and the Anthropocene EcoGothic: Slime and Ecophobia” (2020) argues that slime is a horror gothic substance, coded as feminine and threatening to our sense of bodily integrity. In the book *The Gothic Body: Sexuality, Materialism and Degeneration at the Fin de Siecle*, Kelly Hurley argues that:

Nothing illustrates the Thing-ness of matter so admirably as slime. Nor can anything illustrate the Thing-ness of the human body so well as its sliminess, or propensity to become-slime. Slimy substances—excreta, sexual fluids, saliva, mucus—seep from the borders of the body, calling attention to the body’s gross materiality. (Hurley, 2004, p. 34)

Slime, even when it isn’t even touching us, summons the concept of touch, of the excesses of excretion and perhaps absorption. For a cyberfeminist, queer agenda, this is very rich material indeed. In one of their solo publications, VNS Matrix member V Barratt provides a list of characteristics for the “slime-wise”: “polycephalic, acephalic, non-binary, decentralized, anti-re/productive, opportunistic, forking, ectogenetic, a feedback loop, an open mouth, a zero” (Barrat, 2019, p. 118).

If touch is a primary aesthetic principle of cyberfeminism, slime is perhaps the most potent, the most touch-full substance to engage with. Slime is an experience contained inside a noun, a name that prioritises quality or sensation of matter rather than a description of its make-up.

In *The Viscous*, Mason notes that:

Sartre famously theorizes [that] to touch slime is to risk, it feels, becoming slime. What is crucial, here, is the elongated sense of risk

the viscous excites. At the core of this sensation is the fact that we never become slime, but continue feeling that we might. The slimy encounter locks us into a state of becoming, or rather the becoming of an un-becoming. (Mason, 2020, p. 21)

For a methodology that wants to stay with the body, and to find a way to un-make stable binaries in order to join machine and human in a cyborgian mesh, slime is the perfect strategy of infiltration and sensorial manipulation. Slime becomes a medium of communication as it sticks to you in a mutual grasping:

The more you try to remove it from your hand, the more of your hand it covers. This, Sartre imagines, is the revenge of the “in-itself ” on the “for-itself;” the object taking revenge on the subject, the threat of things to engulf and annihilate subjectivity, to lose ourselves in objects. When honey drips off your fingers, you sense an uncanny continuity of yourself with the world. (Mason, 2020, p. 75)

To return to *Thinking Through the Skin* (Ahmed & Stacey, 2001), I want to put this analysis in conversation with “Three Touches to the Skin and One Look”, an essay collected in the volume in which the author Penelope Deutscher compares Satre and Beauvoir’s writings on embodiment. Whereas Mason’s analysis of slime and Satre’s writing reveals that Satre views sliminess as a form of riskiness, as a threat and source of disgust (perhaps threatening primarily for the disgust it arouses), Deutscher’s analysis of Beauvoir shows a more ambivalent, positive understanding of the risk of touch:

Touching the skin of the other is not simply an example of the constant drive to appropriate the other. Instead, it is a context for subjects to enjoy a complex reciprocity, in the simultaneous assertion and undermining of bodily and subjective boundaries. (Deutscher, 2001, p. 145)

This is why slime is as part of a cyberfeminist aesthetic strategy: slime can be a viral transmission of radical ideas via bodily touch, a mutual process of regeneration and intermingling.

In the years since VNS Matrix were active, there has been incredible progress in simulation and 3D graphics. A lot of money and infrastructure goes towards making things wobble and jiggle in digital worlds these days, primarily in the realm of mainstream video games. With a presumed heterosexual male audience, the video game industry has dedicated vast resources in order to innovate the depiction of breasts, as analysed and discussed in “Jubblies, Mammaries and Boobs: Discourses of Breast Physics in Video Games” (Rogers &

Liebler, 2017). This linkage predates video games, though; in Sartre's previously mentioned phenomenological writing on viscosity, he also compared honey to breasts (Mason, 2020, p.76). The parallel has always been there.

The authors of "Jubblics, Mammaries and Boobs" examine articles from games journalism to provide an analysis of how breast physics are discussed amongst video game consumers: often celebrated as a technical feat when sufficiently "appealing" to their presumed audience and critiqued heavily when deemed inadequate. They note that "the breast and breast physics were often billed as a video game's selling point as it contributed towards the enjoyment of the game, especially for young male users" (Rogers & Liebler, 2017, p. 268).

They also note that the language used when discussing the integration of breast physics with video games "is reflective of a dominant, heteronormative hegemony in its approach to the female body" (Rogers & Liebler, 2017, p. 268). The authors differentiate video games from other media such as film, pointing to how a player has the agency to control and manipulate the actions of characters in a game, "allow[ing] the player to control and take ownership of the breast" (Rogers & Liebler, 2017, p. 259). The authors primarily critique the concept of "breast jiggle physics" through the lens of sexual objectification and commodification of women's bodies, identifying dismemberment as a particular strategy of objectification. We can recall, however, that Dement used dismemberment as a key cyberfeminist aesthetic strategy in her work *Cybergirl Fleshmonster* (1995). Reclamation and repurposing, reworking and reinvention are part of the process, too: taking the technology of wobble and using it for purposes other than our own subjugation and dehumanisation. Cyberfeminist aesthetics—and their deployment for queer VR—want to do something far more interesting than basic heterosexual titillation; we want to use embodiment to destabilise the hegemonic values governing the depiction of women in virtual worlds to achieve something more visceral and playful. We need to use jiggling, wobbling goo not to offer objectification, but to grasp at an integrated subjectivity, one with agency over our body/ies. If we are to be dismembered, it will be by our own hands, and for our own projects of new creation.

Later, in discussion of the final prototype, I will explain in greater detail the difficulties still faced by a creative practitioner trying to make slime happen in their computer. Here, however, I will provide only a short summary: even now a 3D simulation or modelling tool such as Unity game engine does not like to be asked to make something that is neither solid nor liquid. The extensive coverage regarding breast physics that Rogers & Liebler analysed showed not only the dynamics of objectification at play, but also the genuine

difficulty faced by even premiere video game studios when aiming for “realistic” movement of soft flesh. If I look for plug-ins or tools to assist me in my own slimy endeavours, it is inevitable that such tools were either designed specifically for the simulation of breasts in video games or have been used at some point by another creator for such purposes. My utilisation, then, comes with that awareness, and as a form of deliberate mis-use along queerer, stranger lines.

5.6 *Slimy Cyberfeminism for Queer VR*

Cyberfeminism and technofeminism are particularly essential as long-running responses to dominant technological discourses, offering strident scholarly critique from a feminist perspective, as well as developing creative reimaginings and aesthetic reconfigurings of digital technologies such as VR. Cyberfeminism offers a particular kind of analysis that takes gender and womanhood as a primary lens of analysis, informed by marxist feminism and French post-structuralism. It shows a way to grapple with and analyse emergent landscapes of technology and social change. It also shows critical practice strategies, with visual vocabularies and design approaches that can interrogate the conditions and techno-social arrangements embedded in the use of digital technologies such as VR and propose alternatives to the stultifying norm. It provides potent, generative approaches to the quandary of embodiment entangled with digital technologies; instead of seeing the body as a thing to escape, or as an inert and stable prison, cyberfeminism views embodiment as a process of radical malleability that is anchored in physicality even as it allows for reworking, reforging, intermingling and remaking.

For a queer methodology for VR, cyberfeminism shows the value of the cyborg as a potent metaphor, as the site where gender and embodiment can reshape and be reshaped by digital technologies. Within this meeting ground, the episteme of touch as a reciprocal, corporeal communication emerges as a specific aesthetic concern to integrate into a queer methodology for VR. Slime, with all of its in-between *grossness*, is a substance that can be used through this aesthetic engagement for its potent associations with the blurring of bodily boundaries.

*Section Two:
Practice-based
exegetis*

Chapter Six:

Research through Design Methodology for Developing Queer VR

6.1 *Introduction*

This chapter provides an overview of the research design of this project and methods used throughout this research. In this project I bring queer theory into conversation with VR via a Research through Design approach. The methodology that I have utilised in the course of this research has allowed me to explore how the textual, theoretical concepts of queer theory—such as the critique of normative structures and embrace of fluidity—can inform and guide the design of Virtual Reality experiences. By integrating the conceptual grounding of a queer position with the interactive and embodied possibilities of VR, I have developed new ways of both understanding and designing Virtual Reality experiences in a way that challenges the existing set of norms around bodily representation and embodied experience in VR.

Two key outcomes of this research methodology are the queer methodology for VR and the Body Traces Archive VR prototype. It is important to distinguish between the methodology of this overall research project that I discuss in this chapter, and the queer methodology for VR as an outcome. The queer methodology for VR is narrower in scope, as it is aimed at the practice-based development of VR. It has directly informed the development of the final practice-based outcome, the Body Traces Archive, but must be understood as a result of a larger methodological rationale and set of research methods that I detail here in this chapter. The queer methodology for VR, as a finding of this research, is explained in depth in Chapter Eight alongside the analysis of the Body Traces Archive development process, in order to explicate and evaluate how the queer methodology for VR can be utilised in the development of VR. This chapter focuses on the overall research methodology of this project in order to establish the relationship between the historical and theoretical grounding of the last four chapters and the practice-based reflections, analysis and findings of the three chapters that follow on from this chapter.

6.2 *Methodological Rationale*

The methodological rationale I have developed throughout my practice-based research, literature-based research, and overall RtD process consolidates theory and insights from a range of disciplines. In his chapter “Building Theory Through Design”, Thomas Markussen identifies a range of ways that theory and design can be combined. He specifies two approaches that are relevant to this research: guiding philosophies, which “take the form of

sensitizing concepts to help direct designers and researchers in reframing design problems” (Markussen, 2017, p. 90) and conceptual frameworks, “where design researchers borrow ideas and concepts from other disciplines and apply them to design” (Markussen, 2017, p. 90). For my work, the queer and cyberfeminist scholarship discussed in Chapters Three, Four and Five has provided the ideas and concepts for the conceptual framework that has shaped my approach to answering my research questions. Guiding philosophies have been extracted and generated from queer and cyberfeminist literature, my attention to historical and contemporary VR precedents, and my own practise-based experimentation itself. This has further contributed to the design and development of the queer methodology for VR, of which one significant part is the conceptual framework that synthesises these various disparate sources alongside insights from practice.

The next section of this chapter discusses my research design within this research project, namely my utilisation of a RtD methodology and how this has contributed to the findings of this project. The combination and synthesis of literature-based research and practice-based research has been shaped by my years of experience as a research-practitioner, as well as the training I have received in undergraduate and honours studies and practice-based research environments.

6.3 *Research Through Design*

I use Research through Design as a term to describe the process of this doctoral research, as it captures the various ways in which research and practice are conducted in an interrelated and interdependent way. Research through Design, as defined by Frayling in his widely cited paper “Research in Art and Design”, is its part of a broader framework of research within art and design contexts. Frayling identifies three categories: “research into art and design, research through art and design, [and] research for art and design” (1993, p. 5). Within this framework, Research through Design encompasses materials research, development work, action research, and crucially, the communication of findings through the presentation of evidence generated through these processes.

In my work, I have adopted Frayling’s term Research through Design to describe how I use practice to explore questions and develop my methodology throughout this doctoral research. The artefact end product—the Body Traces Archive VR prototype—is a significant component of this process. This

practice-based work is supported by a written thesis, developed through literature-based research aimed at establishing a contextual foundation. The combination of practice-based exploration and literature review has resulted in the creation of a novel queer methodology for VR. This thesis also presents documented findings from the prototyping process, which was guided by the queer methodology in question. While this written analysis is extensive, there are inevitably aspects of my research, thinking and argumentation that can only be fully understood through the experience of my final prototype.

Throughout the course of my research, I have utilised periods of focus on experimental crafting with reflection, then theoretical investigation, then crafting as a result of this investigation, and investigating new lines of thought based on crafting (amongst that, of course, are seemingly random bursts of inspiration or curiosity that inject new directions, to be negotiated and incorporated depending on their suitability). This is a familiarly circular process for any creative research-practitioner, and in the article “Dynamics of Research Through Design”, authors Basballe and Halskov (2012) provide a vocabulary of coupling, interweaving and uncoupling to describe this dynamic of moving between and amongst more traditionally literature-oriented research and practice-based making.

Coupling is described as often the starting stage of a research project, where design and research interests are considered holistically to establish the goals of the overall project. Interweaving describes moments where one process or activity is informing both agendas, while decoupling “modifies the focus” (Basballe & Halskov, 2012, p. 65) and allows for deep concentration in one particular area. For my own work, speaking outwardly about my project through proposals, conferences, articles and this thesis itself is a moment of coupling where the research and practice become inextricable. During crafting or exploratory reading, I am often so immersed in a particular line of thought or knotty coding issue that I am fully decoupled from my wider concerns. Moments of interweaving occur when I surface “for air”, so to speak, reflecting on what I am making, getting feedback, and reading in order to guide my next actions.

In the next segment, I provide a detailed summary of both literature-based and practice-based components of my Research through Design methodology that has driven this overall research project.

6.3.1 Literature Review

I conducted an extensive review of key theoretical literature across diverse fields, including contemporary and historical VR as the primary context of the medium I am concerned with. This literature review enabled me to identify gaps in practice and representation in the field of designing for VR. Literature review of the fields of queer theory and cyberfeminism then allowed for the identification of crucial theoretical tools and insights that guided my approach to engaging with VR critically. Queer theory and cyberfeminist theory are the base of my theoretical frameworks. It is worth clarifying that insights from literature are not fully synthesised before practice-based work begins. Rather, reviewing and synthesising literature occurred throughout the process, with mutually generative inter-relations between reading, analysis, and practice-based making.

6.3.2 Historical Appraisal

As part of my literature review, I undertook a historical review of the various instantiations of VR, focusing on how embodiment and representation have been constructed in this medium throughout its various peaks in popularity. This has allowed for critical identification of predominant conceptual models of embodiment, as well as the identification of counter-strategies embedded within this history.

6.3.3 Analysis of Precedents

Interspersed within my literature review is analysis of key precedents. These design and art precedents range from VR projects to other forms of engagement with digital technologies and media. These precedents provide varied insights regarding aesthetic and practice-based approaches to critical engagement with digital media, and have helped guide my own practice-based experiments.

6.3.4 Practice-based Experiments & Final Prototype

Practice-based exploration took the form of a set of experiments, each with their own set of goals, processes, outcomes (both in the form of a design outcome and research insights) and reflections for how to progress onward from this experiment. I also utilised documentation strategies that allow for

the extraction of insights and general record-keeping of nuanced and specific approaches to practice.

Experiments were a way for me to engage materially with the provocations and insights that emerged within the literature review process, and helped to guide further reading and research based on the experiment findings. These experiments explored how alternative approaches to the material of VR, including back-end code, could reveal queerly-aligned design practices for VR. I documented insights and outcomes from these experiments both during the process of design via significant amounts of recording and note-taking, and after the completion of these experiments, through additional methods such as user testing.

Pippin Barr, in his book *The Stuff Games are Made of*, points out that the textual scholarship of platform studies and software studies have contributed significantly to understanding how computers “shape what we create and how we think about what might be possible” (Barr, 2023, p. 43). However, practice-based experimentation and use of the tools themselves is also a highly necessary part of the process of understanding what exactly our computers, programs and software shape us towards, and what our strategies can be for expanding our ranges of possibilities. By analysing his own experimentation with game engines, Barr shows just how “generative and fascinating wholehearted engagement with the stuff of games can be, how it can lead to insights and understandings we never see coming” (Barr, 2023, p. 75). This is a mode of engagement and exploration that I too engage in via my experimentation with VR and Unity game engine.

The first two thirds of my practice-based research process involved extensive experimentation led by smaller research questions that responded both to literature and previous experiments. This RtD model of modular experiments—of constructing short, smaller design activities for the purpose of discovery and testing—is one that I became familiar with in my Honours course under the supervision of my current doctoral supervisors, and is essential to the practice-based component of my RtD methodology. The material, conceptual, and technical findings of these varied experiments have then been consolidated into a final prototype that communicates this new knowledge. By structuring each experiment with a research question or goal, the process can be directed towards generating results that contribute to the overall research question, while still allowing space for generative, unexpected findings to emerge.

In their article “How a Prototype Argues” (2010), Galey and Ruecker put forward the argument that a prototype or artefact is not just a culmination

of a particular way of working (that may also be argued for, textually), but is itself capable of making arguments. They argue that “one of the goals of the designer has been deliberately to carry out an interpretive act in the course of producing an artefact” (Galey & Ruecker, 2010, p. 406). In producing my own final prototype as a culmination of my practice-based experiments, I have done this “interpretive action” primarily through the synthesis of the findings of my literature-based research. The final prototype, the Body Traces Archive, manifests knowledge from queer theory, cyberfeminism and discourses surrounding the history of Virtual Reality in a generative outcome that synthesises insights from these fields into an experiential format. This stands alongside my queer methodology for VR as a major novel contribution of my research.

6.3.4.1 Experiment Documentation: Visual Documentation Strategies

In her article “Developing Critical Documentation Practices for Design Researchers”, Zoë Sadokierski (2020) explains the importance of documentation methods for authenticating the knowledge generated via Research through Design processes. She proposes four main forms of documentation: progressive overview maps (regular summaries of the research topic), analysis of contextual anchors, reflective experiment logs, and reflecting on peer critique. All of these methods have informed my own approach to documenting my work. Analysis of contextual anchors became my way of initiating my literature-based research and reflective experiment logs were a structuring format to document my previously mentioned experiment process. Progressive overview maps became an essential part of my process, especially when presenting work outwardly, and in general, the process of “mapping” and diagramming became a crucial strategy throughout the crafting process. Reflection on peer critique was a less integral part of my process, with user testing instead being the model I used to integrate feedback. However, as I will discuss later, the user testing I conducted integrated some of the strategies and modes of working that are inherent to peer feedback processes in design.

6.3.4.2 Documenting Digital Processes via Screenshots and Screen Recording

When crafting with software such as *Unity* game engine, it is difficult to keep a record of “versions” being iterated upon. With more common design software such as Adobe Photoshop, Illustrator or Indesign, it is possible to keep multiple versions of the same file or export “incomplete” files as draft versions. In

contrast, the nature of a game engine project means that an incomplete version simply will not function if exported, and keeping multiple copies of code files within the project is essentially impossible. Therefore, it is important to have a documentation process that keeps track of stages of the process, including trials or tests that are non-viable for the final outcome.

For this purpose, I have collected regular screenshots and screen recordings of my project, to ensure that I have evidence of different stages of the process. These screenshots appear in my later analysis, as part of consolidated experiment reflection logs and appendices.

In terms of the final practice-based outcomes produced in the course of my experiments, the documentation of VR experiences poses a particular set of challenges. Virtual Reality is a difficult medium to document, as it is not possible to capture the experience of being “within” the environment without the use of digital compositing that overlays a participant and the virtual environment. Screenshots as well as virtual camera recording within Virtual Reality allow for basic documentation of 3D objects in virtual space, while first-person recording of the headset view allows for video evidence of what a participant (including myself) looks at.

6.3.4.3 Documenting with Note-taking, Diagramming and Storyboarding

For a project so centred on digital media, it may seem unusual to have relied so heavily upon the tried-and-true technology of an A3 piece of paper. The limits and boundaries of the A3 page, as well as its affordances, have been crucially helpful as thinking tools. In experiments and development tasks where I was the only practitioner, diagramming and note-taking was a way to record my thinking for my future self, as well as a way to work out problems of interfacing, information arrangement and complex code interactions (as shown in Figure 6-1 and Figure 6-2). In situations where I was collaborating, diagramming on paper was a way to both figure out our shared problems and to give us a map moving forward.

Storyboarding and diagramming also became crucial for planning and communicating my proposed final outcome, allowing me to communicate the basic narrative and visual language quickly before beginning to work with the game engine and code.

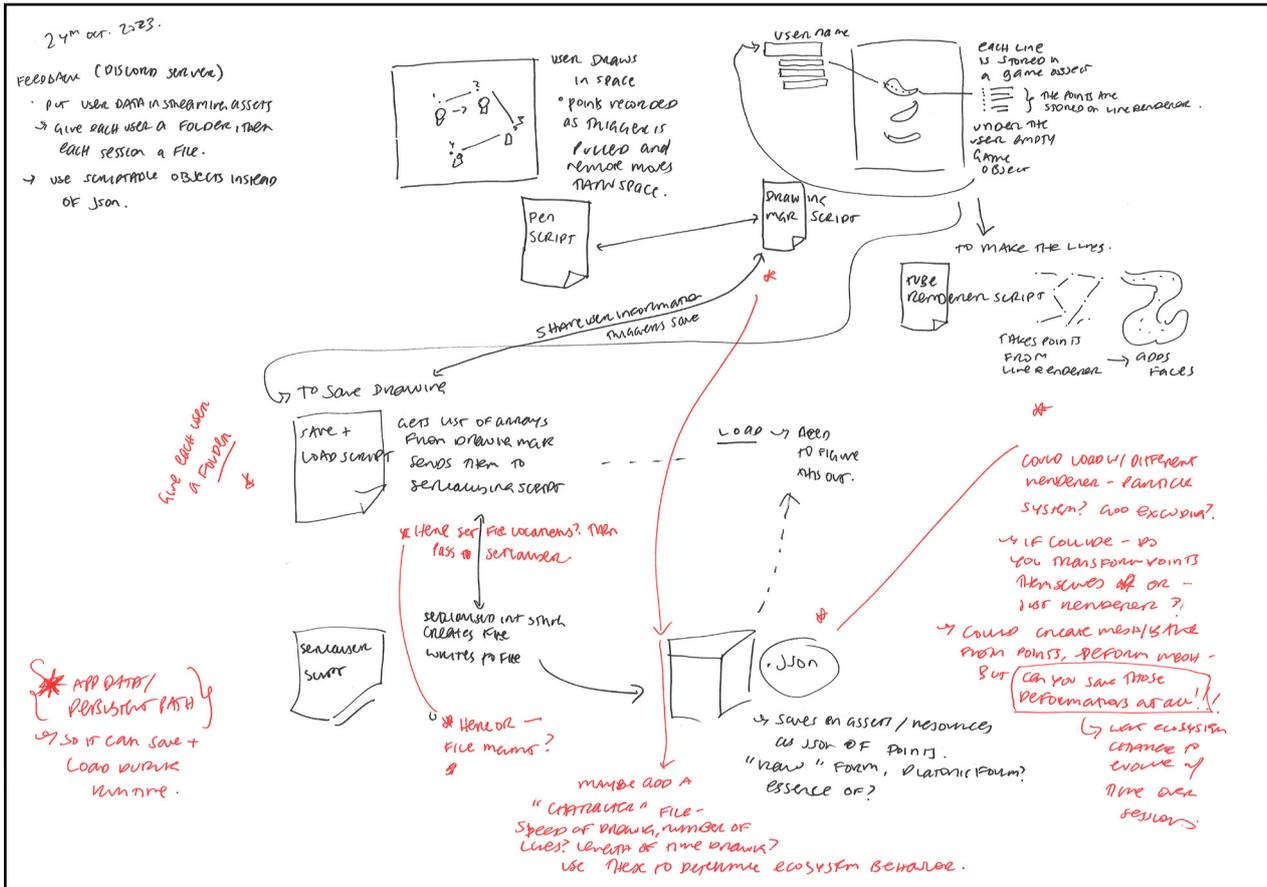


Figure 6-1

Hand drawn diagram of code structures in Body Traces Archive during development

Note. Example diagram of code system and notes to self by researcher, from prototyping process of the Body Traces Archive prototype as outlined in Chapter Eight.

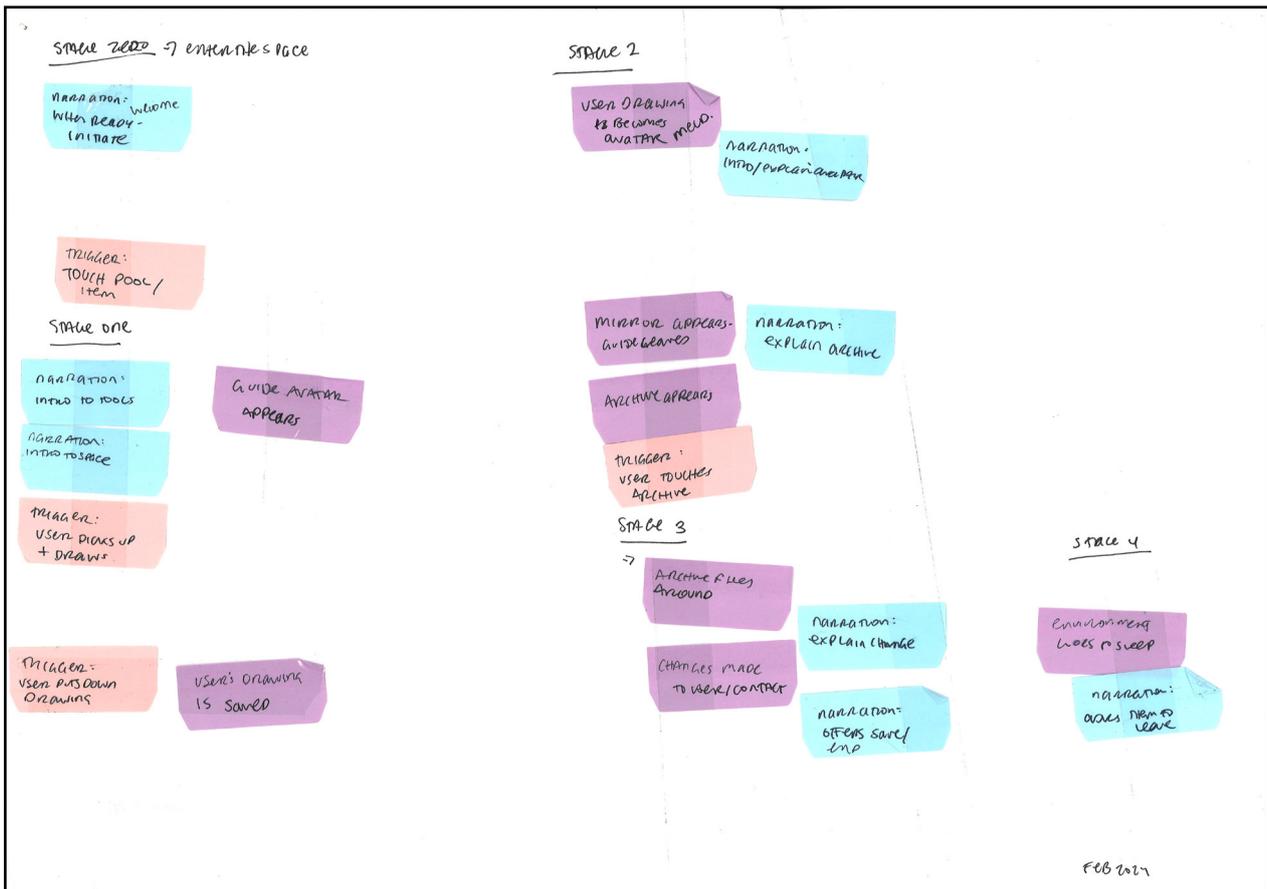


Figure 6-2

Design outline of Body Traces Archive organised into stages

Note. The stages shown here refer to stages organised in a stage manager script in the Body Traces Archive, written by the researcher. This planning document separates out functionality that needed to be implemented from the intended effect and user experience. Blue was used to track what narration would be needed, purple for basic functionality and events that back-end code would need to trigger and complete, and pink for moments of interaction that the participant had control over that would result in progression to the next stage. Stage Zero is the introduction, Stage One, the drawing activity, Stage Two, the mirror and archive appearance, Stage Three the part of the archive experience where participants could touch and interact with the entities, and Stage Four is the completion of the experience and farewell.

6.4 *Applying the RtD Methodology*

The above summary is a distilled and condensed version of the overall philosophy and way of working that guided me throughout this research project. A Research through Design methodology has enabled the synthesis of findings from literature-based and practice-based research approaches, which has resulted a flexible, shareable queer methodology for developing VR, as well as a practice-based outcome, the Body Traces Archive VR experience prototype.

The next chapter presents three of my preliminary experiments as reflective experiment logs. These experiments demonstrate how the then-emerging queer methodology that I was developing through literature-based and practice-based research has allowed me to engage with the digital materialities of VR in productive, insightful ways, and show the findings that have led me to develop my final prototype, Body Traces Archive. Chapter Eight details the queer methodology for VR that consolidates these findings into a shareable and more widely applicable format for other practitioners to utilise. Chapter Eight also presents an analysis of the process of using this methodology to develop the Body Traces Archive prototype, and the findings that emerged as a result of this process. Chapter Nine provides insight from the participant experience of the Body Traces Archive that demonstrates the effectiveness of this methodology and the impact for participants when visiting the Body Traces Archive.

Chapter Seven:

Preliminary Practice- based Experiments

7.1 *Playful Beginnings*

This chapter presents three key experiments, *Queer Dance Worlds*, *Body Traces Mark One*, and *Habit Habit*. These three experiments have informed the development of both my queer methodology for VR and the final prototype, the Body Traces Archive VR experience. While I developed other practice-based experiments, these three were the most informative for my final outcomes. Though the literature review of queer theory and cyberfeminist texts supported the development of my queer methodology for VR, practice-based exploration was crucial in order to identify the most effective and viable practice-based approaches that form a significant part of the queer methodology for VR.

These experiments demonstrate how a playful, critical, practice-based engagement with the medium of VR and *Unity game engine* led to original insights. These experiments led the identification of a set of properties of VR, strategies of craft and qualities of queer VR that constitute the practice-based component of the final queer methodology for VR. My analysis of these preliminary experiments demonstrates how they have made possible the final prototype, Body Traces Archive, as well as the queer methodology for VR, both of which are discussed in depth in Chapter Eight.

The first two experiments, *Queer Dance Worlds* and *Body Traces Mark One*, are VR-oriented projects (either for VR, or using VR) developed in order to explore the meaning-making potential of the medium, and to test and iterate queer approaches to VR. *Queer Dance Worlds* informed the visual and spatial language of the final Body Traces Archive prototype, specifically the use of shapes and arrangements reminiscent of organs and intestines. The *Body Traces Mark One* experiment became the basis for the activity that is asked of participants in the final prototype, the Body Traces Archive.

The third experiment discussed in this chapter, *Habit Habit*, is not a Virtual Reality-based experiment, and instead is a digital simulation work developed as a collaboration with local artist Kalanjay Dhir. While not centred on VR, the work offered significant insights into working with *Unity game engine* and design approaches to digital environments with multiple participants. The approach to architecting social interactions between digital entities in *Habit Habit* significantly informed my approach to the archive portion of the Body Traces Archive, where previous participants' drawings arrive as entities that move and interact with each other.

7.2 *Experiment One: Queer Dance Worlds*

This experiment resulted in the production of a 3-minute VR experience titled *Queer Dance Worlds* (2021), in which the participant is piloted through a landscape of gloopy forms. This project was a collaboration with Thomas Stoddard, a design colleague, friend and music producer working under the name Thorn Sweet; he produced the music that I then responded to with the visual and experiential outcome.

7.2.1 Research Goals

The goal from the outset was to produce a 3D animation in response to the music Thomas had produced, acting as a music video for the piece. As this was very early on in my research process, I also aimed to use this opportunity to experiment with the basics of constructing a 3D landscape that could be used as a virtual environment and experienced via Virtual Reality.

Conceptually speaking, the goal was also to explore how the creation of such a 3D landscape, video or virtual experience can be used to create a digital queer space. With complete creative control, my goal was to experiment with the visual language of objects, colours and spatial arrangements that can be used in *Unity* game engine, and to find compatible aesthetic approaches with Tom's electronic house music.

We developed this in early 2021, during Covid-19 lockdowns, when nightlife and clubs weren't open or accessible for queer communities. I aimed to develop a way of working with VR that would effectively (re)create the liminal experience of a queer club scene, and the emotional, affective, and embodied qualities of that space.

7.2.2 Process

The process of this experiment involved bringing abstract illustrations I created by hand (Figure 7-1) into Photoshop in order to make 3D extrusions of each element (Figure 7-2), and then bringing these 3D versions of each shape into Unity where I experimented with colour, texture and scale before arranging them in a tableau (shown in Figure 7-3 and Figure 7-4).



Figure 7-1

Hand-illustrated elements generated as part of Queer Dance Worlds process

Note. Illustrated by the researcher.

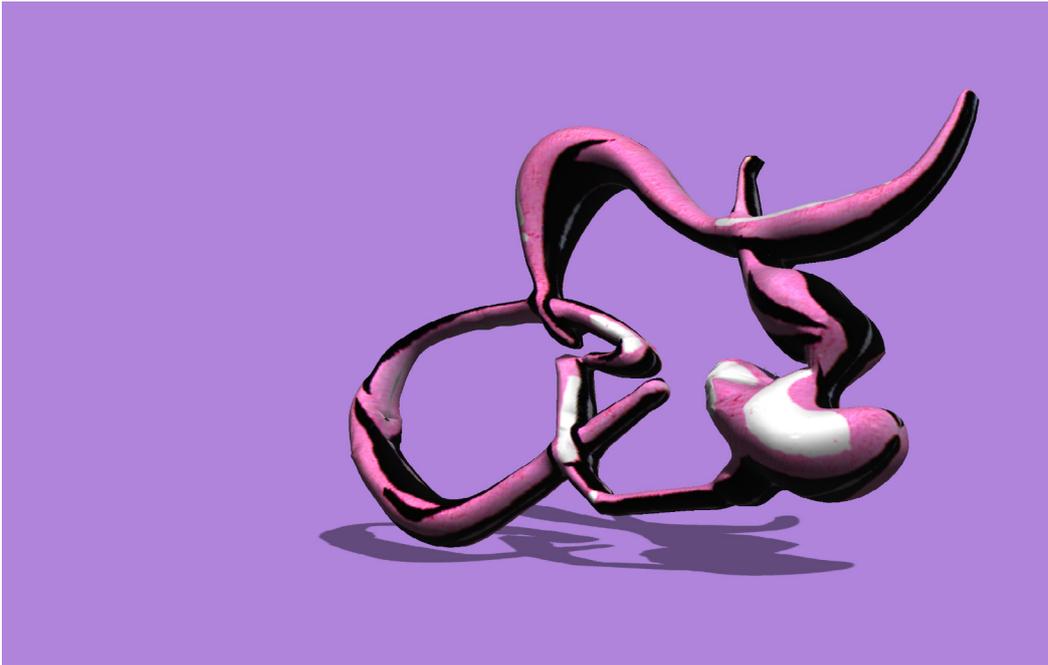


Figure 7-2

3D model of illustration generated via Adobe Photoshop extrusion processes

Note. Generated by the researcher.

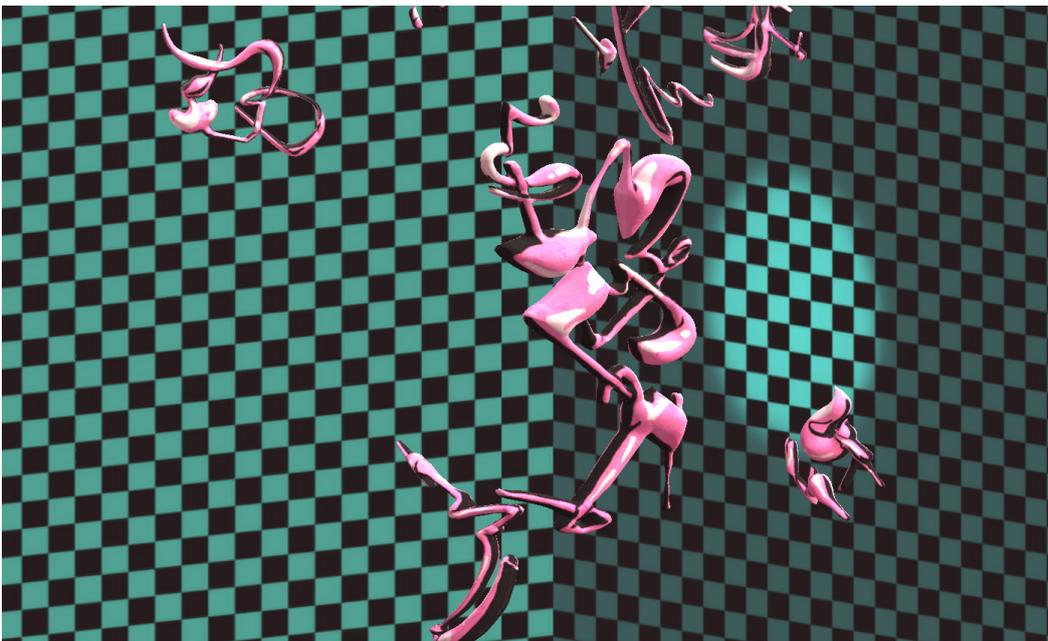


Figure 7-3

3D shapes from illustrations laid out in Unity game engine scene

Note. Developed by the researcher.

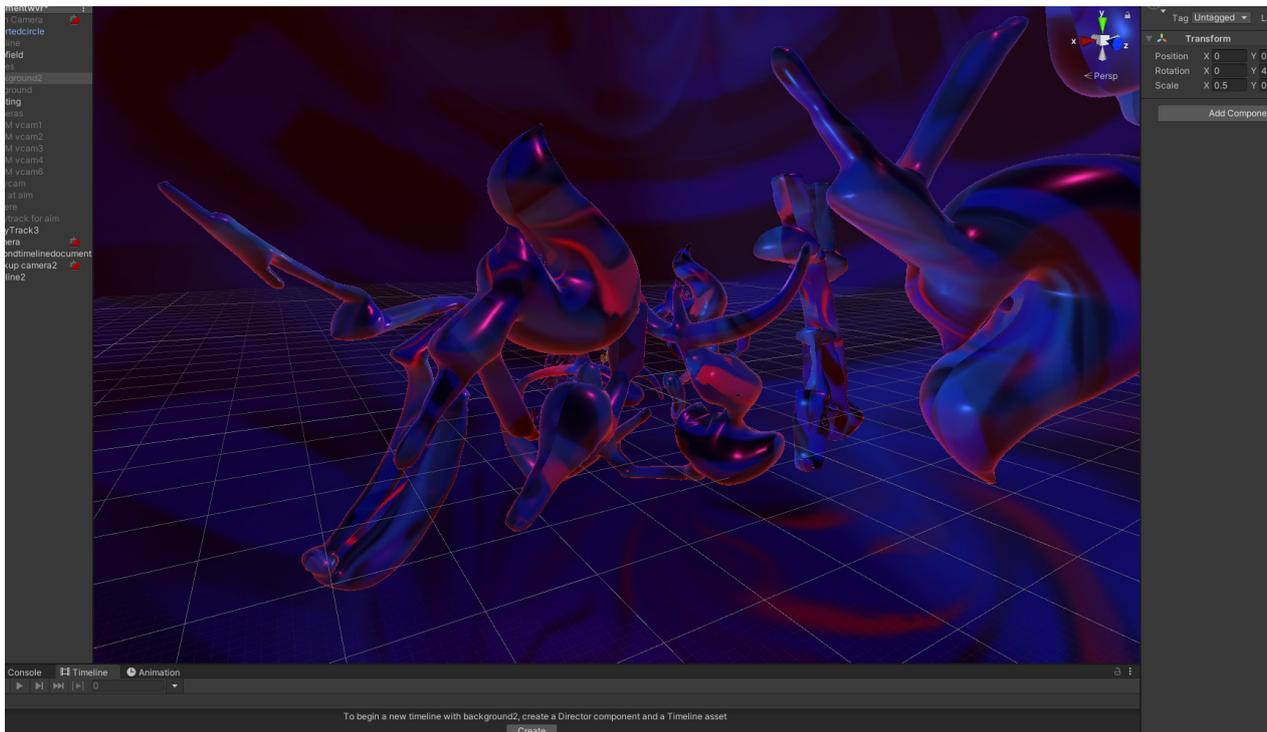


Figure 7-4

Screenshot of Unity game engine interface showing new colour scheme and spatial arrangement

Note. Developed by the researcher.



Figure 7-5

First-person view of the Queer Dance Worlds VR scene

Note. VR scene designed and captured as still by the researcher.

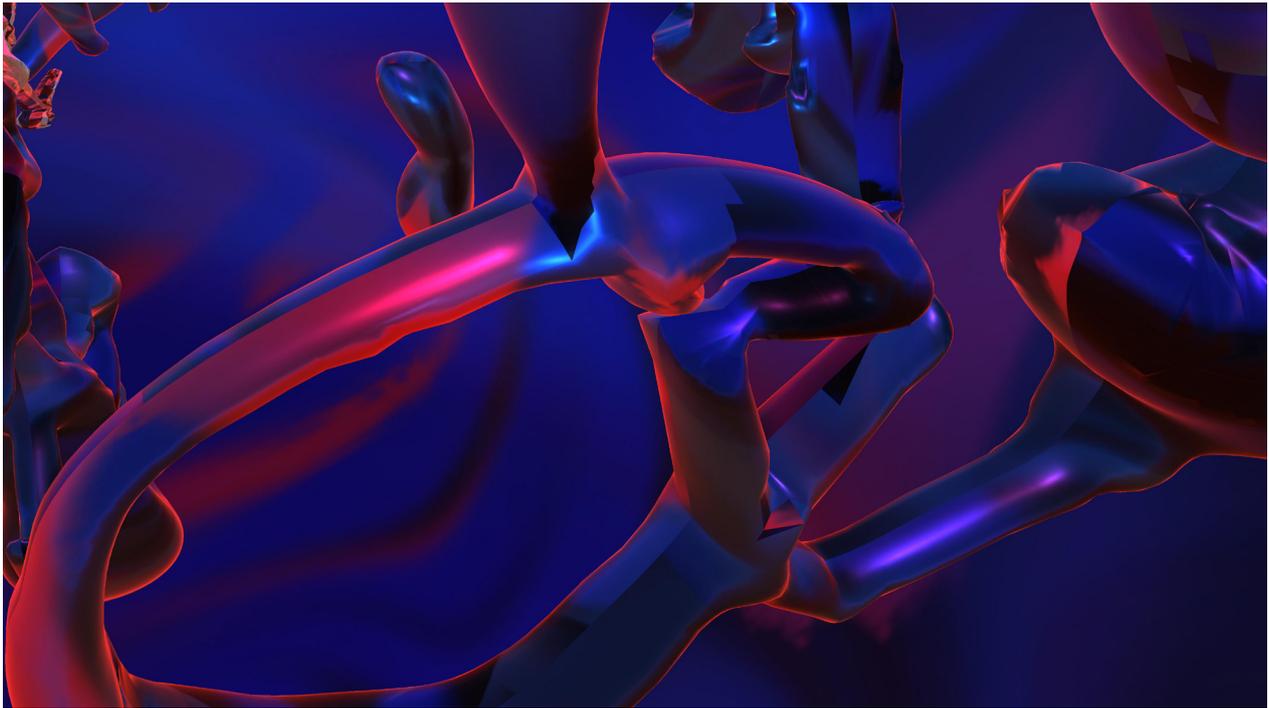


Figure 7-6

Still from Queer Dance Worlds final scene

Note. Developed and captured as still by the researcher.

To bring movement to the arranged scene, I animated camera movement throughout the environment. I also experimented with animation in order to bring a sense of life and liveliness. Unity offers animation tools that provide specific control for a user across many variables, such as size, position and rotation. I used these facets to animate objects in the environment, but the progress of the camera throughout the landscape provided the largest sense of movement. Stills from these later stages of development are shown in Figure 7-5 and Figure 7-6. I also experimented with VertExmotion, a paid package that I have used before. This tool uses sensors and predetermined settings (such as the rate of bounciness) to simulate movement as if the surface of particular objects are soft and squishy. By using this in conjunction with the previously mentioned animation keyframe tools, I animated the objects in the environment to move and modify over time, creating a sense of moving “gloop” or pulsing expansion.

Throughout this process of developing this landscape and video recording, I found that a significant part of the work was exploring what visual and object-based languages are available in a 3D environment when avoiding reference to real world objects. While responding to specific music, the design of the virtual environment was also an activity in testing what abstract forms suit a digital space, and what aesthetic languages are possible when released from the

expectation or goal of reproducing a “real” physical thing.

An excerpt from the final video capture of the virtual environment is viewable in the Documentation Folio.

7.2.3 Practice-based outcome and research findings

The final design output of this experiment was a 2D video recorded via virtual camera in the 3D landscape. If a headset is used, this virtual “rollercoaster”-esque path within the *Unity* project can be traversed by a visitor, with the landscape appearing around them in 3D while they move throughout it. If needed, this could be exported as a 3D virtual reality video. A 2D video excerpt of this VR experience can be viewed in Appendix B: B.2 Preliminary Experiment One: Queer Dance Worlds Process Video Documentation.

The final virtual environment outcome, as well as the overall design process, led to a number of insights that have shaped both the queer methodology for VR and the Body Traces Archive. First, it led to the development of a particular visual language for VR, especially an emphasis on “blobby” abstract shapes. It also led to the identification of disembodiment and disorientation as qualities of a VR experience that can be understood as queer. Finally, it led to the identification of the layered nature of VR, with physical reality and virtual reality existing simultaneously for a participant, as a crucial property that a queer approach must attend to.

7.2.3.1 Visual Languages for Queer VR

Over the course of this experiment, I developed a visual and spatial language that suited the music and concept of a queer club experience in VR. By developing my “blobby” field of objects, I created a non-representational, spatialised visual language that worked to recreate the affective qualities of real places such as nightclubs, rather than a faithful visual reproduction of any particular location. This dark, glowing world of glooping, swirling figures creates the *feeling* of dancing amongst friends and strangers, rather than the *look* of the place such an activity happens in. This realisation—that VR is highly suited to affective rather than representational reproductions—is a significant insight that has shaped both the queer methodology for VR and the final Body Traces Archive prototype. Most significantly, this experiment led to the identification of the strategy, “Use anti-representational or non-representational visual, spatial and metaphorical languages for worldbuilding” within my proposed methodology.

The use of gloopy, blobby, abstract forms is something that I have continued to experiment with throughout my crafting and is visible as an aesthetic strategy in the final *Body Traces Archive* prototype. In terms of the visual style, a valuable finding emerged close to the final stages of development and based on feedback: the experience of flying through this landscape feels almost like visiting the internal guts and intestines of some alien being. This “Feeling of being in another place or time” is identified as a key quality of queer VR in my methodology.

The intestinal experience of *Queer Dance Worlds*—the sense of being “within the untouchable inside”—was not intended, but became an allegory that I returned to in future experiments, especially as it showed a deep conceptual compatibility with cyberfeminist thinking. Early cyberfeminist artists such as VNS Matrix often engaged heavily with ideas of wetware and body-technology combinations that embraced visceral qualities of threshold-crossing, as discussed in Chapter Five. Recognising an affinity between my own aesthetic strategy and this lineage of cyberfeminist aesthetics, I then delved into more rigorous research investigating cyberfeminist practice, slime aesthetics and their relevance to this queer VR project. This experiment therefore is also the beginning of the relevance of slime to my development of queer VR.

7.2.3.2 Disembodiment and Disorientation as Part of a Queer Methodology

This experience was non-interactive, whereas the majority of my other VR experiments involved interaction in some way. In this experience you are flown about without a visual representation of your body or presence, and without control of your movement. This lack of control creates a disorienting experience for people as they stand still in the physical world, with a mis-match between visual input and felt bodily presence. When testing this experience I would become almost nauseous, hyper-conscious of my feet planted and motionless on the floor while the environment swept past me, huge and floating.

In her analysis of *Domestika* by Jacolby Satterwhite, a Queer VR work, Sonia Misra (2020) argues that we should understand VR—especially disembodied VR, where participants do not have an avatar—to be a (dis/re)orientation device for queer purposes. Rather than VR acting as a transcendental escape away from everyday life, Misra’s interpretation sees VR as a way to reframe how people experience themselves both digitally *and* in the everyday that they return to once they remove the headset. It is crucial that the effectiveness of this strategy relies upon understanding VR as a liminal, layered experience: it is only by existing at the threshold of both the physical and the virtual that the

disjuncture between worlds and the ensuing dis-orientation come about. In this way, this experiment has contributed to both the identification of a property of VR—“VR is layered on top of physical space”—and quality of queer VR: “Feeling ‘out-of-synch’ or disoriented between the physical and virtual world”.

This sense of disorientation, rather than being designed out and totally erased from experiences of VR, is recognised as a valuable principle of a queer methodology for VR, as it disrupts the normative and expected orientations of bodily integrity and stability. This finding, generated through both practice and the review of precedents within the field of queer VR, contributes to one of the overall goals of my methodology, to “Disrupt normative, heterosexualising bodily orientations”.

7.2.3.3 Experiential Thresholds and VR as a Queer Utopia

This experiment showed that VR has a liminal, layered quality, where the digital, virtual world exists as a space of computer-ish “otherness” that can be visited, but cannot become the only place a visitor stands in. Even when seemingly immersed in a virtual world, this virtual world will always exist in relation to the physical world: the ground that a visitor stands upon, or the chair they sit in. This contrast has been identified in the property “VR is layered on top of physical space: VR bears a critical relationship to the physical environment the participant is in but cannot see”.

Rather than being a negative, this quality of layered realities is a specific feature of the medium and presents potent compatibility with a queer way of working. When crafting queer utopias, one is always aware of the “no place” at the heart of utopia: the very impossibility of its existence is what makes it so seductive, so promising, so alluring. The contrast between the physical world and the VR world that is visited for a short duration is a key aspect of the meaning-making and rhetorical power of VR. Queer virtual worlds are liminal, threshold spaces that offer escape from, as well as challenge to, the straight world they lie amongst; taking the headset off and returning to the physical, “real” world is a moment of contrast where one becomes aware of what has been left behind in the headset.

Liminal queer spaces are a central focus of Esteban Muñoz’s configuration of critical queer utopianism, as discussed in Chapter Four. *Queer Dance Worlds* demonstrates that VR experiences can be designed to provide the lingering illuminations and hauntings of queer utopian possibility and anticipation that Esteban Muñoz calls for. VR can act as the “then and there” of a queer world, visited for a moment and remembered even in the “here and now” of the

straight, everyday existence once the headset comes off.

This experiment revealed the importance of worldbuilding and spatial design to the task of queerly crafting embodied experience in VR. What is crucial to using VR as an avenue for the “then and thereness” of a critical queer utopia is the phenomenological experience of being in two places at once, and, furthermore, what this second place consists of: a visual and spatial language of abstract shapes that could only be possible in a digital realm. Through the strategy of “Creating places that otherwise would not exist”, VR can be used to generate the quality of “Feeling yourself to be in another place and/or time”. While this set of findings has been crucial to the practice-based interventions within my queer methodology for VR, these findings have also shaped the conceptual framework that motivate the practice-based activities. It contributes to the goal to “Create experiences of critical hope and futurity” and the premise of queerness, that “Queerness is always on the horizon of ‘then and there’, queerness is a kind of potentiality”.

Prototyping a queer VR experience becomes a way to manifest a pocket of then-and-there, a momentary illumination within a headset, a threshold space that is layered upon the physical and stepped into; an immersive space that we know is not physically real and yet acts upon us to create lasting impressions.

7.2.4 Response

These early findings provided both the conceptual and practical base for my eventual queer methodology for VR. The approach to visual language developed in this experiment has been highly influential on later experiments and the final Body Traces Archive, especially in the recognition of certain intestinal, blobby visuals as being compatible with a queer approach.

The recognition of disembodiment and disorientation as queer strategies and qualities of VR also led to a contrasting exploration as follow-up. The next experiment shows how, in response to *Queer Dance Worlds*, I then looked to find ways to bring bodily representation and embodiment in VR while still retaining queer qualities to the experience.

7.3 *Experiment Two: Body Traces*

Mark One

As a follow up of the *Queer Dance Worlds* experiment, Body Traces Mark One came from a goal of investigating how introducing participant involvement and agency would affect a VR experience. For this experiment, the motivating question became, *How might I use interactivity to bring bodily experiences to the fore in virtual environments?*

This experiment resulted in a virtual environment populated by a set of what I call “body traces”, a conglomeration of lines in 3D space generated by drawing against my body in Virtual Reality. The process of generating these body traces became a starting point for my later final prototype.

This experiment was first presented in collaboration with my supervisor, Dr Andrew Burrell, in the symposium presentation “Digital Traces of The Body” at ANAT SPECTRA: Multiplicity (Chalmers Braithwaite & Burrell, 2022), and in the article “Fractured and Fragmented Selves: Queer Approaches to Designing Virtual Experiences” (Burrell & Chalmers Braithwaite, 2023).

Video documentation of this experiment is also available in Appendix B: [B.3 Preliminary Experiment Two: Body Traces Mark One Process Documentation](#).

7.3.4.1 Research goals

The goal of this experiment was to develop an alternative way to bring the body “into” virtual reality, other than traditional avatar creation processes (such as selecting facial features from a list). I was also interested in challenging the perception of VR as a “frictionless” technology of total transcendence. I was particularly inspired by a set of discussions at the *Let’s Object!* HDR Salon run by DAB, TD School and ISF at UTS in 2021. Speaking about his own work, Dr. Tom Lee spoke about the “shininess” of speculative designs, and wanting to find a way to put fingerprints—signs of touch—onto renderings of possible futures. Using this as a starting point, I aimed to explore how friction could be a productive force in the making of embodied experiences in Virtual Reality.

7.3.4.2 Process

When I first undertook this experiment, we were at home in Covid lockdowns. The room I was in was my own study, using the computer, headset and controllers I had on loan from the university. I mention this context because the process was oddly intimate: I opened Tilt Brush, selected a pen tool, and traced myself head to toe, pressing the controller against my body. I am not sure that I would have taken this approach as easily if I had been working in my usual university context, with glass walls where any passer-by could see me.

The drawing program I used, Tilt Brush, is an open-source drawing program that was originally developed by Google. The original purpose of Tilt Brush is to be drawing in the void; you have no avatar and no bodily form. Your controllers float in the air as you move them in front of you, with various palettes to select from to change your drawing tool (as seen in Figure 7-7 and Figure 7-8). You are encouraged, via their marketing material, to reach into the space in front of you to draw.

Choosing to draw against the surface of my body was therefore against the intended use of both Tilt Brush and the controllers themselves. Rubbing the controller against my arms, torso and legs was a way to create traces that were recordings of friction between my invisible yet present physical form and the visible yet insubstantial virtual environment I was visiting. The invisible boundary, the contact surface between me and the virtual world, became visible and material via this friction.

As I finished each tracing of myself, I moved the world around me—this is the common way to navigate Tilt Brush, moving the environment around you rather than stepping around or piloting yourself around a static environment—and drew myself again, only moments later, catching glances of previous drawing nearby. The “momentariness” of these traces, and the multiplicity of them as a gathering of recorded selves that I stepped out of again and again came forward as a particularly meaningful part of the process. Rather than a stable avatar that represented a predetermined identity, each of these traces was only a partial, almost futile, attempt to capture an uncapturable sense of presence.

The original drawings I produced were very simple, primarily drawn with two tools available in Tilt Brush: one a thinner pen tool that had thickness like a ribbon, wider than it is deep; the other a more tubular pen that created an equally thick tube in space, like piped icing. I also experimented with using this tubular pen in various thicknesses. Stills of these original exports from Tilt Brush are shown in Figure 7-9 and Figure 7-10.



Figure 7-7

Still from video showing someone using the Tilt Brush program to draw in space

*Note. Screenshot captured by researcher from *Tilt Brush: Painting from a new perspective* [Video], by Google, 2016, YouTube (<https://www.youtube.com/watch?v=TckqNdrdbgk>).*



Figure 7-8

Still from documentation footage showing someone using the Tilt Brush program to draw a glowing line

Note. Image captured by researcher from “Tilt Brush: Painting from a new perspective” by Google, 2016 (<https://www.youtube.com/watch?v=TckqNdrdbgk>).

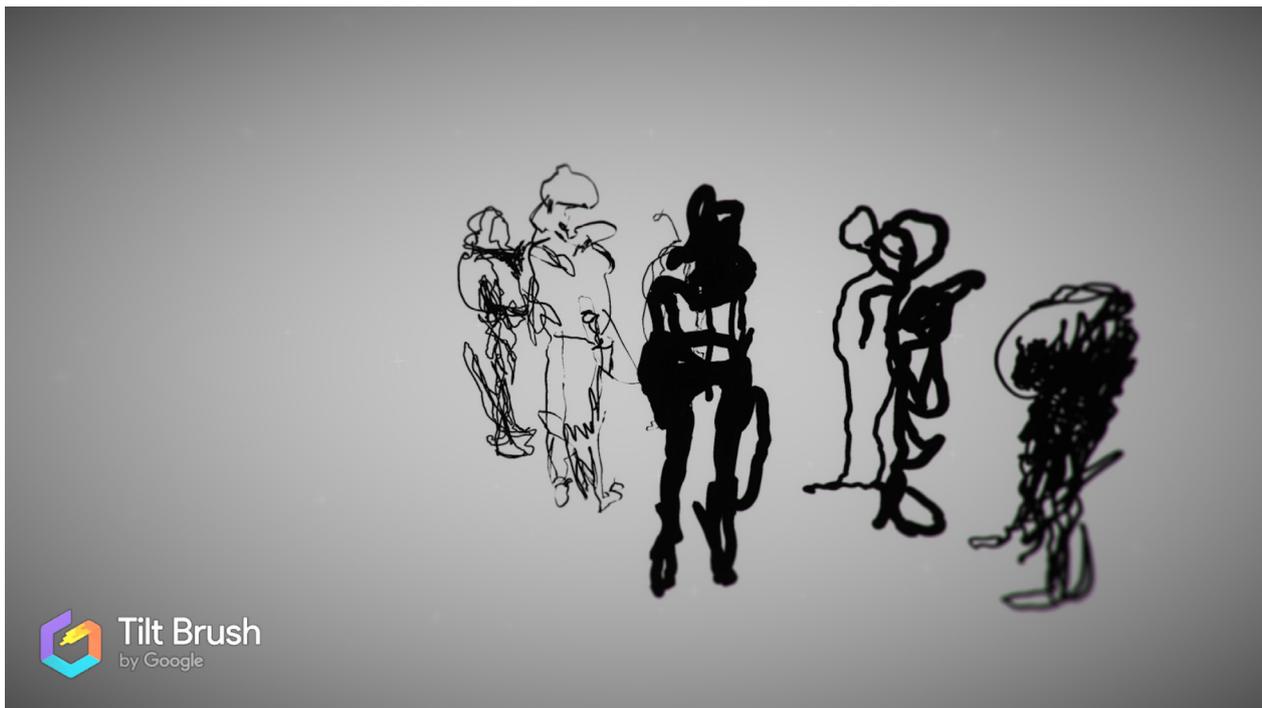


Figure 7-9

Body traces from Tilt Brush

Note. Drawn and captured as an image by the researcher.

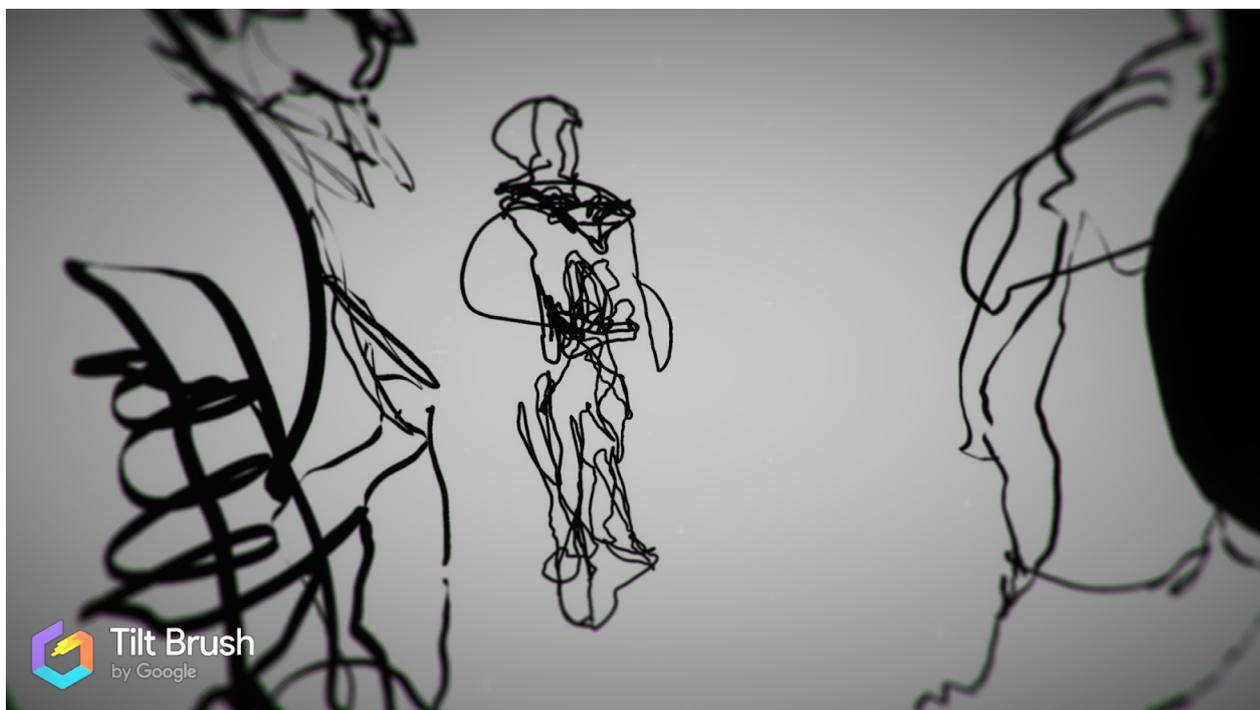


Figure 7-10

Closer view of body traces from Tilt Brush

Note. Drawn and captured as an image by the researcher.

After taking the headset off, I then transferred these 3D squiggle forms into a scene in Unity game engine. When importing into Unity, I experimented with colouring the surfaces of the drawings, and separated out each drawing so they could be arranged around the space of a virtual environment (this process is shown in Figure 7-11).

As mentioned, I tested a variety of Tilt Brush tools while creating my traces. Having coloured them in Unity (as shown in Figure 7-12, Figure 7-13 and Figure 7-14) I could then evaluate these differing visual approaches. A thin line made it more apparent that the traced form was a physical body, existing as a mass of cables or netting around a hollow core. A thicker line, however, registered as contiguous with the visual language developed in the Queer Dance Worlds experiment. With an intestinal appearance, the traces felt like something summoned from the inside of myself, made real in the virtual environment.

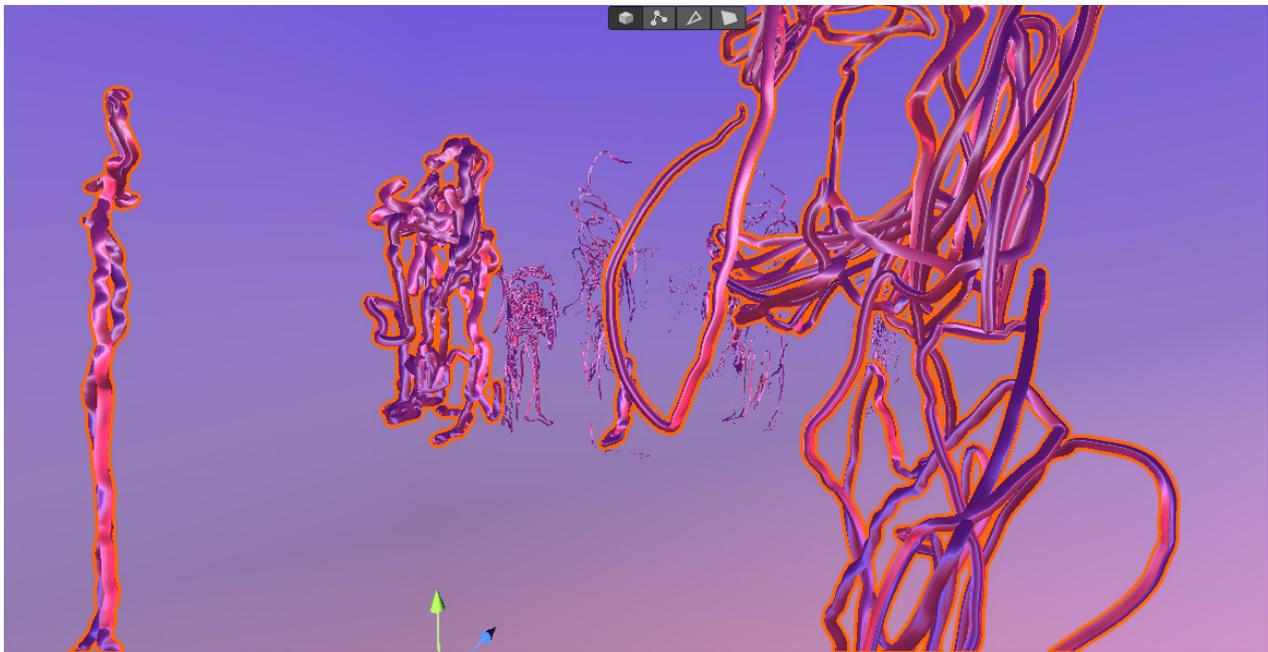


Figure 7-11

Body traces arranged in draft Unity scene

Note. Unity scene created and captured as image by the researcher.

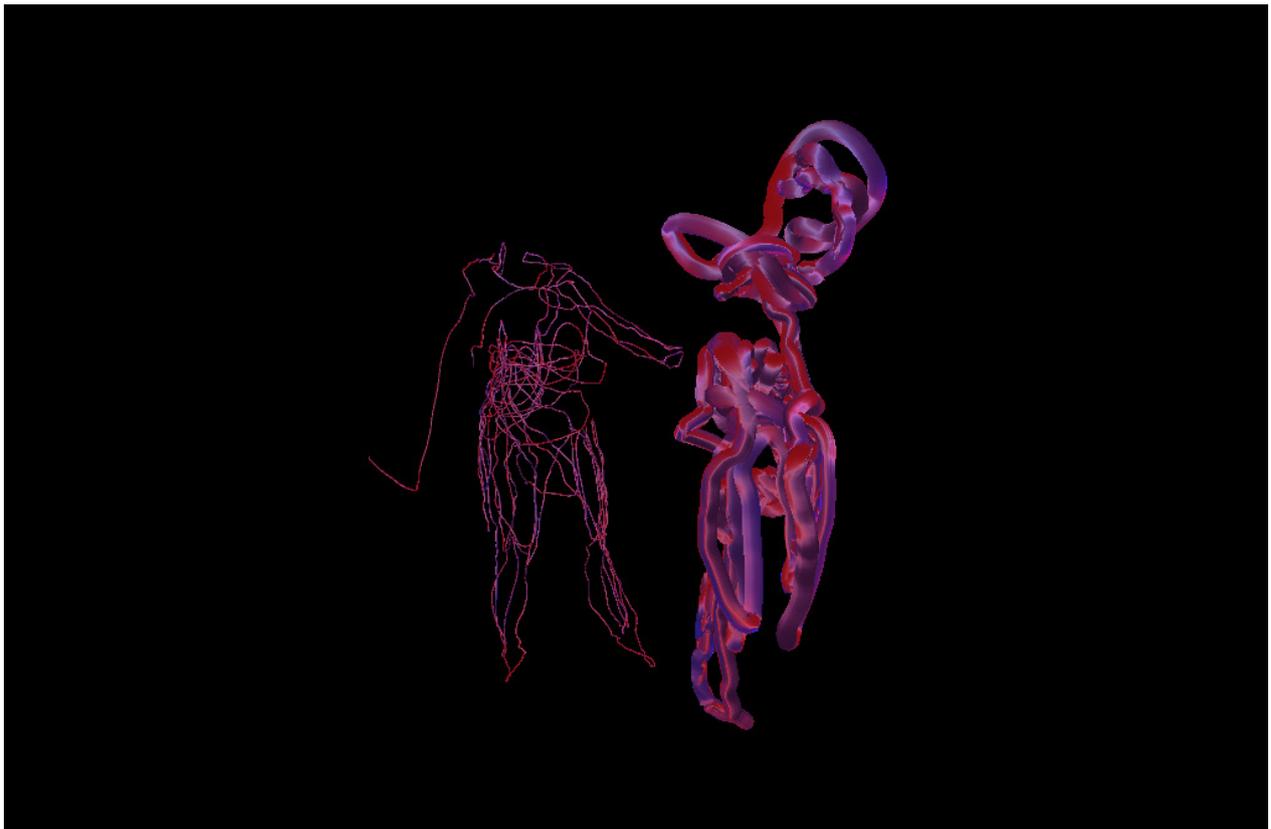


Figure 7-12

Two selected body traces against a black background in a Unity scene

Note. Developed and captured as an image by the researcher.

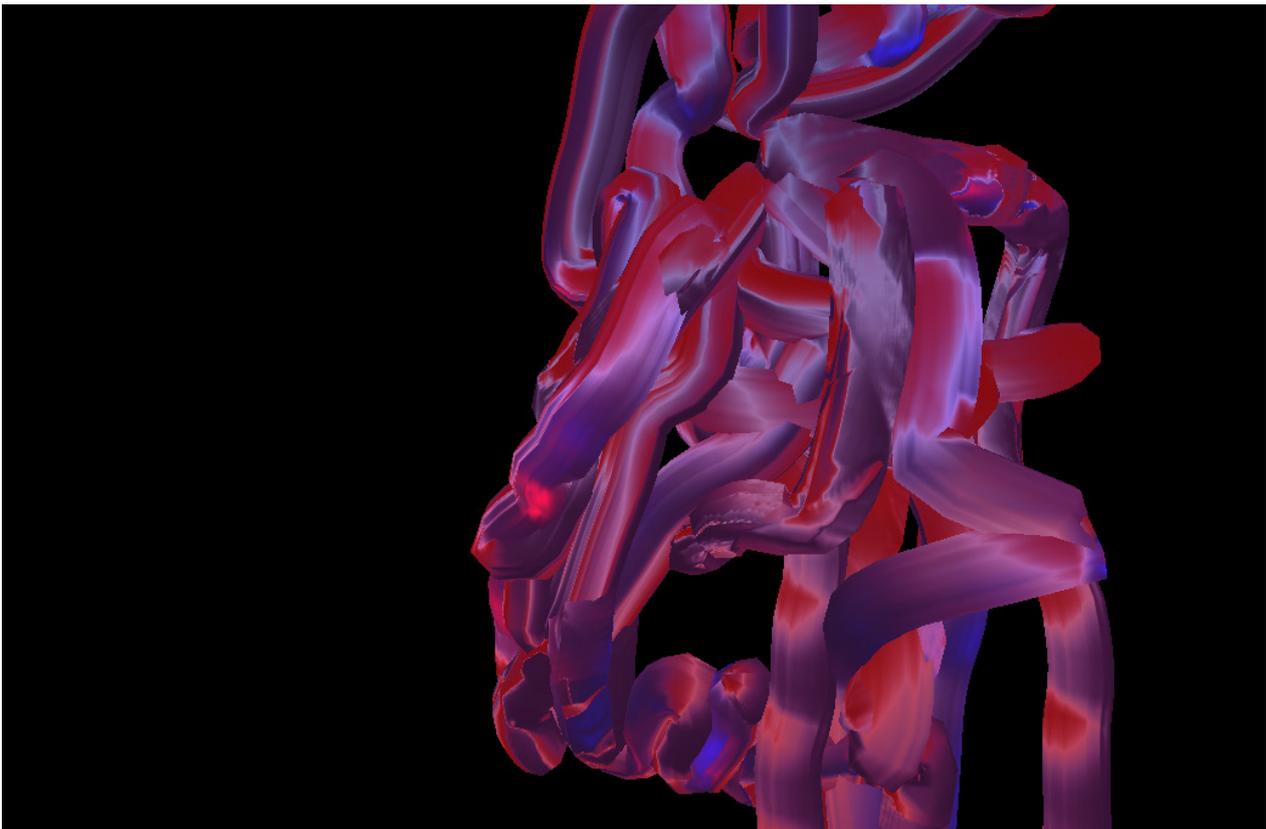


Figure 7-13

Close up of body trace with thick lines and new materials in Unity scene

Note. Developed and captured as an image by the researcher.

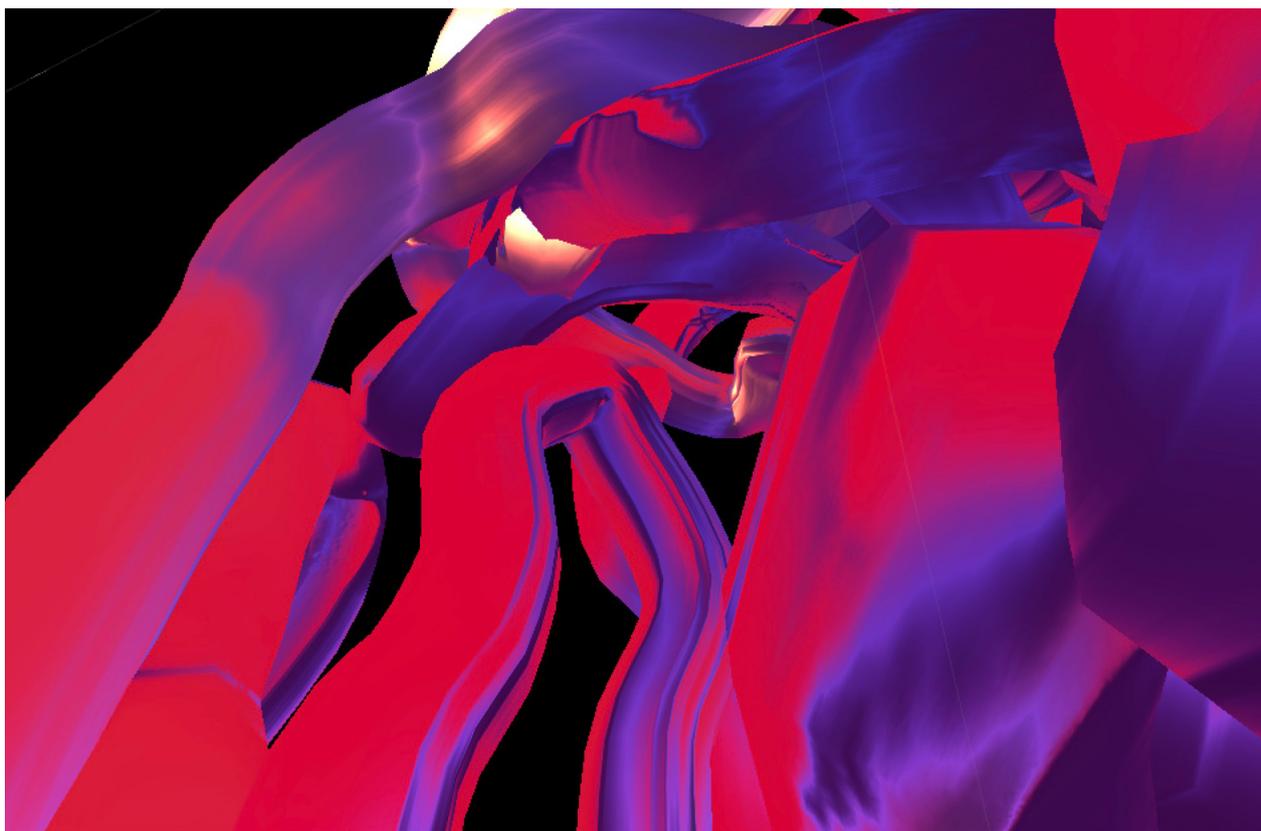


Figure 7-14

Close up of body trace with thick lines and new materials in Unity scene, during colour experimentation

Note. Developed and captured as an image by the researcher.

7.3.1 Practice-based Outcome and Research Findings

The final practice-based outcome of this experiment is a virtual environment that displays a range of my self-traces, viewable on either desktop or via a VR headset. My research findings from the process have significantly informed the design of interactivity within my final Body Traces Archive prototype, as well as many of the components of my queer methodology for VR. The findings include the importance of interactivity and process-based performance for a queer methodology for VR, as well as alternative, disruptive engagements with expected use of hand-held controllers. Finally, this experiment revealed the potency of touch-based drawing as a specific queer mode of performance in VR, which then became the base of the final Body Traces Archive VR prototype.

7.3.1.1 Process-based, Interactive Meaning-making

When you look at the drawings I produced as part of this experiment, they may register as simply blobs of colour. However, once I explain that they are generated by tracing my body, suddenly the meaning changes and they register as a recording, as a remnant of my presence. The importance of the drawing process to the final meaning of the visual outcome suggested a potent approach for integrating interactivity in my future VR development. While I had undertaken the experiment with myself as the only participant in mind, the results made it clear that I would want to build this tool as a way to test it with other people, and this became the core of my final prototype. This demonstrates the key value of “rapid prototyping” as part of an iterative design practice, where pre-existing tools allow for lower stakes forms of play and exploration during early-stage idea testing. While I was using Tilt Brush in a non-traditional way, it allowed me to explore a concept quickly and without first building out the entirety of a drawing tool from scratch. I was able to identify the specific qualities and functionalities of the drawing tool I would later work to implement, such as the drawing tool thickness, colour and texture. More importantly, I was able to play around, explore, and find my way towards a rich concept without first knowing exactly what it was I would be creating.

The previous experiment, *Queer Dance Worlds*, showed the significance and queer potential of the layering of the here and now of the everyday and the then and there of Virtual Reality. This experiment showed that the threshold between the two, where the moment of disjuncture and disorientation occurs, can also be a productive site that generates meaning for the participant.

The process of moving from “reality” into the virtual environment becomes a key moment of meaning-making, when usually it is considered a menial or unimportant “set-up” task before the intended game or experience. Avatar design processes are often structured to be part of a menu selection, with features or characteristics for participants to select before they commence the “actual” experience and are immersed in a fictional world. In this Body Traces experiment, the process of entering the world is itself the focus, with a bodily representation that is not selected from a menu. As a 1:1 trace from head to toe, the drawings are very accurate representations of my body, even though they are not visually recognisable as me. Comparing this visual outcome and process of generation to traditional avatar design processes raises the question of what kinds of accuracies are useful when creating VR experiences: do we need human-looking features that create something analogous to our own visual appearance? What does it do to instead create a representation of the self in virtual reality that is intimately tied to the way we stand and simply take up space?

The findings of this experiment, in tandem with my explorations of the history of embodiment in VR, led to the strategies of “Enable interactions in which participants’ behaviours or actions enacts change both upon themselves and the world around them” and “Design avatar systems or embodiment opportunities that are non-representational and shift in their relation to the participant”. The approach I have taken also reflects the value, “VR Development should stay with the meat: VR should be actual, hot, messy, bloody, material, sullied, base”, as the interactions and embodiment in this experiment are non-representational yet intimately tied to the body.

Drawing upon the surface of the body as a generative act also led me to follow lines of research into skin as a phenomenological surface and touch as a form of intimacy and communication, which is present within the novel methodology in the property “Skin acts as the threshold and interface between worlds” and strategy of “Focus on touch as a form of corporeal intimacy and communication”.

7.3.1.2 Queer Technological Configurations

The way I use the VR headset controllers in this experiment is at odds with how controllers are generally intended to be used. During the drawing process, as I tried to move the controllers behind me along my back, tracking would sometimes cut out and back in again. The headset expected me to use the controllers in a more standard posture, with my hands held roughly at stomach height in front of myself. Using the controllers against their intended manner

was a way of de-familiarising—and re-familiarising—myself with the physical hardware at hand, and by creating contact between controllers and my body, the process brought forward the concept of queer intimacies. This experiment led me to the strategy of developing a technological configuration where contact between controllers and the body besides the hands that hold them was encouraged and explored, very much against the norms of contemporary usage of VR controllers.

This also led me on a significant return to queer video games studies, and a search for literature on how other theorists and practitioners have considered queering the use of controllers. It was through this line of experimentation and later literature-based exploration that I found the work of Jess Marcotte (2018) on queering the use of video game controllers, which I have discussed in Chapter Four. The findings of my experiment, as well as this literature-based research, informed the strategy within my methodology of “Take a critical, anti-naturalising approach to the hardware that enables interfacing with VR experiences, and consider what unusual (mis)-uses you can enable for the headset and controllers”.

7.3.1.3 Drawing the Body as a Queer Phenomenological Record

This traced, recorded self can be seen as a phenomenological record of a bodily presence in Virtual Reality, manifested through a queerly motivated misappropriation of regular VR tools like a drawing app and a set of controllers. This process focuses on the meeting point of the controller and the surface of the body, manifesting it as a virtual presence rather than allowing VR to be an experience of weightless transference into the digital. Embodiment, in Ahmed’s queer phenomenological understanding, is an ongoing process that you do, rather than something that you simply are. Body Traces is a kind of virtual simulation of the phenomenological skin, with a record of my bodily presence in VR accumulating through sedimentary decisions and actions. This experiment shows how a premise of queerness, “Queerness is a performative, phenomenological experience, one of being out-of-joint from the norm”, can be extended from its relevance in analysing the everyday into developing interactions within a virtual environment.

This early Body Traces Mark One experiment also acts as the bridge between the visual language of *Queer Dance Worlds* and my final outcome, showing how my approach to intestinal, gloopy forms continued to develop with the introduction of drawing within VR itself.

7.3.2 Response

This experiment became the foundation of what would become the final prototype, the Body Traces Archive. I went through the process of making a drawing tool in *Unity*, so that I would have control over its integration with a wider virtual environment, with the introduction of a social aspect which I will discuss in later experiments.

7.4 *Experiment Three: Habit Habit*

Habit Habit (2022) is a collaborative screen-based project produced with artist Kalanjay Dhir. The work was produced as part of the inaugural arts commissioning for an installation program at the then-new PHIVE library and council building in Parramatta. The outcome consisted of three 20-minute videos centred on politics, place and personal life. Each video is a recording of a real-time simulation in an isometric 2.5D virtual environment, with twenty-one 3D avatars walking around amongst 2D pixel art. A still in its original aspect ratio, and in a cropped format, are shown in Figure 7-15 and Figure 7-16.

Avatars were designed and made by Kalanjay Dhir, the primary artist, who also designed the map of a future Parramatta and instructed the team overall. 2D pixel art components such as trees and buildings were designed and illustrated by Emma Pham, while text box design and typography was designed by Amy Toma. Interviews were conducted by Kalanjay, which were transcribed by Chi Tran, and text data was processed by Kashif Shiekh. I was responsible for the development of the *Unity* 2.5D environment, animation of avatars using 3D animation clips from Mixamo, and the general programming and code required to consolidate all of the assets and text data in a working simulation. Each video is a recording of a real-time simulation as the avatars walk around the environment. When they run into each other, these characters then have conversations, with the topic chosen randomly from a set of questions. A range of characters also give monologues to the audience (shown in Figure 7-17).

The process of developing *Habit Habit* gave me detailed familiarity with working with code as a way to structure and architect social interactions between digital entities, which I implement in *Body Traces Archive* as a queerly motivated manifestation of a digital ecosystem. The process of developing *Habit Habit* led to notable insights regarding the conceptual significance of code that is “behind-the-scenes” for eventual audiences or participants, but nevertheless crucially shapes the reality of the virtual environment.

7.4.1 Research Goals

As a collaboration led by another artist, the goals of this project were wider than my own primary research agenda. Overall, the goal was to develop a digital social simulation based on the local Parramatta community, using avatars and interview transcripts, with pixel-art video game aesthetics. The development



Figure 7-15

Still of community scene in Habit Habitat (2022), original aspect ratio

Note. The researcher served as project technical lead, *Unity* developer and research support on this project. Image is from *Habit Habitat* [Simulation recordings] by K. Dhir, 2022, PHIVE, (<https://www.kalanjay.com/Habit-Habit>).



Figure 7-16

Still of community scene in Habit Habitat (2022), cropped

Note. The researcher served as project technical lead, *Unity* developer and research support on this project. Image is from *Habit Habitat* [Simulation recordings] by K. Dhir, 2022, PHIVE, (<https://www.kalanjay.com/Habit-Habit>).



Figure 7-17

Character in *Habit Habit* (2022) giving a monologue to the audience

Note. Image is from *Habit Habit* [Simulation recordings] by K. Dhir, 2022, PHIVE, (<https://www.kalanjay.com/Habit-Habit>).

of the visual style as well as the goal of developing a digital social world was informed by our own experiences using online multiplayer spaces like *Habbo Hotel* (which launched in 2000 in Finland, but gained popularity amongst the English-speaking internet around 2005) (Randall, 2024), *Runescape* (launched in 2001) (Klepek, 2016) and *Club Penguin* (launched in 2005) (Iqbal, 2023). The goal was to create a digital environment that uses familiar landmarks and visual styles from both the physical environment of Parramatta and digital platforms to reflect upon the history, present and future of physical common spaces in Parramatta, and how digital life is integrated with these spaces.

As part of my own specific research process, I focused on examining the potential of *Unity* game engine for building cohesive systems of social simulation. While not specifically guided by queerly motivated goals, I was informed by queer understandings of performativity and the question of how social dynamics more broadly can be translated, modified and experimented upon within a digital environment. Therefore, the core research question that guided my specific prototyping process was: *How might we create a lively digital world from textual interview data?*

7.4.2 Process

As lead developer, I constructed the 3D environment in *Unity* game engine using the assets provided by our collaborative team. I developed the back-end system and code that enables the avatars of each participant in the artwork to roam the landscape and interact with each other in conversations that reproduce interview answers. This also involved developing back-end code

to randomise and remix text sources for these interactions. Writing this code allowed me to sculpt and shape the social environment that these agents interacted within, in collaboration with the artist.

C#, as the code language for Unity, became the main material with which to establish the rules of socialisation for this simulation; avatars were given assertiveness ranks and a set of “rules” in their individual code for how conversations and interactions with others should proceed, such as when they should wait to greet someone, avoid a conversation already occurring, and how to farewell each other. Avatars also give “monologues” directly to viewers depending on what stage of the simulation is occurring.

The development of the various scripts required to pilot the avatars, put them into conversation with each other, and generally ensure the world operated, revealed significant insights regarding the use of code as a medium for social simulation. When writing this code, I programmed the characters to collide, and then decide if it was appropriate to speak to each other (for example, if the person they collided with was already in conversation with someone else they would not begin a new conversation), and then once the conversation had begun, both participants had to determine who would speak first and on what topic. Determining how a conversation would work in Unity game engine via code also meant examining how conversations “work” in real life and deciding what aspects of implicit rules that govern our everyday social interactions were most important to make functional in a digital setting.

In consultation with Kalanjay, we decided to implement a “social assertiveness” rank. This meant that when two characters collided or met while walking around, they would start a conversation, and then test who was more assertive. The more assertive character would then initiate the conversation and decide the topic based on the overall theme designated by that stage of the simulation (the code for this is shown in Figure 7-18).

This small facet of the development process showed the crucial role that invisible back-end code can play in developing the social rules of a digital environment. While it is important to develop the narrative framing of a fictional world, it is just as vital that the infrastructural rules that govern and bring this world into being fulfil the overall philosophy behind the worldbuilding task. A diagram showing how various scripts within Habit Habit combine to create the work is shown in Figure 7-19.

In the first experiment discussed in this chapter, *Queer Dance Worlds*, I used animation and a soft body physics system (VertExmotion) to bring a visual and spatial sense of life and liveliness to the virtual environment via movement.

```

// this tests who should speak first and then initiates the convo, they're both doing this as the same time(...ish)
void EstablishDominance()
{
    // gets partner assertiveness from their version of this script - will need to be manually set in unity inspect
    PartnerAssertiveness = MyConversationPartner.GetComponent<ConversationManagerIndividual>().OwnAssertiveness;

    // if my ranking is higher (30 is highest, 1 is lowest) i speak first, otherwise i listen first
    if (OwnAssertiveness >= PartnerAssertiveness)
    {
        ConvoRole = "Leader";

        Debug.Log(name + "changed convorole");

        // this asks brain to think of something to say from the greetings range
        ThinkOfGreeting();
    }
    else
    {
        ConvoRole = "Follower";
        ListenToPartner();
    }
}
}

```

Figure 7-18

Code excerpt from script that manages each character's conversations, showing the function that determines who dominates the conversation based on assertiveness

Note. Code written and screenshot by the researcher.

Habit Habit shows that behind-the-scenes code can also play a crucial role in generating “liveliness” by programmatically providing a set of behaviours for entities to carry out.

7.4.3 Practice-based Outcome and Research Findings

The practice-based outcome of this project is a 3-part video series that is on display in the foyer of PHIVE, Parramatta's council and library building. In terms of research findings, this project highlighted that back-end code such as C# in *Unity* game engine is a design material in its own right. While primarily notable for how it enables functionality, how such functionality of code is integrated within the overall system that a participant eventually experiences is a crucial part of the meaning-making process of working with *Unity* game engine. Particularly in this project that focuses on social simulation, how code enables and constructs interactions between entities in the digital world is crucial to the overall meaning of the piece.

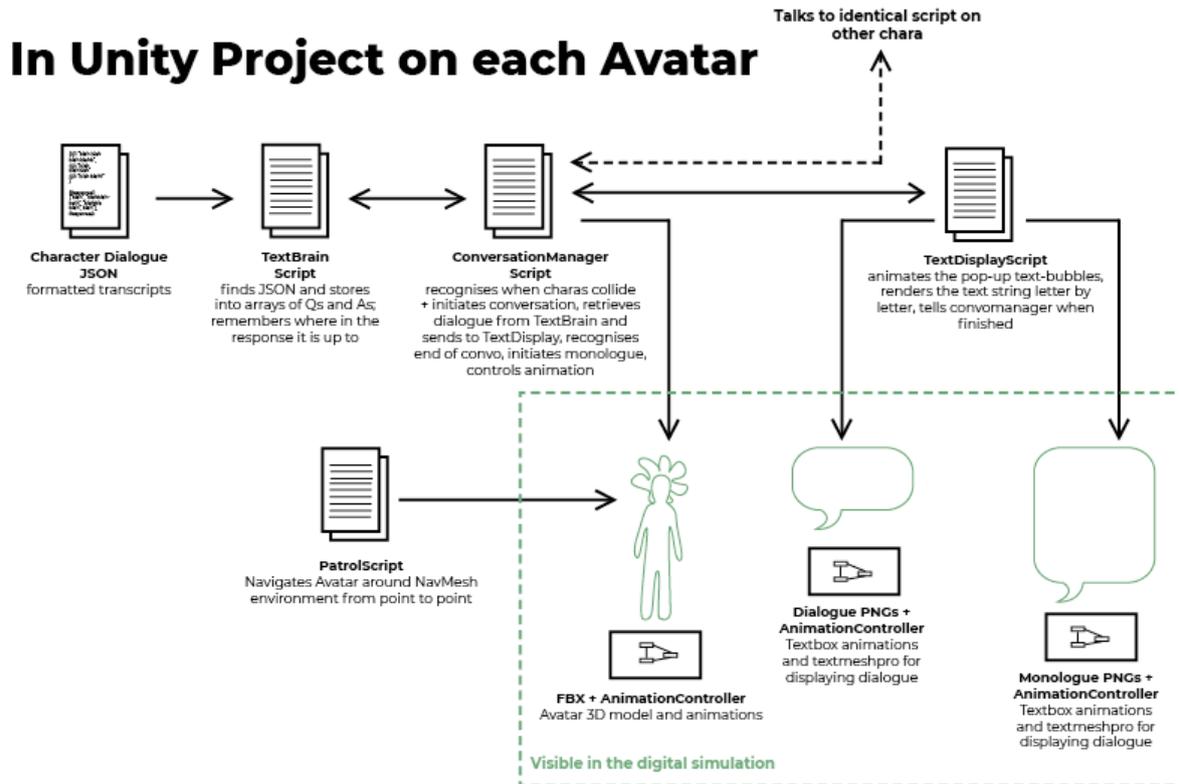


Figure 7-19

Diagram of scripts within the Unity game engine project for Habit Habit (2022) used to animate and control each character

Note. Diagram created by the researcher during project (2022).

7.4.3.1 Performative Back-end Code

The development “stack” and code architecture became essential to the overall meaning of the work as a social simulation, with the rules of interaction and existence within the virtual simulation becoming a representation of a particular kind of social model: each individual had a predetermined assertiveness decided by myself and Kalanjay, which allowed for a function to determine who would begin a conversation when two characters collided. A different option would be to instead randomly generate this assertiveness rank when two characters collide (leaving their “personalities” to chance), or to call this property by a different name: even to call this “dominance” would very significantly change the meaning of each interaction. This is crucial to keep in mind for a queer methodology when working with Virtual Reality, and virtual worlds in general: *how do the foundational rules of the world we code—beyond what is visible to a participant—enable queer-er modes of social interaction?*

My approach to code as part of a queer methodology is informed by the work of Winnie Soon, particularly their book written in collaboration with Geoff Cox, *Aesthetic Programming* (2020) and their performative code piece *Vocable Code* (2023), which began as a series of collaborative works with Geoff Cox, and then in 2023 was installed as part of an exhibition at the Science Gallery of Melbourne. In *Vocable Code*, the code itself is visible alongside its executed form, “‘queering’ what would be considered to be the normative conventions of software and its use” (Soon & Cox, 2020, p. 168). While my own work does not surface code in the final outcomes themselves, I am attentive to how Soon and Cox describe “the performative qualities of code” (2020, p. 168). Viewing code as performative—recognising that when code is run, that reality is in some ways changed or enacted upon—allows us to expand beyond a narrow utilitarian understanding of VR development. It allows us to see a compatibility between one of the key premises of queerness—that “Queerness is a performative, phenomenological experience” and the medium of code. If code is performative, then it is ripe to be utilised to perform and enact new, alternative social models that disrupt and challenge what already exists. This is captured in the strategy of “Use back-end code for its performative qualities in worldbuilding”. This strategy, when aligned with values regarding intermingling and malleability, works towards the overarching goals of subverting and destabilising regimes of normativity and enabling queerer forms of relationality and sociality.

Habit Habit also led to insights and critical reflections on the purposes of avatars and digital selves; it suggests that avatars can exist beyond specific moments of embodiment and instead take on a role as historical recordings.

It also suggested the critical possibilities of animating these “recordings” as digital agents that can interact with each other. In *Habit Habit*, rather than an avatar being an outfit to wear while occupying a digital space, the avatar becomes a “digital other” that the owner or person it represents can no longer control. *Habit Habit* demonstrated the value of experimenting with alternative ways of manifesting our identities in digital spaces, and exploring what sort of agency these digital entities can have as they interact with each other. While the avatars within *Habit Habit* are representational in nature, the potential of fluctuation in the relation between participant and avatar is recognised in the strategy “Design avatar systems or embodiment opportunities that are non-representational and shift in their relation to the participant”.

7.4.4 Response

This project took place midway through my overall doctoral research process and has significantly informed my approach to my final proposed outcome, the Body Traces Archive, and the prototyping process within *Unity* game engine. First, it has significantly informed my approach to using code and behind-the-scenes infrastructure to shape the rules and conditions of the virtual environment that participants interact with. Furthermore, in *Habit Habit*, avatars are entities that reflect and represent individuals, but these avatars also take on their own existence after their creation, rather than being puppeted by a user. This idea of avatars as entities that can have their own liveliness or existence outside of a participant is something that I have incorporated into my final outcome. The overall goal of social simulation, where collision and interaction between digital entities brings about interaction and change, has also highly informed my final outcome; in Body Traces Archive, the range of contributions from participants similarly roam, collide and mutually change one another, as a kind of social functionality significantly informed by *Habit Habit*.

7.5 *Consolidating Findings for a Major Prototype*

This chapter has given an overview of three experiments that have significantly informed the development of my queer methodology for VR and the practice-based outcome, the Body Traces Archive VR experience prototype. Throughout the process of these experiments, various components within my queer methodology for VR cohered and took shape, while also establishing both practical and conceptual grounding for the final prototype, the Body Traces Archive.

In terms of the queer methodology, the first experiment, *Queer Dance Worlds*, showed that non-mimetic, alternate landscapes that contrast against the everyday are a highly potent starting point for creating queer utopian spaces in VR. The second experiment, *Body Traces*, shows that incorporating touch into VR leads to a novel approach to bringing the body into VR—leading to an emphasis on process-based interaction, friction-based tracing, and participant performance within both my methodology and the final prototype. The third experiment, *Habit Habit*, shows that back-end code is a vital part of the meaning-making process, and that back-end code can be used to craft particular social rules and possibilities for a digital world.

In the next chapter, I look closely at the details of the final queer methodology for VR. I then turn to a discussion of the process of developing the final prototype, the Body Traces Archive, and how the application of my queer methodology for VR enables different ways of working with *Unity* game engine and VR as a medium.

Interlude

The following chapters contain still images of the Body Traces Archive and development process. However, a full review of the [Body Traces Archive Documentation Folio](#) in Appendix A (including video material) will assist in understanding the experience.

Chapter Eight:

*Queer Methodology
for VR & the Body
Traces Archive
Prototype*

8.1 *Queer Methodology for VR*

In the previous chapter, I outlined how preliminary experiments led to significant findings that informed the development of my queer methodology for VR, in tandem with the significant literature-based development undertaken in Chapters Two to Five. This current chapter details the queer methodology for VR as a significant finding within this research, and then examines the process of building the Body Traces Archive and what insights are unearthed when enacting this queer methodology for VR via working with *Unity* game engine. The Body Traces Archive in its final form acts as an embodied materialisation of this queer approach to VR.

Traditional approaches to developing VR experiences rarely account for queerness, leaving a significant gap in practice. This methodology aims to address this gap and is structured as a conceptual framework and practice-based guide to intervention to enable VR development with a queer lens. This novel queer methodology for VR provides other practitioners with a methodological toolset to produce transformative and meaningful queer VR experiences. While this methodology represents one specific combination of insights and practices, it acknowledges the multiplicity of queer interpretations and the endless possibilities for reinterpretation in the design of VR experiences. By presenting this methodology for Virtual Reality, the goal is to offer a flexible and adaptable framework that can be expanded to create further queer methodologies for creating VR experiences, rather than prescribing a rigid plan in the form of one queer methodology that is in turn used to create one kind of queer VR.

Building on the findings from the preceding chapters, this methodology integrates insights from queer theory, cyberfeminism, and the history of VR, alongside insights gained via my practice-based experiments, discussed in the previous chapter.

Throughout the process of this research, using the tools of a RtD methodological approach as outlined in the previous section, I aimed to answer two key research questions: “How might a queer critique of the history of VR locate strategies for queer embodiment in VR?” And “How might queer ways of working with digital media technologies provide new understandings of designing embodied experiences in VR?”

Answers to these two questions lie primarily in the Body Traces Archive prototype itself, as well as in the form of a novel queer methodology for VR that I will now discuss. This methodology for developing VR experiences has guided

my own development process of the Body Traces Archive, and can be applied beyond the scope of this specific project by other developers and designers to generate their own iterations of queer VR.

8.1.1 Core Contribution

The methodology introduces a queer lens to VR design, addressing the lack of queer perspectives in both VR development and VR experiences themselves. It emphasises a new kind of embodiment—a queer embodiment—and offers alternate possibilities for representation and experience in VR. As a methodology, it enables other practitioners to engage critically with the medium of VR and promotes the generation of varied and multiple queer Virtual Realities. It consists of both a conceptual framework to use in motivating, guiding and evaluating development of queer VR and a set of practice-based approaches that enable the enactment of the conceptual framework in the design of queer embodied experiences in VR.

8.1.2 Methodology Structure

The methodology is articulated as two distinct but interrelated parts. First, a conceptual framework, which consists of goals for queer VR development, premises regarding queerness, and values for queer VR development. Second, a collection of practice-based approaches that implement the conceptual framework; this consists of the properties of VR that are most ripe for intervention, the strategies of craft for manipulating, engaging with, or designing with these properties, and then the qualities of queer VR that are evoked and generated by such designing. Rather than being sequential stages of development, these two parts have an interdependent relationship; the conceptual framework should motivate practice-based approaches, while the results of practice-based approaches should be evaluated using the conceptual framework, which can also be modified and evolve based on practice. Table 8-1 shows this overall structure.

In the ensuing sections, I detail the contents of this conceptual framework and set of practice-based approaches. For each element, I provide references to a “source” location within this thesis. As a distillation of the extensive findings of literature- and practice-based research, a certain amount of nuance and explanation is lost in this summary. This source reference points to the origin of each finding or argument within its larger context and therefore allows a reader of this methodology to cross-reference and review the supporting justification and argumentation.

Conceptual Framework

Goals of Crafting Queer VR

- Create experiences of critical hope and futurity
- Critique, subvert, destabilise, resist and oppose regimes of normativity, especially regarding gender and sexuality
- Disrupt normative, heterosexualising bodily orientations
- Enable queerer forms of digital relationality and sociality
- Create VR experiences that present an alternative to both historical conceptions of VR as a disembodied space of transcendence, and contemporary conceptions of VR as a mundane mimetic reproduction of our everyday reality

Premises of Queerness

- Queerness is always on the horizon of “then and there”; queerness is a kind of potentiality
- Queerness is a performative, phenomenological experience, one of being out-of-joint from the norm
- Affect is a relational process, and affect is a crucial part of the phenomenological experience of queerness that influences how we are oriented

Values for Queer VR Development

- VR development should take a critical view to data surveillance and prioritise participant knowledge and agency of their own data
- The worldbuilding of VR should challenge subject-object hierarchies and create non-hierarchical, reciprocal mutual relations between entities
- VR Development should stay with the meat: VR should be actual, hot, messy, bloody, material, sullied, base
- VR development should enable bodily intermingling and interdependent transformation
- Normative affective regimes should be questioned and critiqued; alternative affective regimes should be encouraged

Practice-based Approaches

Properties of VR

- VR is layered on top of physical space: VR bears a critical relationship to the physical environment the participant is in but cannot see
- Is multimodal, with visual design, spatial arrangement, movement and animation, spatial sound and hand-held haptics all contributing to the overall environmental design
- VR offers participants physical presence and agential involvement
- Performativity continues in VR
- Skin acts as the threshold and interface between worlds: there is an invisible, porous threshold or boundary between the physical and the virtual located at the skin of the participant

Strategies of Craft

- Use anti-representational or non-representational visual, spatial and metaphorical languages for worldbuilding
- Create places that otherwise would not exist
- Use back-end code for its performative qualities in worldbuilding
- Disrupt and challenge legibility and surveillance with regard to personal presentation and data collection
- Take a critical, anti-naturalising approach to the hardware that enables interfacing with VR experiences, and consider what unusual (mis)-uses you can enable for the headset and controllers
- Enable interactions in which participants' behaviours or actions enacts change both upon themselves and the world around them
- Design avatar systems or embodiment opportunities that are non-representational and shift in their relation to the participant
- Focus on touch as a form of corporeal intimacy and communication

Qualities of Queer VR

- Feeling of being in another place and/or time
- Feeling “out-of-synch” or disoriented between the physical and virtual worldSense of immersion within the virtual environment
- Sense of embodiment that is flexible and malleable
- Sense of bodily disorientation or dislocation
- Sense of slippage or fluidity
- Sense of ambiguity and intermingling

Table 8-1

Queer Methodology for VR Summary, including Conceptual Framework and Practice-Based Approaches

Note. This material is presented in the body of the thesis with further explanation.

8.1.2.1 Conceptual Framework

Goals of crafting queer VR refer to the overarching purpose of the practice-based work, drawing from the queer and cyberfeminist theories I have outlined in Chapters Three, Four and Five. These goals provide direction in answering my specific research questions and guide the implementation of the rest of the methodology. For application to practice-based research beyond my own specific work, these goals can be used to guide the development of a queer VR experience more generally.

Premises regarding queerness refer to the foundational assumptions regarding the functioning of queerness, both in everyday life and within virtual reality.

Values for queer VR development combine the goals and premises of queerness to establish how queer VR should operate. These provide guiding structure in working towards the larger goals.

As a framework, the goals, premises and values give designers a scope of engagement when approaching VR as a medium, as well as a set of conceptual tools for ideation and refinement throughout the design process. Experiments and prototypes can be evaluated for how well they fulfil the values for queer VR development, for how well they illustrate, manifest or extend the premises regarding queerness, and generally assessed based on whether they work towards the goals of the framework.

8.1.2.1.1 Goals of a Queer Methodology for VR

- Create experiences of critical hope and futurity (source: Chapter Four: [4.1.1 Cruising Utopia: The Then and There of Queer Futurity](#))
- Critique, subvert, destabilise, resist and oppose regimes of normativity, especially regarding gender and sexuality (source: Chapter Three: [3.2.2 Gender Performativity](#) and [3.2.3 Queer Affects & Touch](#))
- Disrupt normative, heterosexualising bodily orientations (source: Chapter Four: [4.1.2 Queer Phenomenology: Orientations, Objects, Others](#))
- Enable queerer forms of digital relationality and sociality (source: Chapter Four: [4.2.1 Queer Technology Studies](#))
- Create VR experiences that present an alternative to both historical conceptions of VR as a disembodied space of transcendence, and contemporary conceptions of VR as a mundane mimetic reproduction of our everyday reality (source: Chapter Two: [2.7 Queer Embodiments in the History of VR](#)).

These goals are concerned with overall worldbuilding of VR experiences and experiences of embodiment within that realm. These two layers are consistently utilised throughout the rest of the conceptual framework and practice-based approaches, with the addition of immersion as part of what shapes an embodied experience. In labelling these three categories, I am not trying to argue that they are distinct and possible to separate neatly; instead, I am pointing to how each of these scopes of interest interrelate and influence each other.

8.1.2.1.2 Premises of Queerness

- Queerness is always on the horizon of “then and there”; queerness is a kind of potentiality (source: Chapter Four: [4.1.1 Cruising Utopia: The Then and There of Queer Futurity](#))
- Queerness is a performative, phenomenological experience, one of being out-of-joint from the norm (source: Chapter Four: [4.1.2 Queer Phenomenology: Orientations, Objects, Others](#))
- Affect is a relational process, and affect is a crucial part of the phenomenological experience of queerness that influences how we are oriented (source: Chapter Three: [3.2.3 Queer Affects & Touch](#))

These premises establish how queerness operates in everyday life, and by defining these, development in VR can then aim to enact and re-create these premises in the worldbuilding of VR experiences via practice. While I have established a narrow scope of premises based on the abundant knowledge offered by queer theory generally and my key theoretical texts specifically, potential future practitioners using this methodology could expand and contract this set of definitional claims to reflect their own scholarly and political alignments.

8.1.2.1.3 Values for Queer VR Development

- VR development should take a critical view to data surveillance and prioritise participant knowledge and agency of their own data (source: Chapter Four: [4.2 Integrating Queer Theory in a Praxis for Digital Technology](#))
- The worldbuilding of VR should challenge subject-object hierarchies and create non-hierarchical, reciprocal mutual relations between entities (source: Chapter Three: [3.2.3 Queer Affects & Touch](#) and Chapter Five: [5.4 VR and Embodiment in Cyberfeminism](#))
- VR Development should stay with the meat: VR should be actual, hot, messy, bloody, material, sullied, base (source: Chapter Five: [5.4 VR and Embodiment in Cyberfeminism](#))
- VR development should enable bodily intermingling and interdependent transformation (source: Chapter Four: [4.2.1 Queer Technology Studies](#))
- Normative affective regimes should be questioned and critiqued; alternative affective regimes should be encouraged (source: Chapter Three: [3.2.3 Queer Affects & Touch](#), Chapter Four: [4.2.3 Queer Affects in VR](#))

These values provide ethical guidance regarding how the goals of queer VR should be achieved, and how the premises regarding queerness should be manifested in VR experiences. They also direct the purpose of practice-based interventions and provide a scope for which particular properties, strategies and qualities are most important to surface and incorporate into the practice-based interventions.

8.1.2.2 Practice-based Approaches

Practice-based approaches are the set of tools used to engage with the medium of Virtual Reality directly, putting into action the previously outlined theoretical framework.

Properties of VR are the aspects or features of VR that are most compatible with achieving the goals of creating queer VR (they are not an exhaustive list of all properties of VR, but rather a starting point for those most relevant to the theoretical framework).

Strategies of craft are fine-grained and craft-oriented aesthetic strategies that manipulate, intervene upon, or work with the properties of VR in order to generate particular affects or qualities.

Qualities of Queer VR are experiential and affective qualities that are generated as a result of the deployment, manipulation, and design of the identified properties of VR. These are the qualities of the participant's experience.

Table 8-2 presents an overview of how these three aspects interrelate.

Aspect of VR development	Properties of VR	Strategies of Craft	Qualities of Queer VR
<p>Worldbuilding</p>	<ul style="list-style-type: none"> • VR is layered on top of physical space: VR bears a critical relationship to the physical environment the participant is in but cannot see • VR is multimodal, with visual design, spatial arrangement, movement and animation, spatial sound and hand-held haptics all contributing to the overall environmental design 	<ul style="list-style-type: none"> • Use anti-representational visual, spatial and metaphorical languages for worldbuilding • Create places that otherwise would not exist • Use back-end code for its performative qualities in worldbuilding • Disrupt and challenge legibility norms, data secrecy and surveillance with regards to personal presentation and data collection • Take a critical, anti-naturalising approach to the hardware that enables interfacing with VR experiences, and consider what unusual (mis)-uses you can enable for the headset and controller devices 	<ul style="list-style-type: none"> • Feeling of being in another place and/or time • Feeling “out-of-synch” or disoriented between the physical and virtual world
<p>Immersion</p>	<ul style="list-style-type: none"> • VR offers participants physical presence and agential involvement in a virtual environment 	<ul style="list-style-type: none"> • Enable interactions in which participants’ behaviours or actions enacts change both upon themselves and the world around them 	<ul style="list-style-type: none"> • Sense of immersion within the virtual environment
<p>Embodiment</p>	<ul style="list-style-type: none"> • Performativity continues in VR • Skin acts as the threshold and interface between worlds and between person and place 	<ul style="list-style-type: none"> • Design avatar systems or embodiment opportunities that are non-representational and shift in their relation to the participant • Focus on touch as a form of corporeal intimacy and communication 	<ul style="list-style-type: none"> • Sense of embodiment that is flexible and malleable • Sense of bodily disorientation or dislocation • Sense of slippage or fluidity • Sense of ambiguity and intermingling

Table 8-2

Practice-Based Approaches as part of a Queer Methodology for VR

Note. These practice-based approaches are grounded by the accompanying conceptual framework.

8.1.2.2.1 Properties of VR

- VR is layered on top of physical space: VR bears a critical relationship to the physical environment the participant is in but cannot see (source: Chapter Seven: [7.2 Experiment One: Queer Dance Worlds](#))
- VR is multimodal, with visual design, spatial arrangement, movement and animation, spatial sound and hand-held [haptics](#) all contributing to the overall environmental design (source: Chapter One: [1.2.1 Defining VR](#))
- VR offers participants physical presence and agential involvement (source: Chapter One: [1.2.2 VR as an Immersive Medium](#))
- Performativity continues in VR (source: Chapter Three, [3.2.2 Gender Performativity](#), Chapter Two: [2.3 Developers, Hackers, Artists & Their Bespoke Tools: The Early Era of VR Viability](#), Chapter Seven: [7.3 Experiment Two: Body Traces Mark One](#))
- Skin acts as the threshold and interface between worlds: there is an invisible, porous threshold or boundary between the physical and the virtual located at the skin of the participant (source: Chapter Five: [5.4 VR and Embodiment in Cyberfeminism](#), Chapter Seven, [7.3 Experiment Two: Body Traces Mark One](#)).

Based on these properties—and the values that define how the overall goals can and should be achieved—the following aesthetic strategies for crafting have been identified, tested and implemented in order to create queer embodiment in VR.

8.1.2.2.2 Strategies of Craft

- Use anti-representational or non-representational visual, spatial and metaphorical languages for worldbuilding (source: Chapter Four: [4.2.1 Queer Technology Studies](#), Chapter Seven: [7.2 Experiment One: Queer Dance Worlds](#))
- Create places that otherwise would not exist (source: Chapter Seven: [7.2 Experiment One: Queer Dance Worlds](#))
- Use back-end code for its performative qualities in worldbuilding (source: Chapter Seven: [7.4 Experiment Three: Habit Habit](#))
- Disrupt and challenge legibility and surveillance with regard to personal presentation and data collection (source: Chapter Four: [4.2.1 Queer Technology Studies](#))
- Take a critical, anti-naturalising approach to the hardware that enables interfacing with VR experiences, and consider what unusual (mis)-uses you can enable for the headset and controllers (source: Chapter Four: [4.2.2 Queer Video Game Studies](#), Chapter Seven: [7.3 Experiment Two: Body Traces Mark One](#))
- Enable interactions in which participants' behaviours or actions enacts change both upon themselves and the world around them (source: Chapter Seven: [7.3 Experiment Two: Body Traces Mark One](#))
- Design avatar systems or embodiment opportunities that are non-representational and shift in their relation to the participant (source: Chapter Four: [4.2.1 Queer Technology Studies](#), [4.2.3 Queer Affects in VR](#), Chapter Seven: [7.3 Experiment Two: Body Traces Mark One](#))
- Focus on touch as a form of corporeal intimacy and communication (source: Chapter Three: [3.2.3 Queer Affects & Touch](#), Chapter Seven: [7.3 Experiment Two: Body Traces Mark One](#)).

These strategies of craft are utilised in the practical development of VR in order to leverage the properties of VR and create the qualities of queer VR.

8.1.2.2.3 Qualities of Queer VR

- Feeling of being in another place and/or time (source: Chapter One: [1.2.1 Defining VR](#))
- Feeling “out-of-synch” or disoriented between the physical and virtual world (source: Chapter Two: [2.3 Developers, Hackers, Artists & Their Bespoke Tools: The Early Era of VR Viability](#), Chapter Four: [4.1.2 Queer Phenomenology: Orientations, Objects, Others](#))
- Sense of immersion within the virtual environment (source: Chapter One: [1.2.2 VR as an Immersive Medium](#))
- Sense of embodiment that is flexible and malleable (source: Chapter Five: [5.4 VR and Embodiment in Cyberfeminism](#))
- Sense of bodily disorientation or dislocation (source: Chapter Four: [4.2.3 Queer Affects in VR](#))
- Sense of slippage or fluidity (source: Chapter Three: [3.2.2 Gender Performativity](#), Chapter Four: [4.2.1 Queer Technology Studies](#), Chapter Five: [5.5.1 Slime as Cyborgian Metaphor for VR](#))
- Sense of ambiguity and intermingling (source: Chapter Three: [3.2.3 Queer Affects & Touch](#), Chapter Five: [5.5.1 Slime as Cyborgian Metaphor for VR](#)).

A property is manipulated or designed using a strategy of craft, which creates a specific quality for a participant. This is done in order to represent and manifest the premises of queerness while aligning with the values for queer VR development. Undertaking this development process that takes into consideration worldbuilding, immersion and embodiment is how the overarching goals of queer VR development can be achieved.

For example, let us consider the property “Skin acts as the threshold and interface between worlds and between person and place”. The relevant strategy is “Focus on touch as a form of slippage or fluidity”. The goal of applying this strategy is to achieve the queer quality of a “Sense of ambiguity and intermingling”. With a pre-existing interest in slime, my solution and approach to enacting the strategy of touch led to the use of slime as a major texture and substance that participants interact with as for my final prototype, Body Traces Archive. User testing revealed that this successfully created a sense of slippage and fluidity and contributed to fulfilling one of the values of the theoretical framework—the slime made feel people both gross and pleased, upending normative affective models and generating a new affective model.

8.1.2.3 Significance, Flexibility and Application

This methodology is a response to gaps in the field of VR design. My extensive literature- and practice-based research has revealed numerous scholars and practitioners working to bring a queer perspective to VR and similar new media; what my methodology does is gather, synthesise and systematise the insights from these examples and my own practice-based research. This has generated a unique, comprehensive and shareable methodology for designing and developing queer VR experiences. It expands the potential of VR to represent diverse embodiments and perspectives and provides a rubric that other developers and designers can use to expand and refine their own queer methodology for VR. The methodology presented above is flexible and adaptable, allowing for varied interpretations and applications—it is not a strict prescriptive blueprint, but a structure and set of tools to inspire and guide innovative practices.

8.2 *Putting the Queer Methodology for VR into Action*

Chapter Two presented an overview of specific key moments in the history of the development of VR, with attention to how differing, yet flawed, normative understandings of virtual embodiment have dominated development. Within Chapter Two I highlighted examples of alternative experimental engagements with embodiment in VR, especially during the first wave of VR's commercial rise in the 1980s and 1990s, while acknowledging that this era was primarily dominated by a perception of VR as a manifestation of disembodied cyberspace, a land of pure information. The Body Traces Archive prototype discussed below presents a critique of both this historical conception and the current emerging norms of VR as a medium of mundane mimetic reproduction. This prototype and its embedded critique is only made possible via the complex synthesis of queer and cyberfeminist literature and practice-based findings presented in the above queer methodology for VR. The methodology provides a conceptual framework that consists of a set of goals, premises of queerness, and values for queer VR development which guide the overall process of VR development. Practice-based approaches, in the form of properties of VR, strategies of craft, and qualities of queer VR, are the medium- and craft-specific tools that enable the implementation and development of queer VR. The next section of this chapter discusses the development of the Body Traces Archive in order to reveal how both the conceptual framework and practice-based approaches shaped the development of the prototype, and what findings emerged through the process.

8.3 *Using Unity game engine to develop the Body Traces Archive*

The design of the Body Traces Archive VR Experience drew on the goals, premises and values of my queer methodology in order to create an experience of alternative, expansive, performative embodiment that then brings people into sensitive, squishy interrelation. But what of the crafting process? What were the methods and processes for constructing this experience in the Unity game engine, and what insights were discovered in the process of applying a queer methodology to the task of designing VR?

Developing this VR experience involved a constant negotiation between my conceptual framework of goals, premises and values and the highly structured and compartmentalised operating logics of Unity game engine. Unity game engine offers discrete, hierarchical organisation, and everything that I aimed to do was a challenge to such ways of thinking of digital environments. I understood the materiality of Virtual Reality as a complex web of interrelated objects, forces, a net of pipes and tubes that I strung together, hung objects from, and sent messages running through. Immersed in this complex system, I aimed to challenge the norms of Unity and work “against the grain” of the software (Nicoll & Keogh, 2019, p. 6).

In their book *The Unity game engine and the Circuits of Cultural Software*, Benjamin Nicholl and Brendan Keogh detail the complex gathering of technology that game engines like *Unity* present to a user: they describe game engines as “software hubs wherein a vast range of media forms and skills converge into singular videogame builds” (Nicoll & Keogh, 2019, p. 3). They explain that the defaults, preferences and overall structures of *Unity* lead to a particular look and feel to games produced with *Unity*, describing it as a particular “grain” in the same way that movies shot on a particular type of film and processed in a particular way have certain visual qualities. They describe how video games made using *Unity* “often possess an ineffable ‘look and feel’ through the processes and frameworks that *Unity* presents as either defaults or preferences” (Nicoll & Keogh, 2019, p. 8). While my own work is not in the realm of video games exactly, I am using a program predominantly used to create video games. Their work describes the set of skills required to develop video games as “poised uncomfortably between computer programming and creative practice” (Nicoll & Keogh, 2019, p. 48) in a dynamic very similar to my own balancing act.

Using the framework of cultural software, they describe how:

Unity gives shape to specific production workflows, design methodologies, software literacies, and modes of (self-)governance. These mediations cohere into a software circuit that utilizes multiple techniques—technological, discursive, and aesthetic—to draw users into its orbit. (Nicoll & Keogh, 2019, p. 16)

This spatial, gravitational metaphor feels particularly apt, having felt this pull myself in how I work. Many of the following sections detail my attempts to drag myself out of the slipstream of how *Unity* “wanted” me to work, struggling amongst the turbulence in uncharted waters, and not always succeeding in my plans; sometimes I drifted back into the safer, easier workflows that *Unity* is built to enable, but with much more knowledge than before.

8.3.1 Key Process One: Worldbuilding and Interaction Architecture

My first step in developing the Body Traces Archive was to establish the basic architecture of the virtual environment in *Unity* game engine. This seemingly pragmatic work is the foundation of worldbuilding for VR and has significant implications for utilising the various strategies of craft outlined in the queer methodology for VR. Establishing the interaction architecture of the virtual environment means establishing the back-end logics of code that govern the environment generally, including enabling the presence of a participant via headset, as well as the interactivity that provides a participant a sense of physical presence and agential involvement (two key properties of VR).

The primary tool for implementing interactivity in VR in *Unity* game engine is the XR Interaction Toolkit, a free package on offer from *Unity* directly. While using these out-of-the-box integrations imposes particular limitations and ways of working on a creator such as myself, they also make prototyping many magnitudes easier and faster. Packages such as the XR Interaction Toolkit make set-up relatively quick and enable interactivity with minimal hands-on coding, but this functionality involves a trade-off in which the design principles and worldbuilding structures of *Unity* game engine and XR Interaction Toolkit necessarily impose limitations and ways of working on a creator such as myself, shaping the direction of my own development with these tools. While seemingly primarily a practical consideration, this process shows how, for a queer methodology for VR, there is a fundamental tension at play between the conceptual framework that grounds a queer position and the tools available for the production of VR.

8.3.1.1 Goals

In designing the interactive structure of my VR project, my aim was to use the XR Interaction Toolkit to design a relatively rigorous base of interactions such as grabbing, holding, triggering code events, and putting back down again. With this foundation, I could then implement further strategies that take advantage of this interactivity, especially when engaging with physical presence, agential involvement, and the performative nature of VR—all properties that require the development of worldbuilding and interactivity if they are to be taken advantage of as a designer. In developing this foundation of interactivity, my overall research goal was to investigate the hierarchy and structure of this toolkit, to determine its operating logic and its potential compatibility—or friction—with the queer conceptual framework and practice-based approaches of my methodology, particularly the strategy of using back-end code for its performative qualities in worldbuilding. While also conducting a general technical investigation into these tools for VR, the main goal was to explore how they can be put to use for crafting queer virtual environments.

8.3.1.2 Process

Early in the process, I decided to focus on implementing controllers (rather than hand-tracking) for a number of reasons. A primary motivation was the strategy of working critically with the controller interface, drawing on texts from queer video games studies that discuss the queering potential of disrupting normative usage of controllers (Marcotte, 2018). With Virtual Reality headsets a relatively new technology, the layout of controllers draws on common design patterns from video game controllers (A-B buttons, swivel joysticks). I aimed to explore the potential of disrupting these early normative bridges, and instead think about how we can use controllers to generate novel and queered relationships to the body.

I was also concerned with how hand- and gesture-tracking on the Quest headset line exists in a wider context of data harvesting and monitoring. While I would not be saving everyone's hand tracking to be analysed for marketing purposes, I was aware that other experiences on Meta headsets may be tracking hand- and gesture-movements for their own purposes. In that wider context, using hand-tracking and gesture-control without a significant discussion with a user can normalise the use of data-harvesting methods, going against the strategy of disrupting and challenging data surveillance in VR.

When setting up interactions via controllers within the virtual world itself, the XR Interaction Toolkit offers a number of pre-coded objects to design with. The

primary concern, however, is the structure it enforces upon a VR environment. Using the XR Interaction Toolkit, a handheld controller is classed as an “interactor”, which has a number of events (Hover, Select, Activate) that are triggered by certain button presses. Objects in the environment can be classed as an “interactable” object, and can have the same Hover, Select, Activate events triggered by a controller acting upon them. The effects of these events can be customised via code. An example of how this has been implemented in the Body Traces Archive is shown in Figure 8-1.

This relatively simple range of three options for interactions with any object allows for the majority of interactions that most game and/or VR designers would aim to implement. It was a relatively simple task to introduce objects into the environment, and then using this structure, be able to pick them up (using lower trigger via selection) and turn them on or off (with main trigger via activation).

A key aspect of my prototype is a drawing tool that can be picked up, used to draw, and then put down again; I discuss the development of this in the next section. Implementing the ability for a participant to pick up a drawing tool simply via touch, rather than requiring button presses, required getting into the “guts” of the code of XR Interaction Toolkit in order to customise the provided functions. The leap from out-of-the-box designing to customising in what I thought would be a relatively minor way turned out to be significant, as there were very few online resources or guides: the majority of tutorial material and documentation focuses on using the XR Toolkit in the way it is intended to be used, and I was going outside those boundaries. The skill jump from working with plugins, toolkits and existing tutorials to customising was significant. These difficulties demonstrated what Nicoll and Keogh argue regarding the “grain” of Unity game engine (Nicoll & Keogh, 2019). With certain functionalities and approaches made easier by toolkits and community resources, developers tend towards similar implementations as each other. The difficulty of customisation limits what a developer can do, which in turn limits what is available for the participant in the final experience.

8.3.1.3 Practice Outcome and Research Findings

This crucial groundwork in establishing the interaction architecture of the Body Traces Archive enabled the functionality by which the experience itself is possible, and shaped how all ensuing design processes unfolded. For participants, the XR Interaction Toolkit and basic VR integration with *Unity* is invisible, yet it is what structures the logic of the virtual environment that the participant interacts with.

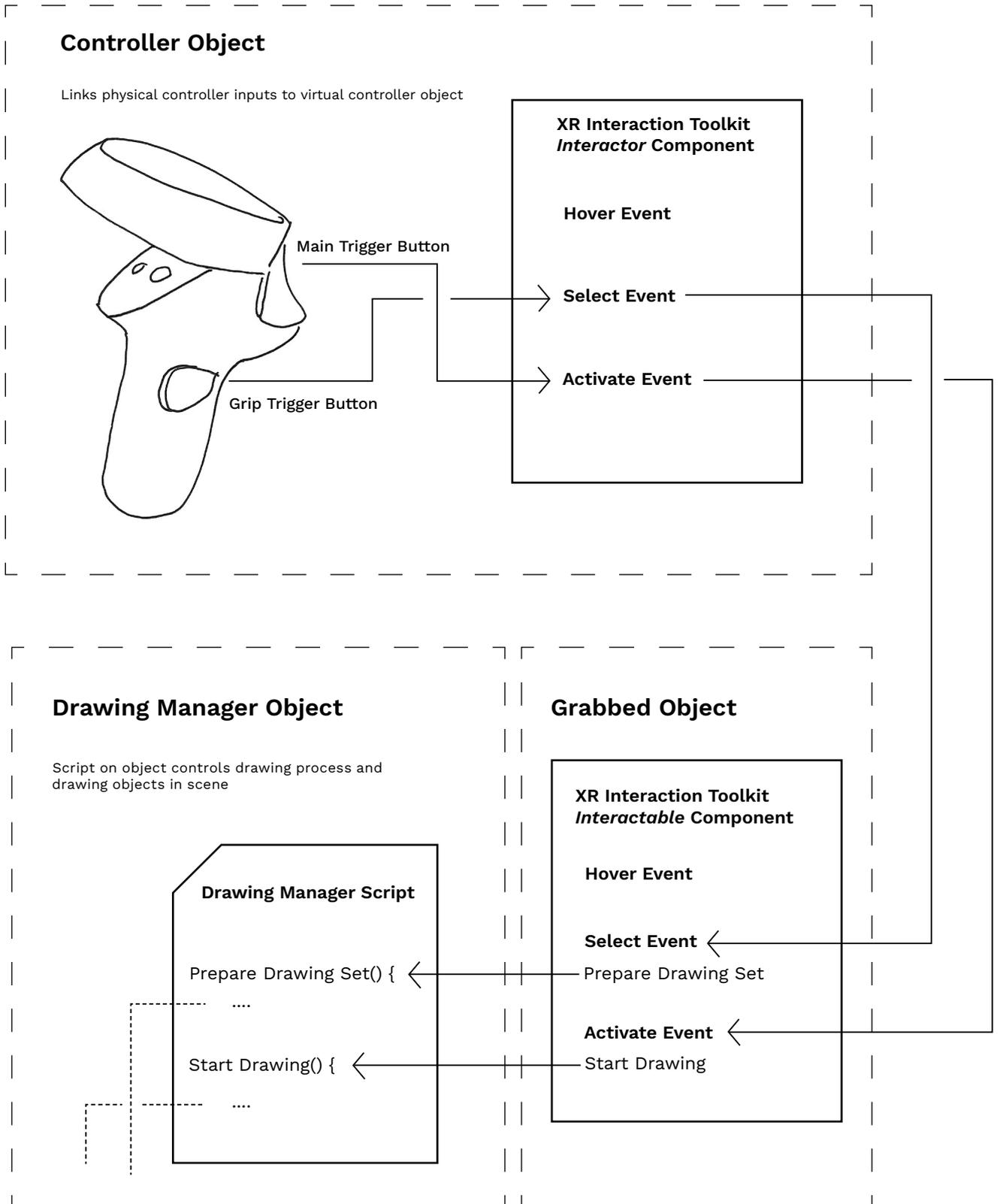


Figure 8-1

Diagram of controller and code triggers

Note. Diagram shows how buttons pressed on the controller are processed by the interactor component, and then the and interactable component. This interactable component then triggers functions in scripts located on other objects.

The process of setting up the basic infrastructure of my VR prototype revealed the operating logic behind pre-existing tools such as XR Interaction Toolkit, in which strict hierarchies allow for rapid prototyping and ease of comprehension for beginner or intermediate game designers but also limit the conceptual experimentation available. With XR Interaction Toolkit's system of Interactor and Interactable, the rules of my VR world conform to an ontology of subject (Interactor) and object (Interactable) that I am attempting to challenge via the overarching goal of challenging normativity, which includes challenging normative structures within the development process, and via values that specify that "The worldbuilding of VR should challenge subject-object hierarchies and create non-hierarchical, reciprocal mutual relations between entities". Both this goal and value are difficult to manifest when the structures of *Unity* game engine rely so significantly on normative subject-object relations to enable basic functionality like interactivity for a participant.

This process revealed very clearly how the cultural software of *Unity* directly shapes the structural foundations of a world that a developer generates for participants, especially when the developer is a non-expert programmer combining custom code with available software packages. A developer or designer can enter the process with clearly defined goals and values, only to collide with adverse implicit values embedded in *Unity* game engine. While the XR Interaction Toolkit allows for rapid prototyping for non-programmers, it also encourages a particular way of understanding the rules of the digital environment—that there are, ontologically, two fundamental classes of entities in the categories of Interactor-subjects and Interactable-objects.

While I was able to work around some of the limitations of the XR Interaction Toolkit infrastructure, it involved working against the sensation that *Unity* and the XR Interaction Toolkit were making decisions for me: I introduced uncomfortable and annoying friction for myself by choosing to make it do something it didn't "want" to do. Moving forward, I remained aware of the structural rules that the XR Interaction Toolkit had enforced on the world I was building, and looked for more opportunities to rework, customise and make the rules my own. I was particularly conscious of how my queer methodology for VR emphasises the potency of subversion and destabilisation, not just as an experience for participants within the prototype, but as the methodological approach while crafting. In the ensuing stages of prototyping, I continued to build towards a queer way of working amongst this friction.

8.3.2 Key Process Two: Designing Interaction

Within the Body Traces Archive experience, participants are invited to draw upon their own body using a drawing tool and then touch the drawings of other participants. This is the primary manner in which I deploy the strategies of enabling participants to enact change upon both themselves and their environment via their actions, through the specific use of another strategy, a focus on touch as a form of corporeal intimacy and communication. The drawing activity uses these strategies to engage with the identified properties of physical presence, agential involvement, the performativity of VR, and skin as a threshold and interface surface. The experience is also designed in a way to enable participants' drawings to return to the environment during future run-times for new participants to interact with. This implementation of an accumulative virtual environment is shaped by the value of non-hierarchical, reciprocal mutual relations, which helps to achieve the goal of enabling queerer forms of digital relationality and sociality.

First, though, the drawing activity required a pen tool to create a 3D line, and a way to then save and recall the drawings of participants throughout future visitations by other participants. The following section details the findings of developing that drawing tool with such saving and loading functionality.

8.3.2.1 Goals

The practical goal for this process was to implement the ability to draw a 3D line in space, which could then be saved and re-loaded later. This way, Body Traces Archive is a persistent virtual environment that develops and evolves over time with the contributions of each participant, as a shared and inhabitable (if only for a brief span of time) virtual environment. Developing and implementing this tool was also a way to further generate knowledge regarding how the ontology of *Unity* impacts the worldbuilding of a VR experience, especially as the drawing tool structure has more direct implications for the avatar and embodiment processes of the participant.

8.3.2.2 Process

I developed a drawing tool where, as a participant holds down the trigger, the coordinates of where the controller is in space (XYZ coordinates) are added to a list, which is stored in a line renderer, as shown in Figure 8-2. Releasing the trigger then “completes” the list and leaves the system ready to generate a new

line fragment. These line fragments are stored under an empty game object that also stores the session information for that participant.

Developing the drawing tool also meant developing a hierarchy for how a drawing would exist in the world. While the drawing activity is underway, each drawing lives within a “Drawing Home” object, titled with the name of the participant and timestamp of drawing time, as seen in Figure 8-3. Each time the user presses the trigger, a “fragment” object is created underneath the user object, with components required to render the drawing already added via a prefab. When the user releases the trigger, this fragment is completed. This means that over the course of the drawing, a participant is generating a collection of many fragments arranged in close proximity, held in relation by the invisible, overarching object that defines them as “one” entity. This hierarchical structure within the Unity scene is shown in Figure 8-4.

After some experimentation with other approaches to line rendering, I implemented a system where these XYZ coordinates of each fragment are used to generate a thick, tubular line spanning the length of the participant’s gesture.

When a participant has completed their drawing, it is then saved to the collection of participant drawings by a script that serialises the XYZ coordinates and object hierarchy into a JSON file—a format that is cross-compatible and human-readable. This data legibility and accessible is a result of the strategy of disrupting data surveillance and the attendant value of taking a critical view towards data surveillance and prioritising participant agency regarding data. With this saving and loading system, participant data is easily accessible and removable, and not stored in any online cloud services. As it is in JSON format, it can also be opened and viewed in any code-editing program to see the saved data, and can be shown to participants directly, as seen in Figure 8-5.

In terms of loading the drawings back into the system, each loaded archive entity arrives as a miniature. The drawings are arranged as part of a circle featuring all of the loaded drawings, and then, once it has been touched by the active participant, it sticks to the participant’s controller as it grows to full size. Once shaken off by the participant, the archive entity then pilots itself throughout the environment via a script that generates a random location within a set potential range of distances, which the script then moves the entity towards. Once it reaches this location, a new location is generated within the sphere of potential locations for it to move towards. This contact-based interactivity, where participants can touch and hold other participant’s drawings, aims to use the properties of presence and agential involvement

The screenshot shows a Unity component interface with a 'Loop' checkbox, 'Positions' label, and a 'Size' field set to '345'. Below this is a table with four columns: 'Index', 'X', 'Y', and 'Z'. The table contains 23 rows of numerical data representing coordinates.

Index	X	Y	Z
0	0.1913053	0.7699656	0.2055229
1	0.1875087	0.75536	0.2041691
2	0.1900899	0.7415559	0.2029206
3	0.1907456	0.7280062	0.2010686
4	0.1926769	0.7116657	0.1989051
5	0.1953776	0.7016697	0.1976409
6	0.1978693	0.6917077	0.1962773
7	0.2014634	0.6798859	0.1945423
8	0.2047888	0.6680152	0.1930138
9	0.2073513	0.6551054	0.1910917
10	0.2098538	0.6410304	0.1882812
11	0.2132512	0.6266688	0.184677
12	0.2166007	0.6141899	0.1811988
13	0.2187818	0.604323	0.1785488
14	0.2216706	0.5945016	0.1753245
15	0.2267772	0.5781045	0.1688976
16	0.2277754	0.56422	0.1627624
17	0.2181271	0.570208	0.1723014
18	0.2219375	0.5770873	0.1803169
19	0.2163847	0.5615142	0.1882909
20	0.2147403	0.5508986	0.1887936
21	0.2144345	0.5393642	0.1885748
22	0.2155776	0.5263672	0.1868883

Figure 8-2

Cropped screenshot of Unity's component interface showing a list of XYZ coordinates that makes up a line fragment

Note. Sourced from *Unity* scene created by the researcher, screenshot created and cropped by the researcher.

The screenshot shows a Unity component interface with a 'User Info' section. The fields and their values are as follows:

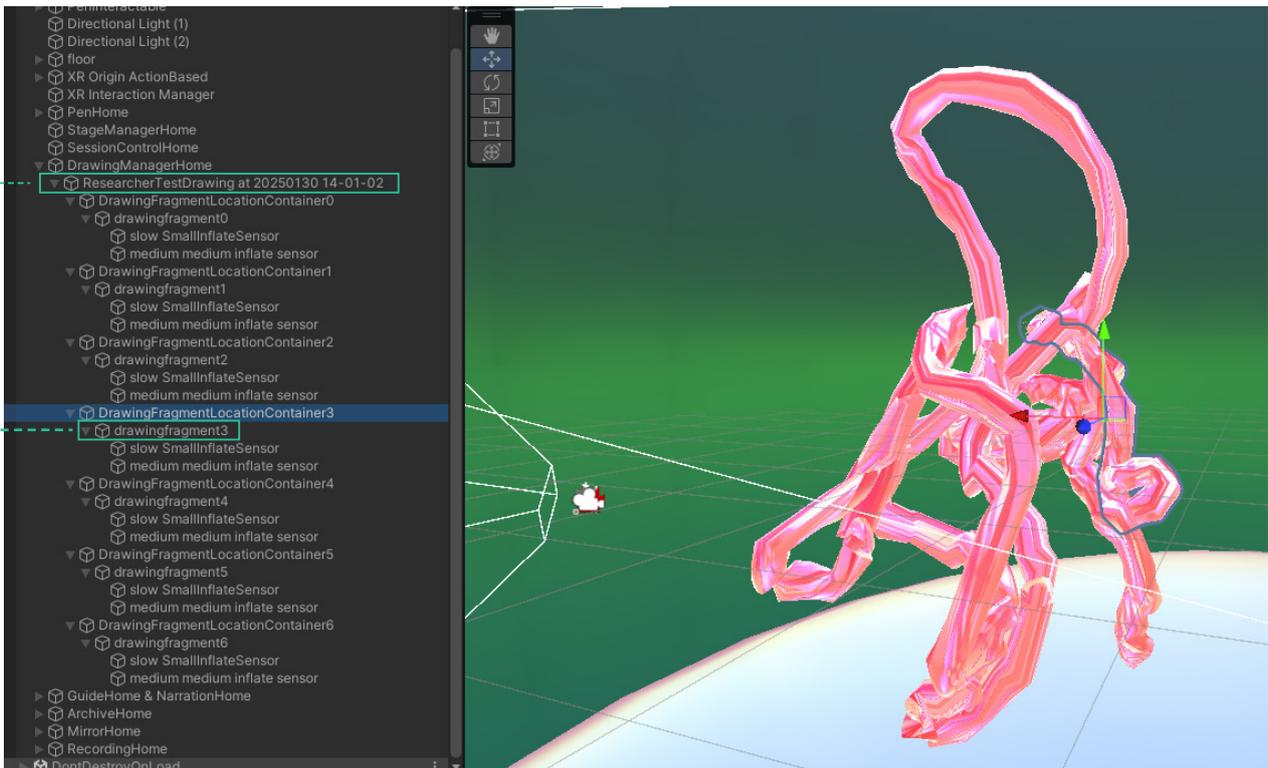
Username	GuideDrawing
Session Info	20231213 14-12-10
File Name	GuideDrawing at 20231213 14-12-10
Player Avatar	None (Transform)
Drawing Home	GuideDrawing at 20231213 14-12-10 (Transform)

Figure 8-3

Cropped image of Unity's component interface showing where a participant's username is entered, in order for ensuing data categories such as session info and file name to be generated automatically via code

Note. Code written by the researcher and image captured by the researcher.

Parent Object Container



Individual Fragment nested below

Figure 8-4

Fragments as part of a participant's drawing, in the Unity scene hierarchy



Figure 8-5

Screenshot of dummy participant data showing XYZ coordinates saved as a JSON file

Note. Code for generating this JSON file adapted from video resource (LlamAcademy, 2022) referenced in full in Body Traces Archive prototype references. Image is a screenshot captured by the researcher.

in order to fully immerse the participant. This interactivity is balanced with a prioritisation of the value of non-hierarchical, reciprocal forms of relations between entities, with each drawing also having their own self-driven activity within the world.

8.3.2.3 Practice Outcome and Research Findings

In its final iteration, the drawing tool is a squishy blob that glows and hovers, waiting for a participant to pick it up. Once picked up, the tool can be used to create lines and marks in the world, hovering in space. Unbeknownst to the participant, when they pick up this tool, a digital object (“parent”, in *Unity*’s nomenclature) is created that acts as a container for the visible lines, which take the form of fragments (“children” objects). This parent-child object hierarchy offers basic conveniences and functionalities, in that it is easier to organise and keep track of what fragments belong together, and to use code or *Unity* tools such as animation.

This parent-child relationship of objects in *Unity* is therefore also an ontology that provides structure to the interrelations of each entity’s own drawing fragments, and the interactions that each entity has with other entities. While participants are not aware of this structure behind the scenes, it nevertheless defines the way that a participant’s own drawing exists, and how the drawings of others that they interact with exist. Later on in the experience, when this drawing becomes the participant’s avatar, the entirety of their drawing is transported to the VR headset parent object; therefore, this structure also shapes the implementation of the strategy of non-representational embodiment for participants. Rather than being embodied as a collection of body parts, facial features and clothing items, participants become represented by a mass of fragments they have created themselves, contained within this parent-child object hierarchy.

My queer methodology for VR, with its strong goals and values of disturbing boundaries and critiquing normative structures, draws particular attention to this ontology of fragments within a container as a vital part of the meaning creation of this work. While participants in the space are not aware of the specific hierarchies of their drawing creation, it would mean something very different if each drawing was constituted of only one set of coordinates that must be rendered as an individual object with no fragments, but as a contiguous, singular line. It would also mean something different if the fragments of a drawing existed without a parent container object to gather them together and give them coherency as an entity that can be interacted with. The process of collision (such as between two roaming archive drawings)

involves a child fragment “sensing” the collision, accessing the colliding object’s own scripts, and comparing their parent container objects to determine if the collision is with fragments from within its own drawing, a fragment from another drawing, or with a controller or headset belonging to the participant. This process is shown in Figure 8-6. The entities within the Body Traces Archive are made more vibrant and active through the interplay of code across their structural elements of fragment and container.

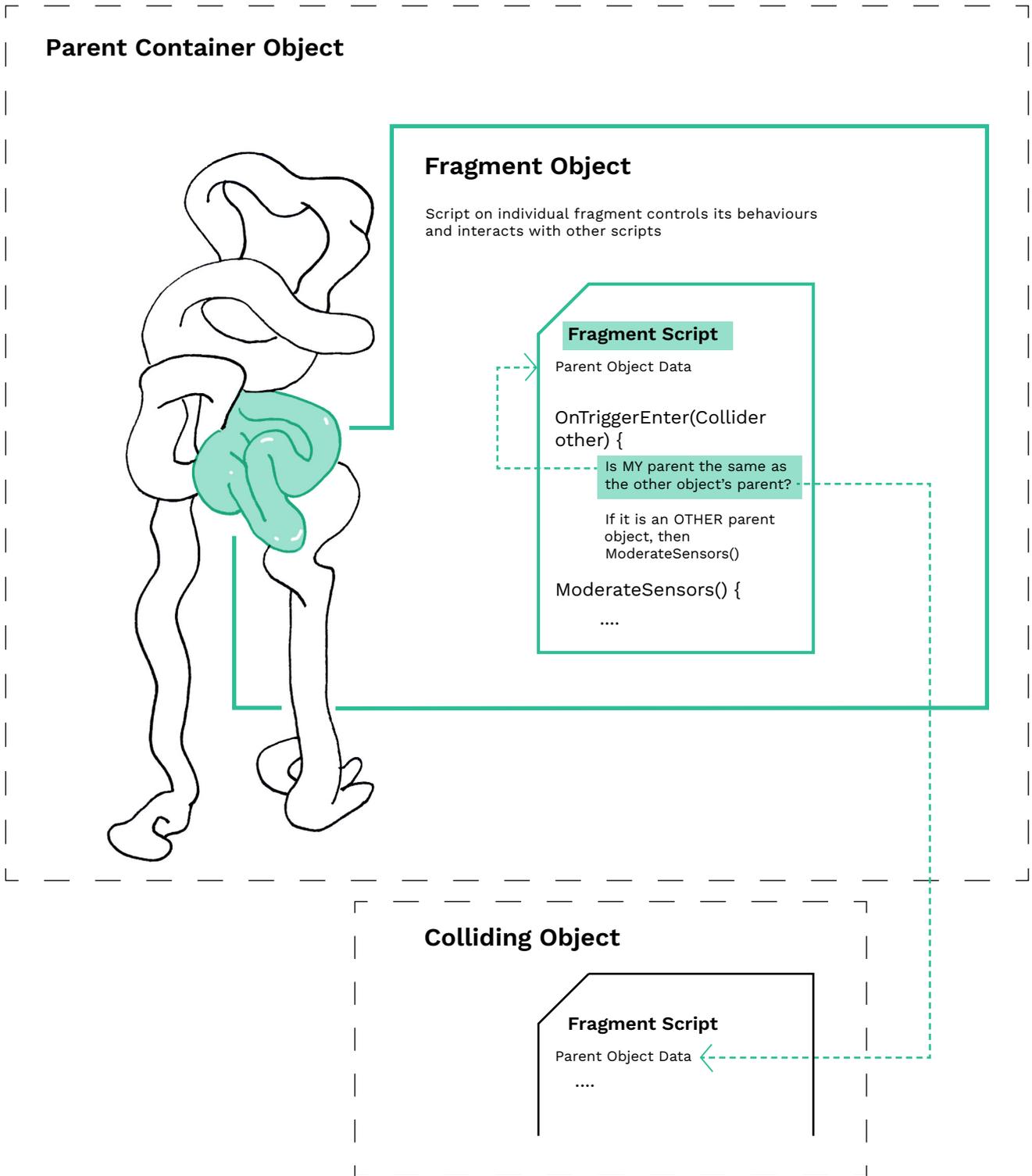


Figure 8-6

Diagram showing how fragment code determines appropriate reaction to collision with other object

Note. Code has been simplified for diagram purposes.

8.3.3 Key Process Three: Rendering Slime

Both of these previous two processes concentrated on architecting the systems that operated the virtual environment, setting up how a participant would be able to use the headset and controller to exist within and interact with the world, and how they would be able to make marks that would last beyond their specific session. With these fundamental building blocks established, I then turned to refining the material styles and visual appearances of the virtual environment. So far, the majority of my work used pre-existing plugins, code fragments from tutorials, built-in components, or code that I wrote myself. This can be thought of as the "higher level" tools that are accessible to any designer working with *Unity*, but there are also a range of more fine-grained, lower level and more fundamental aspects that define how a 3D virtual environment is rendered for the final viewing output. These settings, such as rendering pipelines, physics systems and shaders, are highly complex and require significant expertise to work with and therefore were more challenging to modify and customise.

8.3.3.1 Goals

My first goal for experimenting with my visual rendering approach was to test how I could make slimy, gooey textures for VR. In the past, I had used VertExmotion, a shader-based plugin, to deform the appearance of solid geometric objects in blobby or goopy ways. However, I wanted to explore other methods for rendering with *Unity* game engine in order to complicate the sense of integrity and "wholeness" of a particular object, and to muddy the strict sense of hierarchy that lived behind the scenes. In my experiments I was also motivated by the question of—*what is digital slime?*

If analogue slime is a "between" substance, neither solid or liquid, is there a "between" substance in a digital world? A substance that is neither solid (3D mesh) or liquid (particle system)?

My goal of creating this digital slime is grounded in a number of practice-based approaches from my queer methodology for VR. First, it aims to use the property of VR that defines skin as a threshold and interface between a participant and the virtual environment, through using the strategy of craft that calls for using touch as a form of corporeal intimacy and communication. With the aim to create qualities of flexible and malleable embodiment, ambiguity and intermingling, and slippage and fluidity, focusing on sliminess as the "kind" of touch for the drawing tool and resultant drawings was a highly appropriate deployment of this strategy.

My approach to creating slime in the digital environment of Virtual Reality is also informed by Brian Massumi’s analysis in “Interface and Active Space” (Massumi, 1995a) in which he critiques traditional approaches to interface design, especially Cartesian thinking that conceives of “a directorial self ensconced in a problematic body which it overcomes with the aid of programming and technology in a way that spiritualizes matter, and all of space, by conforming them to its will” (Massumi, 1995a, p. 3). He describes how when designing in 3D via computer programs, screen space extends into three dimensions, with the screen space

treated as a preexisting three-dimensional matrix into which figures can be plopped. Pre-plop, the space is empty. Filling it doesn’t change its spatial characteristics. It is inert. Its three dimensions are invariant axes against which the figure can be plotted and measured. This is a Euclidean space of geometric projection. A figure is projected into it, then is varied against the constant backdrop of the axial matrix until a pre-conceived result is achieved. (Massumi, 1995a, p. 4)

This description—from 19 years before my own work—describes the default *Unity* landscape perfectly, as seen in Figure 8-7.

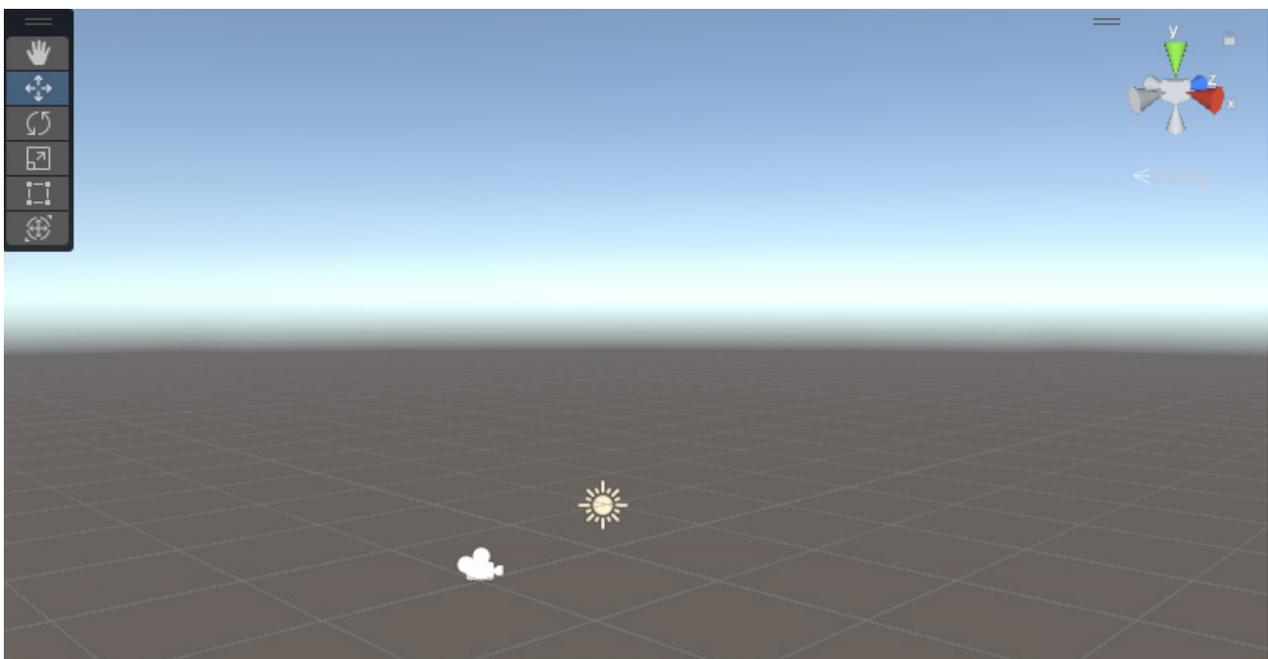


Figure 8-7

Default 3D Unity Scene

Note. Image captured by researcher.

As a contrast, Massumi outlines the work of Greg Lynn, an architect and academic. Using metaballs, an alternative rendering technology to traditional mesh rendering, Lynn works in a “non-Euclidean screen space” (Massumi, 1995a, p. 5) that he populates with blobs, which can meld, merge, stretch and stick, governed by their forces of attraction and repulsion. The blobs, also known as metaballs, are points in space with a mathematical function defining their density and threshold boundaries, and have to be rendered with ray tracing, ray marching, or ray casting, which are much more compute-heavy rendering processes than the more traditional approach of vertice-based geometry and rasterised rendering. Conceptually, using a metaball or metaball-esque approach would allow for a disruption of the strict Euclidean hierarchies that have so far shaped the building of the virtual environment, and, as a result of that, how participants’ drawings manifest; it would mean that the divides between each fragment in each drawing, and potentially each drawing, could be blurred, morphed and made fluid in an appropriately slimy manner, thereby disrupting the strict parent-child object hierarchies used to define participants’ drawings in the previous key process.

In trialling different rendering systems and working towards particular visual styles, I was also drawing on Eve Kosofsky Sedgwick’s writing in the introduction to *Touching Feeling: Affect, Pedagogy, Performativity* (Kosofsky Sedgwick, 2003), as introduced in Chapter Three: 3.2.3 Queer Affects & Touch. Kosofsky Sedgwick argues that:

the sense of touch makes nonsense out of any dualistic understanding of agency and passivity; to touch is always already to reach out, to fondle, to heft, to tap, or to enfold, and always also to understand other people or natural forces as having effectually done so before oneself, if only in the making of the textured object. (Kosofsky Sedgwick, 2003, p. 14)

This explains my own focus on touch as part of my queer methodology—the focus on touching slime, and creating slimy textures, is a way to disrupt the ontological hierarchy of a participant’s Interactor-subject controller and the Interactable-object status of other drawings in space. It also is a way to interrupt and challenge—a way to ooze all over—the boundaries and neatness of each drawing’s parent-container, child-fragment structure.

The following explanations of my experiments with creating slimy textures are therefore concerned primarily with these motivations and lines of questioning. I am not testing these technical approaches from the perspective of a seasoned 3D artist, but rather as a multi-hyphenate designer examining how

these tools can contribute to and manifest a queer methodology for VR. Video documentation of these various tests can be found in Appendix B: [B.4 Body Traces Archive Slime Development Process Video Documentation](#).

8.3.3.2 Process

There are a limited range of slime-centric tools for a would-be developer looking to integrate a pre-existing package, but by casting my net wide and concentrating on shared visual and physical properties (such as slime’s transparency, shine, viscosity and stickiness), rather than the name, I found myself exploring a wide range of precedent digital implementations of difficult-to-recreate substances: water, mud, toxic waste, clouds, goo and alien cytoplasm all provided helpful insights for someone looking to create digital slime. In his book *The Stuff Games are Made of*, Pippin Barr explains the difficulties of creating digital simulations of substances such as water in video game environments:

To make virtual water that ripples, splashes, and roars is no easy thing. It is a complex technical feat: you need image files containing maps of the water’s surface; you need to set the levels of reflection and ripples just so; you may even need to write the computer code that tells the water how to ripple and reflect. To do all this you need to understand how water itself works, to come up with a convincing representation that makes a lake look like a lake and not a flat, blue plane. Virtual water is a triumph of engineering. (Barr, 2023, p. 44)

Looking further afield outside of game development, there is more generalist research into computer simulation of viscoplastic substances, such as described in the article “A Finite Element Method for Animating Large Viscoplastic Flow” (Bargteil et al., 2007). Looking at further work by the same authors, Wojtan’s doctoral thesis, *Animating Physical Phenomena with Embedded Surface Meshes* (Wojtan, 2010) presents a comprehensive investigation of using computer simulation for difficult-to-recreate substances. Wojtan provides a “materials continuum”, shown in Figure 8-8 which delineates a point at which their method for re-meshing a substance as it moves is no longer required, as the substance is “rigid” enough to rely on traditional meshes. This diagram helpfully provides real world examples of substances along the continuum.

While this work in developing specific algorithms for calculating dynamic re-meshing of viscoplastic substances as they collide with their environments is well beyond the scope of this research, I gesture to this research to show

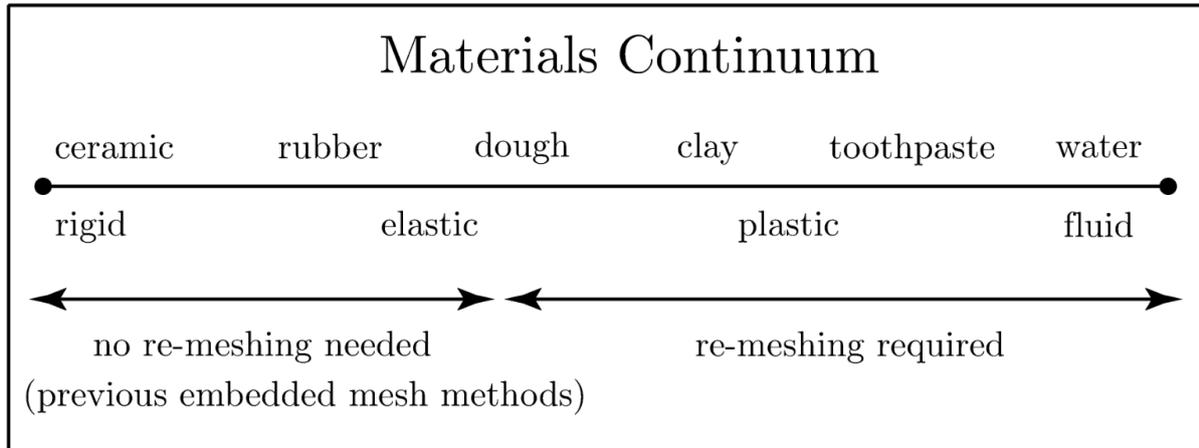


Figure 8-8

Materials Continuum

Note. Image from “Animating Physical Phenomena with Embedded Surface Meshes” by C. Wojtan, 2010, p. 39 (<https://www.proquest.com/docview/862297307/abstract/1D6A343E4349AEPQ/1>).

the intricacies and difficulty of the task, and the depth of research being conducted in order to simulate materials that are difficult to recreate in virtual environments. Developing my own novel methods for simulating slime from first principles was well beyond my scope. Therefore, I was reliant on testing existing tools and choosing based on a balancing of both visual and textural accuracy and how possible it would be to integrate with my existing system.

In the following sections, I provide summaries of my experimentation with different rendering processes. I discuss these experiments through the lens of their utility and relevance for a queer methodology, and therefore provide technical detail only as is essential for this discussion.

8.3.3.2.1 Particle Systems

My first form of experimentation was with particle systems, which emanate small objects from a series of points in a process of procedural generation. While aiming for a slimy, gooey, wobbling surface, instead my experiments with particle systems (see Figure 8-9) seemed floaty, ephemeral and insubstantial around the harsh lines of the generated line mesh.

8.3.3.2.2 Shaders

Finding the particle system inappropriate, I then looked to shaders as a potential way to create sliminess. Shaders are often used to give the

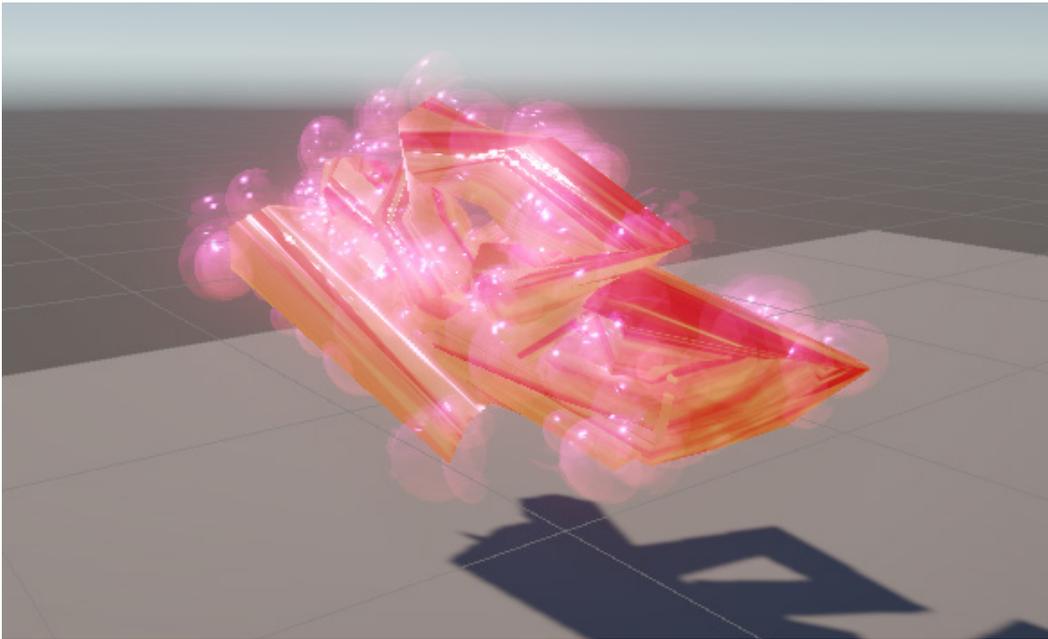


Figure 8-9

Early experiment with particle system for bubble generation

Note. Image sourced from *Unity* scene created by the researcher, image captured and cropped by the researcher.

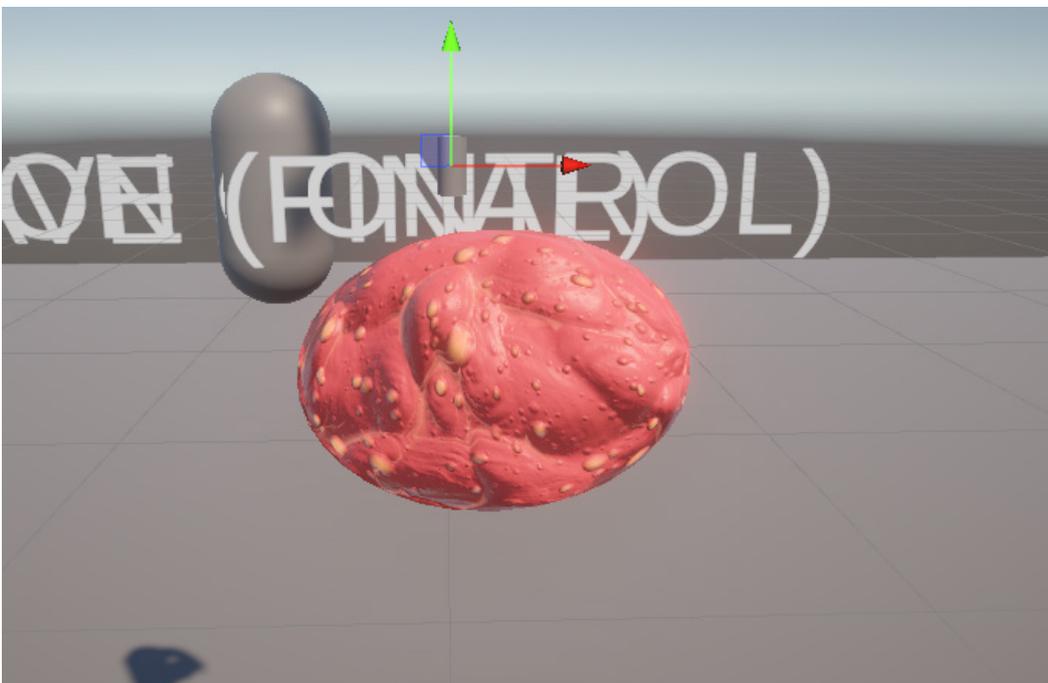


Figure 8-10

Early test of shader implementation to create slime-like textures

Note. This shader was adapted from Shackman2000's Shadershack resource (2023/2024). Image captured from *Unity* scene by the researcher.

appearance of movement or deformation in a less processing-intensive way than simulating actual changes in the mesh of an object. In video games, it is common to simulate water with shaders rather than particle systems, which, while more capable of accurately simulating the dynamic movement and interaction of substances such as water, are highly demanding of rendering systems. Looking for pre-existing tools, I used shaders freely available online to create what I call the “Mortadella version”.

While this was more effectively slime-looking (as seen Figure 8-10 and Figure 8-11) especially when animated, it also looked too opaque and “thick”—hence the association with mortadella, a processed meat product. This approach appeared too directly linked to the concept of meat and gross real-life substances—too substantial, where the particle system had felt too insubstantial—so I continued exploring to see what other approaches I could take.

8.3.3.2.3 Metaballs, Ray Tracing, Ray Marching, Signed Distance Fields

After this, I decided to pivot to explore other rendering approaches besides meshes and shaders. The core goal of my archive section is to have the participant and archived drawings come into relation with each other, making contact and changing each other in a way that challenges the sense of structural integrity of each—providing a sense of two becoming one, one becoming two, and fluctuations between these states. While it would be possible to algorithmically define changes upon collision with a traditional mesh and fragment shader set up (what I had used until this point), I wanted to see if there was a way to approach rendering that would work in the same way that Brian Massumi had called for, disrupting Euclidean space with a logic of forces and proximity. To do this I began looking into metaballs, ray tracing, ray marching, and signed distance fields. In *Real Time Effects for the Technical Artist* (2022) author Chris Roda outlines how:

Volumetric phenomena such as gasses, mists, fogs, and vapors are the most widely used applications for ray marching. At the time of writing of this text, there is no better technology for representing these phenomena, interactively: updating, changing, and conforming with dynamic characteristics in the environment. (Roda, 2022, p. 321)

In traditional rendering, objects exist as a pre-defined geometry, with vertices, polygons, a shader and materials that determine their appearance to the virtual camera. A typical shader describes the appearance of the polygon faces.

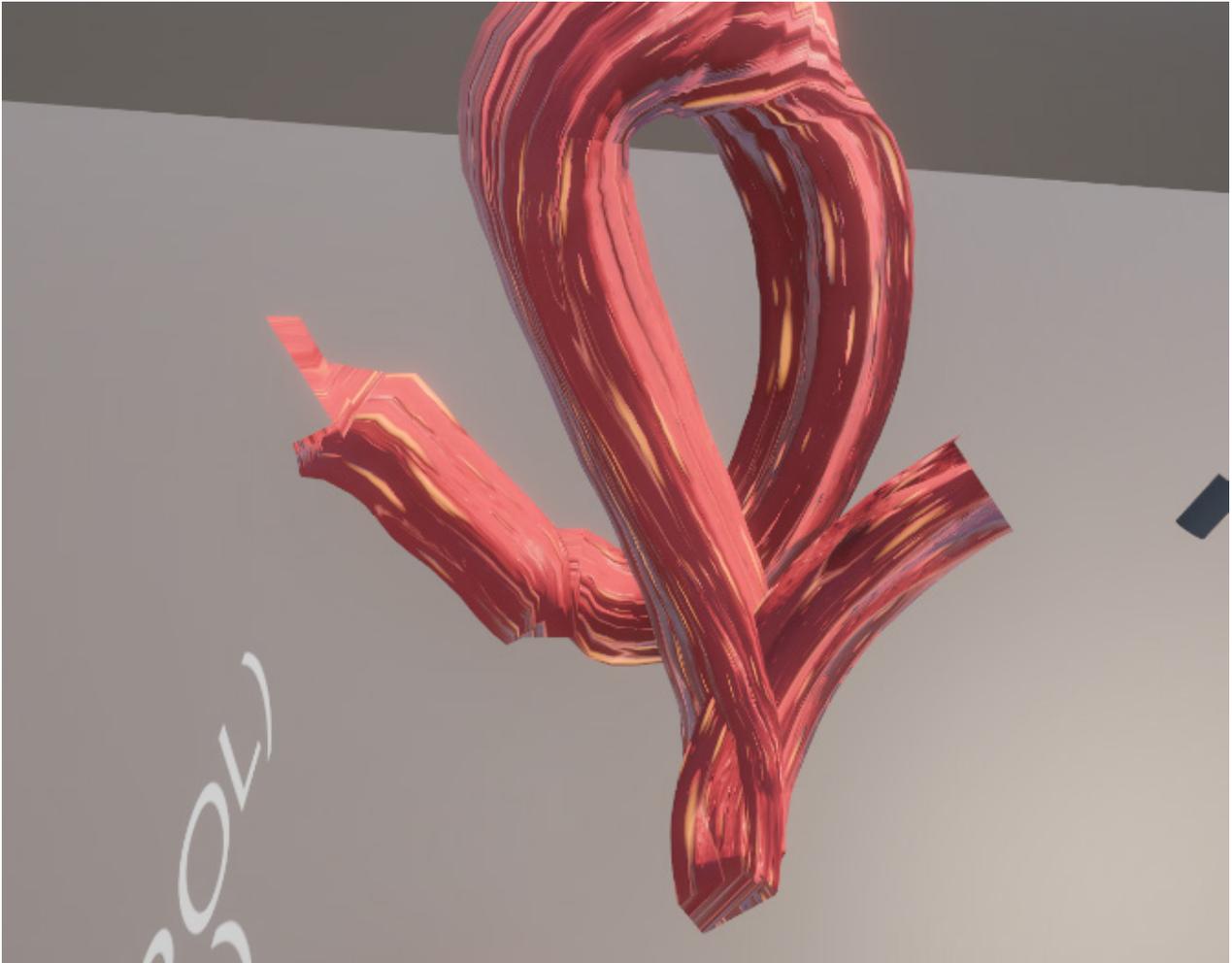


Figure 8-11

Early shader test using the drawing tool

Note. This shader was adapted from Shackman2000's *Shadershack* resource (2023/2024). Image captured from *Unity* scene by the researcher.

When using ray marching and signed distance fields, the presence of an object is determined by sending a ray through a set area (volume), sampling along the way to test if there is something that needs to be rendered. A ray marching shader determines the surface of an entity not via vertices or polygons, but by detecting presence that is assigned dynamically by code. For example, a signed distance field may contain code that describes a set of radii (i.e, a set of spheres known as metaballs). As the ray marching shader travels through the volume, it determines where these radii come into being. Modifying the data that describes the set of radii (either manually or procedurally with code) can make it so that these spheres become blended, combined, bridged, or pulled apart. Even if a particular blob looks separate, at any moment they can become “one” according to the code that is defining their presence within the volume. This combination and melding is conceptually very aligned with my priorities for bringing drawings into contact with each other, and for the concept of “other” to blur and disappear in the process of melding and unmelding.

The crucial finding from this process of experimenting with various raymarching rendering tools was that it was not viable to integrate with my existing architecture. While conceptually compatible with my queer methodology VR due to the potential of intermingling participants’ bodily drawings and destabilising the strict hierarchical ontologies of traditional Unity game engine processes, the friction of working in this completely novel way became insurmountable. It would have been a technical endeavour that eclipsed the specific conceptual goals of this project to continue down this line of research, although it does present a potent line of further exploration in future projects, especially if collaboration with a specialist technical artist becomes possible.

8.3.3.2.4 Final Strategy: VertExmotion & Ripple Script

Following this exploration of metaballs, raytracing, raymarching and signed distance fields, I returned to looking at how I could create slime-like textures using the fundamental tools of a default Unity rendering pipeline: meshes, materials and shaders. Experimenting with the package “Mesh and Object Deformers for Unity 3D” (El Hajj, 2019) I found that the ripple script contained in the package provided appropriate “wobble” to the static mesh generated when drawing; there was still a sense of weight even as it moved viscously (implementation of the ripple script is shown in Figure 8-12). Rather than just creating the appearance of fluctuation, points along the structure of the tubular drawing line are moved through space, like the muscles of a limb flexing.

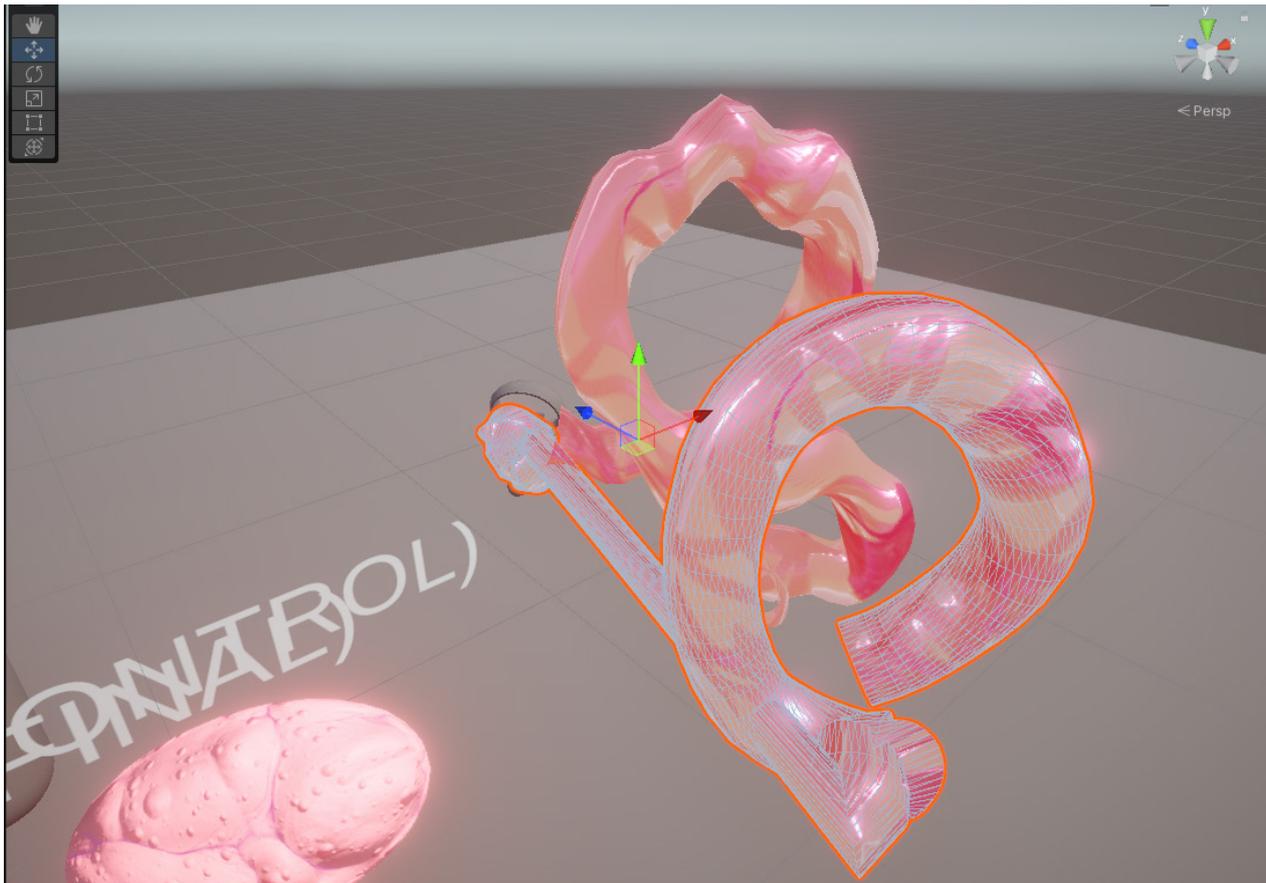


Figure 8-12

Screenshot of ripple script affecting one mesh of drawn fragment in the background, while an in progress mesh in front of it remains smooth

Note. Ripple script is from an asset package from the *Unity Store* (El Hajj, 2019). Image is screenshot captured by the researcher.

However, integrating with the entirety of the archive was extremely taxing on processing power. For this reason, I kept this ripple script as an integrated part of the drawing process for an individual participant, and implemented VertExmotion (Kalagaan, 2024) as the animation tool to create a slime-like texture for participants' archival drawings. VertExmotion is a paid plugin soft body system that I have used extensively in the past; I used this tool in my first experiment discussed in [Chapter Seven: 7.2 Experiment One: Queer Dance Worlds](#). VertExmotion works via sensors with deformation settings such as bounce rate and inflation, which are placed as child objects under the object they are deforming, in this case under each line fragment prefab. The interface of VertExmotion and the VertExmotion sensors is shown in [Figure 8-13](#) and [Figure 8-14](#). Rather than modifying the mesh itself, VertExmotion is shader-based, which means it requires less processing power than the ripple script.

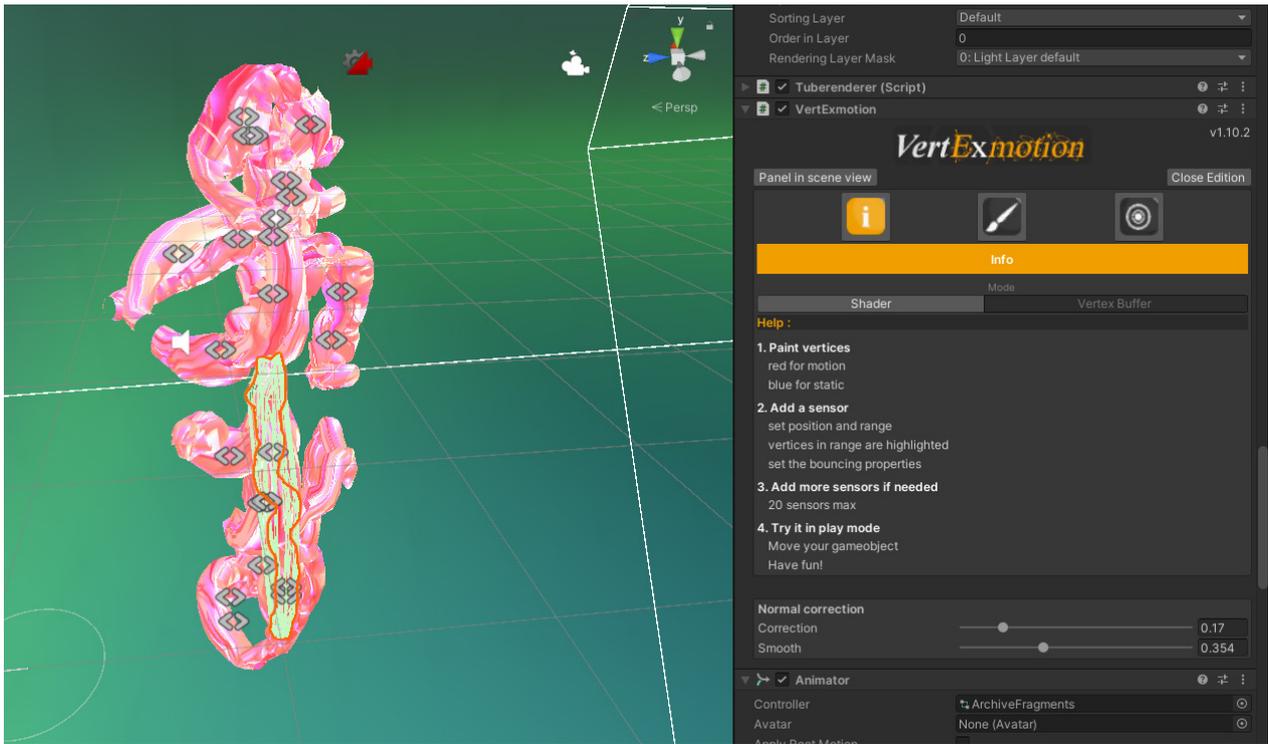


Figure 8-13

Screenshot of VertExmotion Interface, attached to primary mesh highlighted in green

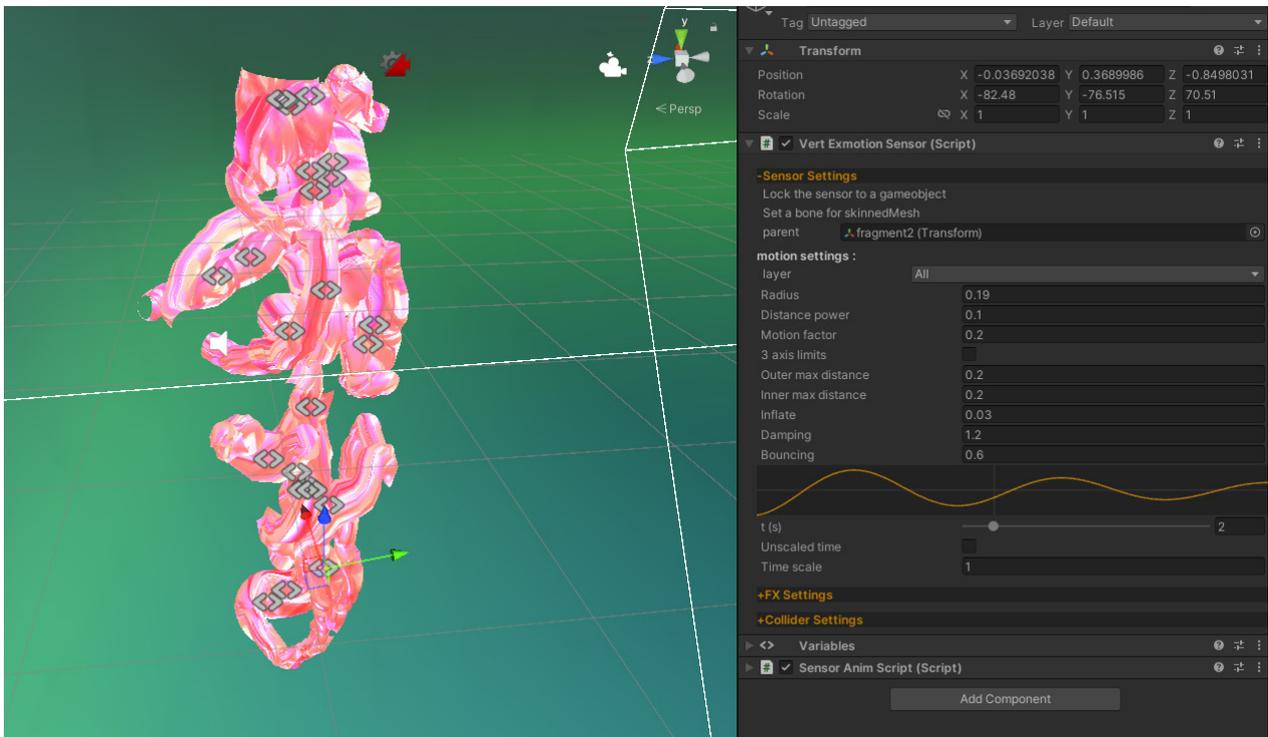


Figure 8-14

Screenshot of VertExmotion Sensor Interface and settings

Note. Each <> symbol shown in the mesh of the drawing is a VertExmotion sensor attached to a specific fragment.



Figure 8-15

Screenshot showing VertExmotion sensors on the left moving through line fragments, resulting in warping shown on the right

Note. Image shows implementation of VertExmotion (Kalagaan, 2024). Screenshot captured by the researcher.

The overall effect is of a swollen, internal bubble moving through the drawing (shown in Figure 8-15), which successfully creates an organ-like sense of movement; during user testing (detailed in the next chapter), one participant described it as “like a peristaltic wave”, the term for the contraction of muscles in the digestive system that moves food along.

As the sensors move through the tube there are glitches, odd sharp corners, signs of the object pushed beyond its breaking point. This glitchy-ness (seen in Figure 8-16) can be understood as a kind of digital version of slime, as matter asserting itself and disrupting the clean functionality of usual rendering.

With the properties of the sensors accessible via code, VertExmotion also proved capable of providing interaction between archival drawings when they collide. Each time the drawings sense a collision with each other or with the participant, both entities increase their sensor’s “inflation” rate, meaning that over time, the drawings have more and more drastic swelling moving through them, creating more extreme deformation, as shown in the comparison between Figure 8-17 and Figure 8-18.

8.3.3.3 Practice Outcome and Research Findings

Throughout this process of slime-oriented experimentation, I developed a specific colour scheme and pattern of movement for both the participant’s drawing as it is being created, and for when it is summoned as an archived

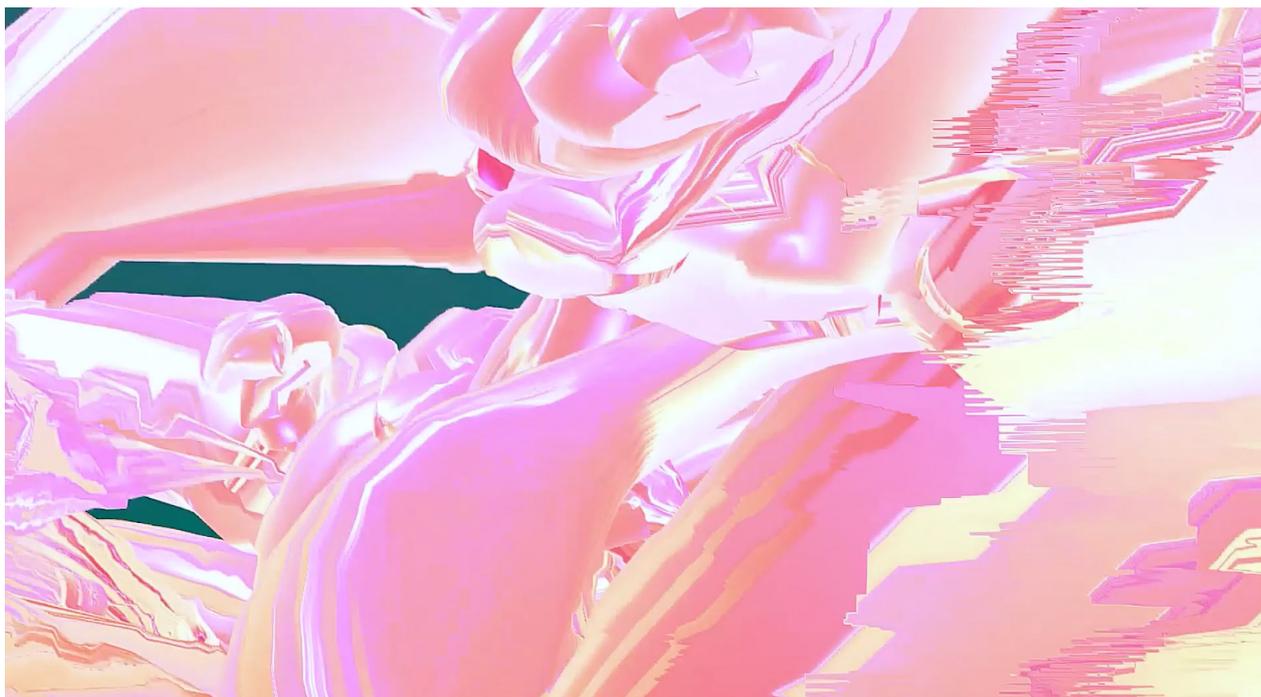


Figure 8-16

First person view from within VR experience of Body Traces Archive, showing collision of entities with the participant's "head"

Note. First person footage captured by the researcher's own participation in Body Traces Archive.

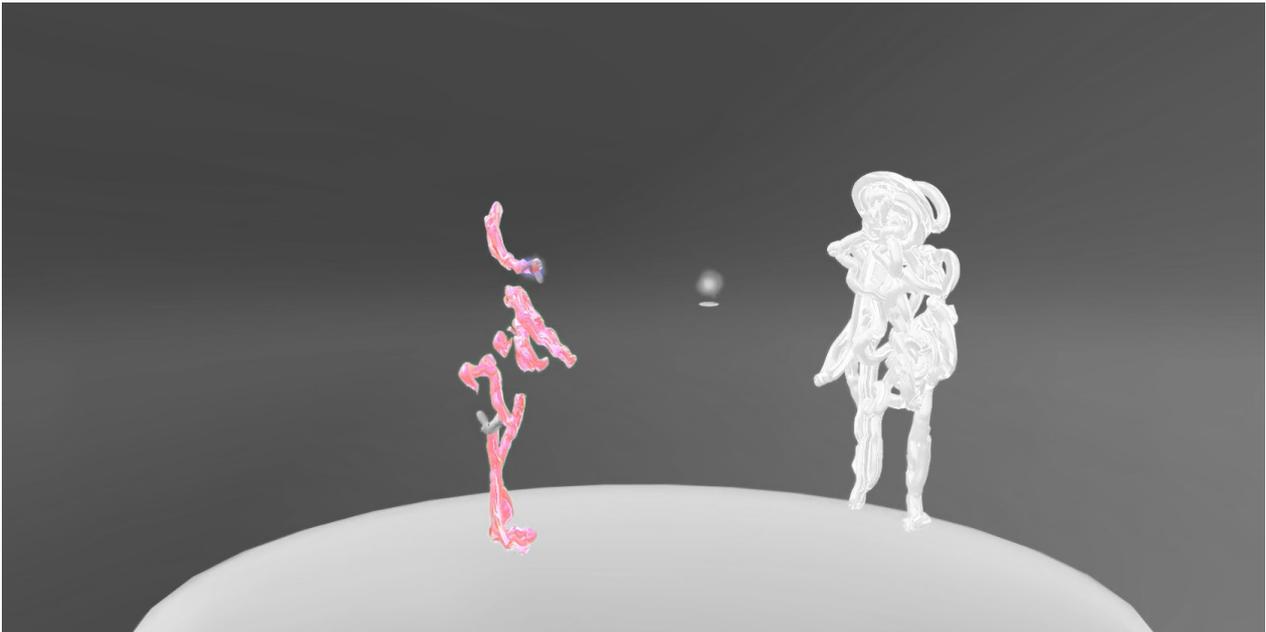


Figure 8-17

Deformation of participant's avatar, before

Note. Background has been edited by researcher to be black and white in order to distinguish the participant's drawing more easily. Pink coloured lines are participant's drawing.

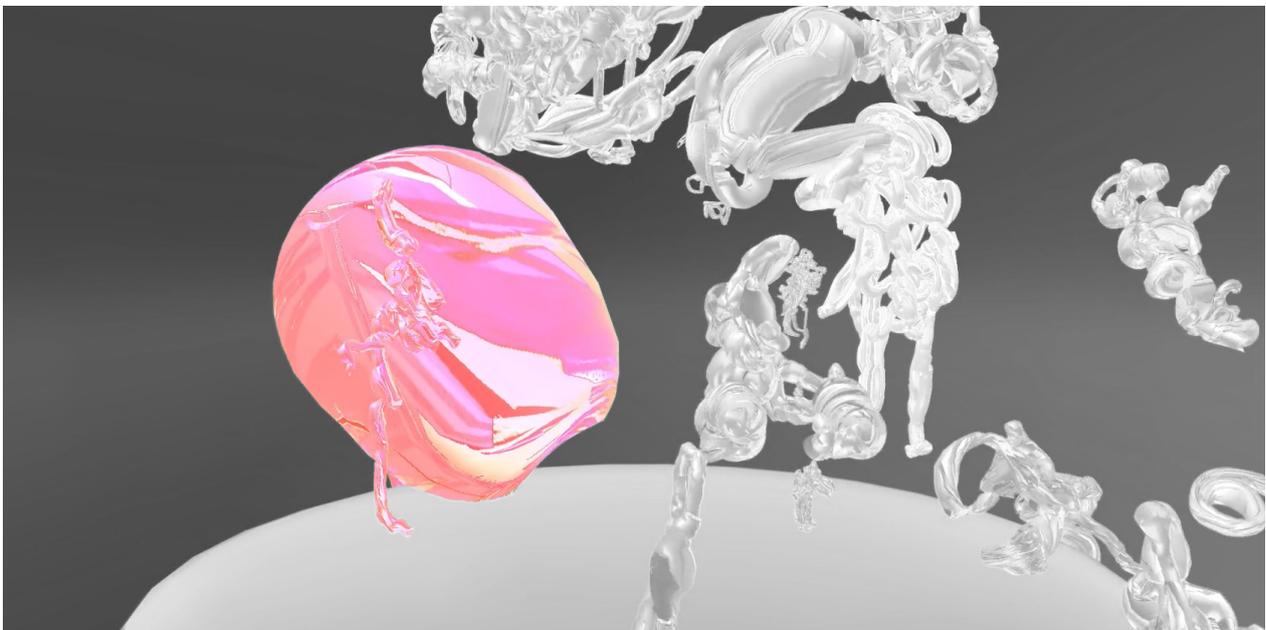


Figure 8-18

Deformation of participant's avatar, after

Note. Background has been edited by researcher to be black and white in order to distinguish the participant's drawing more easily. The pink form is the participant's drawing, after contact with archival drawings has led to significant deformation.

entity. This has come to define the overall visual aesthetic of the virtual environment of the Body Traces Archive and greatly contributes to the range of qualities experienced by participants who visit the Body Traces Archive.

By exploring a number of different rendering options to create slime, I have butted up against—and in doing so, identified—the normative structures of *Unity* game engine with regard to how objects are constructed in space and rendered for a viewer. While I have attempted to trouble and complicate the default divides between solid objects with meshes and flowy particle systems in order to queer the process of working with *Unity*, I have not always been able to achieve a radical departure from standard approaches. Instead, what has become apparent is the intense—yet generative—friction that a queer methodology creates when working against the norms of standard rendering methods available in *Unity*.

A key finding from this process is that the structural, technical differences between various rendering tools has significant impact on both the visual properties of the rendered entity and the invisible structures that govern such an entity's existence in the virtual environment. Each of these iterations testing different representation strategies use the same data source, a participant's (or a test participant's) JSON file containing XYZ coordinates. While I have chosen a particular configuration with VertExmotion and the ripple script as the current format for the prototype, there is no one definitive, "actual" visual representation beyond the recorded data that capture the path of the participant's controller. Each collection of methods for rendering this data provides a different inflection and set of possibilities in terms of the worldbuilding and experience for the participant.

Further development of this prototype could explore what greater queer potentialities are opened up via the discussed, but eventually not implemented, rendering alternatives, such as a ray-marching approach with metaballs, and via alternative forms of interaction between entities that results in more drastic intermingling. While I have eventually chosen one particular technical arrangement in order to manifest the strategies of craft of my queer methodology for VR, other practitioners could extend and expand on these starting points to further explore the relevance of alternative rendering approaches for a queer methodology for VR.

8.3.4 Further Aspects of Experience Design

The previous key processes have been primarily concerned with back-end development, namely how the ontologies of *Unity* lead to a particular hierarchy and organizing logic for a virtual environment, whether participants are aware of this structural background or not. While not feasible to detail at length here, it is important to recognise that certain aspects of front-end design, such as spatialised audio and narration, were also developed concurrently with the overall design of the back-end system. Textural sound effects and guiding narration, as well as the guide figure that acts as the mouthpiece for the narration, are VR-specific approaches to enrich and guide the experience beyond the visual, spatial and interactive elements that are more traditionally understood to be under the purview of a designer.

8.4 *Applying the Queer Methodology for VR via Key Processes*

These reflections show the generative way that working with and against, alongside and amongst *Unity* game engine has led to insights regarding both the structuring logic of *Unity* as a game engine, and how a queer methodology for VR asks particular questions of *Unity* that it is not always prepared to answer. The process of setting up interaction for VR via the XR Interaction Toolkit showed how pre-existing tools make developing VR experiences for non-expert programmers much easier, but also enforce a particular ontology of interaction, with participants and their controllers being Interactor-subjects and the things they are able to interact with—such as the drawings left behind by previous participants—existing as Interactable-objects.

Developing the drawing tool and saving and loading system similarly revealed the structuring logics of how objects exist in a *Unity* scene (with parent-child nesting hierarchies), and the friction between this hierarchy and the queer values and strategies I was attempting to implement. Iterating through different approaches to rendering slime showed the variety of rendering options available when using a program like *Unity*, and suggested further exploration of the compatibility between a queer way of working and rendering methods such as signed distance fields and ray-based rendering. It also showed that hacking

together a variety of tools and pre-existing packages can effectively create the sensorial and affective qualities required to fulfil the goals of a queer rendering of slime.

It is crucial to recognise that these back-end development processes are not merely technical problem-solving tasks or cosmetic considerations. The process of developing the foundational functions for the Body Traces Archive has demonstrated that it matters if our virtual bodies are made of a collection of fragments, which are a collection of points; it matters if our bodies are a clouded mass of remittances; it matters if our bodies are one, unified whole that can be manipulated. It matters what these virtual bodies feel like, whether they have heft, stickiness, wobble. Even if a participant is unaware of the behind-the-scenes structure governing what they draw and interact with, the operating logics influence and shape how a developer works, and therefore what can be enabled and offered for a participant. The meeting point of *Unity's* norms and structures, my technical knowledge, and my queerly oriented motivations in disrupting and challenging *Unity's* norms have come to rest in an uneasy collaboration that defines the rules of this virtual environment that participants are invited into.

As Nicoll & Keogh argue, “*Unity* takes on a mediating role—similar to that traditionally held by the programmer—in the various practices, decisions, and workflows it encourages and discourages” (Nicoll & Keogh, 2019, p. 57). My own experiments and experience with developing the Body Traces Archive prototype have borne out this statement in a practical way, showing how *Unity* requires Cartesian modes of designing 3D spaces and strict object hierarchies, all of which have to be engaged with critically when applying a queer methodology to developing VR. Nicoll & Keogh point out that “it is important to consider how *Unity* specifically and cultural software generally render opaque their own mediation of their users’ workflows” (Nicoll & Keogh, 2019, p. 57). My hands-on experience in *Unity*, and the analysis of it I have presented here, works to make this mediation visible and evident. While I was not always able to work against the mediating drive of *Unity*, the difficulties in applying the conceptual framework and practice-based approaches of my queer methodology have at least made the guard-rails and incompatibilities much more explicitly defined. The process of experimentation also suggested potential future avenues for challenging these guard-rails and incompatibilities further.

The development process of the Body Traces Archive emphasised that queer worldbuilding is not solely the task of inventing the rules of a fictional narrative space that participants enter. Queer worldbuilding is also the process of developing the behind-the-scenes structures, code and inter-related assets

that are deployed by software on run time in a functional sense. For a queer methodology for VR, there will always be tension and friction between the goals, premises and values that define an ideal manifestation of queer VR, and what the realities of *Unity* game engine (or any other software tool) actually allow and make possible when deploying practice-based approaches. While it may not be possible to entirely overhaul the logics of the tools we use, we must always be considering how we can misuse, appropriate, tweak and hack together, and critically deploy our tools for queerer purposes.

The next chapter presents a discussion of the participant experience of the Body Traces Archive. In arguing that this experience is queer VR, I am not arguing that it is the *only* form of queer VR. In fact, in developing a queer methodology for VR, my goal is rather to encourage the creation of many queer VRs. A queer methodology works against the totalising, universalising goal of a singular metaverse; instead, we want a flurry of partial worlds that each illuminate a hopeful iteration of queer existence.

Chapter nine:

*Participant
Experience of the
Body Traces Archive
Prototype*

9.1 *Bringing the Archive to Life*

As I approached the final stages of development for the Body Traces Archive, I initiated a series of one-on-one user testing sessions with friends and acquaintances. These sessions invited participants to engage with the VR experience and provide feedback and reflections on their interactions. While earlier stages of development involved informal, ad hoc feedback, this phase shifted to a structured research method with ethics approval (ETH23-8645 - Thresholds and Unstable Boundaries).

Most crucially, user testing was an opportunity for the potentials of the Body Traces Archive to become actual. The Body Traces Archive experience was designed to collect the body traces of participants, and only via having these selected participants engage with the experience could the virtual environment of the Body Traces Archive come to life. Indeed, the user testing process was how the “archive” in the title of the VR experience came into being. Therefore the participants in the user testing process should also be understood as co-creators of the archive itself.

This chapter first presents a description of the design outcome, Body Traces Archive, in order to establish the intended meaning created for a participant via the experience. Following this, a discussion of the main findings from the user testing process reflects upon the utility and integration of user testing as part of a queer methodology for VR. The discussion also explores what defines the queerness of VR, not only for developers and researchers but also for participants. The results of the user testing process in full can be found in Appendix C.

9.2 *Design Outcome: Participant Experience*

9.2.1 Part One: Inscribing the Self into the Archive

9.2.1.1 Environment

The general environment of the Body Traces Archive consists of an inverted sphere that has a glimmery, shiny green surface in the distance, and then a blue-ish purple circular platform that appears to be a few metres in diameter for the participant to stand on (shown in Figure 9-1). The goal in designing the space in this way was to provide a stable ground for the participant to stand on, and to utilise a finding from the *Queer Dance Worlds* experiment: the use of a sheer, curved surface, rather than a cube or room-like structure as container, creates a sense of being “inside” something more ambiguous than a definable room.

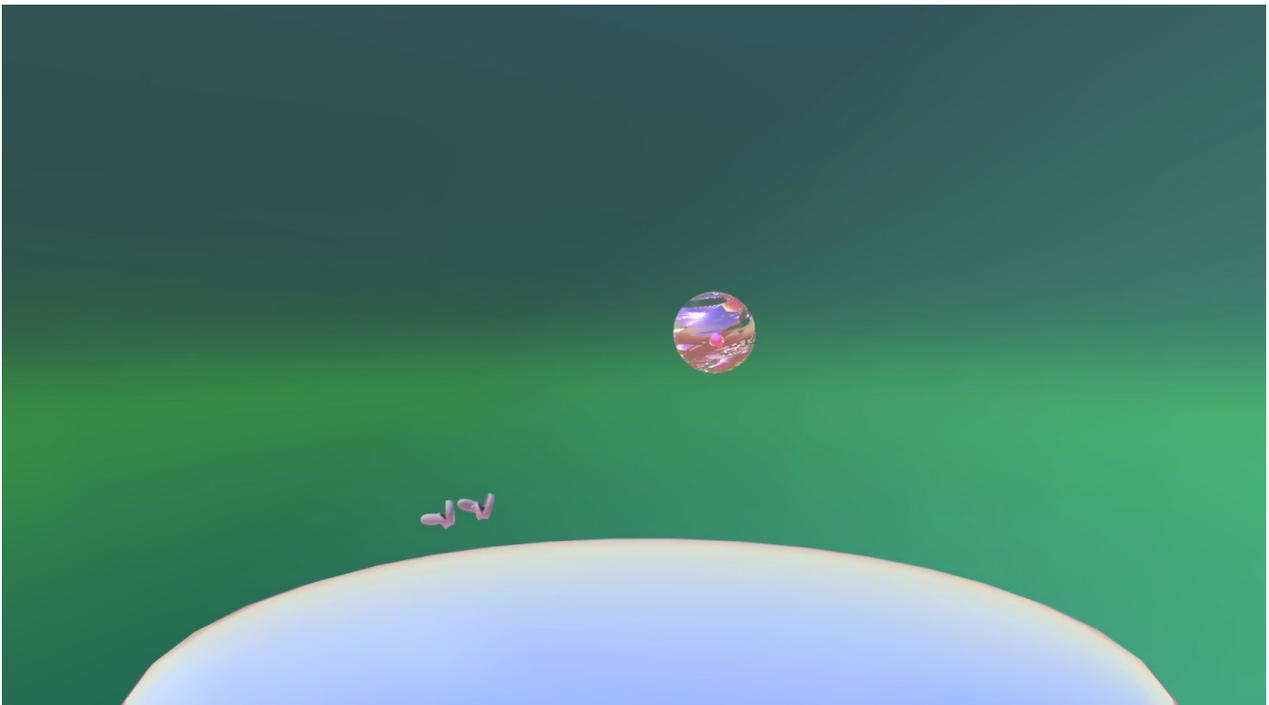


Figure 9-1

Environment Design of Body Traces Archive

The sense of being enclosed in a space that had no real-world analogy was the main goal, to clearly differentiate the virtual space and its impossible utopianism from the existing physical world. While not aimed directly at creating a sense of being within a bodily cavity, this association is something that would further enrich the experience if a participant felt this way. This approach to design of the space participants occupy is informed by two strategies of craft from the methodology: “Use anti-representational or non-representational visual, spatial and metaphorical languages for worldbuilding” and “Create places that otherwise would not exist”. This is a way to manifest the premise of queerness, “Queerness is always on the horizon of ‘then and there’, queerness is a kind of potentiality”. This virtual environment is designed visually and spatially to be a space of then and there and queer potentiality. Participants begin the experience by reaching out and popping a bubble, which brings the guide figure into being. This process familiarises a participant with the activity of moving and making contact with an object in the world.

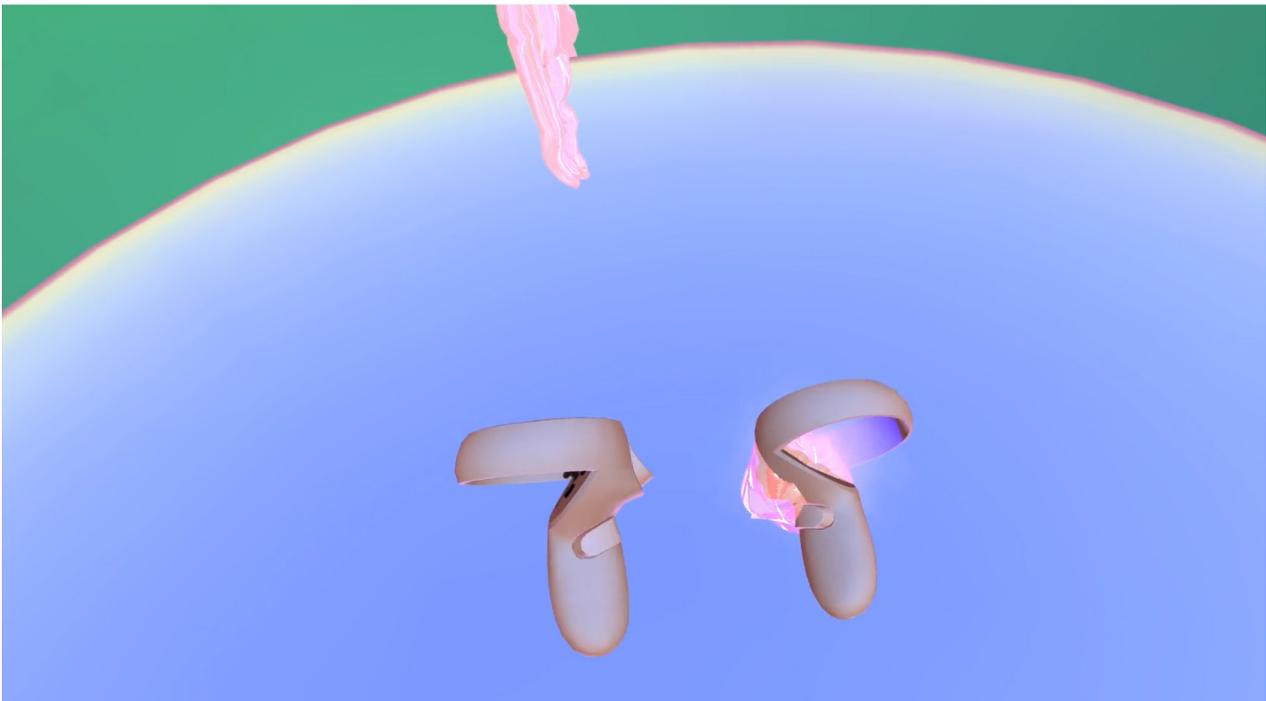


Figure 9-2

First person view of controller holding the drawing blob

9.2.1.2 Inscribing the Self

The pen tool that the participant is invited to use is located on a plinth inside the bubble they have popped. The pen tool, despite its name, is not shaped like a pen: instead, it takes the form of a blobby shape that sticks to the participant's controller on contact. Figure 9-2 shows the controller holding this drawing blob.

The guide figure consists of a body trace that I myself created, and my voice provides the narration. The narration instructs the participant on how to use the blobby pen tool to draw themselves. The instructions specify that participants should bring their controller into contact with the “starting point” of their body in Virtual Reality. This drawing process is a way to enact one of the premises of queerness—“Queerness is a performative, phenomenological experience, one of being out-of-joint from the norm”—in a material (if virtual) way, utilising the performative property of VR. Using the strategy of “Focusing on touch as a form of corporeal intimacy and communication”, contact between the skin surface and the virtual world brings into existence the sedimentary record of the participant's actions in the form of their bodily trace. Using the controllers in an unexpected way is a result of the strategy to “Take a critical, anti-naturalising approach to the hardware”. It is a way to dis-orient participants from an expected posture or stance in VR, such as standing still and upright with controllers held in front of them in order to grab or hit enemies, and instead encourage participants towards a playful, reflective, touchy-feely, queer orientation in VR. This strategy of taking an anti-naturalising approach to hardware is in service of one of the key overall goals of creating queer VR (“Disrupt normative, heterosexualising bodily orientations”).

This drawing process, where the participant is asked to press the controller against their body, and experience the gloopy, slimy sounds of the pen as it is dragged along their surface, aims to heighten the participant's sensitivity and awareness of their body in Virtual Reality. It also heightens and shifts their awareness of the controller; at times the controller is an unnoticed extension of a participant's hand; now it becomes a clunky object sensed against the surface of the body. The traces that participants generate as part of this process are recordings of their actions, explorations and gestures. These drawings are partial, fragmentary, non-totalising; it is very difficult to trace yourself accurately, as in the process, you inevitably shift and move—and this frustration is part of the point. Our movement and performances of ourselves inevitably changes the bodily self we are hoping to record. Figure 9-4 and Figure 9-5 show stills from footage that simultaneously recorded the drawing process in physical space and from within the virtual environment, compositing



Figure 9-3

Still from live composite footage showing the body trace overlaid with the participant's body

Note. Participant for this live composite footage is the researcher.



Figure 9-4

Still from live composite footage showing the body trace overlaid with the participant's body, further in the drawing process

Note. Participant for this live composite footage is the researcher.

this footage together in real time; the participant's trace of themselves surrounds them as they trace first their torso, then their arms.

The drawings that participants produce are low fidelity, with thick lines that are purposefully difficult to be precise with. The lines they draw with are pink and glimmery, not quite intestinal, but deliberately visceral. This viscosity, wrapped around the outside of their body, acts to disturb the boundary between inside (guts, hidden, real) and outside (skin, visible, virtual), putting the vulnerable on display. This textural, visual, aural language of slimy, bodily textures is directly informed by the value "VR Development should stay with the meat: VR should be actual, hot, messy, bloody, material, sullied, base".

The ropery, guts-like, slimy drawing process is a way to emphasise for the participant that this performance and recording of the self is deeply subjective, and that presence in Virtual Reality is always phenomenologically embodied. There can be no total ascension into data; no seamless, perfect transfer into some hollow caricature, or complete mimetic reproduction of the physical self. In the Body Traces Archive, the bodily threshold between the physical and the virtual, the meeting site by which Virtual Reality is experienced at all, comes to life via the productive force of friction between controller and body. The drawing process becomes what the authors of *QueerOS: A User's Manual* call "a relational, embodied, and transformative interface" (Barnett et al., 2016, p. 52).

9.2.1.3 Becoming the Avatar, Reflected

Once the participant has completed their drawing, they are invited to return the pen tool to the plinth it originally hovered over, which triggers the next stage of the experience. This physical interface—rather than, for example, buttons or a 2D menu—allows for the participant to stay "with" the sense of embodiment generated during the drawing process. Before the next primary section of the experience begins, a virtual mirror pops up as their drawing "globs" into position, located roughly at the centre of their body (shown in Figure 9-5).

While only loosely anchored to their physical form, the mirror provides crucial visual feedback for the participant, and as they move, their avatar also moves; this assists in making their drawing feel like it is now their body. Participants' avatars take the form of their self-recorded bodily trace, a phenomenological and indexical recording greatly at odds with the traditional avatar approach of mimetic, cartoonish reproduction of physical world appearances. The avatar process is informed by the strategy to "Design avatar systems or embodiment opportunities that are non-representational and shift in their relation to the participant", with this latter portion taking on more significance throughout the

rest of the experience. The overall drawing and avatar process uses strategies of craft to fully leverage the key properties of performativity, physical presence, agential involvement and skin threshold. This creates the identified qualities of queer VR: a sense of embodiment that is flexible and malleable, a sense of bodily disorientation or dislocation, a sense of slippage or fluidity and a sense of ambiguity and intermingling.

Writing about the ephemeral nature of queer dance, José Esteban Muñoz says that “the best performances do not disappear but instead linger in our memory, haunt our present, and illuminate our future” (Esteban Muñoz, 2019, p. 104). In *Body Traces Archive*, the bodily performance of self-tracing can linger virtually, both as the participant’s avatar, and as a recorded trace that becomes animated upon its return as part of the archive portion of the experience.

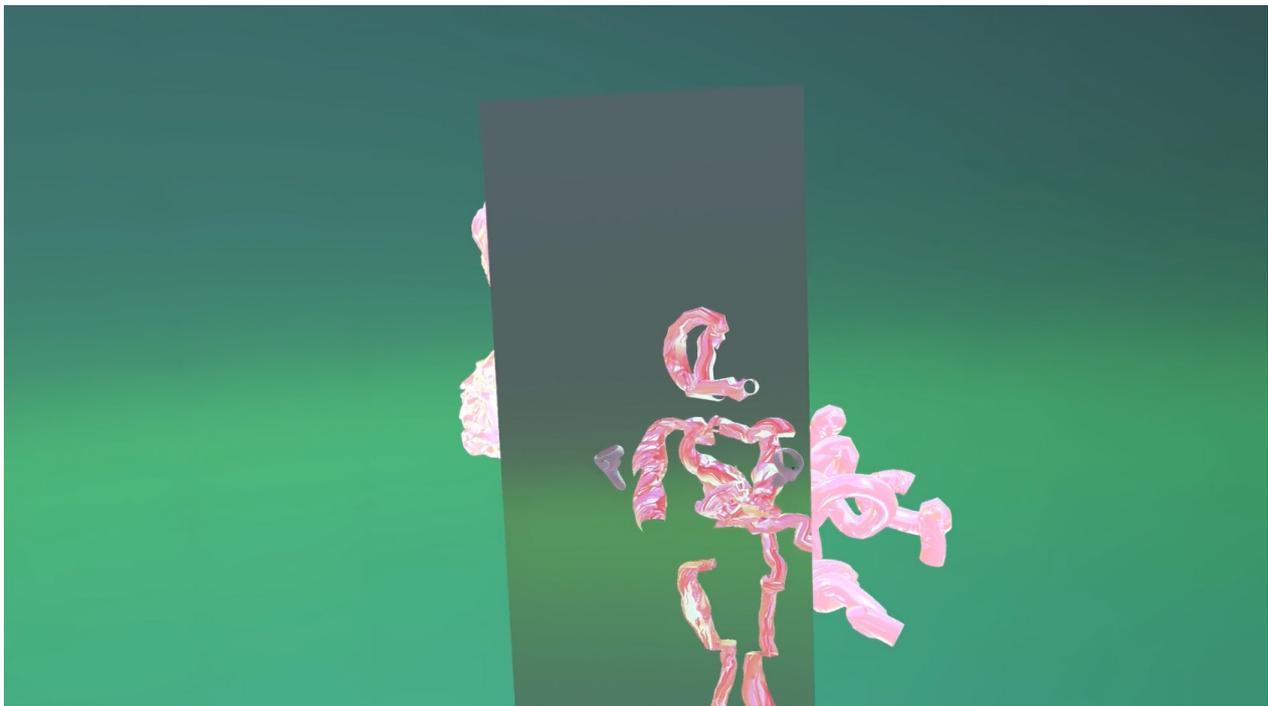


Figure 9-5

First person view of the mirror, showing the participant’s trace as their avatar

9.2.2 Part Two: Arrival of the Ecosystem

9.2.2.1 Archival Entities

As the participant stares at their reflection, maybe wiggling a little to see how it wobbles and blobs about, they are joined by a ring of other small, pink drawings in front of them, as shown in Figure 9-6. These are the traces of previous participants, held in miniature.

Bringing multiple participants together in this way is closely aligned with the goal that identifies that VR development should “Enable queerer forms of digital relationality and sociality”. The communal aspect of the work is crucial for the overall goals and values at play. My own role is merely to create a world of potential and possibility, and for participants to fill it and bring it to life with their participation, accumulating over time.

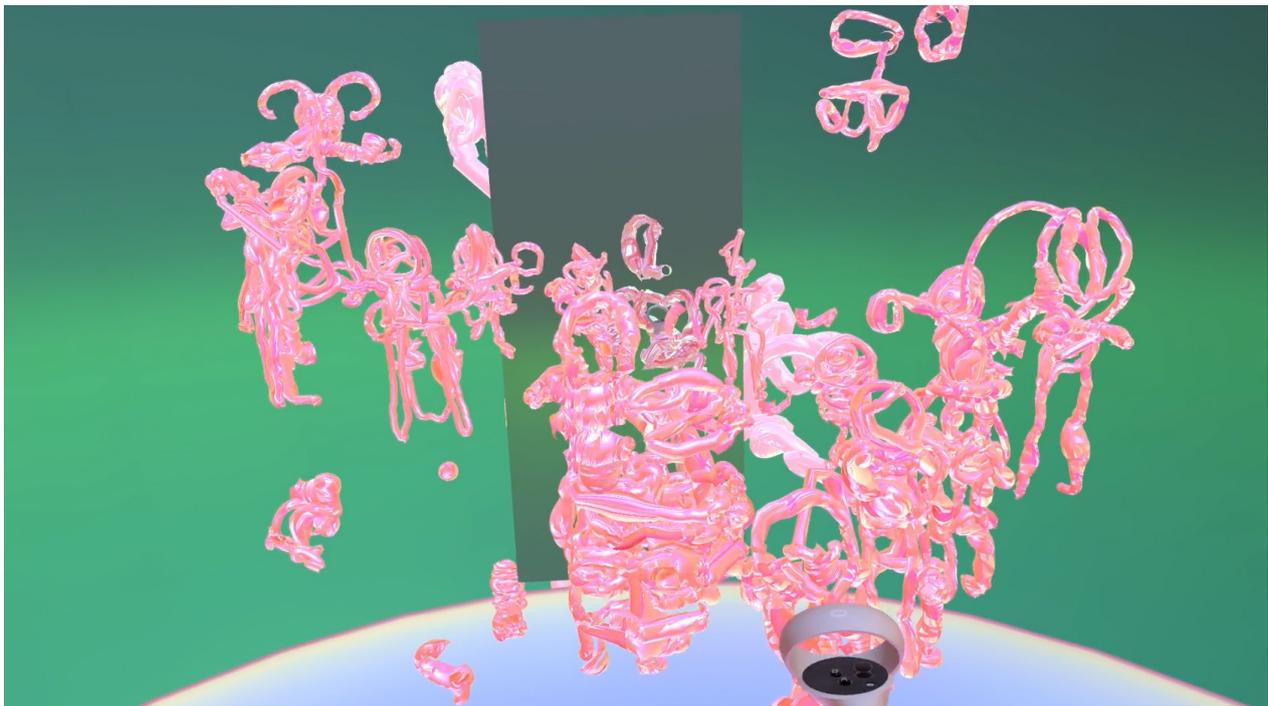


Figure 9-6

First person perspective of the arrival of archival drawings

The participant is then invited by the narration to touch these drawings. When the participant touches a drawing, it grows to the same size it was drawn at and animated fluctuations begin; they slink along each line, swelling and sliding, seemingly alive. The participant is holding the drawing in their controller, and can rotate and move it through space; they can make it collide with their own body or head. These touches and collisions are accompanied by pops and squelches that create a sense of stickiness. When they shake their controller, the drawing is released if the velocity of the controller reaches a particular limit—i.e., if they shake their controller hard enough. This threshold test also contributes to the experience of stickiness for the participant, as the drawing clings to their controller if they are not vigorous enough.

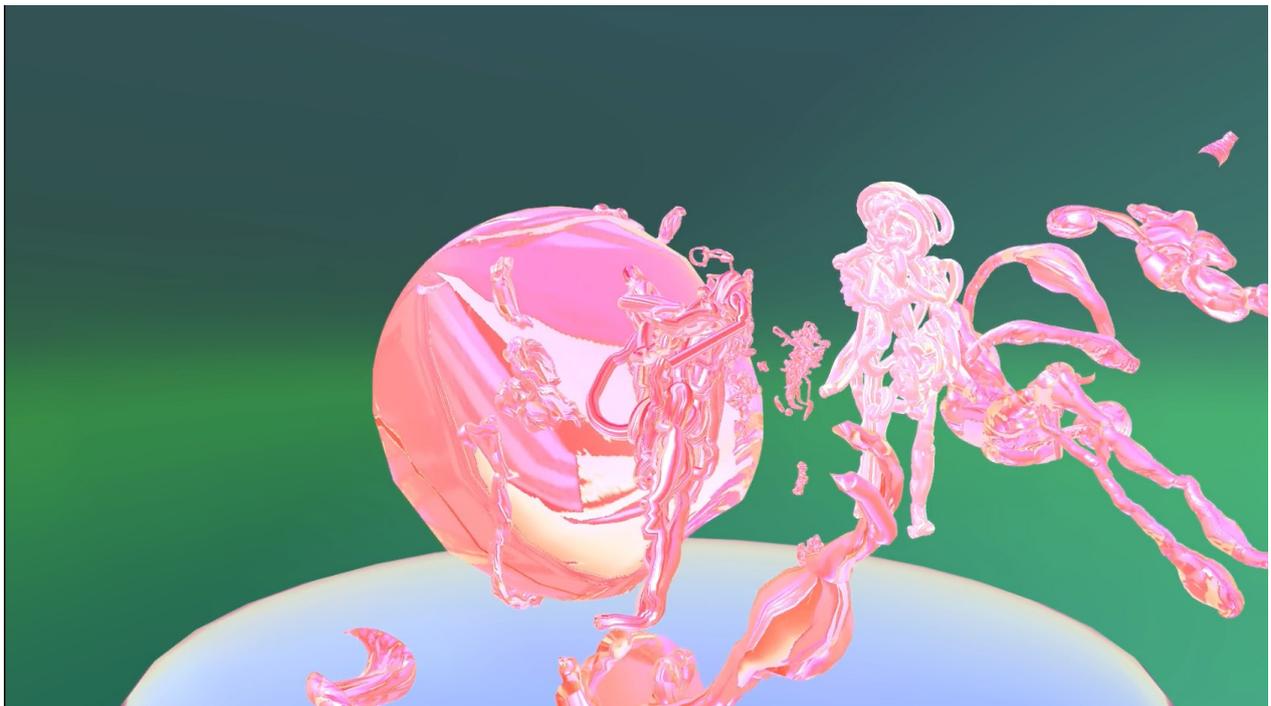


Figure 9-7

External perspective of participant interacting with archival drawings

Note. Participant is the largest figure in the centre.

9.2.2.2 Collisions in the Ecosystem

Once the drawing is set free, it follows an algorithm that determines a random point in a sphere, and then pilots the drawing to this point, before choosing a new point to travel to. This movement is accompanied by squelches and pops, and these entities are intended to seem like lively creatures of some kind, with their own purpose in exploring the space; they are not merely artefacts for the participant to inspect. Each time the participant picks up a drawing or collides with one of these flying entities—or when these entities on their random paths collide with each other—the movement and swelling of both entities will grow a little stronger, warping both of their shapes more drastically (shown in Figure 9-7).

The collisions between entities are meant to feel like a collision with another person or being and is meant to bring the participant into a mutual relationship of influence, in a “relational network of queer kinship with and between people and systems, bodies and objects, one and another” (Barnett et al., 2016, p. 51). This is a manifestation of the values “The worldbuilding of VR should challenge subject-object hierarchies and create non-hierarchical, reciprocal mutual relations between entities” as well as “VR development should enable bodily intermingling and interdependent transformation”.

9.2.2.3 Freeing the Avatar

As the experience draws to a close, participants are asked by the guide figure if they would like to contribute their drawing to the ecosystem. If so, they can take hold of their avatar and release it into the world, watching it join in with the rest of the entities. This is where the strategy of having the avatar in shifting relation to the participant comes into play; participants are once more disembodied but have left something of themselves in the environment to live on.

9.2.3 Intended Participant Experience

This analysis of the final design outcome highlights how the conceptual framework and practice-based approaches of my queer methodology for VR have been used to design a queer VR experience. The next section of the chapter provides analysis of user testing results, providing insights into how the first collection of participants experienced the Body Traces Archive. This also allows for evaluation of the effectiveness of the methodology in generating a queer VR experience.

9.3 *User testing as a Design Research Method*

As part of general design research processes, user testing is a well-established method that allows a designer to discover unintended aspects of the design, problem-solve for interface use patterns and user experience, and refine their designs iteratively (Candy et al., 2006; Laurel, 2003; Muratovski, 2016). User testing to determine the affective and embodied impacts of Virtual Reality experiences is also well-established in Virtual Reality research (Slater et al., 2010; Thomas & Glowacki, 2018). In the context of the Body Traces Archive, user testing enabled me to test if the prototype successfully manifests the goals of the queer methodology for VR. User testing enabled assessment of the Body Traces Archive VR prototype by seeing if the observed experiences of participants aligned with what is defined as a queer VR experience by both the conceptual framework and practice-based approaches within the methodology.

While referring to this process as user testing, I am aware that other elements of standard design practices are also present within my implementation. Another common method in design research is peer critique (Sadokierski, 2020). Peer critique resembles user testing in that volunteers will use or examine a prototype or draft provided by a designer and provide feedback. However, during peer critiques, contributions from participants are not solely based on their experience as a hypothetical user, participant, audience member or consumer of a prototype; instead, in a peer critique context, participants also draw on their own extensive experience and expertise as fellow designers or creative practitioners to identify issues and potential solutions. There is an implicit understanding that everyone involved in a peer critique setting is on an equal footing.

Drawing on my own extensive experience with this additional feedback process, my user testing protocol allowed for participants to express their own expertise, experiences and suggestions. Participants were still “user testing” in the traditional sense of acting as hypothetical end-case users of the VR experience, but throughout the reflective interview section, certain participants with experience of VR or relevant creative practices were able to draw on their expertise and provide collaborative feedback. While participants in this user testing process have been de-identified as a privacy and safety measure, in design practice it is also unethical to fail to credit collaborators. It is important to note that participants are simultaneously de-identified participants in this user testing and co-creators and collaborators in the creation of the Body Traces Archive.

The goals with conducting these user testing sessions are grouped along two lines. First, basic usability and comprehension was tested, to establish if participants felt comfortable and equipped to undertake the basic activities required of them by the VR experience. This was important for the general refinement of the prototype, but is less relevant to the current discussion, which focuses on evaluating the effectiveness of the queer methodology for VR; therefore, my discussion of this more practical aspect is limited. Second, the experiential qualities of this VR prototype were documented, establishing what impact it has for a participant in an affective, embodied and intellectual sense. This latter set of concerns is downstream of the former; without basic usability, it is much more difficult to evaluate the efficacy of the queer methodology used throughout the prototyping process.

9.3.1 Participants & Interview Structure

For my own user testing protocol, I carried out a series of one-on-one, approximately one-hour semi-structured interviews, with questions to establish the participant's familiarity with VR, then a section where they use the VR experience prototype while being asked to commentate, and then a concluding interview segment where they are asked how the experience made them feel and how they would describe the experience of using their body in VR. The user testing process involved 14 participants who created body traces that now live in the Archive. Ten of these participants also participated in the longform semi-structured interviews.

Fourteen total participants drawn from my acquaintanceship circle participated in the Body Traces Archive VR experience user testing process. Two participants were unable to participate in full-length interviews and contributed only their drawing.

Two participants who participated after the designated time period for user testing were able to do full-length interviews, but due to the timing cut-off, their interview material was excluded from this round of analysis; the data gathered from their participation and interviews can be analysed in full alongside the existing set of interviews in later publications. Therefore, in total there are fourteen drawings in the current iteration of the Body Traces Archive, while there are ten full-length interviews that are analysed in the course of these user testing results.

Participants included friends, colleagues working in digital media or new media art, and creative practitioners in performance such as dance. Not all participants are necessarily queer and no one was asked specifically to

describe their sexuality or other demographic information, but during the course of answering questions and describing their experiences certain participants did link their insights to their experiences of gender and sexuality. My approach of using a small research group primarily of peers, friends and fellow designers or creatives in the field of new media is informed by the work of researchers such as Dylan Paré, who has used small workshops of peers to experiment with queer design methods and VR, as seen in the article “Queering Virtual Reality: A Prolegomenon” (Paré et al., 2019). Rather than positioning myself as an external, objective researcher collecting data from participants, I instead allowed for the interview to have moments of dialogue and exchange depending on the participant. All of the participants had awareness of my project or my own ongoing creative practice and research interests to varying degrees, and some are sources of larger and deeper friendship outside of a work context. Rather than trying and failing to hold this familiarity at bay, our existing relationships were a source of trust that enabled participants to engage in a new and unfamiliar process such as VR and offer their feedback.

9.4 *User Testing Findings*

The observed drawing process and interviews revealed that the drawing experience successfully creates a slimy, intimate experience where participants reflect upon their layered presence within both the physical world and the virtual environment. Evaluating the affective experience of both the first stage of drawing, and the second stage where participants meet the drawings of previous participants, revealed that the contact with other drawings is particularly effective at creating experiences of intermingling, boundary-crossing and connection, all of which contribute to the success of the experience as a queer iteration of VR. User testing also enabled me to determine more explicitly what role I myself play as the creator of the experience and as narrator of the guide figure within the virtual environment.

The user testing process also revealed novel insights into how participants understand their own embodiment in VR. While the ultimate goal of the Body Traces Archive prototype and user testing is to create a queer VR experience and evaluate its effectiveness, the novel insights gained into how participants consider themselves to “start” in VR at different points of their body suggests that the drawing process contained in the Body Traces Archive could be utilised for further research into the nuances of how audiences and participants in VR understand their own embodiment.

The ensuing sections of this chapter provide an abridged summary of the findings from user testing. More complete excerpts from interview transcripts and comprehensive analysis of the findings summarised here can be found in Appendix C: C.1 Extended User Testing Results.

9.4.1 Layered Realities, Drawing Activity, Sense of Self, Virtual Sociality and Affective Responses

First, the layered nature of Virtual Reality and the physical environment was a significant theme of note for participants. This aligned with the property identified in the methodology, that “VR is layered on top of physical space”. Participants also commented on the aesthetic regime of the Virtual Environment, describing the experience with words like:

“Squelchiness” (DailyUnify), “gloobily”, “goopiness”, “writhing” (xXs11m3rXx), “blobby” (Pink Thorn), “squelchy”, “pulsating”, “candy-like”, (Chibi), “blobby, globby, shimmery” (The Gardener), “grotesque and exposed” (Bleep Bloop), “viscera” (SecretElevator).

These descriptions demonstrate the success of creating digital slime in the Body Traces Archive.

Second, the drawing activity in which participants were instructed to start their drawing at their main “contact point” with the virtual environment revealed novel insight regarding participants’ sense of their own embodiment: out of the ten long-form interview participants, four started drawing at their hands, two started their drawing at their head, one started at their feet, and three started at a location in their torso: their heart, their chest, and their stomach. These different starting locations (and participants’ differing drawing styles) offered insights for the third theme, participants’ sense of self.

The third theme, participants’ sense of self, showed that participants had differing ways of understanding their virtual embodiment. Some participants felt disembodied yet present before beginning the drawing process, and viewed the drawing process as a way to “inject” themselves into the environment. This reaffirmed the identified property of VR, that “performativity continues in VR”.

Fourth, participants’ experience of the social, interactive aspects of the archive component of the Body Traces Archive demonstrated that the contact between

participants and archival drawings successfully created experiences of slippage, fluidity, ambiguity and intermingling (all identified as qualities of queer VR) via the digital sliminess noted in the first theme. Participants described the other archival drawings as alive entities, and had a range of emotional responses to the collisions between themselves and others. This showed the effectiveness of the development approach to generating liveliness in the archive portion.

Fifth, the range of affective responses throughout both the drawing and archival portion of the Body Traces Archive showed the importance of complex, ambiguous emotions as part of the immersion and boundary-blurring between participant, virtual environment, and virtual entities. In crafting a visual aesthetic centred on slime, I was particularly concerned with how people felt within the environment. I did not want people to be scared or truly disgusted, but my queer methodology has a priority in seeing affective experiences as fruitful even when they are what we generally understand to be negative feelings. Feelings of ambiguity, shame, weirdness, out-of-placeness—all of these resonate with a queer experience and with a realignment away from the normative, as discussed by both Ahmed (2006) and Kosofsky Sedgwick (2003). Participants' reactions of joy, confusion, aversion, excitement, surprise and trepidation, and how this informed their experience of the Body Traces Archive, reaffirmed the identified premise of queerness, that "Affect is a relational process, and affect is a crucial part of the phenomenological experience of queerness that influences how we are oriented", and furthermore, showed the success of the experience in achieving the value "Normative affective regimes should be questioned and critiqued; affective regimes should be encouraged". The affective experiences generated for participants in both the drawing and archive sections of the VR experience contribute to an overall phenomenological experience that re-oriens participants towards openness and connection with other entities in queer forms of digital interrelation.

The user testing process successfully provided insight into how this VR experience works to create meaning with a participant, showing that the queer methodology for VR is successful in creating queer VR experiences, as well as guiding development of VR along queer lines. It provided affirmation that this VR experience creates a novel experience of self and embodiment with the identified qualities of queer VR. It showed that the use of strategies of craft identified in the methodology are effective in leveraging the identified properties of VR to create a queer VR experience.

The aesthetic approach of a non-realistic, abstract space informed by cyberfeminist emphasis on slime was highly successful in creating a nuanced experience of visceral, bodily involvement in the digital world. Many participants

noted that overall, the experience had shown a different perspective to dominant VR paradigms (commercial, game oriented, narrative-oriented), showing the effectiveness of both the conceptual framework in directing novel development and the practice-based approaches in implementing this novel conceptual grounding.

9.4.2 Drawing and Conversation as Part of a Queer Methodology

The conversation before, during and after the VR experience enabled the development and extraction of insights for both participants and myself as researcher. However, it is crucial to note that the conversation and drawing task asked of participants are interrelated, and that the novel insights generated regarding both embodiment in VR and embodiment more generally are shaped by the activity asked of participants.

The generative activity of drawing upon the body proved to elicit nuanced and reflective reconsiderations of embodiment for participants. While this is most useful in evaluating the success of the VR experience in manifesting the goals of the queer methodology for VR, it also demonstrates that drawing in VR could be a more flexible and widely applicable method to accompany interviews as a research method. Bringing artefacts into participatory workshops or interviews is recognised within design research as having the capacity to “trigger” creative thinking and insightful reflection (Akama et al., 2007). For example, in their article “Show and Tell: Accessing and Communicating Implicit Knowledge Through Artefacts”, Akama et al. use “Playful Triggers” as part of an interview method, and participants brought objects to workshops in order to brainstorm and illustrate their answers to various questions. While the artefacts in question were physical, like nuts, bolts, small figurines, matchsticks and so on, the addition of a *doing* activity, above and beyond speaking out loud, proved to generate novel insights. While a Virtual Reality experience is not quite an *artefact* in a traditional sense, my claim is that the generative activity of drawing upon the body in VR led to playful, reflective engagement with questions of selfhood and embodiment both regarding this specific VR experience and more broadly. Therefore, this particular research method of semi-structured interviews surrounding, and concurrent to, a drawing VR experience, could potentially be applied in other areas of research interest in the field of VR design.

9.4.3 Taking on a Caretaker Role as a Researcher

During the interview process, and as part of the off-boarding, it became important to show people the drawing data that I had recorded. This data exists in the form of a JSON file, as a series of XYZ coordinates with some minor other variables also recorded. When opening the file, it is a very, very long text document, as shown in Figure 9-8.

Showing this to participants had several purposes. Primarily, I wanted to make it clear to them exactly what I had recorded to save their drawing and reload it later, as the other recording forms—video and audio—had been clearly explained and were easier for participants to understand. Showing participants their data was a way to fulfil the expectations of ethical research with participants, ensuring them of the safety of their data and the full comprehension of what exactly they had given me. Showing these files often prompted thoughtful discussions regarding anonymisation and data ownership.

Participants described a strong sense of this form of data record being a process of anonymisation, saying, “I feel...de-identified in a really interesting way” (DailyUnify) and “it takes anonymisation to a new level” (Starla). Users were fully aware that the data displayed would be reconstituted into new drawing forms that they had created, but seeing the bare structure of it gave them a sense of anonymity as well as a greater understanding of the operating logics of the world they had just inhabited. One user described it as, “the impression of my impression of me in the virtual space” (Chibi).

This newly integrated stage of the testing process became a part of the general strategy to disrupt norms around the secrecy of data and a way to affirm the value of prioritising participants’ knowledge and agency regarding their own data. This value from the methodology does not “finish” with the completion of the design of the experience, as I continue to hold their data long after they have completed their participation. I have responsibilities established by academic ethics protocols, but also responsibilities particular to a creative and queer position as the creator of the Body Traces Archive. Explicitly identifying my role as that of a “caretaker” acknowledges my own role in the social world I have enabled via the development in Body Traces Archive, and emphasises my responsibility to respect the offerings of participants and cultivate a queerly aligned, positive sociality as the Archive continues to accumulate.

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"z": 0.156865716,
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  "y": 0.9317268,
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,
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Figure 9-8

Participant drawing data example

Note. This data was a test drawing generated by the researcher.

9.4.4 What Makes Queer VR?

The development of the Body Traces Archive aimed to manifest the findings of literature-based research into the contextual history of embodiment in VR, queer theory and cyberfeminism, as well as the findings of practice-based experiments that explored different methods for queerly developing Virtual Reality. This led to the development of a queer methodology for VR, consisting of a conceptual framework and set of practice-based approaches for generating queer VR. This was then refined and iterated upon during the process of developing the Body Traces Archive.

Taking the goals, premises of queerness and values of queer VR development as the starting point—along with the originating body tracing activity outlined in the experiment Body Traces Mark One—the Body Traces Archive creates an experience that participants describe as creating a sense of bodily dislocation and re-alignment, intermingling and malleability.

The development of this experience—both conceptually and technically—is grounded in a queer position. However, do participants interpret the range of qualities, affects and interactions they experience as queer?

While I intended all stages of the experience to be understood as queer, most participants felt that the second portion of the experience, the archive section, was inflected with qualities of disrupted norms and bodily intermingling (which is defined as queer qualities in my methodology). The two-part structure and nature of the activities resulted in a two-staged familiarisation and then defamiliarising process: the first activity, where people draw themselves, acts as the introduction that establishes the norms of the space for a participant. This activity is strongly based on the premises of queerness—particularly the understanding that queerness is a performative, phenomenological experience, in which selfhood and identity is a continually re-inscribed process of embodiment enabled and shaped by what is around you. In the VR experience, though, this queerly logicked experience is understood to be the norm, and then the experience is “queered” or dislocated from this norm by the arrival of other drawings in the space: suddenly people’s sense of bodily boundary and only recently established stability of self is thrown into question. Asynchronously present, the bodily traces of other participants are thrown into a kind of glitch-ful interrelation that emerges uniquely for each participant as a momentary utopia, liminal and quick to disappear once the headset is removed.

Whether or not the entirety of the Body Traces Archive is experienced as queer by participants or identified explicitly by participants with the term “queer” is a relevant question, but not the only question. There are other ways that

participants may choose to understand this series of interactions and affective experiences. However, the conceptual framework component of my queer methodology enables evaluation of this experience according to the specified goals, premises, and values. Based on the findings from user testing as outlined above, the experience successfully implements the premises of queerness: queerness is on the horizon of “then and there” as a kind of potentiality; queerness is a performative, phenomenological experience; and affect is a relational process that is crucial to this phenomenological experience of queerness. The experience also successfully implements the values of queer VR development: a critical view of data surveillance; challenging subject-object hierarchies; non-hierarchical and mutual relations; staying with the meat; bodily intermingling; and interdependent transformation. These have been manifested and implemented throughout the various strategies of craft that take advantage of the properties of VR identified by the practice-based approaches within the methodology.

Rather than focusing on whether participants would use the word “queer” to describe Body Traces Archive, a more useful approach is to consider whether participants emerge from the VR experience and describe it along the lines of the goals for queer VR identified in the queer methodology for VR. The goals of my methodology are to: create experiences of critical hope and futurity; to critique, subvert, destabilise, resist and oppose regimes of normativity, especially regarding gender and sexuality; to disrupt normative, heterosexualising bodily orientations; to enable queerer forms of digital relationality and sociality; and to create VR experiences that present an alternative to the concept of VR as a space of transcendence away from the body or as a mimetic reproduction of our physical forms. I am not trying to argue that the Body Traces Archive perfectly fulfils these goals, and that the task is finished. These are large, complex tasks that are knottily imbricated with much wider dynamics throughout society and the norms of Virtual Reality development, and it is unlikely to be fully possible to achieve these with one singular VR experience. However, participants have identified Body Traces Archive as a unique, novel experience of being in another place that enables joyfulness, in a way that we could call hopeful. Normative regimes of VR have been critiqued and upended. Participants clearly identify the disruption and re-alignment of bodily orientations throughout the experience. Participants clearly identify instances of intermingling and contact with other entities as a kind of sociality that registers as queer in its transgressive, affective impacts. And ultimately, participants clearly elucidated a much more complex, nuanced embodied experience that was both expansive and explorative, yet intimately tied to the body.

9.5 *The Archive as an Ongoing Process*

Close examination of the Body Traces Archive participant experience and findings from user testing reveals that a queer methodological approach to VR creates novel experiences for participants that expand and re-orient their sense of embodiment. The previous chapter showed that applying the queer methodology for VR when working *Unity* game engine reveals *Unity*'s compatibilities and frictions with a queer way of working. This chapter shows that the queer methodology for VR also successfully creates an VR experience for participants that can be understood as queer. The queer methodology for VR, with its conceptual framework and practice-based approaches, is therefore effective both in the “back-end” realm of development and in the “front-end” environment of participant and user experience.

The Body Traces Archive was designed to be sedimentary in nature, as a virtual location that enabled the bringing together of community via asynchronous, slimy interrelation. Before the introduction of participants, it was only a set of potentials, a space that was empty but waiting for the arrival of visitors. Introducing participants put these potentials into action, beginning the life of the Body Traces Archive—which continues on.

Chapter Ten:

Conclusion

10.1 *Research Outcomes in Context*

VR has occupied a unique cultural position as both an interactive medium and as a cultural instantiation of posthumanist fears and hopes for our relationship with digital technologies. In its early days, VR development was—and still is—funded by military ventures, and posthumanist, cyberpunk envisionings of how we might engage with VR showed a preoccupation with achieving disembodied transcendence. VR is back in the mainstream consciousness in a contemporary context thanks to significant investment and promotion driven by Silicon Valley corporations such as Meta and Apple, who, in contrast to the earlier iterations of VR, bring a top-down approach to defining a regime of realistic or mimetic reproduction of real-world identity and embodiment. From its nascent origins as a medium to its current iteration, there has been a strong interest in the process of embodiment in VR, showing it to be a foundational, crucial aspect of how VR works to create meaning. However, from a queer perspective, this binary split between total abandonment of the body and total loyalty to visual reproduction is viewed as a problematic failure to grasp the complex potential of the medium of Virtual Reality. Instead, a queer position sees this binary as a source of productive tension, in which embodiment in VR can remain with the body but change the experience of it, opening up opportunities for expansive, alternative, queer experiences within the bodily and technological intertwinement at the heart of embodiment in VR.

This Research through Design project therefore has generated specific and rigorous insights regarding the experience of embodiment in VR via a queer approach. It has enabled the development of alternative and diverse ways of working with embodiment in VR, as demonstrated by the final prototype, the Body Traces Archive. The overall goals of this RtD project were to:

- Explore and expand the application of queer theory to VR.
- Develop a queer methodology for developing VR, with potential applications across broader design engagements with new media and digital technologies.
- Create an artefact that embodies and demonstrates this queer methodology, providing a virtual space that materialises alternative modes of embodiment.

Both this thesis and the Body Traces Archive VR experience satisfy these goals. The queer methodology for VR stands as a major novel contribution that distils the wide range of findings and analysis I have presented throughout

this thesis, while the Body Traces Archive is an artefact that demonstrates the effectiveness of this methodology and one potential kind of queer embodiment for VR.

10.2 *Overview of Research*

This thesis has examined the history of VR in order to locate both the ways in which embodiment in VR has been understood and how certain practitioners have worked against dominant embodiment norms within the medium. While artistic experimentation throughout the medium's history shows compelling reworkings of embodiment, these alternative approaches are partial and scattered across different artistic or subcultural communities. I am certainly not claiming that this work is the first instance of queer VR. Instead, what is significant about this research is that it collects and synthesises the numerous moments of queerness that orbit, occupy and reshape digital technologies such as VR, and surfaces this varied constellation as a solid and rigorous methodology and example prototype VR experience.

This research used a Research through Design process in which literature-based and practice-based research are interwoven to produce novel theoretical and practical insights. The process has been guided by two key research questions:

Question One: “How might a queer critique of the history of VR locate strategies for queer embodiment in VR?”

This enabled and directed engagement with the history and contemporary landscape of VR. This contextual grounding identified that embodiment in VR within mainstream conceptions—both across historical understandings and contemporary industry norms—either takes the form of disembodied abandonment of the physical form or attempted mimetic reproduction, both approaches that demonstrate problematic normative drives of heterosexualisation and masculine epistemologies. Part of this historical appraisal also included a review of relevant precedents, with the identification of VR and related new media works that disrupt the binary of disembodied ascension/mimetic reproduction.

This research question also guided the development of a queer lens for working critically with VR. The identified foundational concepts of queer theory—critique of normativity, gender performativity, and queer affects—situated a queer approach to digital media broadly and VR specifically. Close examination

of two key queer theory texts, *Cruising Utopia* (Esteban Muñoz, 2019) and *Queer Phenomenology* (Ahmed, 2006), established two additional core concepts of critical utopianism and queer phenomenology. These conceptual tools—anti-normativity, performativity, queer affects, critical utopianism and queer phenomenology—are the basis for the conceptual framework component of the methodology for VR.

Examining cyberfeminism and cyberfeminist artistic practice provided strident critique of the ideal of disembodiment in VR, and provided specific practice-based strategies for engaging with digital technologies with embodiment at the fore. By synthesising cyberfeminist positions and methods with a queer approach, I argued that while cyberfeminism was not directly labelled as “queer” at the time of its original rise in the 1990s, in retrospect we can see political, methodological and practice-based alignments between queer and cyberfeminist approaches to the potent meeting ground of identity, body and digital technology. Bringing these two aligned understandings into conversation was therefore crucial for the project of queer VR.

This positioning work of developing a critical framework then enabled my research to move towards the second question:

Question Two: “How might a queer approach provide new ways of understanding—and working with— embodied experiences in VR?”

This question guided practice-based experimentation, the development of a final practice-based outcome (the Body Traces Archive VR experience) and the development of the queer methodology for VR, which synthesised and condensed the extensive argumentation and findings from the contextual review of VR, overview of queer theory and its applications to digital technology, and the history of cyberfeminism into a more broadly applicable, repeatable, flexible methodology that other practitioners can use to develop queer VR.

The Body Traces Archive prototype stands as a demonstration of this methodology, providing a queer experience of embodiment in VR that exists as its own argument for different ways of doing for, and being in, VR.

My RtD inquiry has applied queer theory to the task of designing VR. As a result, this research has provided essential theory-practice integration that is needed in the field of VR design and development. Queer theory, as well as deployments of queer theory in creative and research engagements with digital new media, provided methodological examples as well as historical and contemporary background for such an integration. Cyberfeminism provided a crucial understanding of the mutually productive relationship between gender

and technology, and demonstrated valuable methods for integrating theory and creative practice. The development of my queer methodology for VR followed these examples. In developing the queer methodology for VR, I built upon and furthered the contemporary work in queer technology studies and queer video games studies from a designerly perspective, while acknowledging that there is still much other essential theory-practice integration needed for VR, such as the involvement of disability studies, crip studies, critical race theory, and other facets of social theory.

10.3 Integrating a Queer Position with Design Research

Using a design lens to interrogate VR has provided opportunities to consolidate critical commentary and scholarship, and this has led to the development of new ways of working with the medium. Queer theory offered particular inclusive, expansive and disruptive strategies and modes of critique for understanding how Virtual Reality works. A Research through Design (RtD) approach allowed for iterative and critical development of practice-based approaches to enacting these queer foundations, leading in this case to the development of a novel queer methodology for developing VR. Research through Design (RtD) provided opportunities to test, prototype, and materialise queer theory in practice, directly challenging heteronormative structures while also creating new queer experiences within VR. An outcome of the RtD process was the development of a novel queer methodology for VR, along with the creation of a unique artefact, the Body Traces Archive VR prototype, which embodies and demonstrates one potential outcome of this methodology.

As discussed further below, this project makes two significant contributions: it extends queer theory into the field of VR, and demonstrates novel queer design research methods.

10.4 *Novel Contribution: a Queer Methodology for VR*

By integrating the conceptual grounding of a queer position with the interactive and embodied possibilities of VR, I have developed a methodology that enables the design of Virtual Reality experiences that challenge the existing set of norms around bodily representation and embodied experience in VR.

The queer methodology for VR that I presented in Chapter Eight enables designers and developers to create experiences of queer embodiment and open up horizons of alternate possibilities. The norms of Virtual Reality—its stakes, its scope, its conceptual focuses and the unique forms it can take and for what purposes—are still in flux, and it is my goal that this methodology can enable wider possibilities for crafting interaction in VR. At the heart of the methodology is a pre-occupation and focus on the embodied interaction that Virtual Reality enables. While the methodology is concerned with worldbuilding and immersion more broadly, the fundamental concern of this methodology is the creation of other ways of being embodied in Virtual Reality that neither escapes the body nor acts like the body is a stable, discrete, unchanging entity that must be reproduced faithfully in a normative manner in Virtual Reality. Anchored by the cyberfeminist critique of mind-body dualism in relation to digital technologies and the ensuing valuing of embodied knowledge, in combination with queer understandings of performativity and phenomenology, this methodology presents a queer, cyberfeminist praxis for designing embodied experiences in VR that stay with the meat as much as they enable modification and change of this meaty, bodily self in its technological imbrications.

My work further enriches the queer and cyberfeminist theoretical positions towards digital technologies shown in Chapters Three, Four and Five by developing a design-specific methodology for VR that uses crafting, experimentation and prototyping as knowledge generation for VR practitioners. My work brings together crucial theoretical perspectives on VR and consolidates this varied scholarship and experimentation into a two part methodology that consists of a conceptual framework of goals for queer VR development, premises of queerness and values for queer VR, and a set of practice-based approaches that define qualities of VR, strategies of craft, and qualities of queer VR.

Queer Phenomenology (Ahmed, 2006) is one of the key texts that informed the queer methodology for VR. In *Queer Phenomenology* (2006), Ahmed states that “a queer phenomenology, perhaps, might start by redirecting our attention toward different objects, those that are ‘less proximate’ or even those that deviate or are deviant” (Ahmed, 2006, p. 3). The methodology developed in the course of this research provides a way for designers and developers of VR to orient themselves queerly towards the task of designing VR, paying attention to different goals, premises and values than the industry norms. This in turn allows the development of experiences that also orient participants towards “less proximate” or deviating modes of embodiment in VR.

This methodology contributes to the field of design scholarship by integrating much needed critical voices of queer and cyberfeminist theory with existing RtD approaches. It also builds on existing applications of queer theory to questions of digital media using a designerly lens, manifesting findings in an easily shareable and applicable methodology that is most valuable and relevant to practitioners working with VR or similar immersive media. It also offers a starting point and model for other practitioners and researchers who wish to develop a queer position in design, whether for VR or for other media. As a flexible, modular methodology, it can either be primarily used in order to guide practice-based design and production, or act as a generative grounding for the development of new methodologies.

10.5 Novel Contribution: Body Traces Archive Prototype as a Queer VR Experience

The Body Traces Archive offers an alternative model of Virtual Reality, presenting a space of otherness where queer embodiment can unfold. The prototype suggests alternative ways of understanding what we can and should feel as part of the embodiment process in VR via its valuing of strange and gloopy affective qualities. It also offers a model of asynchronous sociality as neither a truly single-user VR experience, nor simultaneous multi-player experience. Instead, Body Traces Archive brings people together across time and space, with participants interacting with re-animated traces of past visitors.

The Body Traces Archive offers participants an experience of queerly inflected embodiment, an opening into a different way of understanding

digital technologies and themselves. It offers an experiential interpretation of principles and goals of queer theory and provides an access point into both a different place and a different way of thinking. The queer methodology for VR has produced an outcome that is successfully at odds with mainstream visual and interactive regimes in VR, generating novel and highly affective experiences for early participants as part of user testing.

The Body Traces Archive shows that deploying the queer methodology for VR brings critical attention to the threshold moment where a participant becomes embodied in VR. In many VR experiences, this is a moment “outside” of the purpose of the experience, or elided completely. In contrast, the Body Traces Archive shows that the crossing of thresholds between physical and virtual, at the interface point where person becomes participant, is vital for a queer methodology to pay attention to. Here at this invisible boundary the intimate press of the controller against skin can produce queer embodiments for Virtual Reality. The slimy, gloopy aesthetics of the Body Traces Archive are crucial to this queer embodiment, with slime operating as a touchy, touchful substance that troubles boundaries between liquid and solid and subject and object. The application of the queer methodology for VR via the strategies of craft and queer qualities of VR have led to the prioritisation of slime as a sensorial aspect of queer VR. The Body Traces Archive VR prototype offers these particular aesthetic and interactive strategies that fellow practitioners can further extend and explore. However, these are not a prescriptive examples; how others choose to manifest the methodology may result in the discovery of the affective potential of other substances and textures for queer VR.

For practitioners, Body Traces Archive acts as an example outcome that is made possible by working with a queer methodology for VR. It demonstrates how applying design research methods such as practice-based experimentation can enable the consolidation of a wide range of scholarly knowledge, creative practice and theoretical approaches across interrelated communities of queer theory, social theory, creative practice, video games and VR development. Most importantly, it demonstrates how this consolidated range of scholarly knowledge can be animated and manifested into a designed artefact.

I use the word prototype to describe the Body Traces Archive for a number of reasons. The word prototype communicates a degree of incompleteness. As it stands currently, the Body Traces Archive could be designated as a completed experiment, with extensive documentation to keep a record of it into the future. If it were to be shown publicly in exhibition contexts, the Body Traces Archive would need another round of development, and for this reason the word prototype is more appropriate.

However, on a less practical note, the term prototype also has a conceptual valence that is important to the project. The Body Traces Archive was developed using a queer perspective, and a queer perspective that while drawing on extensive scholarship, is substantially the work of one individual. For this reason, there is significant potential for future development and expansion of both the methodology and the Body Traces Archive prototype via the input of others. For this reason, the term prototype applies because both the project overall and the Body Traces Archive itself have open ended futures. The Body Traces Archive offers an alternative, queerer way of doing VR development and being embodied in VR, but it does not claim that to have completed the task of bringing queerness into the medium. A prototype is part of an iterative process, created in order to be improved upon. Therefore, calling the Body Traces Archive a prototype is also a promise and hope for ongoing making of different kinds of VR, as a prototype for a different kind of future for VR, as a gesture to the not-quite-here and as an envisioning of queer potential that we can continue to work towards.

10.6 *Novel Contribution: Further Findings*

This research has produced additional findings alongside the two most significant contributions of a queer methodology for VR and the Body Traces Archive prototype. Both the development process of the Body Traces Archive and the user testing with the Body Traces Archive have produced findings and insights regarding developing queer VR and the nature of embodiment in Virtual Reality experiences.

The various frictions and opportunities that arose throughout the Body Traces Archive development process reveals how the particularities of *Unity* and other similar programs can limit, guide, shape and inform the work that designers and developers do when creating VR experiences. The values that are implicit in the functionality of *Unity* game engine can be at odds with a queer methodology for VR, which is essential to keep in mind both for future development of queer VR in Unity, and for any applications of a queer methodology through other related digital media.

Most crucially, the development process showed that a queer methodology for VR is not only concerned with the final interactive experience that a participant enters, but is also highly critical of the development process and infrastructural choices made that enable the VR experience to exist. The rules that govern

the existence of the virtual world matter to the goals, premises and values of the conceptual framework that govern the queer methodology for VR, and the behind-the-scenes format that bodily data and interactions take is crucial to the meaning of a final work. The operating logics that govern a virtual world, whether they are known by a participant or not, are a crucial part of the worldbuilding that determines whether the goal of creating experiences of hope and futurity can be achieved and in what manner: only by creating underlying structures that challenge the norm can we create something that is other than what already is; only by working towards something else, even when the process is full of friction, can the potential of critical queer utopias in VR be opened up.

The user testing process of the Body Traces Archive primarily served to elucidate the impacts and effects the Body Traces Archive has for a participant, focusing on evaluating the effectiveness of the queer methodology for VR. However, in addition to this, the process also revealed insights into the general nature of embodiment in VR, with participants sharing a variety of different conceptualisations that they used to describe their own presence in Virtual Reality. This suggests that the drawing process developed via the queer methodology for VR may be able to be applied further in order to more specifically examine different ways that participants understand their own embodiment, both inside of VR and outside of it.

10.7 Potential Directions for Future Research

10.7.1 Further Development of the Body Traces Archive Prototype

When thinking about the future prospects of this project and research, there are a number of avenues that would allow for expansion and further development. Ideally, the prototype would be further developed with the assistance of a programmer or game developer in order to be ready for wider deployment, potentially in an art installation context. This would allow for further research regarding how participants experience the Body Traces Archive, including both the drawing process and interactions with other drawings. Installation in an exhibition context would also evince findings regarding the

different impacts that physical world contexts have for the affective impacts of the experience for an audience, depending on the design of the installation space.

The Body Traces Archive could be developed further in an art and design context, or could be implemented in more applied fields such as education or medical and/or therapeutic interventions. In terms of education, the Body Traces Archive could be used in design and development contexts to provide practical demonstration of the outcomes of design research processes, as well as the value of queer positions in design research for digital media such as VR. It also could function as a viable introduction to VR for students unfamiliar with immersive new media technologies. In a medical or therapeutic context, the Body Traces Archive could be developed to act as a tool for reflection and gathering of participant testimony. In medical or therapeutic research contexts with a focus on shifting experiences of embodiment, can drawing the body in VR prove to be a qualitative method for interviews? Along these lines, there is significant opportunity for further research into the effects of the drawing activity in the Body Traces Archive, with more in-depth examination of how people draw with traditional tools such as pencil and paper, and how this compares to drawing processes in VR or other forms of bodily imaging (such as medical imaging with X-Ray and MRI machines).

10.7.2 Further Application of the Queer Methodology for VR

One significant aspect of the Body Traces Archive is its “lobby”-like qualities, with sparse and minimalist environment design that relies on participant contributions to come alive. One potential way to further apply the queer methodology for VR would be to instead start the development process with a significant archival or historical corpus of non-VR queer material, and then consider how this material can be recreated or introduced into VR contexts, with novel worldbuilding, embodiment and interaction enabling participants to engage with the material in a way that would be otherwise impossible. Another approach would be to consider how this methodology could be applied to other media in the “mixed reality” spectrum, such as augmented reality, and how the qualities of these related but different media causes a different deployment or manifestation of the methodology.

Considering this project has been developed, undertaken and completed primarily as a solo endeavour, it would be highly valuable to consider how collaboration could fit amongst a queer design methodology for VR, and how

the negotiation of allied, competing, compatible, contradictory personalities, methodologies, expertise and research agendas could enrich and further the development of a queer way of working with VR. This could take the form of direct collaboration with other developers, designers or researchers, especially experts in allied fields of social theory that are as yet unincorporated into this methodology; for example, experts in disability studies or advocacy, and race theory and anti-racist advocacy would provide crucial guidance on how the methodology could be further developed in order to provide a more intersectional grounding for development of VR. My goal with post-doctoral studies is to expand upon the queer methodology for VR and bring it into critical conversation with race- or disability-oriented frameworks regarding VR. One avenue for this is via collaboration, such as through a participatory co-design project in which participants are recruited early in the design process in order to lead the ideation and development of a new VR experience according to their lived experiences and expertise. Other forms of collaboration such as via a shared research project, would also provide great opportunity for the ongoing application and enrichment of the queer methodology for VR.

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Appendices

Appendix A: Body Traces Archive Documentation Folio

A.1 Introduction

This portfolio provides videos and still images as documentation of the Body Traces Archive VR experience. This portfolio also presents participants' contributions in the form of a video and still image records of their individual bodily traces.

Appendix B contains additional documentation of the development process of both the preliminary experiments and the Body Traces Archive.

As videos cannot be embedded in PDFs with ease, these video listings link to unlisted YouTube uploads. Please do not share these links without permission of the researcher.

A.2 Body Traces Archive Video and Stills Documentation

A.2.1 Body Traces Archive Full Length Documentation Video

(9 minutes 51 seconds, includes audio)

[LINK](#)

A full length capture of the Body Traces Archive VR experience. Footage from both first person perspective and external perspective was captured simultaneously. The footage features the researcher acting as a participant, in order to demonstrate the participant experience of the Body Traces Archive. Audio narration was written, recorded and integrated into the virtual environment by the researcher. This, along with the gloopy sound effects (also recorded by the researcher), are what a participant hears while immersed in the experience.

A.2.2 Body Traces Archive Documentation Stills & Narration

While these stills of the Body Traces Archive VR experience (Figure A-1 to Figure A-18) are available throughout the thesis, they are collected here for ease of review and as a summary of the participant's experience. Still images are accompanied by transcription of the narration contained in the Body Traces Archive.

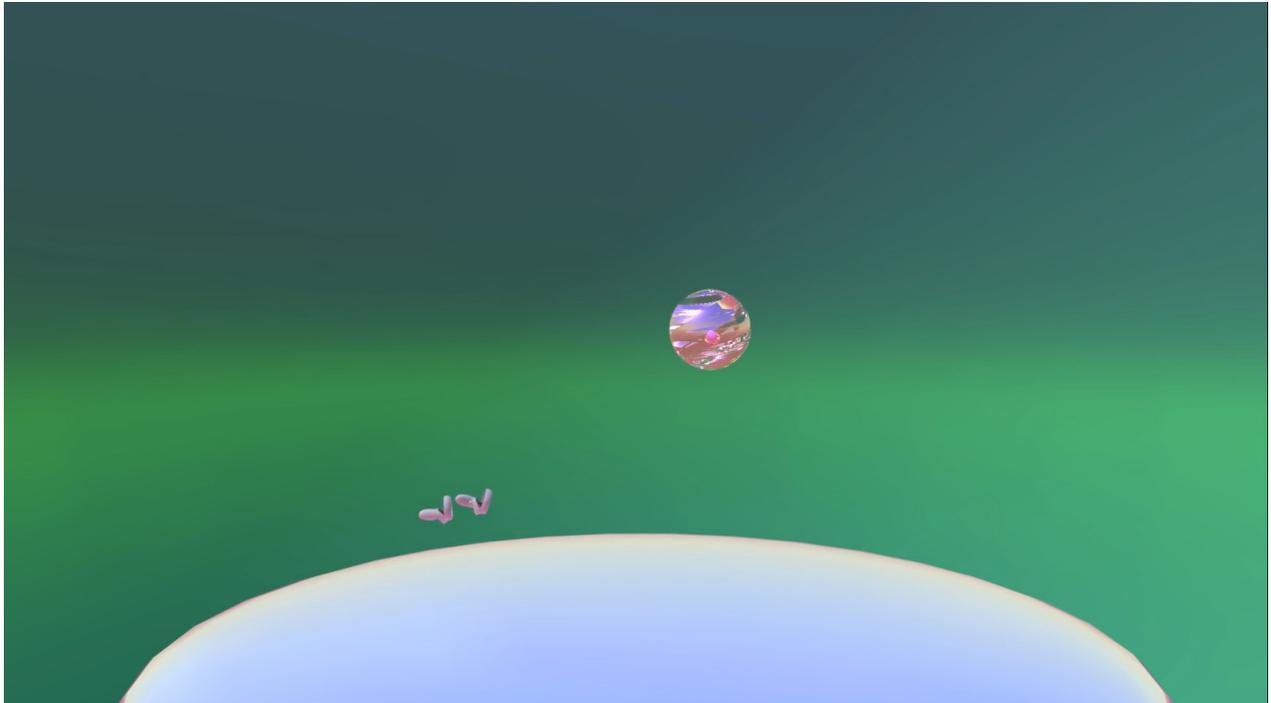


Figure A-1

Environment design of Body Traces Archive

Note. Beginning of the experience. Participant is disembodied, with only their controllers visually represented.



Figure A-2

First person view of the start of the Body Traces Archive

Note. When the participant is ready, the researcher initiates the experience and the guide figure shown arrives. The guide figure provides narration.

Narration:

Welcome to virtual reality. I'm your guide for this visit. What we're going to do today is create a digital skin that will layer on top of and amongst your physical skin. While there are buttons under your thumb and on the controller, the main button for you is a trigger under your pointer finger. This controller will be how you interact with the world.

If you reach forward and touch the bubble in front of you, it will pop.

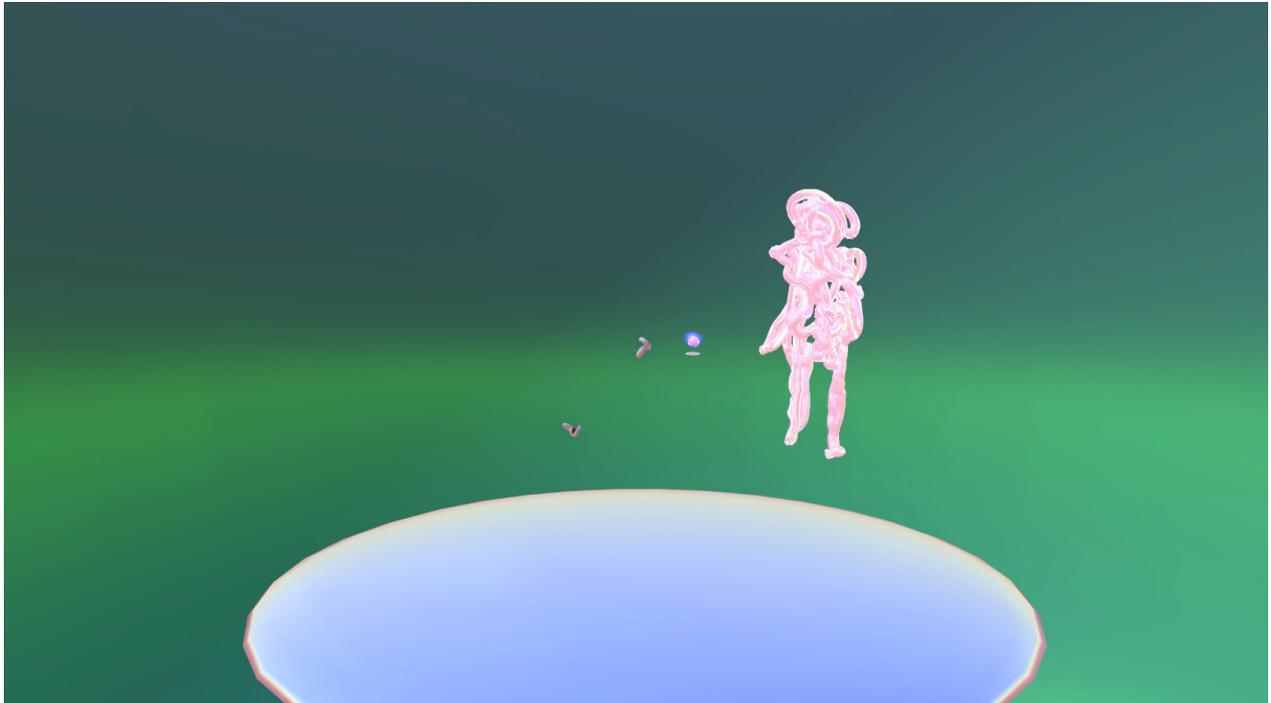


Figure A-3

External view of participant popping bubble

Note. Still captured from external camera within Virtual Reality. The participant has touched the bubble and popped it.

Narration:

Now, if you touch your controller to the blob in front of you, it will stick to your controller.

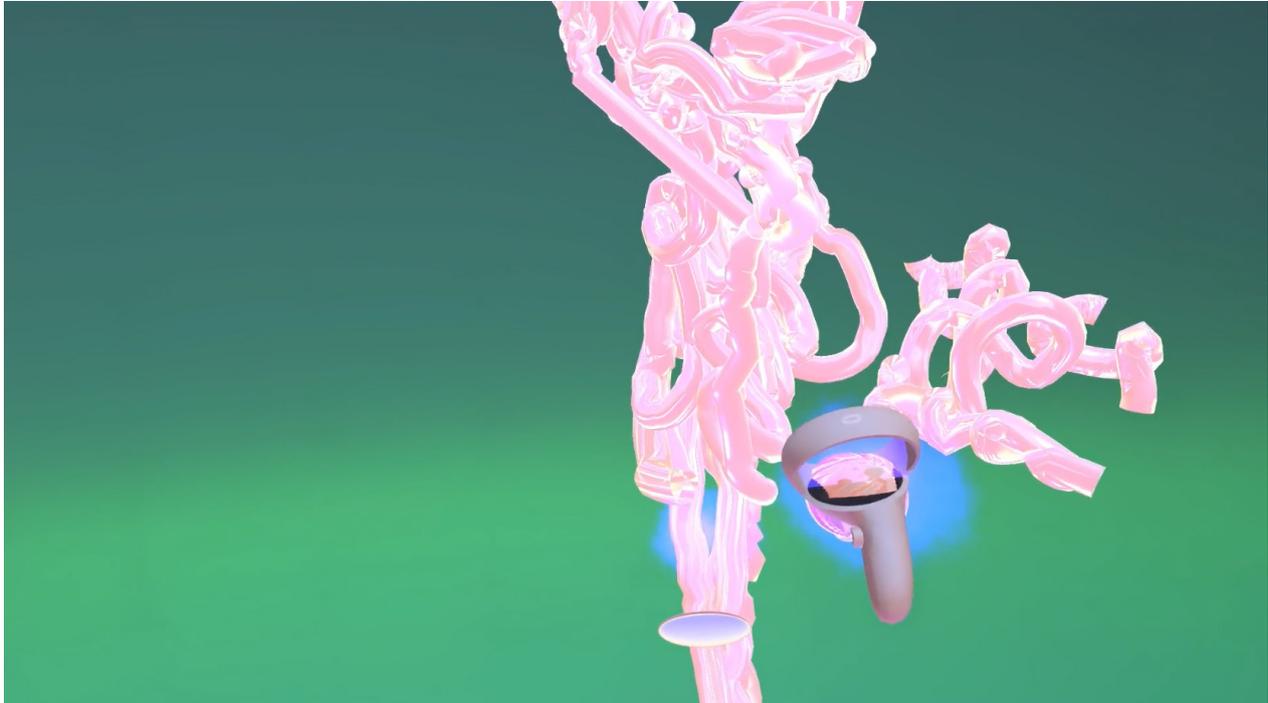


Figure A-4

First person view of picking up blob

Narration:

Once you've picked up the blob, you can pass it from controller to controller. This blob is your connection and tool to bring your body into being. When you pull the trigger on the controller, this blob will create its streaky, gooey marks as you move it through space. There's no way for you to remove any of the marks that you make, so be conscious and deliberate with what you choose to draw.

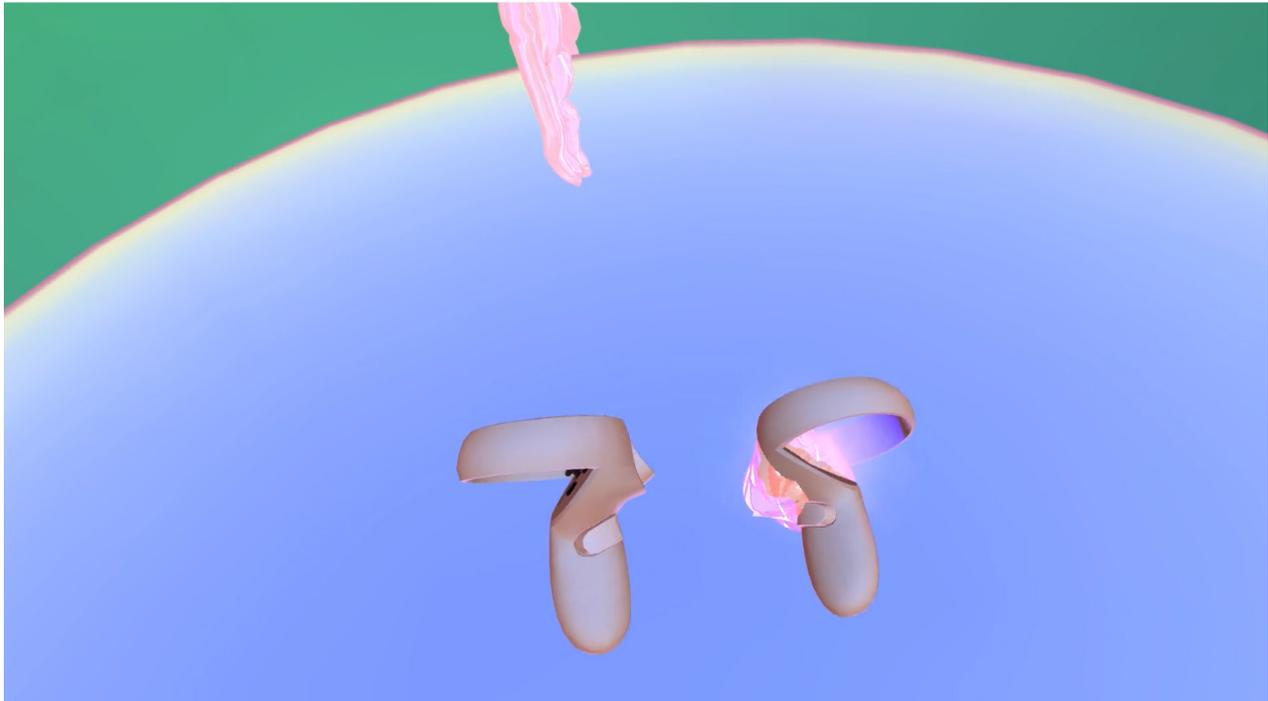


Figure A-5

First person view of controller holding the drawing blob

Note. The participant is receiving spoken instructions from the guide figure regarding the drawing process.

Narration:

What I'm going to ask you to do is to create a trace of yourself in this virtual environment. You're going to use this little blob to bring out the surface of your self. This drawing, tracing, or mark making is how you will bring your body into this virtual space.



Figure A-6

Still from live composite footage showing the body trace overlaid with the participant's body

Note. Participant for this live composite footage is the researcher.

Narration:

You can now start drawing any time you'd like as I continue to guide you through the process. To start with, I want you to place the controller at the beginning of the main contact point of your physical body with this virtual world.

Is it your head? Is it your chest? Is it your gut? Is it your hips? Is it your knees? Maybe your head and the eyes you look out of?

Or it could be where your feet touch the floor.

From here you can continue to draw along your surface.

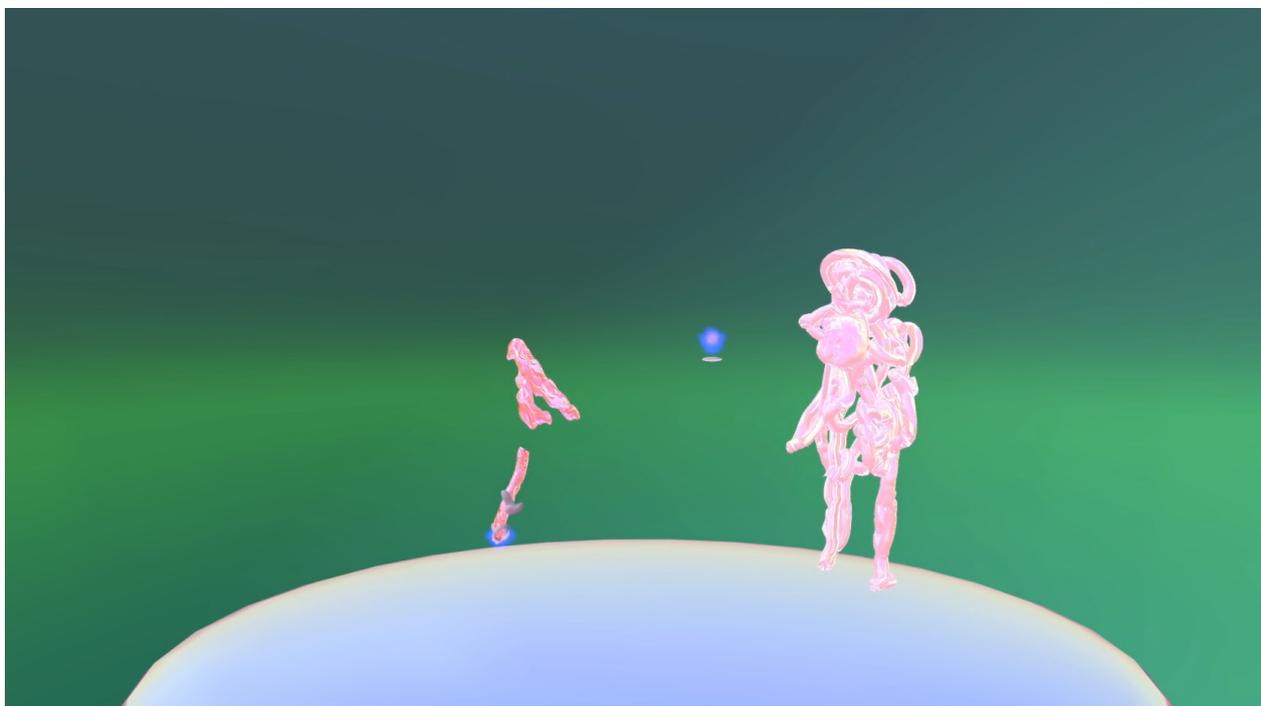


Figure A-7

External view within VR of participant drawing self

Note. Figure on the left is participant in the process of drawing themselves.

Narration:

If you hold down the trigger and move along the surface of your body, it will continue to draw. You can do this in one long line, or you can let your finger off the trigger and start to draw another line.



Figure A-8

First person view of participant tracing themselves

Narration:

As you do this drawing. I want you to think about what best represents you in a virtual environment, and what of your body you would like to bring with you into this virtual environment.

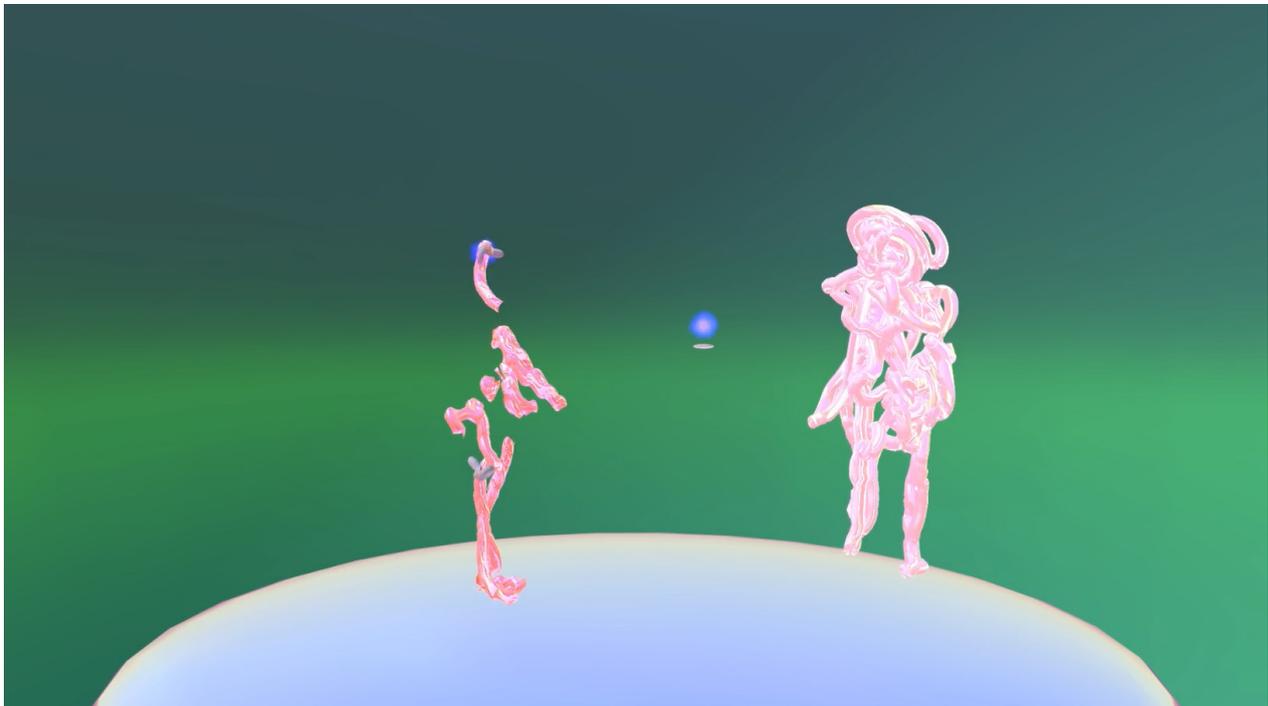


Figure A-9

External view of participant continuing to trace themselves

Narration:

How detailed you make your body tracing is up to you. As long as you stick with the surface of your self wherever you feel that may be.



Figure A-10

Still from live composite footage showing the body trace overlaid with the participant's body, further in the drawing process

Note. Participant for this live composite footage is the researcher.

Narration:

Where you touch and where you draw will become your avatar. This avatar is your embodiment in this virtual space. It is your representation and performance, and it is yourself.

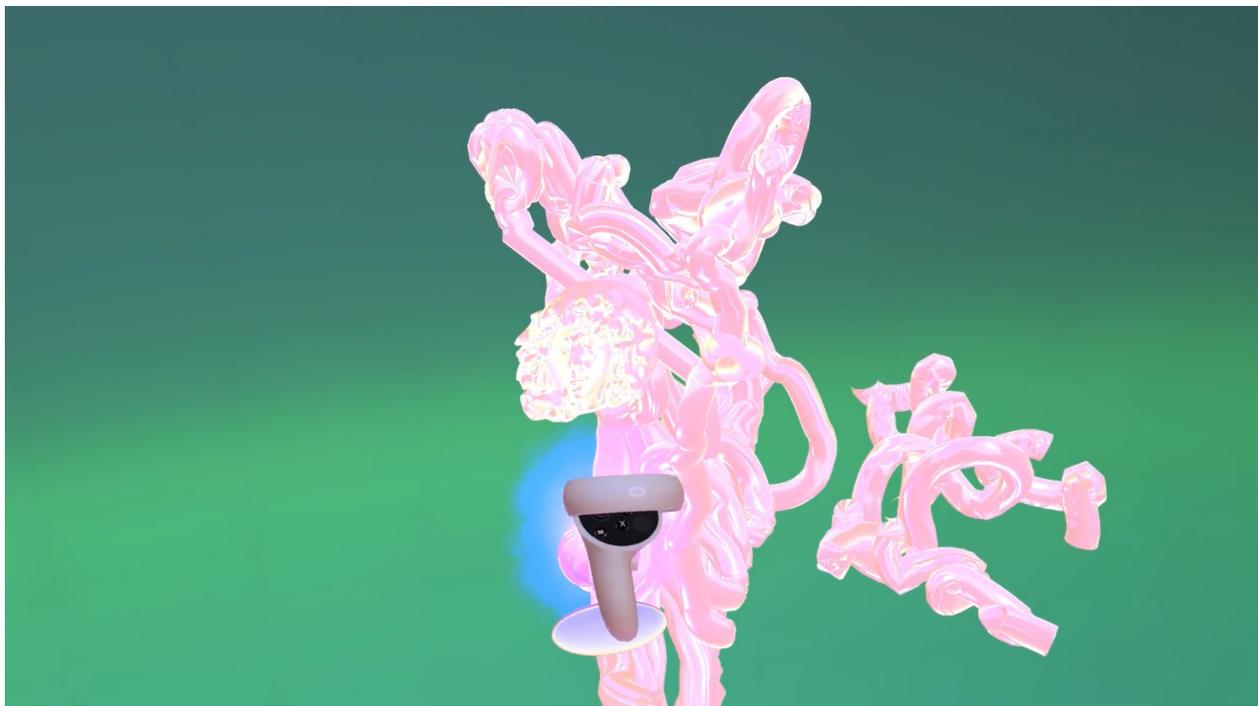


Figure A-11

First person view of the participant returning the blob to the plinth, triggering the next stage

Narration:

Once you finish drawing on the surface of yourself, you can place the blob back in its home.

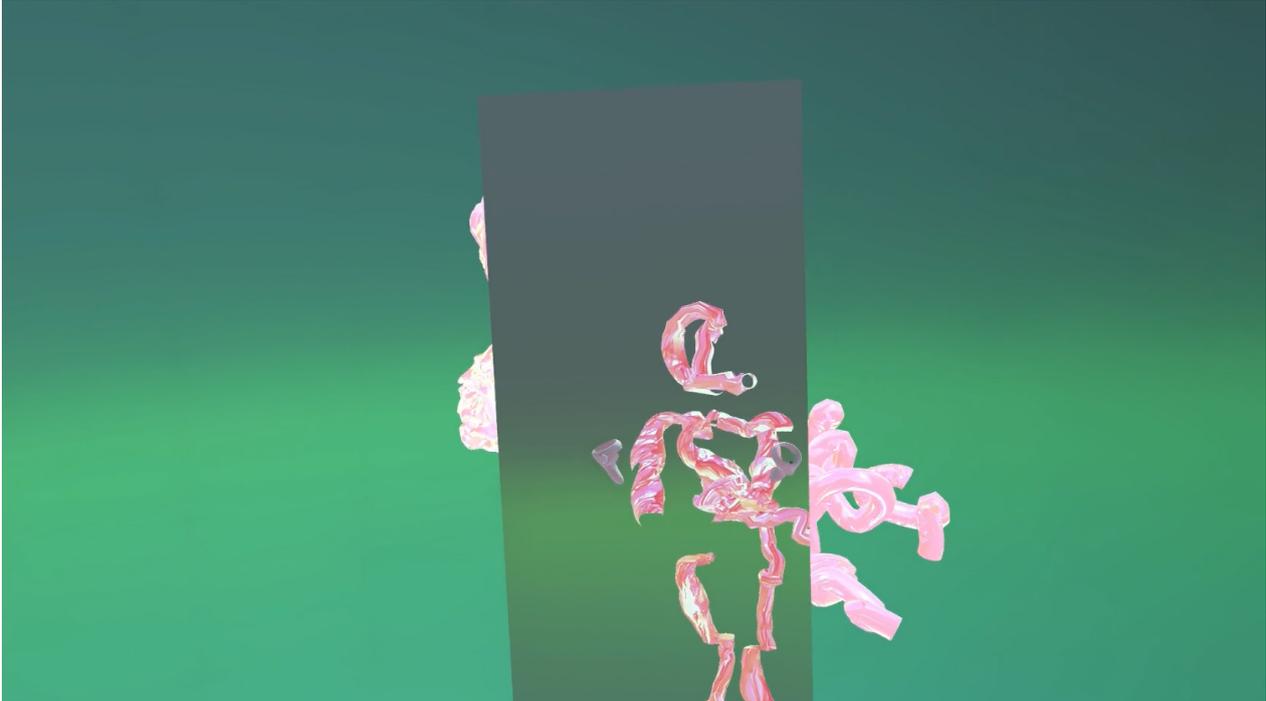


Figure A-12

First person view of the mirror, showing the participant's trace as their avatar

Narration:

This is you. This is your virtual self and physical self laid upon each other to become an avatar. Even though it may not look like you, you know that your movement makes it you.

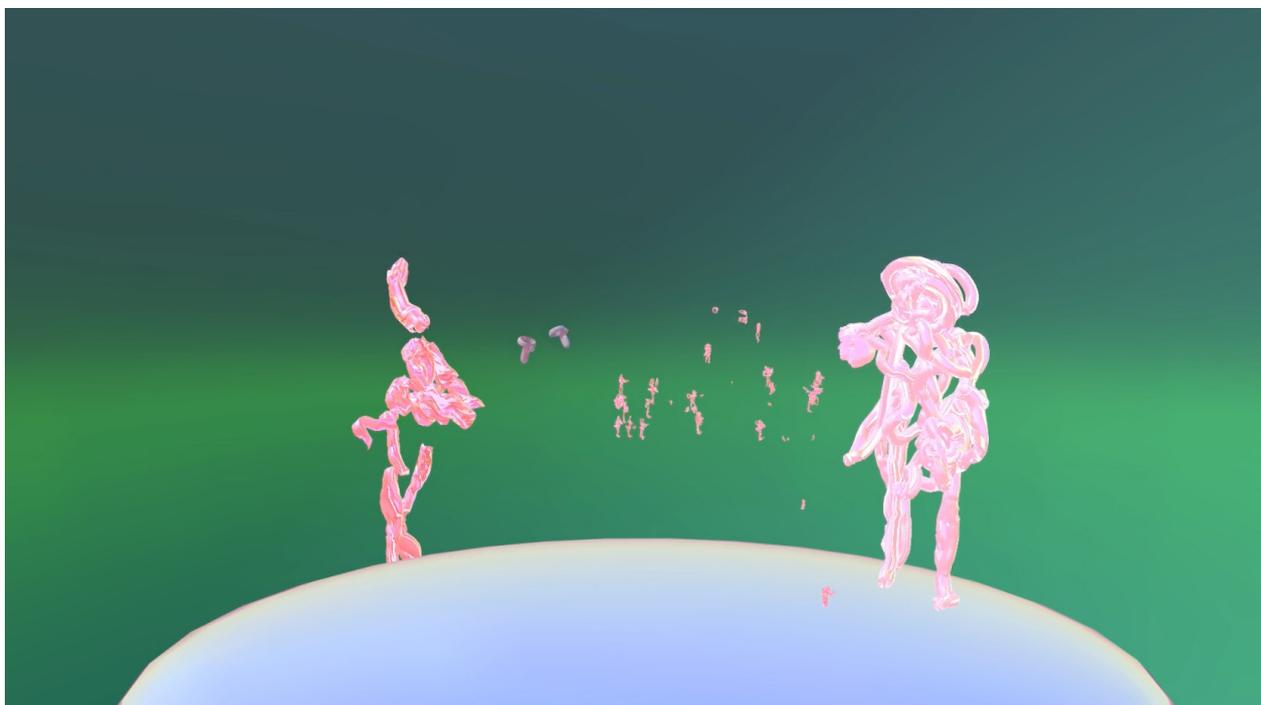


Figure A-13

External view of the archive arriving

Narration:

What is joining you now is an archive of everyone else's drawings: people such as myself, the creator of this space, as well as other visitors.

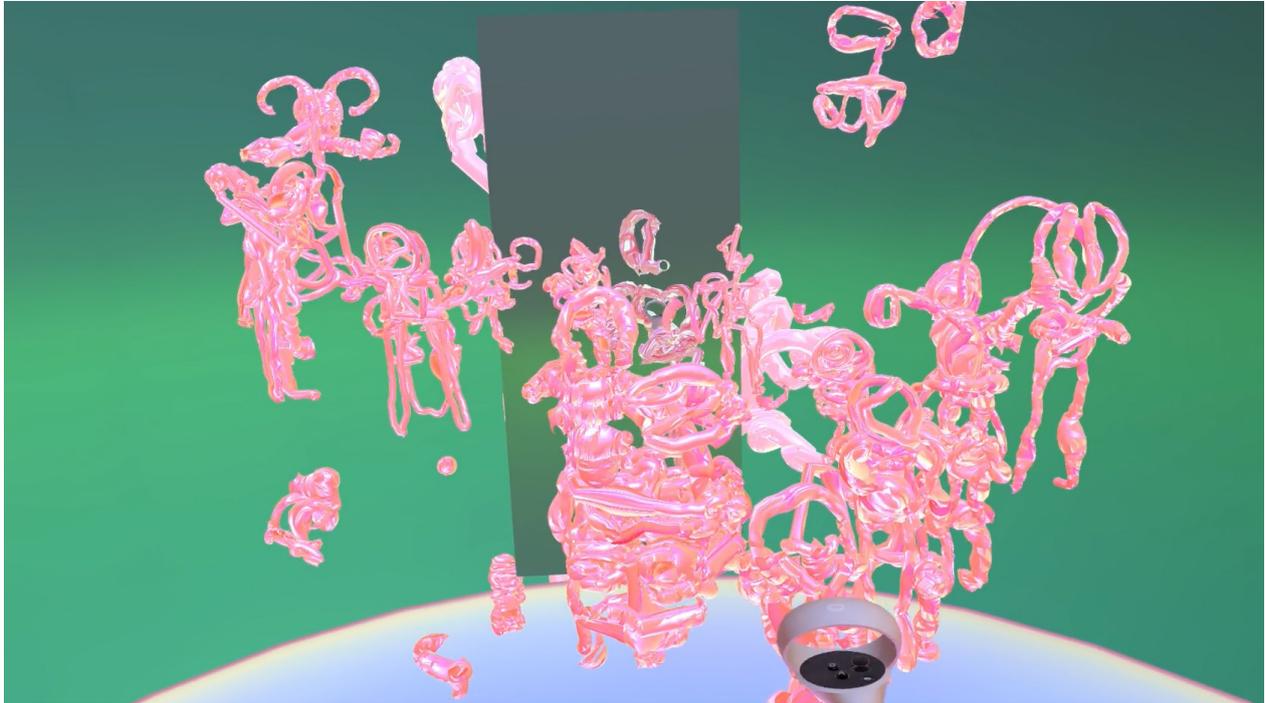


Figure A-14

First person perspective of the arrival of archival drawings

Narration:

If you touch them, they'll come to life. They'll stick to you. If you shake your controller, they'll burst free. These entities are a remaining mark of other people in your space, animated by something more than the originating visitor.

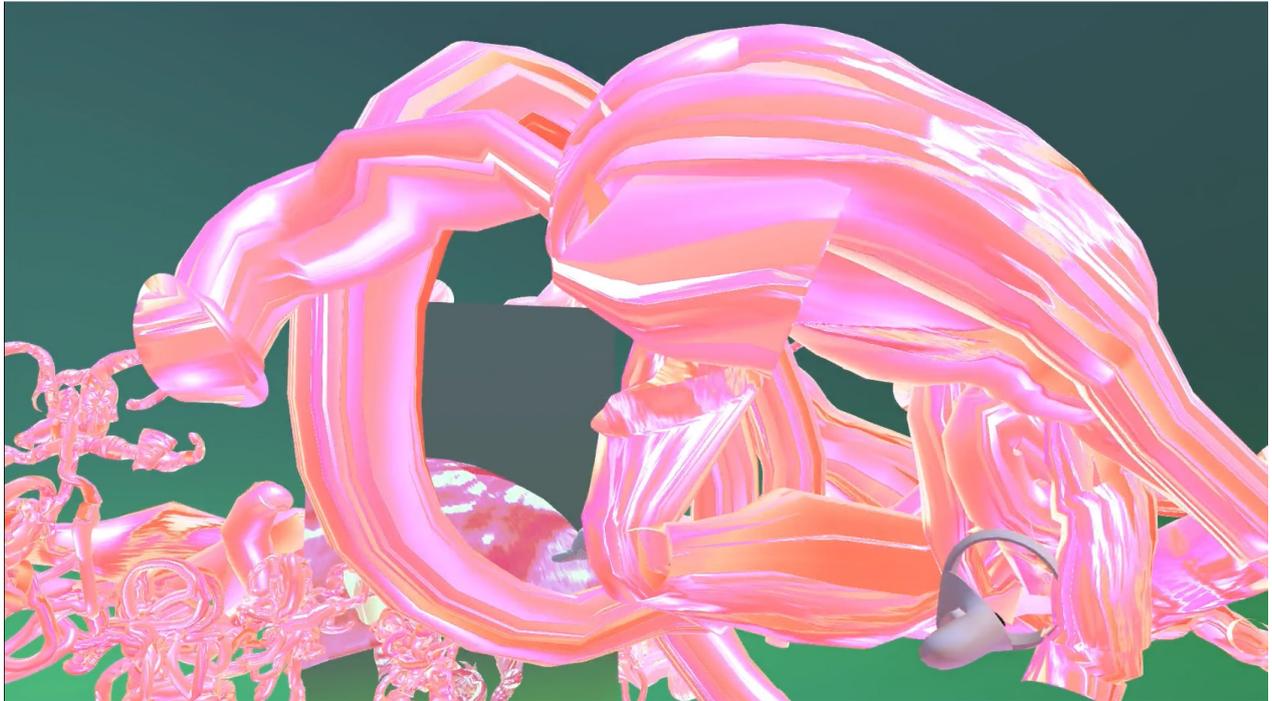


Figure A-15

First person view of the participant holding an archival drawing

Narration:

*Each of these recordings now lives in this digital environment,
and each time these ghosts come into contact with you, you are
changed, and so are they.*



Figure A-16

First person view showing collision of entities with the participant's "head"

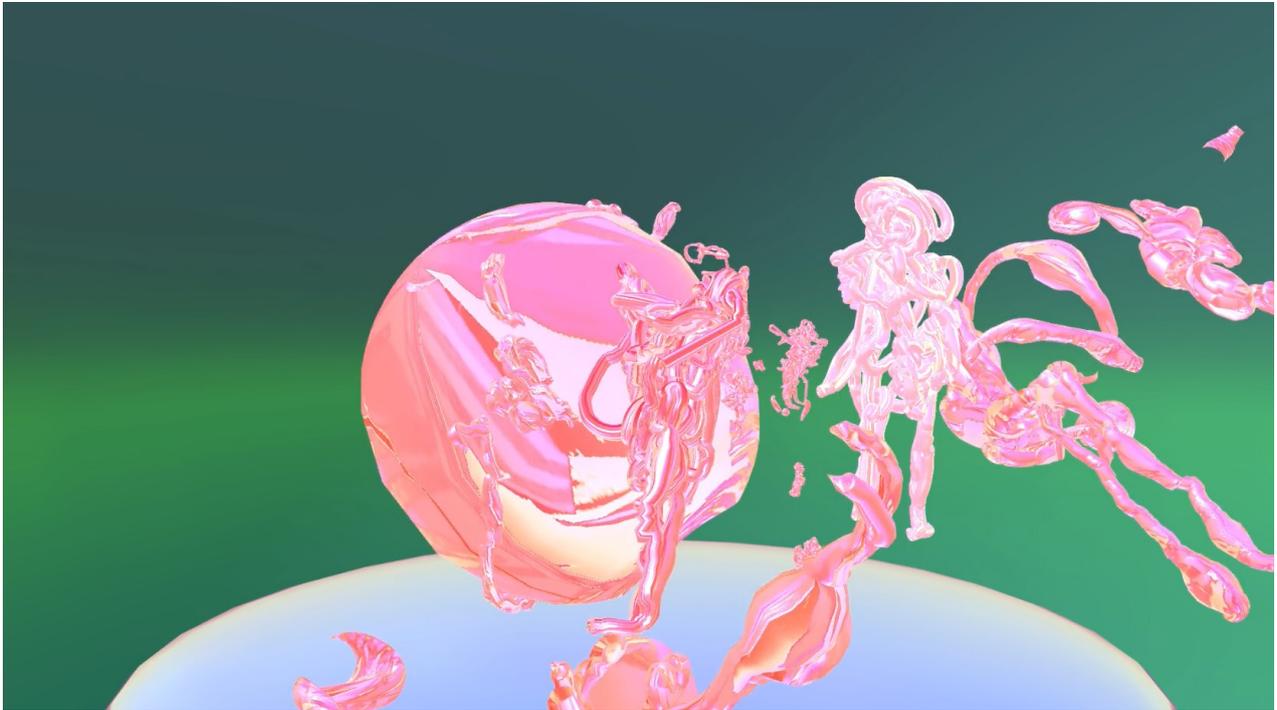


Figure A-17

External perspective of participant interacting with archival drawings

Note. Participant is the largest, roundest figure in the centre.

Narration:

Before you leave this environment, I want to ask you: do you want to keep this tracing? Or would you rather let it dissolve? If you'd like to record it and free it into this environment, it will live with the rest of the recordings, sleeping between each session as a set of coordinates. And then when a new visitor arrives, just like you did, the coordinates will be reconstituted into each line and shape, ready to be freed and animated once more.

If you would like to dissolve your drawing at the end of this session, you can simply leave your trace where it is hanging off your physical form. If you'd like to free it into the environment to live on, you can touch your centre now, and then holding it, push it out into the world.

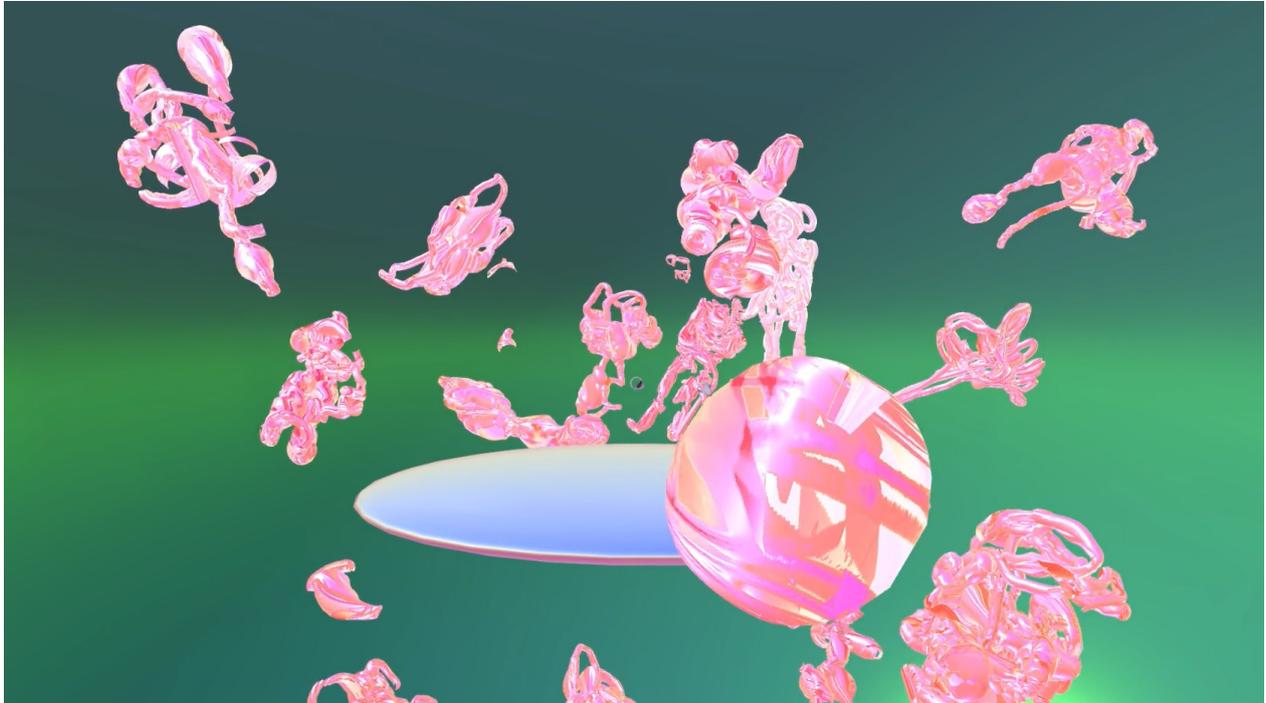


Figure A-18

External perspective of participant freeing their avatar

Note. Participant's avatar is now floating freely and they are once more disembodied.

Narration:

Thank you for your visit and enjoy your journey back to the physical realm.

A.3 Participant Body Traces Video and Stills

A.3.1 Body Traces Archive Participants' Drawings Video

(1 minute 25 seconds, no sound)

[LINK](#)

Footage of 15 participant drawings (one participant has two drawings; the rest are individual drawings from each participant) in motion, with animation active. Comparison of participant drawings shows a diverse range of approaches and visual styles when creating the body trace within the constraints of the pink blobby drawing tool; some participants have created traces that are recognisably human in shape, while others are more abstract. These drawings exist as both data files and visual artefacts that record each participants' virtual embodiment within the Body Traces Archive. Video format also shows the gloopy animation style achieved via the integration of VertExmotion.

A.3.2 Body Traces Archive Participants' Drawings Stills

These still images (Figure A-19 to Figure A-34) show each participants' body trace, allowing for comparison of each individual's drawing style, examination of the mark-making gestures individuals used to trace their body, and what areas of the body were focused on by participants. It also allows for close examination of the visual qualities of the drawing material. In total 14 participants' drawings are shown here (one participant contributed two drawings). These drawings are visual records of each participants' virtual embodiment in the Body Traces Archive.



Figure A-19
Full collection of participants' drawings

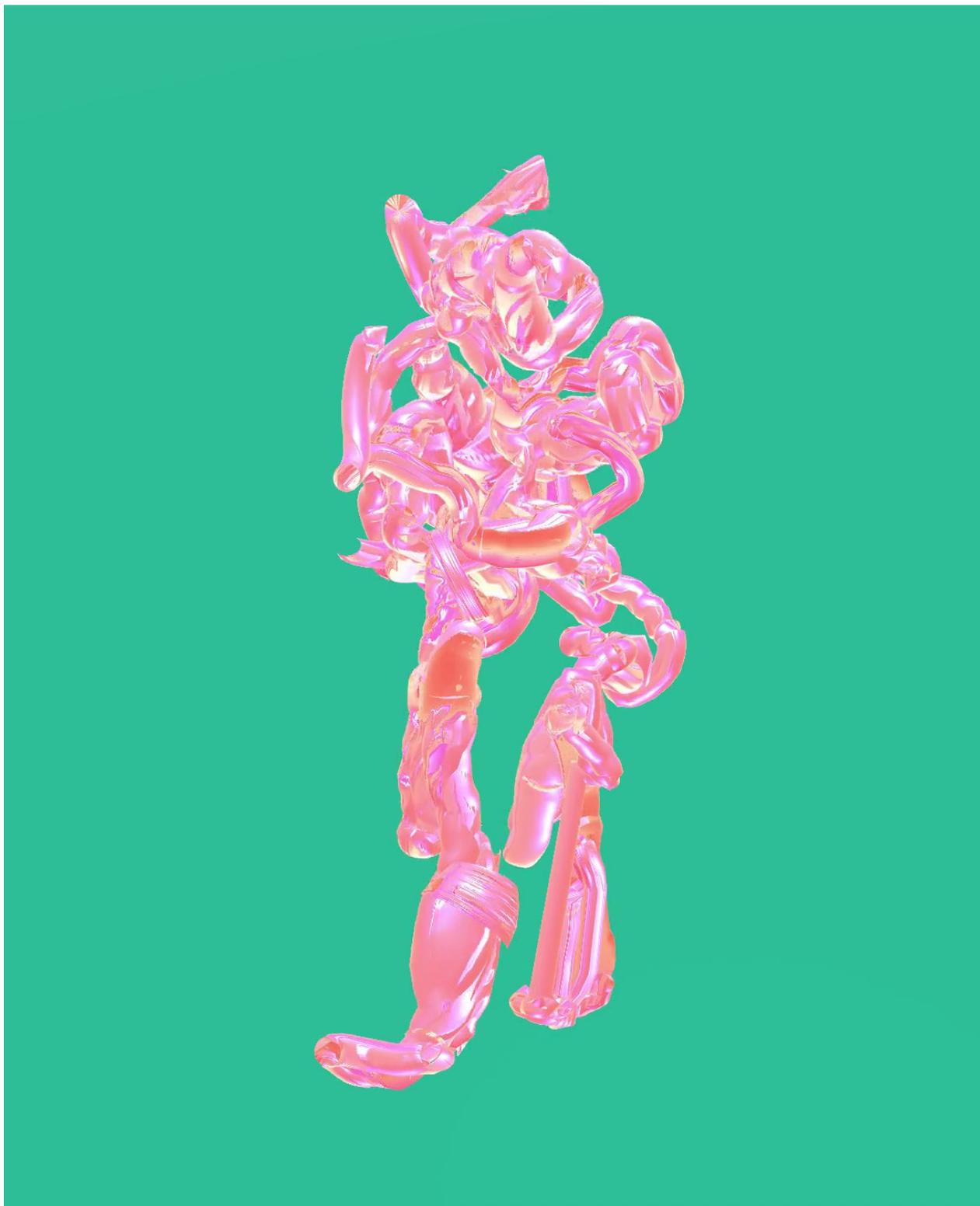


Figure A-20

xXsl1m3rXx, First Drawing

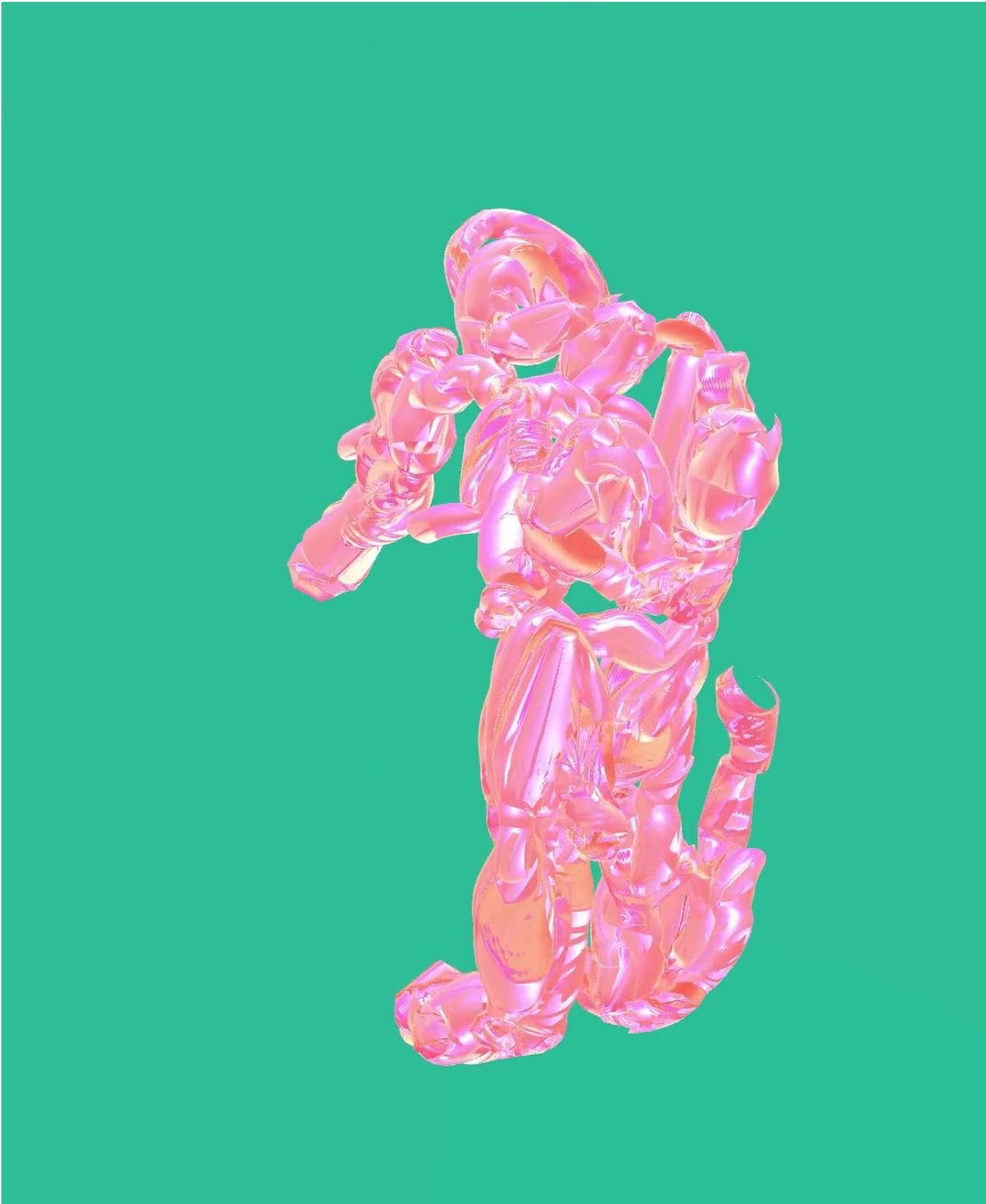


Figure A-21

xXsl1m3rXx, Second Drawing

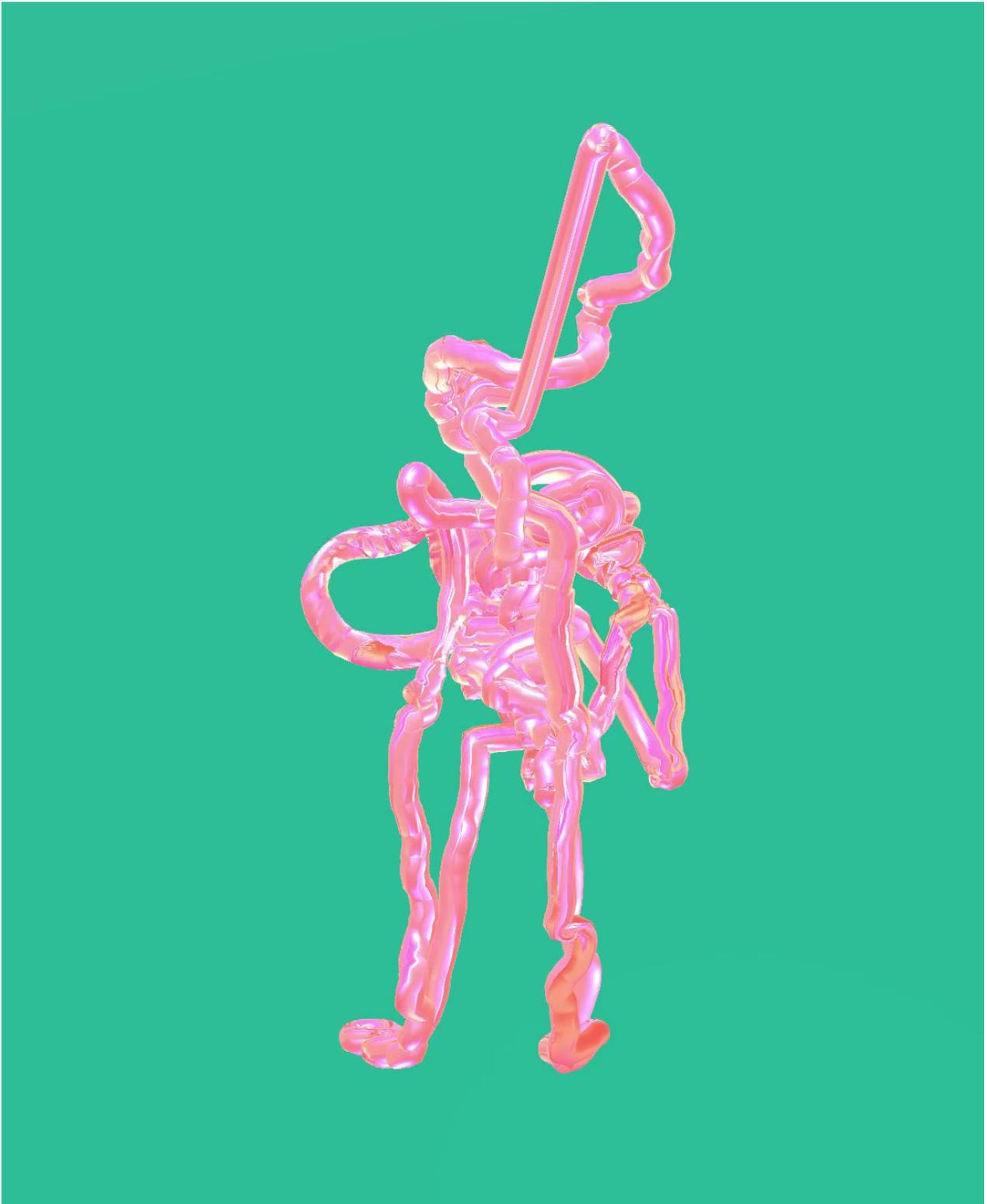


Figure A-22

dailyunify



Figure A-23

Pink Thorn



Figure A-24

Shiro_Alien



Figure A-25

Starla

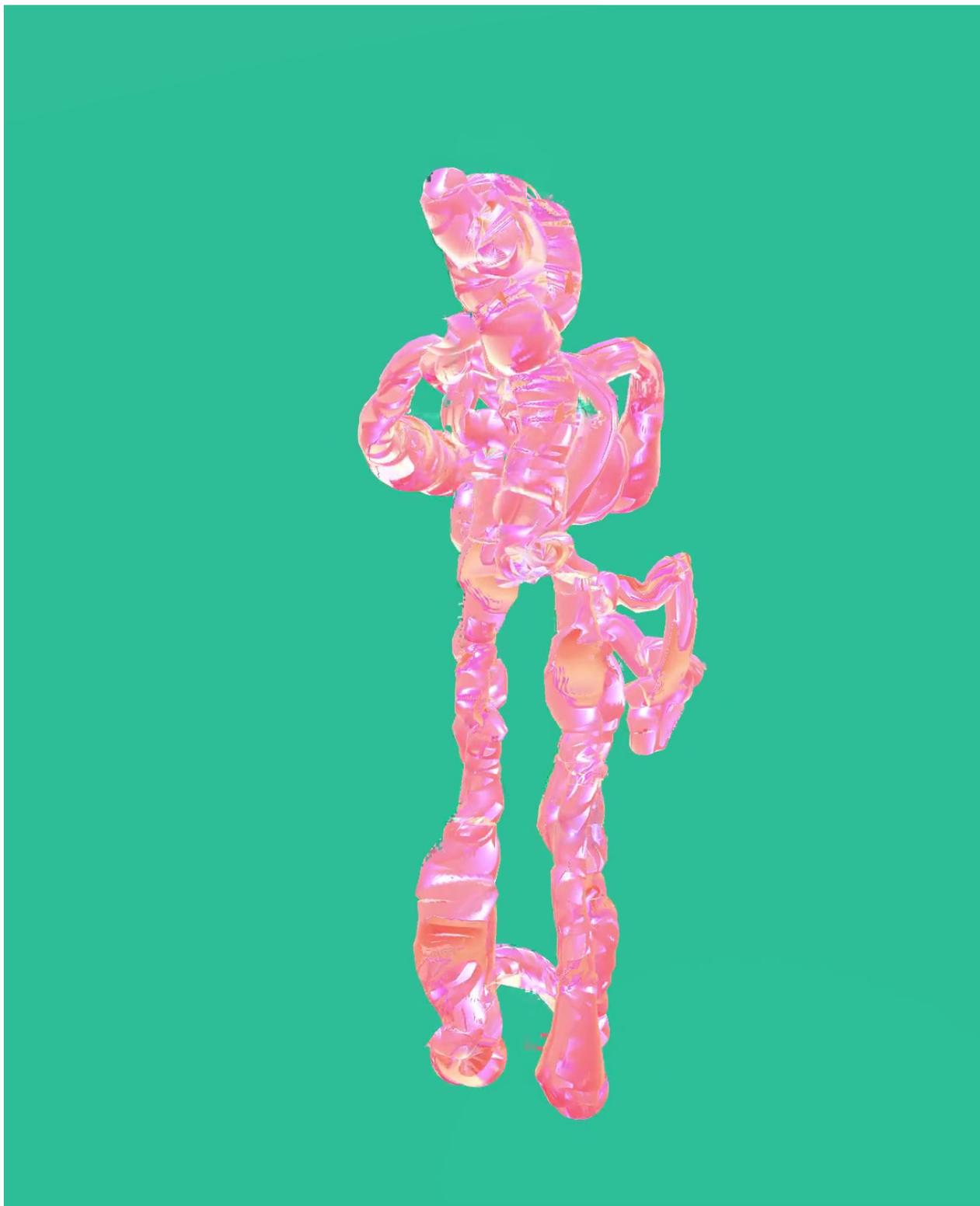


Figure A-26

secretelevator



Figure A-27

Sonny

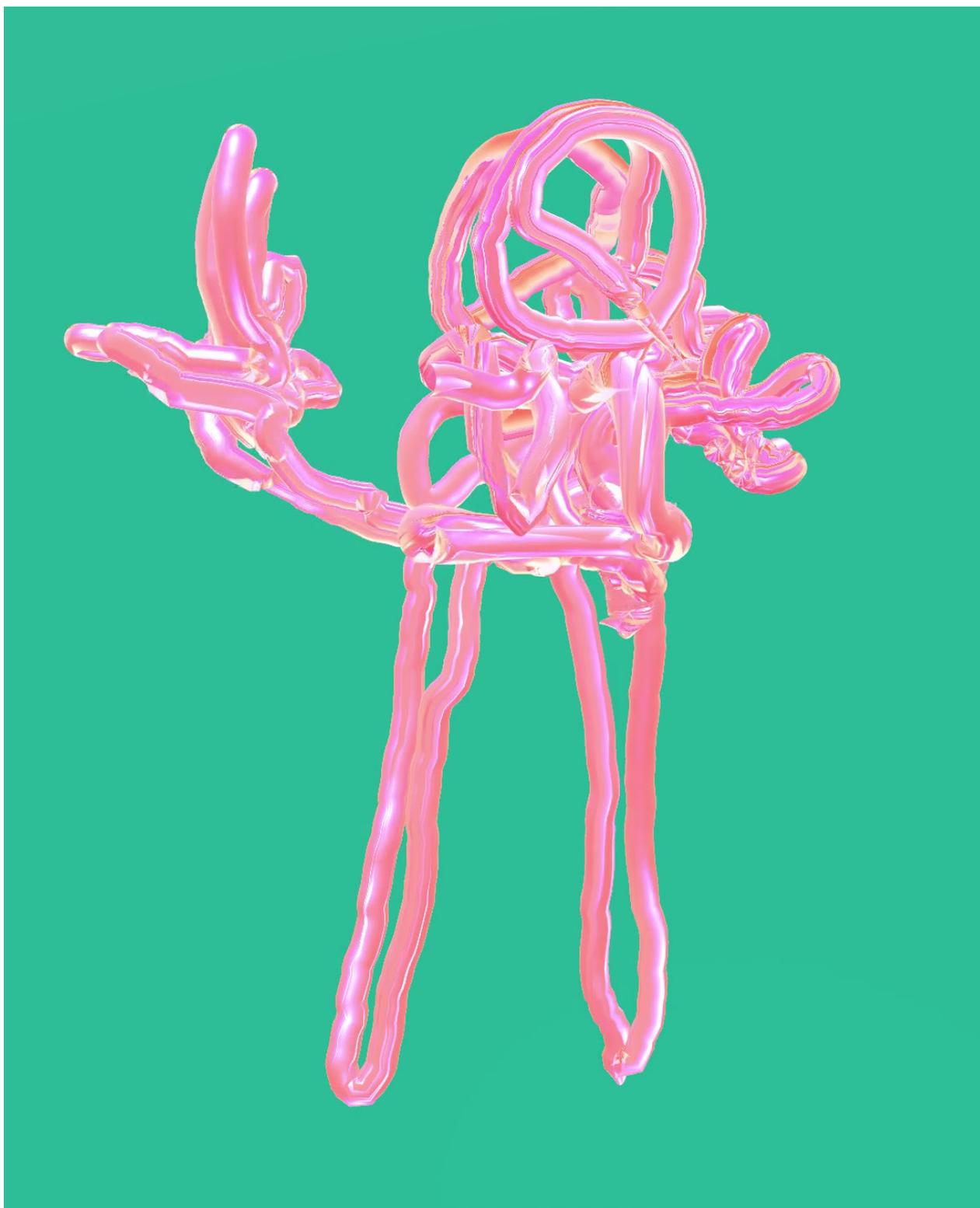


Figure A-28

The Gardener



Figure A-29

chibi



Figure A-30

Bleep Bloop



Figure A-31

tangiblepursue



Figure A-32

popsiccle

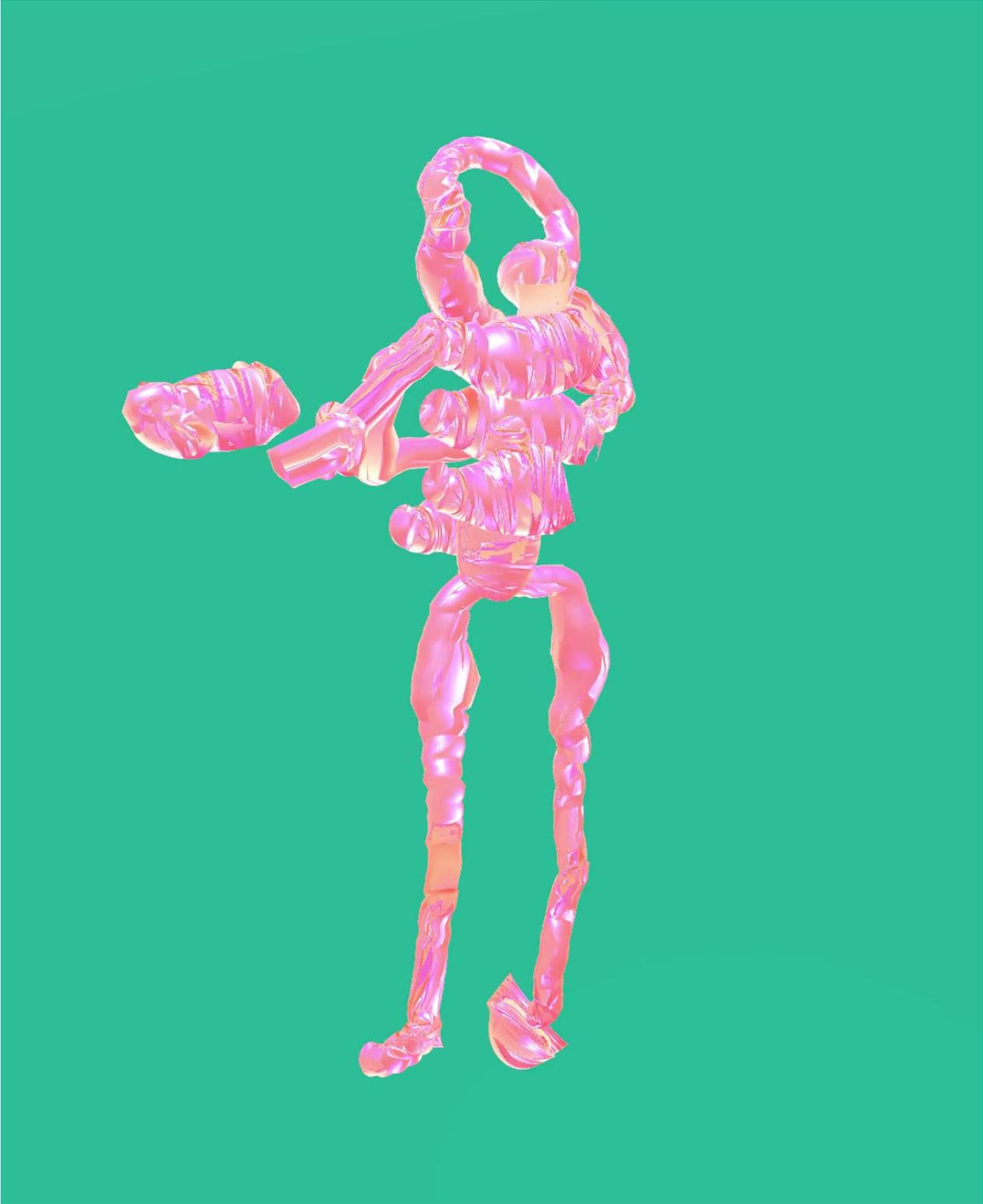


Figure A-33

Kanha



Figure A-34

sparklingfalter

Appendices

Appendix B: Process Documentation

B.1 Introduction

This appendix contains additional material regarding the development of the preliminary experiments as detailed in Chapter Seven, and the development of the Body Traces Archive as detailed in Chapter Eight.

B.2 Preliminary Experiment One: Queer Dance Worlds Process Video Documentation

(58 seconds, includes audio)

[**LINK**](#)

Excerpt footage of Queer Dance Worlds experience, piloting the visitor around the environment. This visual style of gloopy forms went on to inform the visual approach of the Body Traces Archive. Includes audio; track is Champing at the Bit by Thorn Sweet (Thomas Stoddard) and is included with permission.

B.3 Preliminary Experiment Two: Body Traces Mark One Process Documentation

(2 minutes, no sound)

[**LINK**](#)

Compilation of footage of Body Traces created during the Body Traces Mark One experiment, as well as footage of experiments with cloth physics simulation and VertExmotion soft body physics system.

B.4 Body Traces Archive Slime Development Process Video Documentation

(1 minute 43 seconds)

[**LINK**](#)

Compilation of footage of experiments in the development of digital slime for the the Body Traces Archive. No Sound.

Appendices

*Appendix C:
User Testing
the Body Traces
Archive Participant
Experience*

C.1 *Extended User Testing Results*

The following Appendix provides in depth material regarding the user testing process with the Body Traces Archive. This material is summarised in Chapter Nine.

C.2 *Interview Structure*

Each interview began with general questions about participants' familiarity with Virtual Reality. Participants were then assisted in putting on the VR headset and beginning the experience. During the experience, participants were welcome to commentate or ask questions regarding what they were experiencing. After the experience, participants were asked open-ended questions exploring their specific emotional and embodied reactions to the Body Traces Archive. In some cases, formal prompts were unnecessary, as participants readily shared their thoughts and experiences.

Throughout this analysis I discuss participants using the username they selected for their drawing. If participants did not offer a username or if it is too identifying in nature, I have provided a pseudonym from an online random username generator. Whether the pseudonym is selected by the researcher or participant is indicated on first use.

C.2.1 *Interview Questions*

The planned questions for the interview were as follows, although as the interviews were semi-structured, there was flexibility with modifying these or adding further lines of questioning.

Before the VR experience:

How familiar are you with using VR?

Are there any aspects of your identity, lived experience or communities that may impact how you understand or use VR?

During the discussion of these two questions, we often led into a discussion of wider digital media, especially video games. We also discussed whether participants created avatars of themselves regularly and if so, in what manner.

During the VR experience:

Participants will be asked to describe and commentate on their actions in VR.

What aspects of this experience are easy to understand, or difficult to understand?

How can these interactions be improved to help you know what you can or should do?

It very quickly became apparent that participants in the VR experience had so much to focus on and process that asking additional questions would cause issues for their ability to understand what to do and was not necessary for gathering data (it was easily observable which interactions were difficult or awkward for users). Therefore, I withheld the questions and prompted people to commentate on their actions as they progressed through the experience.

After the VR experience:

How did this VR experience make you feel?

How would you describe the experience of using your body to move and interact in VR?

Does this VR experience make you reconsider or understand VR differently?

Part of the second question included a discussion of where on the body they started their drawing of themselves, and if they had a sense of why they started there. It also involved asking how it felt to collide and interact with the other entities during the archive section.

I also asked participants to provide a username for their avatar, which, if provided, is used as the pseudonym in the analysis of the results. I also asked participants what pronouns they would like me to use when referring to them or their avatar in my research.

C.3 *Analysis Methods*

Contemporaneous notes were taken during the process, while the interview area and VR participation area was recorded with video and audio recording devices. The activity within VR was recorded via a screen recording of the external monitor. The drawings that participants generated were also preserved anonymously as a JSON file of XYZ coordinates that can then be loaded

into the archive automatically the next time the VR experience is run. Visual documentation of each participant's drawing as it appears in the Body Traces Archive is available in the Documentation Folio.

The audio recordings were reviewed to manually transcribe key quotes in response to each question, and to take note of general findings in addition to observations recorded during the interview. The interviews were reviewed as a whole in order to conduct thematic analysis, identifying predominant and repeated themes across the set of responses and then highlighting sections that demonstrated this theme. This is shown in Figure C-1, which shows an overview of scanned transcripts. These printed transcripts were highlighted by hand in order to identify these themes.

C.4 *Results*

The user testing process raised several practical concerns, such as basic timing, narration pacing, animation speed and so on, which were refined throughout the process. Major suggestions could not be incorporated into the prototype but do show avenues for further testing and expansion. Key potential further experiments and avenues for improvement include:

- Improving accessibility with subtitles—this also raises the potential to experiment with different integrations of subtitles, and with narration that is more responsive to participant's actions, such as having written narration that users can pick up or tap to hear again.
- Using a different controller configuration. With results showing that participants traced themselves in a variety of different manners with two controllers, it would be valuable to see if no controllers (using hand tracking), only one controller, or a different visual representation of the controllers in the virtual space caused participants to trace themselves differently or to feel differently about the tracing process.
- Integration of more gesture controls—introducing the ability to wave drawings towards or away from themselves would provide users with a greater level of control over their experience of the “social” collisions. Whether this would impact the sense of independent liveliness of the other drawings would be valuable to test.

Beyond these more practical elements, the extensive results of these user testing sessions have shown the complexity and richness of the designed



- Purple: the virtual environment, overlap with the physical world, and immersion
 - Yellow: Drawing Activity
 - Green: sense of self, in and out of VR
- Pink: Sociality and interacting with the archive and drawings by other participants
 - Orange; comfort, discomfort, affective response

Figure C-1

Thematic extraction via highlighting of transcripts

Note. Five themes were identified during review of the interviews: the layering of virtual environment upon the physical and sense of immersion (Purple), the drawing activity (Yellow), their sense of self, in and out of VR (Green), sociality and interaction with the drawings by other participants (Pink), and comfort, discomfort and general affective response (Orange).

embodied experiences in this virtual environment. The results below are organised into a number of sections based on the identified themes. Before I discuss these identified themes, I provide a short summary of participants' familiarity with VR and their perceptions of the medium.

The first theme, the layering of virtual environment upon the physical and sense of immersion, became a significant aspect worthy of note to several of participants. Participants identified that the spatial design of the VR experience as a non-realistic environment is particularly novel and meaningful. This is discussed further in the section *Layering Physical and Virtual Spaces*.

The second theme, the drawing activity, shows how participants engaged with the drawing process in a range of unexpected ways. While the narration was intended to clearly indicate that participants should trace with the controller on their surface, skin or clothing, participants took a range of different approaches. This is detailed in the section *Drawing Process*.

The third theme is participants' sense of self. While some participants felt highly embodied, others felt oddly present but lacking in physical form. The range and nuances of each participant's experiences are reflected, recorded and re-presented in their drawings as well as their verbal responses. This is discussed in the section *Sense of Self*.

The fourth theme, sociality and contact with drawings by other participants, discusses the differing responses participants had to the experience of colliding and interacting with other participant's drawings. Participants were often highly affected by the experience of interacting with the archive of drawings; some felt that it was overwhelming and jarring, while others found it to be warm and comforting. This stage of the experience was where a participant's sense of self was most challenged and where the most emotionality came through from participants. This is discussed in the section *Archive Section: Asynchronous Sociality and Contact With Others*.

The fifth theme, participants' affective responses throughout the experience, has been divided into two sections: first, *Affective Experience during the Drawing Process*, and then after the discussion of the archive section, *Affective Experience During Archive Section*.

Table C-1 shows select responses and observations grouped around these themes.

Every participant listed in Table C-1 contributed a drawing to the Body Traces Archive. Not all participants who engaged in the drawing process were able to

Table C-1

Excerpted participant responses according to themes

Participant	Full Length Interview?	Experience or history with VR	Perceptions of VR	Layering of virtual environment and physical, immersion	Drawing Activity	Sense of Self	Sociality and interacting with other drawings	Comfort, discomfort and affective response	Misc. Notes
sparklingfalter	No. Body Traces Archive experienced with the first version of the narration.								
dailyunify	Preliminary Interview; less structured than the rest of ensuing interviews. With first version of narration.	Has used VR but only on rare occasions.	Described "a kind of hesitance that comes when you're older"; and that after a certain age there is a barrier to learning new things. Described experience using VR at a museum, and finding the design of a female character overly sexualised. Described sense that VR is targeted at "what they [designers of VR] think 15 to 18 year old boys would be interested in."	It felt like I was contained, and I think that's really important." Described the feel of the space as "liminal".	"I want to make a foot because I don't want to be a stump... because I don't feel like I can balance." Started drawing at her heart. Commented that initially felt like she should start at the headset, then decided that the question was more about the body. "Interestingly, usually when you do a trace, it looks more like what we think of as a shadow. But this is not a shadow."	Linked the idea of the drawing trace to digital traces more generally, and how we are constantly photographed, videoed and scanned by surveillance technology.	"It's a little bit freaky when things come and well, then like, mingle with you. Because there's the moment where you're not sure if it's you." "I enjoyed looking at what other people had done and how their shapes were kind of similar."	"It felt safe."	
xxsl1m3rx	Yes. With first version of narration.	Rarely; not super familiar with it.	Perceives VR as not "welcoming". Associates VR mostly with the concept of the metaverse or cryptocurrency. "The currently thriving world [of VR] is not one that's for me." Describes how contemporary VR feels like it's "on a different political plane than I am on." Has specific anecdotes and concerns regarding gendered harassment in online and virtual spaces.	Commented positively on the lack of narrative or linear fictional story within the experience. Found this experience "welcoming".	"I also thought it was funny that I forgot to draw my head." Started at right hand. "I always take it kind of like you can't step in the same river twice sort of thing. If I do it again, I'm drawing a different body, you know?"	"Leaning through it [the drawing] is bizarre." Linked experience of drawing self with avatar generation in video games, and how that process is usually about accessing a story, whereas this was instead a process of "making yourself and then exploring others' images." "It's not like you disappear. No. When you're in, it's still just a human somewhere wearing goggles."	When picking up other drawings: it feels like it has become part of her hand; "I wield this now"	The sensation of standing and not knowing what to do is uncomfortable Drawing on chest area feels weird; especially knowing that people could walk past the room and see in "This feels very weird, but I suspect that's the point." "I'm actually deeply enjoying this." "There's a couple of times when I laughed and I couldn't tell myself whether it was nervous laughter."	Did the drawing experience twice.
Pink Thorn	Yes	Not very familiar with VR, have played some VR games but not many. Does play videogames	Noted a lack of deep engagement with the medium in mainstream creative circles, and has concerns for how to get audiences to engage with the conceptual side of VR as opposed to "people just want[ing] to play the game"	Commented positively on how digital the space looked, and that it "isn't trying to be something else." "The digital space should remain... you can see the grid in this piece, you can see the primary shapes, that I think are more characteristic of the digital.	Starts drawing at head, then as drawing continued, added horns	"With the more time you were in it, you felt like you were somewhere else, and you kind of gradually forget that I'm also here" "I also felt a sense of fluidity in the experience"	"how cute!"	"It feels like being cuddled" when holding multiple drawings on the controller Found it peaceful and calm overall, was enthusiastic and engaged	
Shiro_Alien	Yes	Has done some VR but did not enjoy it very much, has used VR in museum and gallery context and described the experience as "jarring"	Noted that they have heard of VR experiences used in awareness raising campaigns, and sees this as a potential for the medium. However also noted that "I struggle to see if there's a point to it other than just being an innovative fun thing that some people like."	Described sense of alertness while in VR, and discomfort for lack of ability to see the outside world: "You lose your sense of ... what's the word... when we walk around, we're always scanning for danger, even subconsciously"	Started drawing at head – "If I would explain it now, it's because I put the headset on, so I associate that and this area with entry into the world."	"I'm realising I don't really have any connection to my legs. Like they do not exist. I think because I can't see them, I have no desire to draw them." "It was nice to feel like, within the constraints of this blob thing, you can represent yourself in any way you choose."	Described contact with other drawings as: "If I could think of an example in the physical world, it would be like someone just walking up to you and then just staring at you"	Found it confronting and was highly responsive and reactive to events "I'm scared!" Laughed and said "wow this is cool" when beginning to draw "I feel like I'm being hugged. It's quite nice," having drawn all around herself "I don't like when they go close to me" when the other participants' drawings moved around the space	

<p>Starla</p>	<p>Yes</p>	<p>Has done VR once before in a party context. Made her feel sick and generally has bad motion sickness that makes them averse to the medium. Uses online platforms like picrew to generate avatars and profile pictures: "I want an approximation of me"</p>	<p>"The only thing I can imagine people getting really into VR for besides video games is porn"</p>	<p>"It's the first time I've used a VR thing that wasn't some kind of product placement. It's nice to see something that's non-commercial."</p>	<p>Started drawing at hand: "because it was holding the controller." "I drew like a weird... like a crime scene outline."</p>	<p>When drawing, she did not put the controller against her bodily surface. When asked why she did not touch the controller to herself: "That would be a sensory no-no." "That would be uncomfortable, and I can't explain why."</p>	<p>"Oh I'm merging with someone!" "I made a mega-blob!" "I like that I made myself into some sort of weird huge ball, just rolled around and collected people and squashed them into my person."</p>	<p>"This feels very weird and awkward" "The immersiveness of it is quite uncomfortable for me." "I'm really bad at drawing, and I feel embarrassed about it."</p>	
<p>secretelevator</p>	<p>Yes</p>	<p>Familiar with VR conceptually and has worked with creative technologies for a long time, but didn't get to use VR until the Oculus headsets in the mid 2010s.</p>	<p>"I have a historical and contemporary understanding of what VR has done, and its potential to do" Sees VR as part of immersive media and virtual environments more generally, such as text-based worlds, 2D graphical worlds, and 3D screen-based iterations such as World of Warcraft and Second Life.</p>	<p>Commented on how it re-envisions what a digital space can be, particularly a virtual environment or digital space as a space that "contains viscera"; the experience is "implicating the messiness of the body."</p>	<p>Started drawing at wrist – "It just seemed like the place to start. I don't know why beside the fact it felt right."</p>	<p>"It made me interested in the relationship between the way that I had drawn myself, and the other people had, and the boundaries of my body, and then it colliding." "it's different to other experiences of VR where your representation literally follows your movements. You're sort of creating this abstract representation that is actually more bound to your physical self than traditional avatars, because it is completely traced off yourself, but at the same time it becomes external to yourself quite quickly. There's a letting go of it that is interesting." "This is about a temporary relationship with a moment in time. Your trace is a trace that exists as a record of that moment and when that moment is passed, I don't think it needs or wants to be you anymore."</p>	<p>"When it started colliding with other bodies, there was a certain sense of distortions of personal space and boundaries, and sort of... intersections of boundaries"</p>	<p>Was overall a very calm and non-reactive participant. Commented that it could have been "intrusive" when other drawings started colliding, "but it didn't feel that way"</p>	
<p>Sonny</p>	<p>Yes</p>	<p>Extensively familiar with VR, has been working with it for seven years. Familiar more so as a developer than as a consumer.</p>	<p>Grew up playing video games; VR reminds him of the feeling of newness of video games in the 1990s</p>	<p>Found the design of the space too enclosed and wanted a wider, more open horizon</p>	<p>Made a big sweeping motion to start the drawing. "When the initial question was asked, my answer was my feet" Describing the drawing process: "It's not a collage of pre-made things."</p>	<p>"In virtual spaces, I am actively against an accurate representation of myself." "I would always choose to be abstract, on the low end, robot or whatever, on the high end, something way more abstract" On the instructions to draw: "draw[ing] yourself using yourself as a grounding element to portray yourself in a virtual space, that's a really decent question for me to ponder about because when given the choice, I wouldn't ground it to my physical body."</p>	<p>When interacting with other drawings, played around and patted the drawings to create sounds. Described archive as space where characters "mingle with each other."</p>	<p>When all the other drawings were flying around, through the headset: "I'm pushing my limit."</p>	
<p>The Gardener</p>	<p>Yes</p>	<p>Familiar via working in related industry, but "I don't have a set at home for example" but "I get these kind of insights, from a while back, of like how far VR has come, but it's not first hand, it's really just hearing bits and pieces because I'm in that kind of industry."</p>	<p>Identified VR as a product and media format that is heavily associated with emerging technology. Described how as a studio working in emerging technology and arts contexts, potential clients often ask about VR, although as a studio they work more with AI, generative machine learning, and augmented reality. Identified how "because [VR] lives in an object, it's quite easy to recall and associate, as 'that's emerging tech'." Also described in a more general sense, "in the stereotypical view, [VR] would represent a disconnect from the physical, or at the minimum, tapping into a realm that is not based in the physical."</p>	<p>"There is an interesting overlap that I thought of just now with the mask, which is that I've been going out diving with [my partner] and also watching lots of docs on underwater worlds... maybe that's the closest for me, a physical analogue version of this, which is you put on the mask and can see this other place." "I like that you've made [the controller] sticky." "I like the space, in that I'm very drawn to this kind of aesthetic, the kind of blobby, globby and shimmering things."</p>	<p>Started drawing at hands. "My first reaction was 'Oh, I'm going to give myself really huge hands,' because I feel like I have huge hands right now ... My hands are so powerful right now." "I'm conscious that you've asked me to trace along my body, so I want to be touching the edge of my body, but I'm also conscious of not like, knocking the headset, or not knowing the controllers of myself. I feel like I'm drawing just as if I was standing in front of myself." When explaining why she didn't want to knock the controllers: "I don't know. I guess I'm scared of hurting it? Because it's a mechanical object?" Also wrote her name in the environment.</p>	<p>"I'm inside of myself! Cool!" when viewing reflection of avatar</p>	<p>"I would like to interact with this little guy." "I do like these little characters." "I like that I can kind of hold them."</p>	<p>"Woah, that was a bit nauseating." "I'm comfortable with the ambiguity, maybe as a person more comfortable with the ambiguous." "I consider myself as very comfortable with ambiguity generally in life. And so I like those kinds of experiences, I like being in spaces where my imagination is stretched ... for some people, that might be scary, or that might be frustrating at minimum, because they like the kind of clear edges and they like to know what the interaction is that they're having." "I would love to frolic in this world ... It's frolic inducing"</p>	<p>Had to restart the experience due to tech issues</p>

<p>chibi</p>	<p>Yes</p>	<p>Quite familiar with VR; not fully abreast of current products but has a strong understanding of conceptual grounding and as part of mixed reality continuum of media. Has used VR to play games and in exhibition contexts.</p>	<p>Identifies that VR is "heavily marketed for gaming," due to the large market and potential profits.</p>	<p>"In terms of physicalisation, I'm still aware that I exist in a physical space restricted by things prior to entering the digital space."</p>	<p>There was a scale to each part of the drawing: heads, hands and feet had more scale and intensity.</p> <p>"I started from the centre... that's the centre of me generally."</p> <p>"The only part of myself I traced was my chest. There was no hesitation. And then I stepped back." After stepping back, she then completed the drawing by drawing in the air in front of herself.</p> <p>Drew hands as spiral shapes: "each point that's like a circle, I know something generally happens here. It's like my head interfaces with thinking, my hands interface with movement, my feet interface with the ground, my chest does this, the hips do that."</p> <p>"I left a digital impression in this digital space."</p>	<p>"Oh my god I look terrifying!" Laughed at seeing avatar in the mirror.</p> <p>Regarding where her centre is: "Maybe it's because my heartbeat is there."</p> <p>"I was conscious to connect my body parts with each other."</p>	<p>"It's like pulsating."</p> <p>"This is looking very candy-like, but I can imagine for anyone who maybe either doesn't know what raw meat looks like, might think like, oh my God, this is just a bunch of intestines."</p>	<p>"The movements can get overwhelming"</p> <p>Identified an acclimatisation process, especially regarding contact with digital entities: "The fear of phasing through things... I wouldn't even say fear, but it's more like you know, friction, the initial gut hesitation... I think once it clicks it's like, 'Oh!'"</p>	
<p>Bleep Bloop</p>	<p>Yes</p>	<p>Familiar with VR via similar user testing experiments, although more so in a health science setting. Has participated in a concussion treatment trial and simulated workplace training trial. Has also engaged with VR in an art exhibition setting but these are more likely to be passive rather than interactive.</p>	<p>Identified a strong interest in the emergent technology space and the use of VR for creative purposes, as well as cross-disciplinary applications.</p> <p>"I feel like there's a real space for art and health outcomes to be brought together through digital spaces."</p> <p>Has not played any VR games and is doesn't engage with video games generally.</p> <p>Identified that her experience with dance informs how she understands VR. "I'm very interested in how an embodied experience that sort of transcends or combines both, the physical and the digital, feels."</p>	<p>"I've been accustomed to going into VR experiences that are so like, kind of clinical, pared back... so it was nice, because this felt much more human and sort of conversational."</p> <p>"It reminds me of these dance exercises I've done, where it's sort of a guided improvisation in a way."</p> <p>"I liked in a way how bare bones the experience was, I felt like I had a lot of agency in it. Because there wasn't sort of like, a very elaborate world, or elements to kind of explore Whereas this was kind of like, here are the tools to create yourself, which yeah, very different."</p>	<p>Started drawing at stomach, drawing in a spiralling figure of eight from the hips up.</p> <p>"I feel like it has to be a continuous line but I'm realising it doesn't."</p> <p>"I'm going to go for extra [drawing] on the feet, for groundedness."</p>	<p>"To be honest I feel like my body wasn't really in there."</p> <p>When asked what was in there, if not their body:</p> <p>"Kind of this weird, like, non-being? In that like, it was only if I pulled a trigger or something that I felt like I had injected something o myself into there. Whereas before doing that, I just felt kind of like, formless, yeah. Just kind of like a floating invisible mass of myself that was there but not there."</p> <p>"I am just this strange mass floating in space."</p> <p>"Once I was like, okay, body stuff, I think I just really wanted to go into slow mode."</p>	<p>"Can I make it be still, or is it like, a very alive... it feels very alive!"</p> <p>"It definitely felt like they were this like, affronting force, throwing themselves at me like 'Hello! Hello!'"</p> <p>"Knowing they were depictions of other people's sort of beautiful bodies, yeah, that had sort of taken on this new sort of spirit energy... It made me feel like I wanted to kind of get to know them."</p> <p>"it was funny how sticky they were!"</p>	<p>"It's an attack!"</p> <p>"Maybe I just wanted processing time."</p> <p>Regarding contact and collision with other entities, identifying if there was a sense of discomfort or not: "More amusement I think, maybe the tiniest bit of annoyance or frustration... kind of just like when you want to bat away mosquitos, or like a clingy child, where it's like, just give me some space, like I love you, but chill out"</p>	<p>Did it sitting down due to tech issues</p>
<p>tangiblepursue</p>	<p>Yes; excluded from results presented here as this interview was conducted after thematic analysis and result analysis of first batch of interviews.</p>								
<p>popsiccle</p>	<p>Yes; excluded from results presented here as this interview was conducted after thematic analysis and result analysis of first batch of interviews</p>								
<p>Kanha</p>	<p>No.</p>								

participate in a full-length interview. Two participants contributed drawings and participated in full-length interviews after the first batch of interviews had already been transcribed and analysed, and are included in the list as drawing participants but are not included as part of the results.

C.4.1 Perceptions of VR beforehand

The participants had very varied levels of familiarity and comfort with using VR. Multiple participants were familiar with the concepts and technical facts of VR from working with related digital technologies, but only one person identified themselves as someone extensively familiar with the medium, both as a designer and user. Perceptions of what VR can be used for included video games, pornography, medical assistance, artistic applications, journalism, and social interventions. While many participants identified one or all these potential applications, many of them also referred to a sense of confusion or lack of clear idea of what the long-term utility of VR was, with a sense of it being “gimmicky” (The Gardener).

Two participants discussed a recent public VR experience shown as part of a historical museum exhibition based on ancient Egypt. One specifically critiqued the modelling and animation of a female guide character, describing how the large chest and detailed but physically-impossible jiggling animation made it feel as if the experience was aimed at teenage boys (DailyUnify, pseudonym chosen by researcher), while another identified the posing of this same character as particularly flirtatious (Chibi). While these two participants identified different aspects of this female character to discuss, both provided direct reflections on how objectification of a female character alienates a female participant in VR: there is a distinct sense that this character was made by a man for other men, with titillation as a key goal. These two discussions showed that some participants already engage critically with VR, specifically regarding depictions of gender in the medium.

The sense that VR is “not for me” was echoed by other participants, who described contemporary mainstream VR as a “metaverse crypto bro world” (xXs11m3rXx) and stated that “I think that a lot of those kinds of spaces are inherently unwelcoming for someone like me, because I’m left wing, I broadly present as a woman, I’m queer.... generally online spaces are not that welcoming to feminine voices” (xXs11m3rXx).

This participant gave an account of a friend who was harassed when viewing an online VR concert; using the proximity chat feature, other participants had crowded this person and made it impossible for her to hear the concert.

Another participant noted that the headset was difficult to size correctly. It reminded them of their experience using ill-fitting and large hardhats on worksites, which were bought in large sizes because it fits “everyone”, i.e. most men on site; even though they did not fit her.

It was clear that amongst the general perceptions of VR as an emergent technology, there were concerns regarding how the medium depicts and welcomes women in particular into experiences. There was a general sense that many VR experiences are currently designed “for” certain audiences, of which many of my participants felt excluded from.

C.4.2 Layering Physical and Virtual Spaces

While the interview questions did not contain a direct question regarding the design of the virtual space and its overlap with the physical room we were in, many participants commented on these facets of the experience. One participant discussed how awareness of being in a glass-walled room with unseen bystanders walking past (xXsl1m3rXx) impacted their sense of comfort when carrying out the activities in virtual reality.

When discussing this further with these participants, it became clear that the physical location of the VR experience was highly influential for their sense of the experience. Safety within the physical environment was both a conscious and subconscious influence throughout the experience, both on a basic physical level of concern for tripping or bumping, and on a larger level of awareness of vulnerability and scrutiny. Multiple participants discussed ways that the experience, if exhibited, could consider the “onboarding” process and consider the comfort of the participant if there is a wider audience. For example, xXsl1m3rXx noted that if it was an art experience in a gallery, “I would expect the person doing the drawing to be walled (off) somehow” (xXs11m3rXx). These discussions reveal how crucial the physical environment is to shaping the experience of VR, and how crucial that it be designed to enrich the virtual experience. At the very least, there is a need for close attention to removing any impediments that will work against the main experience when exhibiting publicly.

It also became clear that rather than VR offering an “escape” from the “real world”, it sensitises people to their presence in both worlds at once. This issue is particularly crucial to consider in a wider queer VR methodology, which recognises the liminality and layered nature of VR as a key property of

the medium. The dialogue between physical and virtual is what allows VR to achieve the larger goal of creating a critical utopia, a window into another world that speaks back to the physical environment it is located within.

Another key discussion that I had not anticipated was the value of the visual and spatial regime developed for this virtual experience. The deliberately non-realistic depiction was commented on by multiple participants (The Gardener, Pink Thorn, DailyUnify). DailyUnify wondered whether, if it were realistic, she would then be hyper-conscious of the weight and inconvenience of the headset and controllers and if it would feel like a “gaming thing” (DailyUnify). This suggests that in an unrealistic, abstract space like the Body Traces Archive, the headset and controllers become less incongruous and instead part of the digital world itself, showing the effectiveness of the strategy of anti- or non-relational visual languages.

Another participant raised concerns for what they described as the “ethical considerations of copying reality, or being too similar to reality” (Pink Thorn) and praised how this virtual experience instead was unmistakably digital:

This to me is a very like-almost like-a digital space that is being presented as a digital space, that isn't trying to be something else. The digital space should remain. You can see the grid in this piece, you can see the primary shapes that I think are more characteristic of the digital. (Pink Thorn)

The idea of the environment being a vacant, lobby-like location without a narrative was discussed with multiple participants (xXs1m3rXx, DailyUnify, Bleep Bloop, Pink Thorn). Rather than being populated with my own artwork, music, or a linear narrative for the participant to explore, the space instead asks the user to create and contribute. One participant describes the non-narrative structure as: “you are making yourself, then exploring other's images. Or you're exploring like, yourself? you're not slaying a dragon or exploring a forest” (xXs1m3rXx). Another participant described the experience as “bare bones” in a positive manner; they described how instead of an existing “elaborate world” to explore, the experience felt like “the tools to create yourself” (Bleep Bloop).

Both of these reflections show the success of the designerly approach taken with the Body Traces Archive: the intention was always for the meaning of the work to rest upon the contributions of each participant in the form of their traces, accumulating over time in the Archive.

This set of participants' feedback prompted significant reflection on the effectiveness of the queer methodology and strategies of craft. Primarily, it was evident that the non-representational visual and spatial languages of the Body Traces Archive were effective at evoking the feeling of being in another place or time. The crafting of this environment was centred on creating a set of relations between the participant and their own body, their body and the environment, their body and the bodies of others, rather than conveying a linear narrative. Focusing on designing the space to enable relations, proximities and forms of contact was a way to manifest the values of interdependent transformation and queerer forms digital relationality and sociality. This was recognised by participants as a particularly unconventional approach that caused a heightened sense of agency and reflection upon their embodied experience.

C.4.2.1 Evaluating Slime Aesthetics

The aesthetic development of the Body Traces Archive virtual environment drew heavily on the visual and aesthetic regimes of cyberfeminist artistic practices, as discussed in Chapter Five. The blobby drawing tool, intended to act as a kind of digital slime, turned out to very effectively convey its intended affect and associations for many of participants. Multiple participants commented that the pink drawing tubes looked gut-like or intestinal (Bleep Bloop, Chibi), but not overly "gore"-like (Chibi), not too "creepy" (DailyUnify) or "abject" (SecretElevator, pseudonym selected by researcher), although in bringing up these comparisons, participants have implicitly acknowledged the potential of such readings. The delicate balance of achieving a slimy viscera association without being overly disgusting was highly important to my own goals. Central to the cyberfeminist valuing of slime is the seductive potential, and how it creates an intermingled, paradoxical desire to touch and avoid.

The different words people used to describe the slime and sliminess of the experience in general are particularly reflective of the visceral impact it had for participants: "squelchiness" (DailyUnify), "gloobily", "goopiness", "writhing" (xXs1m3rXx), "blobby" (Pink Thorn), "squelchy", "pulsating", "candy-like", (Chibi), "blobby, globby, shimmery" (The Gardener), "grotesque and exposed" (Bleep Bloop), "viscera" (SecretElevator).

One participant linked the nature of the slime drawing material to the wider digital non-realism, specifically valuing the ambiguity present on all levels:

I think there's—this is non.... non-realistic, or it's not a defined thing. It's not like, anything... Or maybe it's a little

like something you would encounter in the world, but it's not a clear thing, where you can sort of say, oh it's a chair, it's a person, or it's an animal. Like you can't define it... which is maybe well aligned with the queer methodologies. Its form is ambiguous. Or undefinable. (The Gardener)

Another participant described this feeling as “fluidity” rather than ambiguity:

I also felt a sense of fluidity in the experience ... I think the warmth, or the fluidity really comes through with the paint that was chosen, that's almost a candy type of colour, and the thing glowing while moving through, also adds a sense of liveliness. (Pink Thorn)

This feedback shows that the strategy of utilising touch (specified in the practice-based approaches) upon the threshold of the skin (a specified property of VR), is highly effective at creating a sense of slippage, fluidity, ambiguity and intermingling. Furthermore, the use of slime as the specific manifestation of touch in the Body Traces Archive is an effective textural metaphor that resonates with participants. The slippage, fluidity, ambiguity and intermingling that the touchy, gooey slime creates is a core set of the qualities of a queer VR experience and works to manifest one of the values of queer development, via offering an alternative affective regime, which I will discuss at greater length later in this analysis.

C.4.3 Drawing Process

C.4.3.1 Origin Points When Beginning Their Trace

In the narration that guides the participant, they are asked to think of the main contact point between their physical body and the virtual world. They are instructed to use this as the starting point of their drawing. Out of the ten long-form interview participants, four started drawing at their hands, two started their drawing at their head, one started at their feet, and three started at a location in their torso: their heart, their chest, and their stomach.

Describing why they started at their hands, participants explained that it “felt right” (Starla), or “because it was holding the controller” (The Gardener). One participant described how the sensations of being in VR prompted their starting point:

[I thought to myself] “Oh I’m going to give myself really huge hands,” because I feel like I have huge hands right now. Because you were talking about an entry point into this space, and I was like okay well my hands are so powerful right now. And the rest of me sort of feels a little bit disembodied, and my hands are kind of the only thing I can feel. (The Gardener)

For the participant who started with their feet (Sonny), they explained that was where they felt grounded in space. For one of the participants who started with their chest (Chibi) they explained that this was where they felt their sense of life and continuing existence resided. For two participants who started that their head, one stated that it was because their brain was how they are interacting with the world (Pink Thorn), while the other felt that the headset was the entry point into the world (Shiro_Alien).

These different starting points, and how confident people were with this, begin to show how people understand their embodied presence in the virtual world: participants felt themselves to be entering VR at the locations on their body that could enact change within the environment (their hands), making it clear that agency and interactivity is a key factor in immersion. For others, their sense of their “starting point” in VR was much more concretely rooted in their ongoing sense of physicality, regardless of VR. With one of the key identified properties of VR being the skin as a surface threshold, these findings provide more specific nuance and reveal that how people experience that threshold upon the skin can vary greatly.

C.4.3.2 Drawing Styles

Each participant’s body trace can be viewed as either still images or in video compilation in Appendix A: A.3 Participant Body Traces Video and Stills.

After beginning their drawings at their feet, head, hands or chest, the majority stayed closely aligned with their general “real” physical form. Only one person verbalised an intent to be creative and inventive beyond their physical self, with Pink Thorn adding horns to their avatar. People more familiar with the project tended to draw with solid physical contact between the controllers and their body, with a wider range of approaches from those less familiar. Some hovered the controller a short distance from the body (Pink Thorn, The Gardener, Bleep Bloop, Starla) while others drew in the air in front of them (Chibi). When asked why they did not bring the controller into contact with themselves, they had a range of reasons, including an instinctive sense of comfort: “That would be uncomfortable, and I can’t explain why that would be a sensory no-no” (Starla).

One participant described a concern for the headset and controllers, saying during the drawing process that:

It's funny because I'm conscious that you've asked me to trace along my body, so I want to be touching my—the edge of my body, but I'm also cautious of not like knocking the headset or not knocking the controllers to myself. I feel like I'm drawing just as if I was standing in front of myself. (The Gardener)

When asked why she was concerned, she said with some laughter that “I don't want to hurt it?”. The experience of holding the controller against the skin or clothing was intended to disrupt normal configurations of controller use, and this participant was able to recognise that request while also recognising the not-entirely-logical but strongly felt sense of safety and care for the controllers that prevented her from following these instructions.

The range of drawing styles also revealed a range of approaches to understanding their presence in the virtual environment. For example, one participant deliberately chose not to draw their own feet as “I'm realising I don't really have any connection to my legs. like they do not exist. I think because I can't see them, I have no desire to draw them” (Shiro_Alien). This same participant drew their trace as a circular, rising pattern at arm's length around themselves, creating something similar to a cage around them. When asked why she didn't draw on her surface, she answered:

I think because I was not aware of my body, I couldn't see it. ... It was like a process. because I think I was aware that I didn't feel like I had a body anymore, so I had nothing to trace. But I think on some level I was still aware that I was.... kind of.... like... this....

She gestured in front of her, a kind of column; when I suggested that, she laughed and said, “Yeah I just felt like a column. So I just drew around the column.” The laughter was not incidental; it reflected the difficulty in describing what she had experienced.

Two other participants, in contrast to Shiro_Alien and her absent feet, described how drawing feet was a way to give themselves a sense of stability and balance. If we consider the previously discussed huge hands and absent feet, we see two participants who have used the drawing process to reflect and inscribe their felt experiences of self into the virtual environment. In comparison, the two participants who added feet were using this to alter their felt experience. For these participants, drawing feet was less a reflection of

a pre-existing reality—their physical feet standing on the ground—and more a gesture that enacted and brought about a sense of greater presence and stability within the virtual landscape.

The drawing activity and the discussion that ensued from it has clearly revealed significant insights into how users of VR make sense of their experience of self in a virtual environment. Furthermore, it shows how drawing upon the surface of the self is a particularly strong strategy for elucidating these discussions.

C.4.4 Sense of Self

Laughter and halting speech were not uncommon when trying to describe the bodily experience of being in VR and drawing upon themselves. There was a strong sense that people were trying to put into words something that resisted such translation. Overall, most participants reported a sense of heightened sensitivity and awareness of their own physical presence.

For some participants, the lack of visual representation to start with led to a feeling of disembodied presentness (Burrell & Chalmers Braithwaite, 2023) as described by Shiro_Alien regarding her invisible column of self. Participants were unsure of how to describe what seems like a contradictory experience. Another participant, who also felt that the lack of visual representation kept them from being fully embodied, said: “To be honest I feel like my body wasn’t really IN there” (Bleep Bloop). When questioned on what was there instead, she continued:

Well.... kind of this, weird, like, non... non-being? In that like, it was only if I pulled a trigger or something that I felt like I had injected something of myself into there. Whereas before doing that, I just felt kind of like, formless, yeah. just kind of like a floating invisible mass of myself that was there but not there. (Bleep Bloop)

For this participant, the inscription of self with drawing was a way to “inject” themselves into the space, even though they were already navigating and interacting with the virtual environment. This reflection reaffirms the identified property of VR as a performative medium, where actions, gestures, and activities create the reality at hand. Another participant spoke similarly, describing it as a process of “splitting” (Pink Thorn), and drawing parallels to shadow clones in the anime *Naruto*—the creation of a second self to occupy the virtual environment. They described the drawing and avatar as a representation of themselves, but not exactly something that they “owned” or “were”.

For one participant (Sonny), who is very experienced with VR and video games in general, having spent significant time in social virtual environments (not VR) such as *Second Life*, the drawing task challenged their existing thinking regarding the use of avatars. They stated that “in virtual spaces, I am actively against an accurate representation of myself” (Sonny) and that “I would always choose to be abstract, like on the low end, robot whatever, on the high end, something way more abstract or whatever” (Sonny). They explicitly link this to their extensive experience in online spaces over the years, describing how “maybe it’s even like an old internet thing as well, because if you asked me how I want to represent myself on the internet, the answer is anonymity, default, first time.”

They identified that the instructions of the drawing task were contrary to their usual choice when selecting an avatar, as they “wouldn’t ground it to my physical body”. For someone highly experienced in VR and comfortable in digital environments, it was notable that this VR experience still brought out a new perspective and encouraged a reflection on processes of identity and self within a digital environment. Sonny identified that the experience was successful in making them think about their body in a virtual space in a way that they haven’t before as a VR user, as “most [VR experiences] blur past that”. They commented that the experience is “considering a part of every VR experience, of which very few VR experiences make you consider, which is your physical representation”. This feedback, along with the in-depth reflections from other participants, showed that the drawing activity and its focus on the embodied self brings about a novel and reflective and experience for participants, achieving the overall goal of offering an alternative to pre-existing avatar systems of either transcendental disembodiment or mimetic reproduction.

C.4.5 Affective Experience During the Drawing Process

In conducting user testing, I wanted to see what kinds of affective experiences were coming forward for participants, and how comfortable or safe they felt with a range of feelings that were not necessarily always pleasant. I also wanted to identify moments of joy, pleasure and excitement that arose as part of the experience.

Throughout the VR experience, many participants made wordless exclamations like “Ooh!” “Oh-” or “Ah!”. While many participants put their emotional responses into words after an exclamation or when questioned later during

the interview portion, not all were able to specify the feeling precisely. Many participants laughed during the experience or our interview, and I also laughed or exclaimed when watching what they were doing. One participant recalled how: "There was a couple of times where I laughed and I couldn't tell myself whether it was nervous laughter because I was doing something that made me feel uncomfortable, or laughter because I thought it was funny" (xXs11m3rXx).

The widest range of responses from participants came from this questioning regarding the emotional qualities of the experience. Several participants described a sense of anxiety regarding the drawing experience, with concerns over the quality of their drawing and their skills in illustrating. Some participants, such as Shiro_Alien, entered the experience with trepidation and experienced a level of discomfort and stress throughout, whereas other participants such as Pink Thorn found the experience so calming that they described it as a "guided meditation". The participant who found parts of it quite overwhelming or unpleasant still found moments of pleasure, such as when she stood within her drawing like a cage of pink gloop around her and said "I feel like I'm being hugged. It's quite nice" (Shiro_Alien). Another reported that the drawing process felt "personal and intimate" (DailyUnify). This sense of intimacy and comfortable contact is a particularly helpful insight that shows a successful balancing of comfort and unfamiliarity.

One participant felt very directly positive throughout the entirety of the experience, describing it via the urges it brought forward for them: "I would love to frolic in this world. ... it's frolic inducing" (The Gardener). They specifically linked the activity of frolicking with carefreeness and joy and linked these to the interactions within the virtual space, describing the smooth drawing motion and haptic and auditory feedback as the elements that had caused this. The Gardener stated that "there's a satisfying kind of freeing feeling to be drawing with this kind of liquidy, gooey thing. That you can't-like you can't do that in reality."

The range of affective responses noted reveals the overall success of the VR experience in creating a sense of immersion, and in fostering an environment in which the strange, unusual embodiment experienced by participants is nevertheless interpreted as positive and expansive in nature compared to everyday physical reality. The qualities of queer VR identified in the methodology (feeling of being in another place and/or time, feeling "out-of-synch" or disoriented between the physical and virtual world, sense of immersion within the virtual environment, sense of embodiment that is flexible and malleable, sense of bodily disorientation or dislocation, sense of slippage

or fluidity, sense of ambiguity and intermingling) were present in varied amounts for all participants, and while participants felt differently about these emotive, affective aspects of the experience—some excited by the experiences of strangeness while others were more intimidated or cautious—the overall affective regime generated through the drawing process is well aligned with the goals and values of the methodology.

C.4.6 Archive Section: Asynchronous Sociality and Contact With Others

After the drawing section, participants were joined by a collection of other people's drawings (of which their own drawings would be a part for later participants). This is shown in Figure C-2. These drawings are small and motionless until touched, at which point they grow to full size, and then when shaken off, they fly around the environment with blobby animations and sound effects.

Every participant had a very strong sense that the other drawings were entities with some kind of life, personality or agency. This indicated the success of utilising back-end code as a strategy for worldbuilding and generating liveliness in the environment and shows that the value of challenging subject-object hierarchies has successfully been manifested, as the other participants' drawings were experienced as entities with their own will, agency and personality, as subjects in their own right, rather than simply objects for a participant to control.

Many participants reported a strong sense of chaos and liveliness, saying that “it feels very alive”, or like an “affronting force” (Bleep Bloop) although for this participant, this was not felt to be a negative or scary experience. Instead, she described how:

These things are coming at me fast, but they're not maliciously attacking, and also knowing they were depictions of other people's sort of beautiful bodies, yeah, that had sort of taken on this new sort of spirit energy. (...) It made it feel like I wanted to.... I don't know, kind of get to know them. (Bleep Bloop)

The range of feelings and reactions when colliding with other drawings has some parallels in the anecdote from one of the participants regarding their friend who was harassed in a public VR setting. I am conscious that while I want to challenge people with interactions and collisions with the other

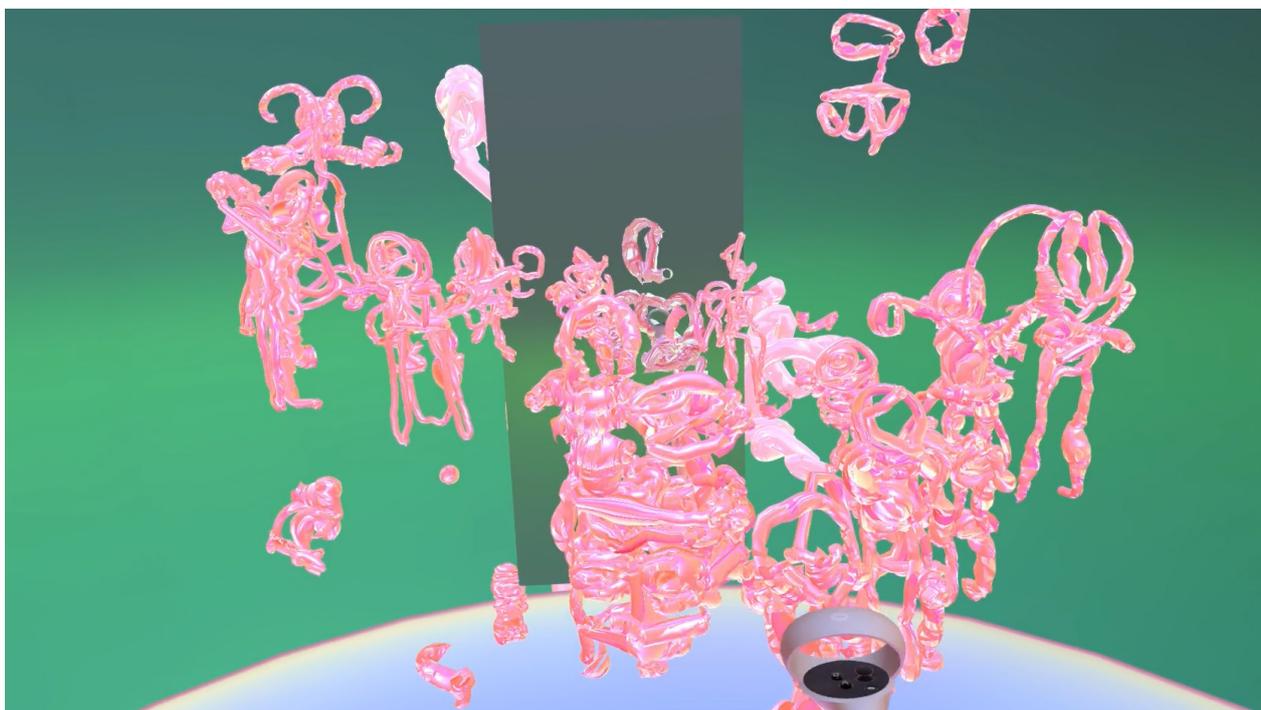


Figure C-2

Archive arrival from first person perspective

drawings, I do not want to be denying them the ability to set their own boundaries and assert their need for personal space. There is a need to navigate this boundary-crossing between bodies in an ethical manner, so as not to create potentially highly upsetting experiences of harassment. Potential solutions were discussed with a number of participants, especially those who wanted more space from the other drawings; they described how they would have liked to have a way to gesture to bring other drawings closer, or to gesture to create space. It was important in our discussions to acknowledge that there is a need to allow for a level of comfort and ability to assert personal boundaries that does not take away from the sense of liveliness or agency of the drawings, or indeed, the sense of intermingling and boundary-blending that occurs if participants are comfortable with interacting with other drawings.

C.4.7 Affective Experience During Archive Section

Everyone perceived encountering these entities as a form of physical contact, highlighting the effectiveness of using collisions and sound design to evoke the sensation of touch. However, people's perceptions and feelings about this touch within VR varied significantly. On one end of the spectrum, one user was highly disturbed by things colliding with them, describing it as a form of invasion, collision or attack. One participant described it by saying, "If I could think of an example in the physical world, it would be like someone just walking up to you and then just staring at you" (Shiro_Alien).

At the other end of the spectrum, a different participant described being surrounded by other drawings as being "like being cuddled" (Pink Thorn). Within this wide range, it was clear that for every participant the other drawings were entering a zone of intimacy with the participant, creating a feeling of vulnerability and connection. For the majority of participants, their experience fell somewhere in the middle, such as the observation that "it is a little bit freaky when things come at you" (DailyUnify) but without any particular negative feeling or concern for the experience.

When interacting with the other drawings, beyond the first reaction to collision or interaction, many participants reported a sense of fluctuation in their boundaries of self. Some described it as an "intermingling" with "a moment where you're not sure if it's you or it" (DailyUnify), as "distortions of personal space and boundaries, and sort of intersections of boundaries" (SecretElevator) or "merging with someone" (Starla). Another participant (xXsl1m3rXx) described touching and holding another drawing as a form of

“wielding”, as they felt that it was now immediately an extension of their arm.

This is a significant component of my methodology in terms of the values for queer VR development. The success of various crafting strategies—especially the focus on touch—in creating qualities of overlap, morphing and intermingling is highly valuable to have established from participants. One participant reflected on this by praising the lack of explanation and how it was left to interpretation, describing how they felt that “there’s some kind of comment here about them being a part of me, or sticking to me, or leaving some kind of trace on me” (The Gardener).

Overall, the range of affective responses throughout both the drawing section and archive section of the experience showed that the premise of queerness—that “Affect is a relational process, and affect is a crucial part of the phenomenological experience of queerness that influences how we are oriented”—has successfully come to fruition in the Body Traces Archive.

Through the relational process of contact with others and the environment, qualities of intermingling, fluidity, malleability, affect are generated for participants, which exist as part of an anti-normative affective regime that values the pleasure and generativity of these affects. While there are aspects of the experience that are ambiguous and surprising in a way that could be taken as confrontation and unpleasant, ultimately, it registers for participants as an expansive, alternative mode of being that re-orientes away from a normative engagement with the medium of VR. All of this contributes to an overall anti-normative, re-oriented, relational phenomenological experience that can be described as queer.

Appendices

*Appendix D:
Fractured and
Fragmented Selves
Journal Article*

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Fractured and fragmented selves: Queer approaches to designing virtual experiences^{1,2}

ABSTRACT

This article presents an overview of three queer virtual reality projects, Virtual Drag (2016), Domestika (2017) and Untitled (2020). These are considered alongside other examples and design experiments by the authors that also take a critical, queer approach to representing bodily forms in virtual environments. This consideration includes looking at how bodies are represented in the environment that the participant explores, as well as the embodied experience of the participant visiting the environment either via a head-mounted display or via desktop. Through the discussion of queerly performed embodiment offered by these precedents, we propose a queer sensibility of disembodied presentness for virtual reality that embraces a position of immersion and presentness in multiple physical and virtual realities at once, as a theoretical and aesthetic grounding principle. Queering of presentness is a key concept that emerges through these works, in part due to the multiplicity of perspectives that VR affords. In Virtual Drag (2016) by Alison Bennett, Megan Beckwith and Mark Payne, we see the use of photogrammetry and

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avatars
embodiment
presentness
queer theory
new media art
LGBTQIA+

1. This article is based on an initial idea presented at ANAT Multiplicity 2022, Melbourne, Australia.

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2. Andrew Burrell and Alexandra Chalmers Braithwaite are joint first authors.
3. Of particular note here is Meta/Facebook's foray into developing 'the Metaverse' during the COVID pandemic, a moment in time when it might have seemed that conditions were ripe for such a technology, yet consumers rejected the banal vision offered, with Meta quietly shifting away from their dedication to this space in early 2023.

glitch aesthetics to bring ideas of queer performativity and drag 'realness' to the fore when imaging bodies with permeable, porous boundaries in virtual reality. In Domestika (2017) by Jacolby Satterwhite, the virtual environment is populated with multiple avatars that repeat recordings of the artist's dance performances; in this multiplicity of repeated traces, a viewer is unable to settle on a fixed representation of the artist's self. This effect is amplified by the participant's non-corporeal presence, demonstrating the creative potential of queer disorientation in virtual environments. In Untitled (2020) by Tarik Ahlip and Tactical Space Lab, we are immersed in a cinematic environment, filled with simulated light. There, we encounter the artist's body, disembodied and forcing the viewer into the role of virtual voyeur and onlooker to actions out of time.

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